

Third generation alumina-on-alumina ceramic bearings in cementless total hip arthroplasty in patients 55 years and younger: A 10 year follow-up.

R Chana, S Tilley, M Facek, WL Walter, B Zicat, WK Walter [Sydney, Australia]

AIM

Alumina ceramic on ceramic bearings in total hip arthroplasty (THA) may reduce the prevalence of osteolysis due to its properties of low wear and chemical inertness. This is critical in the younger patient population as they place increased demands over a longer period. This study reports on the clinical and radiographic outcomes of a series of modern cementless ceramic on ceramic THA at a minimum of 10 years in this younger group.

METHOD

A series of 120 consecutive third generation ceramic cementless THA were performed at a single centre in 110 patients from 1997 to 1999. The average age of the patients at the time of surgery was 45 years (20 to 55 years). All procedures were carried out via the posterior approach using the same implant by the two senior authors.

RESULTS

At 10 years, 4 patients had died and 6 were lost to follow-up (5%). The mean Harris Hip Score was 94.7 points. All surviving implants analysed radiographically had evidence of stable bony ingrowth, with no cases of osteolysis. Wear rates were undetectable. There were 3 revisions (2.5%). One stem was revised following periprosthetic fracture, one stem was revised to facilitate a femoral shortening osteotomy. One cup was revised for anterior impingement causing psoas tendonitis. There was one incident of intraoperative ceramic liner chipping, which was changed without complication. There were no postoperative bearing fractures. Two patients reported intermittent squeaking at extreme hip flexion and internal rotation, the hips otherwise functioned well. The survival for both components with revision for any cause was 97.5%

CONCLUSION

Alumina ceramic on ceramic bearings in cementless primary THA in this series have resulted in good clinical and radiographic outcomes with low wear rates and excellent function in the demanding younger patient group at 10 years.

Presenter information: Rishi, Chana, Specialist Orthopaedic Group, Sydney, Australia,
rishi.chana1@bopenworld.com

The Use of Proximal Femoral Allograft in the Restoration of Bone Stock in the Revision Hip Surgery

B Rogers, S Garbedian, R Kuchinad, M MacDonald, D Backstein, O Safir, A Gross [Toronto, Canada]

Introduction

Revision hip arthroplasty with massive proximal femoral bone loss remains challenging. Whilst several surgical techniques have been described, few have reported long term supporting data. A proximal femoral allograft (PFA) may be used to reconstitute bone stock in the multiply revised femur with segmental bone loss of greater than 8 cm. This study reports the outcome of largest case series of PFA used in revision hip arthroplasty.

Methods

Data was prospectively collected from a consecutive series of 69 revision hip cases incorporating PFA and retrospective analyzed. Allografts of greater than 8 cm in length (average 14cm) implanted to replace deficient bone stock during revision hip surgery between 1984 and 2000 were included. The average age at surgery was 56 years (range 32 - 84) with a minimum follow up of 10 years and a mean of 15.8 years (range).

Results

From the original cohort four patients had died with the original PFA, 21 (30.4%) patients required further surgery with 14 (20.3%) of these needing revisions of the femoral component. The mean time to femoral revision was 9.5 years and Kaplan-Meier survivorship analysis demonstrates a 79.9% PFA survivorship at 20 years.

Discussion

Proximal femoral allograft affords long lasting reconstruction of the femoral component in revision hip surgery. We advocate PFA as an attractive option in the reconstruction of the hip in the presence of significant segmental bone loss in younger patients.

Presenter information: Benedict, Rogers, Mount Sinai Hospital, Toronto, Canada,
benedictrogers@hotmail.com

Reconstruction of Deficient Hip Abductors with Allograft after Total Hip Arthroplasty **B Rogers, R Kuchinad, S Garbedian, D Backstein, O Safir, A Gross [Toronto, Canada]**

Introduction

A deficient abductor mechanism leads to significant morbidity and few studies have been published describing methods for reconstruction or repair. This study reports the reconstruction of hip abductor deficiency using human allograft.

Methods

All patients were identified as having deficient abductor mechanisms following total hip arthroplasty through radiographic assessment, MRI, clinical examination and intra-operative exploration. All patients underwent hip abductor reconstruction using a variety of human allografts including proximal humeral, tensor fascia lata, quadriceps and patellar tendon.

The type of allograft reconstruction used was customized to each patient, all being attached to proximal femur, allograft bone adjacent to host bone, with cerclage wires. If a mid-substance muscle rupture was identified an allograft tendon to host tendon reconstruction was performed.

Results

Allograft reconstruction was performed in 15 patients over 18 months. One patient had an abductor deficiency after a primary total hip. All patients had an abductor lurch gait and positive Trendelenburg test preoperatively. Manual muscle strength testing showed significant weakness with a mean MRC grade of 3+/5. Peri-trochanteric pain was cited as a significant complaint in > 80 % of patients.

Proximal humeral allografts, with rotator cuff, were used in 8 patients, 5 had tensor fascia lata and the remainder had patella with attached tendon allograft. The majority of patients had a reduction in pain and 8/15 (53%) increased their abductor strength by almost a full grade. A reduced lurch was observed in 10 (66%) patients and one patient re-dislocated after a failed revision for instability.

Conclusion

To our knowledge, this is the largest reported series of allograft reconstruction for a deficient abductor mechanism following hip arthroplasty.

A viable solution is demonstrated, with promising early results for a difficult problem, utilizing a straightforward technique with low morbidity.

Presenter information: Benedict, Rogers, Mount Sinai Hospital, Toronto, Canada,
benedictrogers@hotmail.com

Subchondral plate removal and cemented acetabular cup lucency at five years: a prospective multi-centre study

M Hossain, D Beard, D Murray, G Andrew [Wrexham, United Kingdom; Oxford, United Kingdom]

Introduction: Acetabular cup lucency predicts cup survival. The relationship of subchondral plate removal and cup survival is unclear. Using data from a prospective study conducted between January 1999 and January 2002 we investigated the role of subchondral plate removal in cemented acetabular cup survival at five years.

Methods: A number of cemented cups were implanted using antero-lateral and posterior approaches. 1400 cups were inserted. 935 cups (67%) were followed up at 5 years and acetabular radiolucency (AR) recorded.

Results: F: M ratio was 1.88. The mean age was 66 (range 23-94). 325 cups had AR. AR was commonest in zone 1 (274). 126 cups has AR isolated to zone 1 only. AR ranged from 1-3 mm. Bone surface was clean and dry in 780 cases. High viscosity cement was used in 1391 cases. Simplex was the commonest cement used (749) followed by CMW1 (347). Conventional UHMWPE acetabular liner was used in 755 and "Duration" in 644 patients. 719 Exeter cups and 363 flanged cups were inserted. Acetabular roof was decorticated in 844 and cement pressurised in 1269 cups. AR was more common if cement was not pressurised (52/78 not pressurised vs 268/850 pressurised, $p=0.000$), if subchondral plate was removed (219/561, $p=0.002$), and if Simplex or CMW1 was used instead of Palacos ($p=0.000$). AR after subchondral plate removal was equally common in the young and the older patients (>65 years). There was no difference in cup ($p=0.55$) or pressuriser type ($p=0.45$) between those with or without AR. In a logistic regression model only cement pressurisation and type of cement used were predictive of AR ($n=895$, $p=0.000$). Subchondral bone removal became insignificant ($p=0.443$).

Discussion: AR was only affected by cement pressurisation and type of cement used. Subchondral plate removal did not prove likely to affect 5 year cup survival.

Presenter information: Munier, Hossain, Betsy Cadwaladr University Local Health Board, Wrexham, United Kingdom, munierh@doctors.org.uk

How important is improvement in range of motion following total hip arthroplasty?

M Hossain, D Beard, G Andrew [Bangor, United Kingdom; Oxford, United Kingdom]

Introduction: There is uncertainty about the relationship between improvement in range of motion (ROM) and functional outcome or patient satisfaction after total hip arthroplasty (THA). Using data from a prospective multi-centre study we investigated this relationship.

Methods: We recorded the Oxford Hip Score (OHS), Merle d'Aubigne and Postel score (MDA) and range of motion (ROM) preoperatively and at one and five years and a patient satisfaction questionnaire at five years. Complete 5 year data were available for 342 patients.

Results: Improvement in ROM between one and five years was significant but minimal ($p=0.005$, year 1: mean 191(0-280), year 5: mean 191(70-300). Both absolute ROM (year 1, $r=0.27$; year 5, $r=0.40$) and ROM gain ($r=0.45$, 0.59) had a significant linear correlation ($p=0.000$). ROM improvement and MDA gain at five years had the best association and predicted 34% of the variability of the model. Absolute and ROM gain both had a linear correlation with OHS gain ($p=0.001$), but their predictive value was poor. ROM gain predicted OHS gain better than absolute ROM (year 1, $r=0.22$ vs 0.10 ; year 5, $r=0.23$ vs 0.09). The strongest association was between ROM gain and OHS gain at 5 years that explained 5% of the variability. There was no difference in absolute or ROM gain between those who were satisfied and not with surgery.

Conclusion: There was minimal improvement in ROM after first year. ROM predicted surgeon reported assessment but not patient reported outcome. Relative gain predicted OHS improvement better than absolute ROM but did not affect patient satisfaction. It may be unnecessary to review patients in person to assess ROM after THA.

Presenter information: Munier, Hossain, Ysbyty Gwynedd, Bangor, United Kingdom,
munierh@doctors.org.uk

MEASURING CUP ORIENTATION: USING EBRA SOFTWARE UNDERESTIMATES SURGICAL ACCURACY

K Davda, N Smyth, AJ Hart, JP Cobb [London, United Kingdom]

Cup mal-orientation in metal on metal hip resurfacing (MoM HR) has been strongly associated with increased wear and pseudo tumour formation. Optimal cup orientation values to guide the surgeon have been reported, based on two dimensional analysis of radiographs using Ein-Bild-Roentgen-Analyse (EBRA) software. We aimed to quantify the reliability and accuracy of cup measurements on EBRA using three dimensional computed tomography (3D CT) as a control.

Low dose 3D CT scans and standardised antero posterior radiographs were obtained postoperatively for 31 MoM HR patients. Radiographic inclination and version were measured against the anterior pelvic plane, and, the number of hips within a 10° safe zone of 40° inclination and 20° version were calculated.

Intra class correlation was used to assess inter-observer reliability for each modality. Spearman's rank correlation, as well as Bland and Altman analysis of agreement was conducted.

Inter observer reliability was high for both EBRA and 3D CT measurements of inclination (0.97 vs 0.94) and version (0.99 vs 0.98).

There was a moderate correlation between modalities for version ($\rho = 0.72, p = 0.0001$) with a mean difference of -8° (limits of agreement 0 to -17°); the correlation was poorer for inclination ($\rho = 0.57, p = 0.0019$) with a difference of 1.6° (10° to -6.7°). The number of hips within the safe zone was 83% with 3D CT, but only 32% with EBRA ($p = 0.003$).

There is a wide difference in measurements of cup orientation when using EBRA compared to 3D CT. Error from EBRA may arise from the algorithm used to calculate cup orientation, and the difficulty of delineating the cup rim during version calculation. Safe zone scatter graphs based on EBRA values may be highly inaccurate for judging the performance of a device or surgeon. We do not advocate the use of EBRA software for measuring cup orientation in MoM HR.

Presenter information: Kinner, Davda, Imperial College, London, United Kingdom,
kdavda@gmail.com

Review of Patients At or Under the age of Fifty having Total Hip Replacement using Hydroxyapatite Ceramic Coated Hip Implants: A Clinical and Radiological Evaluation with up to Nineteen Year Follow-up
J Buchanan [Sunderland, United Kingdom]

Aims

Will Hydroxyapatite ceramic coated (HAC) arthroplasty perform well in patients under the age of fifty? The incidence of aseptic loosening and implant failure has been considered.

Younger, active patients are prone to aseptic loosening, wear or even fractures of the components of their replaced hips. Component wear might progress to Debris disease.

Methods

This is a study of 269 Hydroxyapatite ceramic coated (HAC) hip arthroplasties carried out in patients of, or under, the age of fifty with annual review using Harris Hip Score (HHS) and plain X-rays.

Assessments were over a maximum of 19 years with 90 hips still under review at 10 or more years. Early patients (46) had implants with ceramic/plastic bearings. Later patients (223) all had ceramic on ceramic bearings.

Results

HHS showed 90.3% scoring over 90 or 100. Lower scores mostly relate to other joint and medical problems.

Aseptic loosening and thigh pain has not been a problem. Osteolysis and debris disease have only been seen rarely in hips with ceramic on polythene bearings. Fractured alumina components have been encountered (6 heads and 3 acetabular liners, 2.1%). Ceramic /ceramic hips have otherwise remained successful. .

Wear in polythene liners developed in 21 patients followed up more than 15 years (45.7%). 3 have been revised. The others are currently asymptomatic.

Other complications include one post operative death and 14 dislocations (5.2%).

Conclusions

HAC hip arthroplasty in patients under the age of fifty does well. Hydroxyapatite bonding provides lasting implant/bone stability. No patients have thigh pain. Considering bearing surfaces, polythene will wear out and contribute to osteolysis and debris disease. Alumina bearings occasionally fracture. Zirconia Toughened Alumina has superseded Alumina which should reduce or eliminate the incidence of ceramic failure.

HAC hip arthroplasty with ceramic bearings is advocated for patients under the age of fifty.

Dislocation rates following total hip arthroplasty - A five-year analysis of English NHS patients

S Jameson, D Lees, P James, I Serrano-Pedraza, P Partington, S Muller, D Meek, M Reed [Middlesbrough, United Kingdom]

Background

Dislocation is a major complication following total hip arthroplasty (THA). Aetiology is multi-factorial, but increasing femoral head size may result in lower dislocation rates. The latest England and Wales National Joint Registry (NJR) annual report has highlighted a statistically significant increase in the use of femoral heads of size 36mm+ from 5% in 2005 to 26% in 2009, together with an increase in the use of the posterior approach. The aim of this study was to determine whether national dislocation rates have fallen over the same period.

Methods

Hospital episode statistics (HES) data for England was analysed so as to determine trends in national rates of 3-, 6-, 12- and 18-month dislocation rates following primary THA performed between 2005 and 2009 (247,546 THAs). 18-month revision rates were also examined.

Results

Significant decreases in cumulative dislocation rates were seen at each time interval (3-month: 1.117% (2005) to 0.863% (2009), $p < 0.001$, 6-month: 1.247% to 0.955%, $p < 0.001$, 12-month: 1.423% to 1.112%, $p < 0.001$, 18-month: 1.556% to 1.309% (2008), $p < 0.001$). 18-month revision rates did not significantly change (1.26% to 1.39%, OR=1.10, 0.98-1.24, $p=0.118$). An analysis of hemiarthroplasty patients over the same period showed no evidence of changes in the coding of dislocations.

Discussion

This data has revealed a significant reduction in dislocations associated with a rapid increase in the use of large femoral head sizes, despite an increase in the use of the posterior approach. 18-month revision rates remained unchanged.

Presenter information: Simon, Jameson, South Tees NHS Trust, Middlesbrough, United Kingdom, simonjameson@doctors.org.uk

A Randomised Study of CT Based Navigation versus Freehand Hip Resurfacing : An Analysis of Acetabular Component Orientation

K Davda, M Masjedi, AJ Hart, JP Cobb [London, United Kingdom]

Suboptimal functional outcome and implant survival in Metal on Metal hip resurfacing (MoM HR) have been associated with complications arising from acetabular component mal-orientation. We compared the accuracy of cup orientation in MoM HR performed by freehand to computed tomography (CT) based navigation.

In this ethically approved study, seventy five patients (81 hips) were randomised to either freehand (n=42) or CT based navigation (n=39). The groups were similar in distribution of age, gender and pattern of hip morphology. Surgery was conducted by two expert hip surgeons, with the aid of a preoperative three dimensional (3D) CT surgical plan, blind to the method of cup implantation until the day of operating. Post operative 3D CT analysis was performed to calculate the deviation in inclination and version, as well as, number of cups within a 10° safe zone and 5° optimal zone of the planned orientation. A Bland and Altman analysis for inter observer agreement was performed on 15 randomly chosen hips.

A high level of inter-observer agreement for CT measurements was demonstrated with a mean difference of -0.3° for inclination and 0.1° for version.

Deviation from the planned inclination was significantly reduced with navigation compared to freehand technique (4° vs 6°, p=0.02). We could not detect a difference between the two groups for errors in version (5° vs 7°, p=0.06). There was significantly greater number of hips within a 10° (87% vs 67%, p=0.04) and 5° (50% vs 20%, p=0.06) safe zone when navigated.

Image based navigation can substantially improve accuracy in cup orientation. The results of our freehand group appear better than published historic controls, suggesting the use of a 3D plan may help to reduce technical error. We strongly advocate the use of image based navigation in MoM hip resurfacing arthroplasty.

Presenter information: Kinner, Davda, Imperial College, London, United Kingdom,
kdavda@gmail.com

The rising financial burden of revision total hip arthroplasty: expense to the Trust versus compensation by the National Tariff

I Vanhegan, A Malik, P Jayakumar, S ul Islam, F Haddad [London, United Kingdom]

Introduction. The number of revision hip arthroplasty procedures is rising annually with over 7000 operations performed in the UK in 2009. These are expensive procedures due to pre-operative investigation, surgical implants and instrumentation, protracted hospital stay, and pharmacological costs. There is a paucity of robust literature on the costs associated with the common indications for this surgery.

Objective. We aim to quantify the cost of revision hip arthroplasty by indication and identify any short-fall in relation to the national tariff.

Methods. Clinical, demographic and economic data were obtained for 305 consecutive revision total hip replacements in 286 patients performed at a tertiary referral centre between 1998 and 2008. These operations were categorised by indication into: aseptic loosening, dislocation, deep infection and peri-prosthetic fracture. Clinical data included length of stay, operative time, estimated blood loss, prosthesis and instrumentation required. Financial data was collected on cost of implants, materials and augmentation utilised at time of surgery, operating room costs, recovery, inpatient stay, physiotherapy, occupational therapy, pharmacy, radiographs and laboratory studies. Statistical analysis was undertaken using the SPSS statistical package (SPSS Inc. Chicago, IL). Non-parametric bootstrap samples were used to obtain consistent 95% confidence intervals. Analysis of variance between groups was performed ($p < 0.05$).

Results. The mean total cost of revision surgery in aseptic cases ($n=194$) was £11897 +/- 4629, septic revision ($n=76$) £21937 +/- 10965, peri-prosthetic fractures ($n=24$) £18185 +/- 9124, and in dislocations ($n=11$) £10893 +/- 5476.

Conclusion. Revision procedures for deep infection and peri-prosthetic fracture were associated with longer operative time, increased blood loss and a higher number of complications compared with revisions for aseptic loosening. Total inpatient stay was also significantly greater $p < 0.001$. Our study shows that financial costs vary significantly between the different revision subtypes which is not reflected by current National Health Service tariff rates.

Presenter information: Ivor, Vanhegan, University College London Hospital, London, United Kingdom, ivanhegan@nhs.net

Does accuracy of reconstruction affect patient reported outcome after hip replacement?

D Barlow, G Andrew, S Badr, S-J Rhee, D Beard, D Murray [Bangor, United Kingdom; Exeter, United Kingdom]

We examined data from a large prospectively collected dataset which followed up patients after Exeter total hip replacement (THR) - the Exeter Primary Outcome Study. We studied 78 patients who had total hip replacement for osteoarthritis on a morphologically normal hip, and in whom the other hip was also morphologically normal for comparison. All selected patients had complete patient outcome data at 1 and 5 years, and x-rays at 1 year were available.

We measured accuracy of reconstruction on AP Pelvis radiographs. The parameters measured were difference in height of lesser trochanter from horizontal pelvic line (LLD); length from ASIS to greater trochanter (indicating abductor length, AL); length from symphysis to centre of femoral head (SFH); length from centre of head to axis of femur (offset). We examined clinical outcomes including gain of Oxford Hip Score (DOHS) at 1 and 5 years, absolute OHS at 1 and 5 years, and absolute SF-36 Physical Functioning and Role Physical scores at 1 and 5 years.

Examining the ratios of AL, SFH, Offset, Offset to SFH ratio and LLD between side of THR and unaffected side all showed marked variation. Thus the ratio of SFH varied from 0.85 to 1.11. For further analysis we divided the patients into 3 groups on the basis of variability of the ratio from 1; we examined whether the clinical scores above varied between these 3 groups. 1 way ANOVA demonstrated no significant difference for any of the clinical outcomes for any of the 5 grouped x-ray variables.

Accuracy of reconstruction has been shown to affect the risk of dislocation after THR. Our results indicate that clinical outcomes of total hip replacement appear resilient to some degree of surgical inaccuracy. Future trials of navigation should be designed to demonstrate not only improved accuracy but also improved clinical outcome.

Presenter information: David, Barlow, Ysbyty Gwynedd, Bangor, United Kingdom,
daveybarlow@hotmail.com

HIGH FAILURE RATES WITH A LARGE DIAMETER HYBRID METAL ON METAL TOTAL HIP REPLACEMENT: CLINICAL, RADIOLOGICAL AND RETRIEVAL ANALYSIS.

BJRF Bolland, DJ Culliford, DJ Langton, JPS Millington, NK Arden, JM Latham [Southampton, United Kingdom; Newcastle, United Kingdom]

Introduction: This study reports the mid-term results of a large bearing hybrid metal on metal total hip replacement (MOMHTHR) in 199 hips (185 patients) with mean follow up of 62 months. Clinical, radiological outcome, metal ion levels and retrieval analysis were performed.

Results: Seventeen patients (8.6%) had undergone revision, and a further fourteen are awaiting surgery (defined in combination as failures). Twenty one (68%) failures were females. All revisions and ten (71%) of those awaiting revision were symptomatic. Twenty four failures (86%) showed progressive radiological changes. Fourteen revision cases showed evidence of adverse reactions to metal debris (ARMD). The failure cohort had significantly higher whole blood cobalt ion levels ($p=0.001$), but no significant difference in cup size ($p=0.77$), inclination ($p=0.38$) or cup version ($p=0.12$) in comparison to the non revised cohort. Multifactorial analysis demonstrated isolated raised Co levels in the absence of either symptoms or XR changes was not predictive of failure ($p=0.675$). However both the presence of pain ($p<0.001$) and XR changes ($p<0.001$) in isolation were both significant predictors of failure. Wear analysis ($n=5$) demonstrated increased wear at the trunnion / head interface (mean out of roundness measurements of 34.5 microns ± 13.3 ($\pm 2SD$, normal range 8-10 microns) with normal levels of wear at the articulating surfaces. There was evidence of corrosion at the proximal and distal stem surfaces. The cumulative survival rate, with revision for any reason was 92.4% (95%CI: 87.4-95.4) at 5 years. Including those awaiting surgery, the revision rate would be 15.1% with cumulative survival at 5 years of 89.6% (95% CI: 83.9-93.4).

Conclusion: This MOMHTHR series has demonstrated unacceptable high failure rates with evidence of high wear at the head / trunnion interface and passive corrosion to the stem surface. This raises concern with the use of large heads on conventional 12/14 tapers.

Presenter information: Ben J R F, Bolland, Southampton General Hospital, Southampton University Hospital Trust, Southampton, United Kingdom, bbolland@btinternet.com

Aetiology of Hip Revision cases performed within the UK: Results from the National Joint Registry.

BJRF Bolland, SL Whitehouse, JR Howell, MJW Hubble, GA Gie, AJ Timperley [Exeter, United Kingdom]

Aims & Methods: This study utilised NJR primary hip data from the 6th Annual Report to determine the rate and indication for revision between cemented, uncemented, hybrid and resurfacing prosthetic groups. Regression analysis was performed to identify the influence of gender and age on revision rates. Prior to analysis, validity of data was explored by interrogating areas of misclassification within the dataset.

Results: We identified 6,034 misclassified episodes within the four groups, 97 of which were revisions. This corresponded to a misclassification rate of 2.7% by procedure type and 4.3% for revisions. Further analysis was performed using the "reclassified dataset". The 3 year Kaplan-Meier revision rates were 0.9% (95%CI: 0.8% - 1.0%) for cemented prostheses, 1.9% (95%CI: 1.8% - 2.0%) for uncemented, 1.2% (95%CI: 1.0% - 1.4%) for hybrids and 3.0%, (95%CI: 2.7% - 3.3%) for resurfacings. These differences were significant across all groups ($p < 0.001$). In patients < 55 years old the revision rate was again significantly lower for cemented compared to uncemented and resurfacing hips. Cox regression analysis indicated both prosthesis group and age significantly influenced failure ($p < 0.001$) and further confirmed uncemented ($RR = 2.2$), hybrid ($RR = 1.4$) and resurfacings ($RR = 3.2$) had a higher risk of revision than cemented arthroplasties. Revision for pain, aseptic loosening and malalignment were highest in uncemented and resurfaced hips. Revision for dislocation was highest in uncemented hips. The difference between groups for these indications were significantly different ($p < 0.001$). There was no significant difference in revision rates for lysis and infection between groups ($p = 0.57$, $p = 0.51$).

Discussion: Cemented prostheses continue to perform well with low revision rates both overall and for aseptic loosening. The importance of component positioning in hip resurfacing is further highlighted by high failure rates secondary to malalignment. Areas of misclassification within the NJR dataset have been reported back for future annual analysis.

Presenter information: Ben J R F, Bolland, Princess Elizabeth Orthopaedic Centre - Exeter, Exeter, United Kingdom, bbolland@btinternet.com

Fractures of the Exeter Femoral prosthesis: Incidence, Aetiology, and Factors predisposing to failure.

BJRF Bolland, JR Howell, MJW Hubble, AJ Timperley, GA Gie, RSM Ling [Exeter, United Kingdom]

Background: Since 1991 to 2008 approximately 800,000 Exeter stems have been sold worldwide with 80 reported cases of fracture (neck or stem). This study aimed to determine factors predisposing to fracture.

Method: Clinical, surgical, radiological and retrieval data was collated from Stryker Benoist-Girard and Exeter research databases. Risk factors associated with fracture were categorised to patient related (weight and activity levels), surgical related (poor medial support, component size, placement, offset) and anatomical / implant related.

Results: Data was available on 48 patients (24 stem, 24 neck fractures). Number of fractures per annum increased in proportion with sales. Mean patient age at fracture was similar for both neck and stem fractures (68yrs, 53-84; 66yrs, 41-89. $p=0.56$). 82% neck and 47% stem fractures occurred in males. Mean weight was 110kg (82-140) in neck and 91kg (70-126) in stem fractures with 11/16 neck and 11/13 stem fractures either obese or morbidly obese. Mean time to fracture was 80mths (36-144) for neck and 67mths (2-155) for stem fractures. 44#2 and 44#3 were the most common size associated with neck fractures. Stem fractures occurred more commonly (85%) in the smaller sizes (35.5 to 44#1). A + head was used in 9/16 neck and 1/9 stem fractures. Neck fractures were most commonly associated with patient (increased weight and activity) and implant related (use of a + head) factors. Stem fractures were most commonly associated with correctable surgical related causes predominantly secondary to stem undersizing or inadequate medial support.

Conclusion: Careful pre operative planning and templating is essential to identify those patients with pre-existing identifiable patient (weight, activity levels) and anatomical (proximal femoral canal morphology and offset) risk factors, to ensure appropriate stem selection, size (which may require a custom made implant) with meticulous placement and cementing technique in order to maximise fracture prevention.

Presenter information: Ben J R F, Bolland, Princess Elizabeth Orthopaedic Centre - Exeter, Exeter, United Kingdom, bbolland@btinternet.com

A prospective long term study of a cemented titanium (Ulitima) femoral stem
B Bloch, D Angadi, S Brown, E Crawford [Northampton, United Kingdom]

Method: 286 patients underwent total hip arthroplasty with a cemented titanium femoral implant (Ultima, Johnson & Johnson) between July 1995 and July 2001. The acetabular component was either a porous coated cup or a cemented all-polyethylene cup. A 28mm cobalt chromium head was used in all patients. Patients were prospectively evaluated with clinical examination, Harris hip scores and radiographic assessment. Analysis of the data was performed.

Results: Of the 286 patients, 11 patients were excluded from analysis for reasons including incomplete data (8) and death (3). The remaining 275 patients were comprised of 118 males and 157 females with an average age of 70.8 years (55-89 years). The average follow up was 10.5 years (1.03 - 14.23). The median follow up was 10 years. 177 cemented all-polyethylene and 98 porous coated acetabular cups were used. The average Harris hip scores were 34.4 and 81.25 for preoperative and last follow up visit respectively. 11 stems were revised (aseptic loosening-9, infection-2). Radiographic assessment showed vertical subsidence in 30 patients (10.9%) (>5mm in 6 and < 5mm in 24 patients). Complete cement-bone radiolucency was noted in 11 stems (4%). Radiolucent lines covering < 50% of cement-bone interface were noted in 18 stems (6.5%). There were no cases of cement fracture. Kaplan-Meier survivorship was 90.1% at 10 years.

Conclusions: This prospective study represents the largest reported cohort of patients with a cemented titanium alloy femoral stem. The stem design used in this study has a good long term clinical outcome. Radiographic loosening of these stems is similar to other studies in the current literature. However close monitoring is required to identify the clinically symptomatic patients after 10 years.

Presenter information: Benjamin, Bloch, Northampton General Hospital, Northampton, United Kingdom, benjamin.bloch@doctors.org.uk

The influence of Total Hip Arthroplasty metallurgy on migration: A RSA study.
S Mehmood, H Gill, D Murray, S Glyn-jones [OXFORD, United Kingdom]

Introduction:

Stem geometry is known to influence the outcome in THA; however it is unknown whether the material properties, stiffness in particular can influence the stem stability and outcome. The aim of this study was to measure the influence of stem material properties on micromotion and migration using Roentgen Stereophotogrammetric Analysis (RSA) system.

Methods:

41 patients were implanted with a collarless polished tapered (CPT) femoral stem (Zimmer, Warsaw, Indiana), which was made of either cobalt-chromium (CoCr) (n=21) or stainless steel (n=20). RSA was used to measure dynamically inducible micromotion (DIMM: difference in stem position in going from double-leg stance (DLS) to single leg stance (SLS)), prosthesis bending (difference in the head-tip distance when going from DLS to SLS), and mean migration of the head, tip and the cement restrictor. DIMM and bending were measured at 3 months, migration at 6, 12 and 24 months. All analyses were carried out using SPSS for windows (v.15.0.0, Chicago, IL, USA). Results were reported as mean $\pm$ 95% confidence interval (CI) and regarded as significant when $p < 0.05$.

Results:

Preliminary analysis showed that DIMM of head was significantly ($p = 0.02$) greater for CoCr ($0.97\text{mm} \pm 0.6\text{mm}$) than stainless steel ($0.27\text{mm} \pm 0.6\text{mm}$). The mean stem bending for CoCr was $0.08\text{mm} (\pm 0.06\text{mm})$ and for stainless steel $0.15\text{mm} (\pm 0.06\text{mm})$ ($p = 0.77$). Both implants heads migrated posteriorly, medially and distally. The mean subsidence for the cobalt-chromium and stainless steel stems was $1.02\text{mm} (\pm 0.19\text{mm})$ ($p < 0.001$) and $1.12\text{mm} (\pm 0.34\text{mm})$ ($p = 0.001$) ($p = 0.07$) at 24 months.

Conclusion:

Dynamically induced micromotion was greater for the stiffer stem, however there were no differences in terms of over all migration, indicating that survival (in terms of loosening) should be the similar for both stainless steel and CoCr versions of this implant.

Presenter information: Shahid, Mehmood, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, OXFORD, United Kingdom, drsmehmood@yahoo.com

Can GP's perform routine long-term follow-up of Total Hip Arthroplasties (THAs)?
M-C Nogaro, S Santhapuri, M Wijeratna, M Sood [Bedford, United Kingdom]

Background

It has been suggested that routine follow-up of primary THA patients could be performed by GPs in primary care, rather than by Orthopaedic Specialists. Essential radiographic follow-up would likely be based on radiographic reports, rather than on inspection of the radiographs themselves.

Aim

To look at the quality of these reports to determine their usefulness as a method of radiographic follow-up of THAs.

Methods

The immediate pre-revision AP radiograph of a consecutive series of 50 patients, who had undergone revision surgery in 2 hospitals over a 2 year period, were examined by a senior Orthopaedic Trainee, supervised by a Consultant with a revision THA practice, and compared to the Consultant radiologist report of the same radiograph.

Results

Comparison to previous radiographs, essential in assessing THAs, was only performed by Radiologists in 42% of cases. Fixation type (cemented/uncemented) was mentioned in only 2 cases and was correct in 1 case. With the femoral component, discrepancies were found in 38% of cases, 89% of which were due to under-reporting by the Radiologists. Findings not reported by the Radiologists included definite loosening of the prosthesis, including cement fracture (45% of cases missed) and lucency (72% cases missed). With the acetabular component, discrepancies were found in 50% of cases, 88% of which were due to under-reporting by the Radiologists. These related to cup migration, indicating definite loosening (17% cases missed) and significant liner wear (53% cases missed).

Discussion

The radiographs reviewed contained definite evidence of failure, being pre revision radiographs. Despite this, a significant amount of important information was lacking in the Radiologists' reports. This information would be vital in helping GPs to decide when referral for further assessment should be considered. We do not, therefore, feel that it is safe for THAs to be routinely followed-up by GPs using radiographic reports.

Presenter information: Marie-Caroline, Nogaro, Bedford Hospital NHS Trust, Bedford, United Kingdom, marie.nogaro02@imperial.ac.uk

Independent vascular risk factors predict perioperative mortality in lower limb arthroplasty surgery

S Jameson, A Bottle, P Aylin, M Reed, M Walters, K Lees, M Maze, R Sanders [London, United Kingdom]

Background

There is a lack of information on the independent preoperative predictors of perioperative mortality, including the influence of vascular risk factors. Previous studies have grouped variables under the umbrella term "ischaemic heart disease". In this study, we investigated the influence of vascular risk factors separately.

Methods

The Hospital Episode Statistics database was analyzed for elective admissions for total hip (THR) and total knee (TKR) replacements between 2004 and 2009. Independent preoperative predictors of perioperative outcome were identified from admission secondary diagnosis codes. Perioperative mortality was defined as 30-day in-hospital death. Logistic regression analysis was used to identify independent predictors of outcomes. Data was adjusted for age, social deprivation and Charlson co-morbidity score.

Results

591996 THRs and TKRs were performed in the study period. There were 1334 deaths within 30 days (0.23%). Independent vascular predictors of perioperative mortality were myocardial infarction (OR 20.93 (17.46 to 25.08)), stroke (OR 7.72 (6.09 to 9.78)), heart failure (OR 4.52 (3.75 to 5.45)), unstable angina (OR 3.6 (2.19 to 5.92)), atrial fibrillation (AF, OR 1.37 (1.16 to 1.61)), non-AF arrhythmia (OR 2 (1.34 to 2.98)), peripheral vascular disease (OR 1.63 (1.16 to 2.3)), and diabetes mellitus (1.35 (1.15 to 1.59)).

Discussion

Vascular risk factors predict perioperative mortality. Previous myocardial infarction carries 20x higher odds of mortality. These patients should be considered high risk in the perioperative period.

Presenter information: Simon, Jameson, Imperial College, London, United Kingdom,
simonjameson@doctors.org.uk

The dislocating hip in revision surgery - Can a dual mobility implant succeed where others have failed?

RG Middleton, NL Vasukutty, PS Young, EC Matthews, CE Uzoigwe, THA Minhas [Boston, United Kingdom]

Introduction: Postoperative dislocation is the commonest complication following revision total hip arthroplasty (THA) and, despite a pantheon of options available to the revision surgeon, still remains a challenge seeking a solution. A number of studies indicate that unconstrained Dual mobility acetabular implants (UDMAI's) may offer a solution in primary THA for preventing dislocation in patients with risk factors for instability. However, the use of UDMAI's in revision THA remains sparsely reported.

Methods: We retrospectively reviewed the clinical and radiographic outcome of 156 revision THA's with risk factors for instability that had been performed using the Spinissimus Dual Mobility implant. Indications for revision were aseptic loosening (n=113) recurrent instability (n=30), periprosthetic fracture (n=11) and sepsis (n=2). 118 patients had both femoral and acetabular components revised while 38 were restricted to acetabular component exchange. Cementless cups were used in 122 cases. Cups cemented within a reinforcing acetabular cage following bone grafting were used in 34 cases

Results: Mean age was 77 years (range 42-89) with mean follow-up of 36 months (range 12 to 60). There were five early single incident dislocations and one case which dislocated twice. Radiographic review has shown no evidence of acetabular component loosening. Four patients underwent re-revision for causes unrelated to failure of the UDMAI. The total postoperative dislocation rate at the end of follow-up was 3.8%

Discussion: In our series the use of an UDMAI in revision THA with risk factors for instability yielded a single incident dislocation rate of 3.8% and a recurrent dislocation rate of 0.6 %. These figures compare very favourably with other treatment strategies that have been advocated in the literature. In our hands the use of an UDMAI has considerably reduced the challenge of dislocation in revision THA's at risk of instability. However, longer term follow up is required.

Presenter information: Rory George, Middleton, Pilgrim Hospital, Boston, United Kingdom,
rorymiddleton@doctors.org.uk

Assessment of abduction brace efficacy following dislocated total hip arthroplasty

S Thomson, RJ Napier, NW Thompson [Derry, Ireland]

Introduction

Dislocation is one of the most common complications following total hip arthroplasty. The literature suggests a frequency of 1-3% for primary total hip replacement (THR) and 7-10% for revision procedures. No definitive treatment algorithm exists for their management, with some surgeons attempting to constrain hip motion with casting or bracing initially. The evidence for this practice is limited. The purpose of this study was to determine the current practice for managing THR dislocation within our unit, and to determine the effectiveness of abduction bracing.

Method

A retrospective case-note analysis was performed on all patients admitted with a dislocated THR between 01/01/08 and 31/12/10. Patients were categorised into three groups: first time dislocators, recurrent dislocators, or dislocation occurring following revision surgery. The following data was collected; time from original surgery, closed or open reduction, surgical approach, prescription of abduction brace post-operatively, and the number of subsequent dislocations. Any patients who underwent open reduction were excluded from the study.

Results

A total of 45 patients were included in the study. Of the first time dislocators, 57% treated with abduction brace re-dislocated, and 26% of patients treated without bracing re-dislocated. In the recurrent group 63% had been braced after their initial dislocation.

Conclusion

Based on this study the benefit of abduction braces is limited and patient compliance tends to be poor. The cost of these appliances is significant (£450/€525) and patients typically have a prolonged hospital stay for ordering and application. Our unit has subsequently discontinued the use of such braces. Goals to reducing THR dislocation remain; meticulous preoperative planning and patient selection, accurate component positioning with intraoperative stability testing, good soft tissue repair, and early patient education.

Presenter information: Stacey, Thomson, Altnagelvin Area Hospital, Derry, Ireland,
staceylthomson@hotmail.co.uk

Early revision of failed hip resurfacing to total hip arthroplasty rapidly relieves pain and improves function in the early post operative period

N Sandiford, S Muirhead-Allwood, JA Skinner [London, United Kingdom]

Introduction

Metal on metal hip resurfacing arthroplasty (MoM HR) has the highest revision rates according to the UK National Joint Registry. Revisions for lesions associated with soft tissue necrosis (pseudotumors) have been associated with poor outcomes. There is a relative paucity of information on early revision of painful HR prostheses. We present the results of a series of patients who underwent early revision of painful MoM HR procedures.

Methods

This prospective study involved a consecutive series of patients undergoing revision of HR to THA. The diagnoses leading to revision are discussed. Clinical and radiological assessments were performed pre operatively as well as 6 weeks, 12 months postoperatively and yearly thereafter. Pre and post operative Harris Hip Score, Oxford Hip Score and WOMAC scores were calculated. Patient satisfaction was assessed using a visual analogue scale.

Results

Revisions were performed for recurrent pain and effusion, infection and proximal femoral fractures. Both components were revised in 20 cases.

There were 12 male and 13 female patients with average time to revision of 34.4 and 26.4 months respectively. The mean follow up period was 12.7 months (3 to 31). All patients reported relief of pain and excellent satisfaction scores (9/10 compared to 2/ 10 pre- operatively). Two patients experienced stiffness up to three months post operatively. Pre operative Oxford, Harris and WOMAC hip scores were 39.1, 36.4 and 52.2 respectively. Mean post operative scores at last follow up were 17.4, 89.8 and 6.1 respectively ($p < 0.0001$ for each score).

All patients except those with femoral neck fractures had at least a small effusion

Conclusion

These results show that conversion of painful hip resurfacing prostheses to total hip arthroplasty is associated with improved function, pain relief and high levels of patient satisfaction.

Presenter information: Nemandra, Sandiford, The London Hip Unit, London, United Kingdom,
nemsandiford@hotmail.com

RDW is a strong independent predictor of mortality following hip fracture
U GARBHARRAN, S Chinthapalli, I Hopper, M George, F Dockery [LONDON, United Kingdom]

Background

Red cell distribution width (RDW), an automated measure of variability in red blood cell size on full blood count (FBC) results, has recently emerged as a strong independent predictor of mortality in large population studies as well as several disease states. We wanted to determine the prognostic value of RDW in patients following a hip fracture - a condition associated with high mortality, as this relationship has not been assessed to date.

Methods

We examined the relationship between admission RDW and all-cause mortality on 1-year follow-up, in consecutive hip fracture cases who presented between January 2007 and November 2009. Cox regression analysis adjusted for: baseline Haemoglobin (Hb), Mean Corpuscular Volume (MCV), Creatinine, age, gender, ASA grade, Charlson index, pre-morbid independence level, Mental Test Score (MTS), delay to surgery and post-operative cardio-respiratory complication.

Results

Of 577 consecutive patients there were 377 females, 199 males; median age 81.4y. Fifteen (3%) were lost to follow-up at 1-year but were coded as survivors and last follow-up date included, on Cox regression. One-year mortality was 23% overall. Unadjusted mortality was 12%, 15%, 29% and 35% in quartiles of increasing RDW. Along with age, gender, MTS, post-op cardiac or respiratory complication, Charlson and ASA score, RDW remained a significant independent predictor of mortality (adjusted hazard ratio (HR): 1.142, 95% CI: 1.032-1.263, $p=.01$) whereas Hb did not. We repeated analysis excluding those lost to follow-up which did not alter significance of any outcome. We performed a third analysis in non-anaemic patients ($n=464$): again RDW remained an independent predictor of mortality on multivariate analysis (HR: 1.201, 95%CI: 1.039-1.389, $p=.013$).

Conclusion

RDW, a widely-available parameter on full blood count, is a significant independent predictor of 1 year mortality following hip fracture, regardless of age, co-morbidity or anaemia status.

Presenter information: UPAASNA, GARBHARRAN, GUY'S & ST THOMAS' NHS FOUNDATION TRUST, LONDON, United Kingdom, upaasna17@gmail.com

Resurfacing arthroplasty in patients with femoral head defects- early results of the birmingham mid head resection arthroplasty
N Sandiford, S Muirhead-Allwood, J Skinner [London, United Kingdom]

Introduction

There is no consensus on the ideal management of young, active patients with disabling coxarthrosis. Within this group, patients with femoral head defects secondary to cysts or avascular necrosis pose particular challenges. Resurfacing arthroplasty is contraindicated and the results of traditional total hip arthroplasty are suboptimal in this group. The BMHR was designed to offer a bone conserving option for these patients. We report the outcome of this device in the short term.

Methods

This prospective study examines the clinical and radiological outcome of a consecutive series of patients treated with the BMHR arthroplasty. All patients had femoral head defects and disabling hip pain. Patients were reviewed pre operatively and then at 6 weeks, 12 weeks, and 1 year post operatively and then yearly. Oxford, Harris and WOMAC hip scores were calculated at each review. Radiological assessment was also performed at each follow up.

Results

Forty one patients were included (28 males, 13 females). Average age was 48.0 years (3.8 to 65.1 years). All patients participated in 2 or more sporting activities. Average follow up was 12 months (3-19). Pre and post operative OHS, HHS and WOMAC scores were 34, 46 and 42 and 18, 91 and 6 respectively ($p < 0.0001$ in all cases). There were no complaints of pain or reduced function at last follow up and there were no revisions or pending revisions up to last follow up. All components were well fixed radiographically.

Discussion

The BMHR arthroplasty has shown good early results in treatment of young, active patients with femoral head defects. It seems to offer a resurfacing option in this group with the inherent benefits of improved stability and while allowing preservation of femoral bone stock. There is also the potential for a technically less demanding future revision on the femoral side.

Presenter information: Nemandra, Sandiford, The London Hip Unit, London, United Kingdom,
nemsandiford@hotmail.com

Uncemented custom computer-assisted design and manufacture of hydroxyapatite-coated femoral components: survival at 10 to 17 years

N Sandiford, S Muirhead-Allwood, JA Skinner, J Hua, W Peter [London, United Kingdom]

Introduction

Optimal results from uncemented total hip arthroplasty (THA) requires the prosthesis to obtain initial stability, restoration of biomechanics, bone contact along the ingrowth surface and uniform stress transfer to the proximal femur. Anatomic variation within the population makes this difficult to reproduce in every patient. To achieve optimal fit and fill of the proximal femur, options are reshaping the canal or creating an implant which precisely fits the patient's anatomy. The former increases bone loss and risks weakening the supporting bone, creating areas of stress concentration or shielding. Computer assisted design-computer assisted manufacture (CAD-CAM) femoral components were designed to overcome these issues. We present the long term results of CAD-CAM femoral components used in primary THA.

Methods

This was a prospective study looking at a consecutive, single surgeon series of THA's. Patients were reviewed pre operatively then at 6 weeks, 3 and 12 months post operatively and then yearly. Clinical as well as radiological review was performed at each visit and Harris Hip Score (HHS), Oxford Hip Score (OHS) and Western Ontario McMaster's (WOMAC) scores were calculated. Kaplan-Meier survival analysis was performed.

Results

One hundred and eleven patients were included (53 men and 58 women). Their mean age was 46.2 years and mean follow-up was 13 years. Pre operative Oxford, Harris and WOMAC hip scores were 43.1, 42.4 and 57.0 respectively. Mean post operative scores at last follow up were 18.2, 90.3 and 11.9 respectively ($p < 0.0001$ for each score). There were no revisions for aseptic loosening. Worst-case survival at 13.2 years was 98.2%.

Conclusions

CAD CAM femoral components result in pain relief and functional improvement in the long term. These results are comparable with the best long term results for primary THA with any means of fixation.

Presenter information: Nemandra, Sandiford, The London Hip Unit, London, United Kingdom,
nemsandiford@hotmail.com

Uncemented computer-assisted design-computer-assisted manufacture femoral components in revision total hip replacement: a minimum follow-up of ten years
N Sandiford, S Muirhead-Allwood, JA Skinner, J Hua, W Peter [London, United Kingdom]

Introduction

The variability of the endosteal geometry after removal of the femoral component can make proximal fit difficult to achieve with an 'off the shelf' prosthesis. Whatever the anatomy of the proximal femur, it is important to achieve immediate stability, preserve bone stock and protect the femur from cortical defects which can lead to subsequent fracture. In revision Total Hip Arthroplasty (THA) this requires a large inventory of modular components. The use of custom computer-assisted design-computer-assisted manufacture (CAD-CAM) components negates this need. Little has been published on the use of custom-made components in revision THA. We report the results of a cohort of patients who underwent revision THA using CAD-CAM femoral components.

Methods

A prospective study was performed between 1991 and 1998. A consecutive series of patients who had revision THA using custom components were assessed clinically and radiologically. The design of the femoral components was governed by the existing femoral bone stock. Patients were reviewed pre operatively then at 6 weeks, 3months and 12 months postoperatively and then annually. Radiographs were assessed at each visit and Oxford, Harris and WOMAC hip scores were calculated

Results

One hundred and fifty eight patients were included (97 males, 61 females). Mean age was 63.1 years (34.6 to 85.9 years). Mean follow-up was 10.8 years (10 to 12).

The mean Oxford, Harris and Western Ontario and McMaster hip scores improved from 41.1, 44.2 and 52.4 pre-operatively to 18.2, 89.3 and 12.3, respectively ($p < 0.0001$ for each). Six patients required further surgery. Survival of the femoral component was 97% (95% confidence interval 94.5 to 99.7).

Conclusion

Custom CAD CAM femoral components provide pain relief and return to function when used in revision THA. These clinical results are comparable to previously published reports for revision THA using either cemented or uncemented components.

Presenter information: Nemandra, Sandiford, The London Hip Unit, London, United Kingdom,
nemsandiford@hotmail.com

Use of Pre-operative Magnetic Resonance Arthrography in Femoro-acetabular Impingement

D Banks, R Boden, R Mehan, M Fehily [Bolton, United Kingdom]

Background: Femoroacetabular impingement presents difficulties of diagnosis. No one imaging modality gives all of the necessary information, although magnetic resonance arthrography (MRA) has been recommended, with literature demonstrating a high sensitivity for labral tears and a poor correlation with chondral injury.

Methods: A prospective trial to investigate the sensitivity, specificity, accuracy and predictive value of MRA for diagnosis of labral tears and chondral defects. Over a 25-month period 69 hips undergoing hip arthroscopy were investigated with MRA prior to the definitive operative procedure. MRA findings were compared to the intraoperative findings.

Results: In the assessment of labral tears, MRA demonstrated a sensitivity of 81% with a specificity of 51% and an accuracy of 58%. Positive predictive value of MRA was 33% and negative predictive value 90%. For chondral defects MRA demonstrated a sensitivity of 17%, a specificity of 100% and accuracy of 55%. Positive predictive value of MRA was 100% and negative predictive value was 51%.

Conclusions: In what the authors believe to be the first study to explore both chondral injury and labral tears in a prospective manner and looking specifically at accuracy, it can be seen that the MRA has poor accuracy for both pathologies. We recommend a move away from MRA, which is an invasive procedure with associated risks. We recommend the use of computed tomography with three dimensional reconstruction to clearly identify the osseous pathology.

Presenter information: Daniel, Banks, Royal Bolton Hospital, Bolton, United Kingdom,
danielbabanks@doctors.org.uk

Ion Levels in Large Head Metal on Metal Total Hip Arthroplasty: A Comparison of Three Total Hip Systems

J Smith, P Railton, D Kinniburgh, P Faris, L David, D Marshall, B Burkart, J Powell [Calgary, Canada]

Purpose

To determine whether there is a difference in metal ion levels among three different metal-on-metal total hip systems: two monoblock large heads and one modular hip replacement system.

Methods

A group of 56 patients were recruited that had either undergone total hip replacement with a Birmingham resurfacing socket, the Durom resurfacing socket, or a Pinnacle metal-on-metal bearing surface. All patients recruited were at least one year following their surgery.

We reviewed every patient clinically, radiographically and biochemically. Blood was obtained for cobalt (Co) and chromium (Cr). All patients signed an informed consent and completed three questionnaires, The Western Ontario and McMaster Universities index, the Short Form 36 and UCLA activity score. Analysis was performed on the collected data to assess whether there were any other potential influence on the mean metal ion levels.

Results

The blood metal ion levels in the larger non modular acetabular sockets were significantly raised compared to the Pinnacle group. For Co, 1.95 µg/l and 2.70 µg/l in the Durom and Birmingham groups respectively compared to only 0.52 µg/l in the Pinnacle group ($P < 0.001$). Cr levels were the same in the two monoblock systems, 1.9 µg/l compared to the Pinnacle sockets 1.2 µg/l ($P < 0.001$).

There was no statistical difference between the groups in terms of anteversion and abduction angles, although the Pinnacle group showed overall higher values. There was also a smaller spread this group in terms of range of angles. There was also no relationship between these values and the metal ion levels.

Discussion

We have demonstrated that clinical performance of an implant does not necessarily match predicted ion levels. We believe that it may be the choice of implant that determines overall metal ion levels rather than head size or position following metal on metal total hip arthroplasty.

Presenter information: James, Smith, University of Calgary, Calgary, Canada,
jamesmith@doctors.net.uk

Triple Tapered Polished Cemented stem: The C-Stem in total hip arthroplasty with a minimum follow-up of 10 years.

B Purbach, BM Wroblewski, PD Siney, PA Fleming, PR Kay [Wigan, United Kingdom]

The C-Stem in its design as a triple tapered stem, is the logical development of the original Charnley flat-back polished stem. The concept, design and the surgical technique cater for a limited slip of the stem within the cement mantle transferring the load more proximally.

Five thousand two hundred and thirty three primary procedures using a C-stem have been carried out since 1993. We reviewed all 621 cases that had their total hip arthroplasty before 1998.

Sixty nine patients (70 hips) had died and 101 hips had not reached a ten-year clinical and radiological follow-up and had not been revised. Thirty-two hips had been revised before 10 years, none were revised for aseptic stem loosening. The indications for revision were Infection in 4, dislocation in 3, aseptic cup loosening in 24 and unexplained pain in 1.

The remaining 418 hips had a mean follow-up of 12 years (range 10 - 15 years). There were 216 women and 173 men, and 34 patients had bilateral LFAs. The patients' mean age at surgery was 53 years (range 16 - 83 years). Thirty four hips had been revised at the time of review. The reasons for revision were infection in 5, dislocation in 2, aseptic cup loosening in 24 and 1 for neuralgia paraesthetica where the stem was well fixed. Two hips were revised for stem fracture.

There were no revisions for stem loosening but 2 stems were revised for fracture - both with a defective cement mantle proximally.

The clinical results are very encouraging and they support the concept of the Charnley cemented low friction arthroplasty, but place a demand on the understanding of the technique and its execution at surgery.

Presenter information: Bodo, Purbach, The John Charnley Research Institute, Wigan, United Kingdom, bodo.purbach@wwl.nhs.uk

Outcomes of total hip arthroplasty in the octogenarian population with a minimum 5 year follow-up

JW Kennedy, L Johnston, L Cochrane, PJ Boscainos [Dundee, United Kingdom]

Although total hip arthroplasty (THA) has been shown to be a cost-effective means of treating patients with hip arthritis, there is some ambiguity within the literature as to its success in those over 80 years of age. With the rapid expansion of this population group and an estimated 40% rise in THA figures in the UK expected by 2026, this study aims to review the results of primary THA in the octogenarian population. A series of 510 consecutive cases was obtained from the local Arthroplasty Audit Group database, consisting of all patients over 80 years of age who underwent primary THA between 1994 and 2004. A control group of 3405 individuals under the age of 80 years was also established using the same database and inclusion criteria. Pain scores were comparable 5 years post-operatively in both groups ($P=0.479$); in particular 81.5% of octogenarians and 80.2% of the control noted no pain. The mean Harris Hip Function and Score were lower by 5.9 and 5.4 points, respectively, in the octogenarian group over this period ($P<0.001$ in both cases). The median hospital stay was 3 days longer in the elderly population (12 *cf* 9, $P<0.001$). More complications occurred in the octogenarian group (38.1% *cf* 28.7% of controls, $P<0.001$) however fewer cases of revision were noted (1.4% *cf* 3.8%, $P=0.005$). Survival time to revision was comparable in both groups (mean 16.4 years in control *cf* 14.3 years in octogenarian, $P=0.17$). Patient satisfaction was also similar (97.8% in octogenarians and 98.1% in controls, $P=0.741$). These figures suggest that although individuals over 80 years of age might not obtain equal functional outcomes compared to younger patients and are more prone to complications, the pain, satisfaction and low revision ratings are sufficient to justify this procedure. Patients should be made aware of the potential short-comings, however.

Presenter information: John W., Kennedy, University of Dundee, Dundee, United Kingdom,
kennedy_sdmf@hotmail.com

Revision Total Hip Arthroplasty with an uncemented, modular femoral prosthesis - Early to Mid-term results

D Matthews, J Bhamra, A Gupta, V Ranawat, J Miles, J Skinner, R Carrington [London, United Kingdom]

Aims

Revision total hip arthroplasty is a common operation. The MP Link (Waldemar Link, Hamburg, Germany) system is a distally loading, modular, tapered femoral stem component for revision hip surgery. MP Link in revision total hip arthroplasty was investigated clinically, radiologically and with Oxford hip scores.

Methods

A prospective study was conducted of 50 patients undergoing revision total hip arthroplasty with MP Link prostheses between 2004 and 2010. The patients were operated by one of the senior authors (JM, JS, RC).

Results

Of the 50 patients, 23 were males. The mean age at surgery was 70.88 years (range 37-97 years). The mean follow up was 33.1 months (range 10-61 months). Indications for revision surgery ranged from aseptic loosening in 38 patients (75.4%), infection in 8 (15.1%), periprosthetic fractures in 3 (7.5%) and recurrent dislocations in 1 (2%). None of the patients were lost to follow up. 4 patients died with asymptomatic, well-fixed stems. 2 patients requested to have their follow up referred to their local hospital after 6 and 28 months respectively. The average Birmingham hip score following the revision surgery was 35/48. 100% of the patients had osteointegration of the stem and there were no cases of loosening or osteolysis. One hip became re-infected and underwent a further revision surgery.

Discussion

The early to mid term results of the uncemented, modular femoral MP link prosthesis are encouraging in complex revision total hip arthroplasty. Long term results are awaited.

Presenter information: Douglas, Matthews, The Royal National Orthopaedic Hospital, London, United Kingdom, douglasmatthews@doctors.org.uk

Does the alignment of the femoral stem affect patient functional outcome following primary total hip replacement?

RJ Holleyman, PD Gikas, P Tyler, P Coward, R Carrington, J Skinner, T Briggs, J Miles [London, United Kingdom]

Background: It is known that excessive varus alignment of the femoral stem in total hip replacement (THR) creates a sub-optimal biomechanical environment which is associated with increased rates of revision surgery and component wear. Little is known regarding the effect of femoral stem alignment on patient functional outcome.

Methods: Retrospective study of primary THR patients at the RNOH. Alignment of the femoral stem component in-situ was measured subjectively by a consultant musculoskeletal radiologist in both coronal and sagittal planes using post-operative anterior-posterior and lateral pelvic radiographs. Each THR was grouped into valgus, minor-valgus, neutral, minor-varus or varus coronal plane alignment and posterior, minor-posterior, neutral, minor-anterior or anterior sagittal plane alignment. Patient reported functional outcome was assessed by Oxford Hip Score (OHS) and WOMAC questionnaires. Data analysed using a linear regression model.

Results: 90 THRs were studied in 87 patients (55 Female). Mean age at THR=62 (22-86). Mean follow-up=17 months (11-39 months). Median OHS=16, WOMAC=8. Coronal plane alignment of the femoral stem was not associated with any change in OHS ($p>0.05$) or WOMAC score ($p>0.05$). Sagittal plane alignment of the femoral stem was not associated with any change in OHS ($p>0.05$) or WOMAC score ($p>0.05$).

Conclusion: Although it is known that alignment of the femoral stem on sagittal and coronal planes has a direct effect on survivorship of the prosthesis, our study does not demonstrate any relationship between femoral stem alignment and functional outcome in patients undergoing primary THR.

Presenter information: Richard, James, Holleyman, Royal National Orthopaedic Hospital, Stanmore, London, United Kingdom, r.holleyman@googlegmail.com

Large diameter Metal-On-Metal articulation Total Hip Replacement versus 28mm Metal-On-Polyethylene - is there a functional difference at 5 yrs?

AR Pearce, M Price, JE Higgins, KS Conn, GJ Stranks, JM Britton [Basingstoke, United Kingdom]

Introduction

Large head total hip replacement (THR) has been shown to reduce dislocation rates and give a larger theoretical range of motion. We hypothesised that this would translate into greater improvement in functional scores when compared to 28mm metal-on-polyethylene THR at 5 years.

Methods

A multi-surgeon case control study in a district general hospital. The study group consisted of 427 patients with 452 hips of a new design 38mm uncemented metal-on-metal articulation THR (M2A/Bi-metric, Biomet UK). The control group consisted of 438 age and sex matched patients with 460 28mm metal-on-polyethylene articulation THR (Exeter/Exeter or Exeter/Duraloc - Stryker UK), from our local joint registry database. All patients were assessed in a physiotherapist led Joint Review Service as part of their standard follow up, with functional scoring using Oxford Hip (scored 0-48) and WOMAC scores (0-100).

Results

The demographics for the 38mm and 28mm groups gave mean ages of 65.8 years and 66.4 years, 40.4% and 39.3% male respectively. Pre-operative function scores were comparable with Oxford Hip scores of 23.3 and 26.8 respectively, WOMAC 49 compared to 53. At each review point there was no statistical difference in either Oxford or WOMAC scores and this was sustained at 5 yrs ($p = 0.070$ delta Oxford, $p = 0.076$ delta WOMAC). Dislocation rates in the 38mm group were lower (2.9% vs. 5%) though not statistically significant ($p = 0.111$). Revision rates between the groups were comparable (3.3% vs. 2.0%, $p = 0.951$) with the difference due to ALVAL (1.5%).

Conclusions

There is no functional difference between 38mm Metal-on-Metal THR and 28mm Metal-on-polyethylene THR at five years. Dislocation rates were found to be lower in the 38mm THRs as would be expected, but this was not statistically significant. The difference in revision rates was found to be due to metal-on-metal allergic reactions (ALVAL).

Presenter information: Andrea R, Pearce, Basingstoke and North Hampshire NHS Trust, Basingstoke, United Kingdom, lochinvar27@hotmail.com

A Randomised Controlled Trial of The Topical Tranexamic acid in Total Hip Replacement.
S Alshryda, P Sharda, M Vaghela, A Nargol, C Tulloch, S Tang, C Nick, R Logishetty, L Mc Partlin, J Mason
[Middlesbrough, United Kingdom]

Introduction:

Blood loss is common after joint replacement. Literatures shows that about 30% of patients need blood transfusion after joint replacement. In this study, the effect of topical TXA on blood loss in total hip replacement (THR) was investigated in a randomised controlled trial

Design:

A double blind randomised controlled trial of 157 patients who underwent unilateral primary THR. This number gives a 90% power to detect a 50% reduction in blood loss and 80% power to detect a reduction in blood transfusion from 30% to 10%. Seventy eight patients were randomly allocated to receive Tranexamic acid and the rest to receive a Placebo. A postoperative protocol was introduced to standardise drain removal, timing of blood test, DVT prophylaxis and blood transfusion trigger.

OUTCOME MEASURES:

Primary outcome:

- Blood transfusion required (number of patients needed blood transfusion and number of units of blood transfused until patient is discharged).

Secondary outcomes:

- The visible drain blood loss (First 48 hour).
- Haemoglobin and Haematocrit drops (On day 2 postoperatively).
- General quality of life measure (EUROQOL) preoperative and at 3 months postoperative.
- Oxford hip score preoperative and at 3 months postoperative.
- Length of stay.
- Cost effectiveness analysis.
- Complications as per protocol definitions.

Results

There was a significant difference in the amount of blood loss and blood transfusion rate in favour of TXA. Twenty four patients out of 79 who received a placebo needed blood transfusion versus 7 out of 78 who received TXA (Chi Square $P=0.005$). The mean blood loss in the placebo group was 380 ml versus 265 (95% CI: 35.7 to 195.8 ml; $P=0.005$). Length of stay was not statistically different between the two groups. There was no significant difference other outcomes.

Presenter information: Sattar, Alshryda, The James Cook University Hospital, Middlesbrough, United Kingdom, sattar26@doctors.org.uk

Low Metal Ion Release in Patients at up to 8 years following Titanium Niobium Nitride (TiNbN) surface treated Metal-on-Metal Hip Arthroplasty.
D Woodnutt, K Hamelynck [Swansea, United Kingdom]

This study examined whether TiNbN surface characteristics can reduce corrosion and wear of Chrome Cobalt Molybdenum Metal-on-Metal bearings.

Two series of patients had plasma concentrations of chromium and cobalt at intervals following surgery. The First Series comprised a retrospective analysis of 52 consecutive cases (49 patients, 73-96, Ø85, months; age: 33-78, Ø57) who had undergone an ACCIS (Implantcast, Germany) Modular Large Head hip replacement. The Second Series comprised a prospective, consecutive series of 125 cases (109 patients, 1-61, Ø30, months following operation; age at surgery: 24-75, Ø54) who had undergone an ACCIS Resurfacing Hip Replacement in whom pre-operative samples and periodic post-operative metal ion analysis was obtained. Cup inclination and anteversion angles, patient outcome and Harris hip scores at last follow-up were also recorded.

The first series revealed medians for [Cr] of 1.2 (range < 0.5-2.4) µg/l and [Co] of 3.3 (range < 0.15-8.18) µg/l. Four patients were not available for measurement. The second series gave one year [Cr] of 0.8 (range < 0.5-1.6) µg/l and [Co] of 0.2 (range < 0.15-0.9) µg/l and at two years [Cr] of 0.2 (range < 0.5-1.5) µg/l and [Co] of 0.8 (range < 0.15-1.0) µg/l. There was no correlation with cup inclination (38° to 62°) or anteversion (0° to 32°) in either group. Mean Harris Hip Scores were 80.9 and 92.3 respectively.

Low median levels of metal ions were found in the First Series (despite differing stem type usage). The low median ion levels were more consistent in the Resurfacing patients of the Second Series. The Titanium Niobium Nitride Ceramic Surface Engineering Metal-on-Metal bearing implants appear to protect against raised plasma [Cr] and [Co] both over time and with outlying cup positions. The Harris Hip Scores suggest a good patient outcome for the hip replacements in both series.

Presenter information: David, Woodnutt, Morriston Hospital, Swansea, Swansea, United Kingdom,
dave.woodnutt@virgin.net

Management of Hip Instability with a Cemented, Constrained Acetabular Component.
M Moran, J Bakker-Dyos [Edinburgh, United Kingdom]

Introduction. Dislocation is one the commonest major post-operative complications following THR and managing dislocation risk following Primary and Revision THR has many strategies. Concerns with constrained acetabular components include early aseptic loosening, increased wear, impingement and component dissociation. The aim of this study was to review the indications, survivorship and clinical outcome of cemented constrained components in our institution.

Methods. Between 2000 and 2008, 100 patients underwent implantation of 101 cemented constrained acetabular components. Patient notes and radiographs were reviewed and an Oxford Hip Score and SF-12 questionnaire completed. Pre and Post-operative mobility and co-morbidities were recorded.

Results. The mean age at surgery was 76 (range 48 to 95). The mean follow-up was 3.1 years (range 1.0 to 7.9 years). 35 patients had died and 9 patients were lost to follow up during the study period. The outcome of the prosthesis was known in all patients who had died. 80% of patients were classified as Charnley class C (Co-morbidity Index). Three cemented components failed at a mean 2.8 years after surgery. No further components were radiographically loose. The mean OHS was 33 and SF-12 34/52 (Physical/Mental Component Scores). 61 patients underwent surgery for recurrent dislocation (mean 4 dislocations, range 1 to 10) and 39 for potential instability (Abductor loss due to tumour, periprosthetic fracture or infection; dementia). Constrained Acetabular component survivorship at 5 years is 95.3% (95% CI 0.89:1.0); Worse case survivorship at 5 years is 85.1% (95% CI 0.76:0.95).

Discussion. A cemented constrained acetabular component protects against hip instability with a low rate of failure in the medium term. Functional outcome, measured by the Oxford Hip Score, was similar to those reported for revision hip arthroplasty. All 3 failures could be attributed to technical problems at the time of surgery. Further follow up is required in the long term.

Presenter information: Matthew, Moran, Royal Infirmary, Edinburgh, Edinburgh, United Kingdom,
matt.moran@ukgateway.net

early results of treatment of adverse reaction to metal debris

P Mereddy, RP Sidaginamale, JN Gandhi, D Langton, R Logishetty, N Cooke, A Nargol [Stockton on Tees, United Kingdom]

Introduction: Adverse reaction to metal debris (ARMD) is an increasingly recognised complication of metal-on-metal hip arthroplasty. A previous study described poor results following revision and recommended early intervention¹. We determined the outcome of revision for ARMD and present the largest case series to date.

Methods: Between 2005 and 2010, 98 patients (101 hips) underwent revision for ARMD. The diagnosis of ARMD was based on clinical history, examination, appearance at revision and histology. Patients were reviewed at 3, 6 and 12 months and annually thereafter. Patient satisfaction, Harris hip scores (HHS) and metal ions were analysed.

Results: 54 patients (55 hips) with an average age of 58 years (29 to 81 years) completed minimum one year follow-up (range 1 to 5 years). The mean HHS improved from 49.7 (10 to 79) to 86.3 (40 to 100). Forty-five (81%) patients were satisfied and nine (16%) patients were not satisfied with the outcome. The mean serum cobalt 24.5 (1.65 to 96.6) improved to 1.17 (0.31 to 6.99). Two patients died from unrelated diseases. There were 8 (14%) dislocations and one (1.8%) sciatic nerve palsy that has not recovered. Eight (14%) patients needed re-revision (dislocation: 5 and pain: 3). 26 % had severe soft tissue damage. Six patients have persistent pain and four had recurrent effusions. There were no dislocations in the most recent 50 cases.

Discussion: Treatment of ARMD is technically demanding because extensive soft tissue damage can compromise stability. Early results in the current study were promising. Early intervention reduced the dislocation rate and appeared to have a positive impact on outcome. A small group of patients may have persistent pain and recurrent effusions that may require re-revision.

Reference: 1) Grammatopoulos et al. Hip resurfacings revised for inflammatory pseudotumour have a poor outcome. JBJS (Br) 2009; 91-B: 1019-24.

Presenter information: Praveen, Mereddy, University Hospital of North Tees, Stockton on Tees, United Kingdom, mpkr3@yahoo.com

Ceramic-on-ceramic versus metal-on-polyethylene bearing surfaces in the ABG II total hip arthroplasty - 4-10 year results of a randomised controlled trial

S Dawson-Bowling, D Yeoh, H Edwards, D East, N Ellens, K Miles, PA Butler-Manuel, H Apthorp [Hastings, United Kingdom]

Introduction: Debate continues regarding the relative advantages of ceramic-on-ceramic (CoC) and metal-on-polyethylene (MoP) articulations in total hip arthroplasty (THA). Perceived benefits of CoC include longevity, and low wear - in turn limiting the effects of particulate wear debris. However, CoC bearings cost significantly more, and concern remains over the risk of ceramic fracture; a complication not seen with MoP bearings, which are also cheaper.

Method: We electronically randomised 268 consecutive patients undergoing THA to receive either a CoC or MoP articulation. Patients aged over 72 were excluded. In all patients the prosthesis used was an uncemented ABG II (Stryker, USA), implanted by one of the two senior authors (HDA, ABM). Patients were scored preoperatively, and at annual follow-up clinics, using SF36, Visual Analogue (VAS), Merle d'Aubigné (MD) and Oxford Hip (OHS) Scores. Satisfaction levels were also documented.

Results: Follow-up ranged from 4-10 years (mean 73.9 months). 56 patients died or were lost to follow-up, leaving 212 (79.1%); 102 CoC and 110 MoP respectively. There was no statistical difference in age, follow-up, pre-operative scoring, surgeon numbers of each prosthesis or sex distribution between groups.

5 CoC patients underwent revision surgery, compared with 4 MoP. Mean follow-up scores in the CoC group were: SF36 67.9, VAS 1.5, MD 16.5 and OHS 28.2, for the MoP cohort, results were: SF36 61.1, VAS 2.4, MD 16.3 and OHS 21.8. None of these were statistically significant differences, and satisfaction levels were the same between groups.

Discussion: Our data suggest that, up to 10 years, both articulations give equal satisfaction, survivorship and functional outcomes. Anecdotally, many surgeons appear increasingly to favour ceramic bearings in THA; although longer follow-up may be needed to demonstrate any advantages of ceramic over MoP, results such as ours should perhaps be considered when making this decision.

Presenter information: Sebastian, Dawson-Bowling, Conquest Hospital, Hastings, United Kingdom, sebd_b@hotmail.com

Results of Charnley cemented total hip replacement- A minimum ten years follow-up from a district general hospital

A Jariwala, A Yadav, L Johnston, G McLeod [Dundee, United Kingdom]

Charnley cemented total hip replacement (Charnley THR) is the bench mark for total hip arthroplasty. Excellent results have been reported from various specialist centres and from different joint registries. We analysed the results of Charnley THR carried out at a district general hospital in United Kingdom. The data was gathered prospectively at 1, 5, 10 years by independent assessors.

Of the 791 patients in the group, 404 had either died or withdrawn before ten years. Complete information was available only for 387 Charnley THRs. 95% were operated by two consultant surgeons. All surgeries were done in supine position through an antero-lateral approach.

The pre-operative mean Harris hip score (HHS) was 48.35 and at ten years it was 89.75. The pre-operative mean function score was 25.86 and at ten years it was 37.75. Based on the HHS grading 85.53% hips had good to excellent results at ten years. There was no statistically significant difference in terms of mean HHS between gender (p-value = 0.893), age (below and above 60 years) (p-value = 0.389) or when comparing weight subgroups (normal weight, overweight and obese). Most common complication was dislocation which occurred in 13 (3.36%) hips. Revision was done in 6 hips (1.55%), aseptic loosening being the most common cause for revision surgery.

The HHS at each review up to ten years and complications (dislocation, infection and revision) for Charnley THRs were compared with other total hip replacements. No statistical significant difference for mean HHS and complications was noted between Charnley THR and other cemented (0.290/0.101), uncemented (0.147/0.310) and hybrid (0.216/0.191) total hip replacements.

The results of this study are similar to other studies in literature for Charnley THR indicating its good long term results. In addition, this study reemphasises the consistency and success of Charnley THR out with the specialist centres.

Presenter information: Arpit, Jariwala, NHS Tayside, Dundee, United Kingdom,
ajariwala@dundee.ac.uk

Proximal femoral bone reconstitution in Revision Hip Arthroplasty using extended trochanteric osteotomy and distally fixed proximally coated modular hip revision system.
P Vinayakam, A Zaveri, R Slack [margate, United Kingdom]

INTRODUCTION

Osteolysis causing proximal femoral deficiency is a major problem in revision hip arthroplasty, various methods including impaction bone grafting have been used to address this issue. We have analysed bone reformation following extended trochanteric osteotomy and distally fixed proximal hydroxyapatite-coated modular revision hip system (Stryker Restoration System) in 100 consecutive revisions by a single surgeon.

METHOD

Pre-operative radiographs were analysed using Gruens zone for osteolysis and the Paprosky grading system for bone loss. Standardized radiographs and follow-up radiographs at 6 weeks, 6 months and yearly post surgery were used for analysis. Minimum follow-up of 18 months (1.5- 3.5years) Bone reformation is quantified as definite reformation, some evidence of reformation and no bone reformation. Extended trochanteric osteotomy union rates were also observed.

RESULT

Osteolysis was present in all cases. The majority of femurs had significant bone loss (Paprosky type III 84%, Type II 16%) Bone reformation was evident in all patients in this study. The extended trochanteric osteotomy union rate was 100%.

DISCUSSION

All patients in the study demonstrated evidence of bone reconstitution of the proximal femoral deficiency. The union rate of the extended trochanteric osteotomy was 100%.

Stability of the reconstruction, and viability of the osteotomy flap are key for a successful outcome. We believe this technique provides an excellent option for the treatment of proximal femoral deficiency in revision total hip surgery.

Presenter information: Parthiban, Vinayakam, east kent university hospital nhs trust, margate, United Kingdom, parthvinayak@hotmail.com

Mid- to long-term results of CAD-CAM femoral stems used in hip replacement for patients with proximal femoral deformity due to previous osteotomy

P Lee, P Smitesh, J Hua, A Gupta, A Hashemi-Nejad [Stanmore, United Kingdom]

Introduction:

Many patients who had previous proximal femoral osteotomies develop deformities that are not amenable to total hip replacement (THR) with standard off-the-shelf femoral stems. Previous studies have shown high revision rates (18% at 5-10 years follow-up). Computer-assisted-design computer-assisted-manufacture (CAD-CAM) femoral stems have been indicated for such patients but no results have been published. We assessed the clinical results of THR using CAD-CAM femoral stems specifically for patients with proximal femoral deformity due to previous femoral osteotomy.

Methods:

We included patients who underwent THR with CAD-CAM femoral stem, for significant proximal femoral deformity due to previous osteotomy, operated by the senior author (AHN) from 1997 with a minimum of 5 years follow-up. We noted the indications for previous femoral osteotomy, complications associated with THR and improvement in pain and function. Radiological outcomes include assessment for loosening defined as development of progressive radiolucent lines around implant or implant migration.

Results:

We included 41 patients (43 THRs) at a mean age of 32 years (range 19 to 49) with a mean followup of 9.1 years (range 5.9-12.8). Indications for previous femoral osteotomy included acetabular dysplasia, Perthes disease, epiphyseal dysplasia, avascular necrosis and slipped femoral epiphysis. More than 90% of patients had satisfactory pain relief and function improvement. There was 1 (2.3%) stem loosening with subsidence that required revision. Six polyethylene liners were revised because of eccentric wear/osteolysis after a mean of 9.8 years (range 7-11.5) but there was no associated radiological stem loosening. Other associated complications include 3 (6.9%) intraoperative femur fractures and 1 (2.3%) deep infection.

Conclusion:

In contrast to previous studies that have shown high revision rates (18%) for THR in patients with proximal femoral deformity due to previous osteotomy, the use of CAD-CAM hip stems has shown good midterm clinical outcomes with a considerably lower revision rate of 4.6%.

Presenter information: Paul, Lee, Royal National Orthopaedic Hospital, Stanmore, United Kingdom, paulleeth@hotmail.com

Randomized Controlled Trial of Primary Total Hip Replacement Comparing Cemented Stem Behaviour between Large Metal on Metal and Conventional Metal on Polyethylene Bearing Surfaces

J Ramaskandhan, A Malviya, R Bowman, E Lingard, J Holland [Newcastle upon Tyne Hospitals NHS Trust, United Kingdom]

Introduction

Cemented stems have shown 90-100% survivorship when coupled with polyethylene acetabular component. This study aims to compare cemented stem behaviour in combination with large metal on metal (MOM) vs. metal on poly (MOP) bearings.

Patients and Methods

100 patients were recruited into a single centre RCT (we required 40 in each group for power .90 to confirm stem subsidence of $>0.5\text{mm}$ at 2 years; $p < 0.05$). Recruits were randomized to MOP (28mm) or MOM femoral heads with CPCS cemented femoral stem. Assessments included X-rays (AP pelvis), Harris Hip Scores, blood metal ion levels and patient questionnaires (WOMAC, SF-36, satisfaction questionnaire). Evaluations were done pre-operatively and 3, 12 and 24 months post operatively; blood metal ion measures at 1 year.

Results

There were 50 patients in each arm of study matched for age (64 ± 8.5) and BMI (29.04 ± 5.5). There was no difference in femoral stem subsidence at 2 years $1.34 (\pm 1.3)$ and $1.4 (\pm 1.2)$ mm for MOM and MOP respectively ($p=0.88$). There was significant improvement in HHS from pre-op to 3 months: 41 to 87 for MOM and 44 to 86 for MOP ($p=0.00$). This was maintained with no difference between groups at 2 years ($p=0.74$). Similar pattern was seen for WOMAC and SF-36 scores for both groups at 2 years ($p>0.05$). Increased blood Cobalt and Chromium levels were observed in 17% and 0% for MOM and MOP group. MOM group reported better patient satisfaction for overall (91% vs. 79%), pain relief (82% vs 66%) and improvement in ADL activities (94% vs.70%) at 2 years.

Conclusions

There were no significant differences between groups for stem behavior, clinical and patient reported outcomes. Despite higher patient satisfaction reported by MOM patients, increased metal ion levels had raised concerns regarding the use of MOM bearings with cemented stems for primary THR.

Presenter information: Jayasree, Ramaskandhan, Newcastle upon tyne hospitals NHS trust, Newcastle upon Tyne Hospitals NHS Trust, United Kingdom,
jayasree.ramaskandhan@nuth.nhs.uk

Measuring Leg Length Discrepancy Using Pelvic Radiographs

C Heaver, J-P St Mart, P Nightingale, A Sinha, E Davis [Dudley, United Kingdom]

AIMS

Leg length inequality following total hip replacement remains common. In an effort to reduce this occurrence, surgeons undertake pre-operative templating and use various forms of intra-operative measurements, including computer navigation. This study aims to delineate which measurement technique is most appropriate for measuring leg length inequality from a pelvic radiograph.

METHOD

Three observers took a total of 9600 measurements from 100 pelvic radiographs. Four lines were constructed on each of the radiographs, bisecting the acetabular teardrops (Methods 1/2), ischial spines (Method 3/4), inferior sacroiliac joint (Method 5/6) and inferior obturator foramen (Method 7/8). Measurements were taken from these lines to the midpoint on the lesser trochanter and to the tip of the greater trochanter.

The effect of pelvic positioning was also assessed using radiographs of a synthetic pelvis and femur using the same eight methods by a single observer (ED).

Intra-observer variability was analysed using within subject standard deviation. Inter-observer variability was analysed using the coefficient of inter-observer variability (CIV).

RESULTS

When considering the 100 pelvic radiographs measurement methods 3 (SD 3.5, CIV 0.34) and 8 (SD 3.3 CIV 0.33) showed the best inter and intra observer variability. Methods 4 and 6 performed badly for inter and intra observer variability (SD 3.8 CIV 0.4 and SD 4.6 CIV 0.4). Methods 1, 2, 5 and 7 performed well in one aspect but poorly in the other.

When considering the effect of pelvic positioning using radiographs of the synthetic pelvis and femur construct, methods 3 and 7 performed best (SD 6.7 and SD 7.4).

DISCUSSION

Method 3 (Inter-ischial line to lesser trochanter) has the best intra- and interobserver variability. It also performs well despite pelvic position.

As techniques improve in the measurement of intra-operative leg length, a more accurate measurement of leg length is needed to validate these technologies by.

Presenter information: Catriona, Heaver, Russells Hall Hospital, Dudley, United Kingdom,
catriona.greenfield@doctors.net.uk

Is Long-Term Follow-up After Uncomplicated Primary Total Hip Arthroplasty Necessary? **R Silverwood, R Lawton, K Barnett, D Finlayson [Inverness, United Kingdom; Aberdeen, United Kingdom]**

Background: British Orthopaedic Association (BOA) Guidelines recommend clinical and radiological follow-up after Total Hip Arthroplasty (THA) at 1 year, 5 years and every 5 years thereafter to detect asymptomatic failure and allow early intervention. As revision surgery in asymptomatic patients is rare recent studies have questioned the need for routine follow-up in well-functioning individuals. To evaluate the importance of routine out-patient follow-up appointments (OPAs) in identifying failing implants, symptoms and route of presentation of patients undergoing revision THA were reviewed.

Methods: 176 patients who received 183 first-time revision THAs over a seven year period (2003-2010) were identified from an arthroplasty database. A preliminary study sampled 46 THAs in 45 patients. Retrospective chart review recorded patient demographics, primary and revision surgery parameters and follow-up information. Follow-up OPA cost, based on staffing and x-ray, was used to estimate potential financial savings.

Results: Symptoms at failure were present in 100% of patients (pain 96%, decreased mobility 76%, limp 35%, stiffness 26% and night pain 24%). Route of presentation was 80% new referrals (GP 63%, in-patient 9%, A&E 4%, rheumatology 4%) vs 20% via routine orthopaedic follow-up OPA. The minimum cost for a routine follow-up OPA was £35. Assuming discharge after the earliest review when the patient has returned to full normal activities for the 2009 cohort of 377 primary THAs performed in our hospital the financial saving would be £13195 at 1 year and £52780 over the lifespan of the implants (assuming average 15 year survival).

Conclusions: Following uncomplicated successful THA in our hospital, failure is unlikely to occur without symptoms. Symptomatic patients are more likely to present to their GP or other specialities rather than via routine orthopaedic OPAs. Early discharge after return to full normal activities would be safe and lead to significant financial savings.

Presenter information: Robert, Silverwood, Raigmore Hospital, Inverness, United Kingdom,
robert.k.silverwood.05@aberdeen.ac.uk

catastrophic failure of the articular surface replacement (ASR) after 5 years

JN Gandhi, RP Sidaginamale, PK Mereddy, D Langton, T Joyce, J Lord, S Natsu, A Nargol [Stockton on Tees, United Kingdom]

Background

The failure and subsequent withdrawal of the ASR device in both its resurfacing and THR form has been well documented. The National Joint Registry report of 2010 quoted figures of 12 - 13% failure at five years. Adverse reaction to metal debris (ARMD) is a poorly understood condition and patients developing severe metal reactions may go unrecognised for sometime.

Patients and methods

In 2004 a single surgeons prospective study of the ASR bearing surface was undertaken. We present the ARMD failure rates of the ASR resurfacing and ASR THR systems. The diagnosis of ARMD was made by the senior author and was based on clinical history, examination, ultrasound findings, metal ion analysis of blood and joint fluid, operative findings and histopathological analysis of tissues retrieved at revision. Mean follow up was 52 months (24 - 81) and 70 patients were beyond 6 years of the procedure at the time of writing. Kaplan Meier survival analysis was carried out firstly with joints designated "failure" if the patient had undergone revision surgery or if the patient had been listed. A second survival analysis was carried out with a failure defined as a serum cobalt > 7µg/L. Full explant analysis was carried out for retrieved prostheses.

Results

There were 505 ASR patients in total.

657 metal ion samples were available at the time of writing (152 repeats).

Survival analysis using revision/listed as end point (at 6 years):

ASR resurfacing: 26.1% failure. ASR THR: 55.5% failure.

Survival using ion analysis (at 5 years):

ASR resurfacing: 50.1% failure. ASR THR: 66.5% failure.

The median (range) volumetric wear rate of failed prosthesis was 8.23mm³/year (0.51 - 95.5).

Conclusion A number of design flaws in the ASR has led to excessive wear of the bearing & taper leading to catastrophic failure secondary to ARMD.

Presenter information: Jamshid Noshir, Gandhi, University Hospital of North Tees, Stockton on Tees, United Kingdom, jgandhi@nhs.net

Accuracy of digital pre-operative templating in 100 consecutive, uncemented total hip arthroplasties : a single surgeon series
S Shaarani, G McHugh, D Collins [Dublin, Ireland]

Introduction

Leg length discrepancy is a considerable cause of patient morbidity post total hip arthroplasty (THA). Uncemented components necessitate accurate intra-operative assessment of size to avoid complications such as calcar fracture and subsidence whilst maintaining bone stock where possible on the acetabular side. Many potential problems can be anticipated pre-operatively with the use of a templating system. We proposed that pre-operative digital templating could accurately assess femoral and acetabular component size.

Methods

Pre-operative templating data from 100 consecutive patients who received uncemented implants (Trident cup, Accolade stem) and who were operated on by the senior author were included in the study. Calibrated pelvis anterior-posterior X-rays were templated with Orthoview™ software. Demographic data, templating data (stem and cup size, femoral neck cut), operative records (actual stem and cup size, head size) and post-operative data (femoral stem alignment, radiographic leg length, acetabular cup abduction angle) were collected.

Results

There were 51 males and 49 females with a mean age of 60 yrs (SD = 7.3 yrs). 75% of stems were templated to within 0.5 (a single size increment) and 98% to within 1. A total of 79% of cups were templated to within 2mm and 98% templated to within 4mm. 21 patients were templated to have a 132° but 7 of these patients was converted to 127° femoral prosthesis neck angle intra-operatively. The cup angle was 45.1° (SD = 4.81) and stem alignment was 1.5° (SD = 1.13). The mean leg length discrepancy was 3.3mm (SD = 5.5 mm) post-operatively.

Conclusion

Digital templating is a highly accurate method of assessing femoral and acetabular component sizes. This allows surgeons to foresee potential problems and recognize an intra-operative error when a large discrepancy exists between trial components and the templated size. It is also useful as a method of storing data for patient records.

Presenter information: Shahril, Shaarani, Sports Surgery Clinic, Dublin, Ireland,
delphaex@gmail.com

Outcome of Acetabular Bone Grafting in Revision Hip Arthroplasty. 5 - 20 Year Follow-up.
R Nickinson, P Fleming, P Siney, T Board, B Purbach, M Wroblewski, P Kay [Wigan, United Kingdom]

Introduction: We present the outcome of 297 acetabular revisions using bone grafting and cemented acetabular components in 297 patients, with a mean follow-up of 8 years 3 months (5 - 20 years).

Methods: All patients underwent acetabular revision with allograft bone grafting and insertion of cemented acetabular components. Of the 297 patients, 134 patients (45%) were male and 163 (55%) were female. The mean age of undergoing revision surgery with bone grafting was 60 years (25 - 87 years). The mean weight at revision surgery was 71.9 kg (40 - 128 kg). Post-operatively, all patients were reviewed regularly in out-patients, where they were examined clinically for any complications and their radiographs were examined for evidence of graft union, radiological lucency and cup migration.

Results: Post-operatively, 61 patients suffered from early complications, which were defined as complications within one year of surgery. These included 15 dislocations (5%), 12 trochanteric non-unions (4%), 2 deep infection (0.7%), and 32 medical complications (11%). Thirty six patients (12%) have subsequently undergone re-revision surgery. Twenty four re-revisions were performed due to loose socket (8%), 12 for loose stem (4%), 3 for deep infection (1%), 2 for dislocation (0.7%) and 1 for fractured stem (0.4%). In all the cases of loose socket, radiolucent lines at the bone cement interface were noted.

Discussion: Reconstruction of the acetabulum during revision hip surgery using allograft and cemented cup is an effective technique with good short term results.

Presenter information: Richard, Nickinson, Wrightington wigan and leigh NHS foundation Trust, Wigan, United Kingdom, rnickinson@doctors.org.uk

Long term follow up of Acetabular Impaction Grafting for Revision Surgery in Aseptic Loosening

G Bartlett, M Wilson, S Whitehouse, M Hubble, G Gie, J Timperley, J Howell [Exeter, United Kingdom; Truro, United Kingdom]

Introduction

We present a consecutive series of 346 revision procedures with acetabular impaction bone grafting (AIBG) and a cemented polyethylene cup performed for aseptic loosening in 333 patients between May 1995 and December 2002. Defects were contained with mesh without supplementary cages or support rings.

Method

There were 130 male, 216 female patients, with no patient lost to follow up. The acetabular defects treated were: 11 Paprosky type 1, 154 type 2, 81 type 3. There was a mean follow up of 6.6 years for which Kaplan Meier survivorship curves were calculated. The Oxford Hip (OHS) and Harris Hip (HHS) scores were collected prospectively. A radiological definition of cup failure postoperatively was either > 5mm vertical or horizontal linear displacement, or > 5° rotation. Multivariate analysis was performed on patient and surgical factors to determine their significance on survivorship.

Results

27 cases were revised for aseptic cup loosening, 4 for dislocation. Kaplan Meier survivorship at 10 years (42 cases at risk) for aseptic loosening 87.2% (95% Confidence interval (CI): 81.9 to 92.5) and 85.9% (95% CI 80.6 to 91.2) for all revisions. 88 cases (25%) exceeded the radiological migration parameters, however their functional scores were not significantly different to non-migrators: OHS $p=0.289$, HHS $p=0.15$. The whole group latest postoperative mean OHS was 33 (SD 10.75). The multivariate analysis identified paprosky grade and patient age as significant risk factors for revision; $p=0.044$ and $p=0.049$.

Discussion

The 10 year survival of this large series is comparable to other studies using AIBG techniques. 25% patients met radiological criteria for failure, but maintained high functional scores, not significantly different from the stable cup group, questioning usefulness of this measure. AIBG without cage re-enforcement is a successful technique for small and medium sized defects; caution should be applied in large defects and very elderly patients.

Presenter information: Gavin, Bartlett, Princess Elizabeth Orthopaedic Centre - Exeter, Exeter, United Kingdom, gavin_bartlett@me.com

Failure of large diameter bearing metal on metal total hip arthroplasty due to Taper wear.
DJ Langton, J Ghandi, RP Sidaginamale, P Mereddy, TJ Joyce, J Lord, S Natu, A Nargol [Newcastle, United Kingdom]

Introduction

We conducted independent wear analysis of retrieved metal on metal (MoM) hip components from around the world. All patients with resurfaced hips who developed adverse reactions to metal debris (ARMD) were found to have increased wear of the bearing surfaces. This was untrue in patients with large diameter ($\geq 36\text{mm}$) MoM total hip replacements. This led us to search for other factors leading to ARMD.

Methods

MoM THR explants retrieved from 78 patients suffering ARMD underwent full volumetric wear analysis of bearing surface and taper-junctions using coordinate measuring machine. Scanning electron microscopy (SEM) used to characterise material composition of specific areas.

Results

34 MoM THRs were found to have relatively low bearing surface wear ($< 3\text{mm}^3/\text{year}$). In each of these cases, material loss up to 60 microns wear depth was identified on the internal taper-junctions of femoral components. However, volumetric loss was rarely $> 5\text{mm}^3$. Similarly only 65% of metal ion levels of these patients were found to be greater than the MHRA guidance figure ($7\mu\text{g/L}$). Patterns of material loss at the tapers were consistent with antero-posterior force splaying open the taper-junction. This characteristic pattern was identified in number of commercially available devices (titanium and cobalt chromium stems). Soft tissue lesions were severe in patients found to have taper damage. Histology confirmed severe ALVAL with lymphoid neogenesis in majority cases, suggesting that wear debris from taper junctions may have greater potential to stimulate adverse immune response.

Discussion

The results suggest that forces transmitted from large diameter hard-on-hard bearing surfaces are sufficient to cause mechanical damage to modular junctions with secondary localised corrosion. We urge caution in the use of these designs and recommend a re-evaluation of the stem head interface.

Presenter information: David J, Langton, University of Newcastle upon Tyne, Newcastle, United Kingdom, djlangton22@yahoo.com

Comparison of INSORB® Subcuticular Skin Staples and Autosuture™ Signet™ Skin Staples in the closure of Total Hip Arthroplasty Wounds
O Breathnach, A-M Byrne, T Kennedy, F Doyle, F Condon [Limerick, Ireland]

Aims: The purpose of this study was to compare the use of INSORB® subcuticular skin staples with Autosuture™ Signet™ skin staples in the closure of Total Hip Arthroplasty wounds. INSORB® subcuticular staples are designed to combine the cosmetic result of absorbable sutures with rapid closure time associated with metal skin clips as well as eliminating the need for metal skin staple removal post operatively. **Methods:** A Randomised Control Trial of patients undergoing Primary Total Hip Arthroplasty was undertaken. Parameters measured included wound length, time taken for staple insertion, GP appointment for suture removal and patient satisfaction with wound appearance at 6 weeks post-operation. **Results:** 50 patients were recruited for this study with 25 patients in each group. Four patients in each subgroup were lost to follow-up. The mean age of patient included in this study was 60.8 years. Average wound length was 16.5 cm. Insertion time for the INSORB® staples was on average 170 seconds, almost three times the average length of time taken for the insertion of skin staples. The initial dressing change in the INSORB® group was noted to occur earlier in the treatment phase due to wound ooze. The INSORB® group also recorded a lower attendance at primary care centres for wound review when compared to the Autosuture™ staple group. Over 90 % of patients in both groups described themselves as being satisfied or very satisfied with their wounds post-operation. **Conclusion:** INSORB® subcuticular skin staples act as a adequate method of skin closure in primary hip arthroplasty. They also provide an excellent cosmetic result and high levels of patient satisfaction. The increased cost associated with the INSORB® staple set (€30) when compared with the Autosuture™ staple set (€17) is favourable as no further primary care review is required.

Presenter information: Oisin, Breathnach, Croom Orthopaedic Hospital, Limerick, Ireland,
opbreathnach@hotmail.com

Impaction femoral allografting at revision hip arthroplasty using a proximally hydroxyapatite coated stem without cement.

S Masterson, S Lidder, W Yoon, G Scott [London, United Kingdom]

Introduction

There are conflicting reports in the literature regarding the migration of femoral stems in revision hip arthroplasty following the use of impaction allografting with or without cement. In some cemented series distal migration of the prosthesis within the cement mantle has been recorded, as well as migration of the whole cement / prosthesis construct into the graft.

Method and Results

The results of 26 cases of revision hip replacement using femoral impaction allografting in the absence of bone cement are reported. The mean follow up was 8.5 years (range 4 to 17 years). The technique employed a Freeman stem coated proximally with hydroxyapatite.

Three cases required further revision at 2, 4 and 5 years for high subsidence and unacceptable thigh pain. The remaining 23 cases stabilised following a period of initial settlement and overall results have been comparable to other series that have utilised cement. The initial sinkage in this series occurred mainly in the first six postoperative months. These results, from a single surgeon series, demonstrate that the method is highly technique dependent and relies on adequate graft impaction.

Discussion

With sufficient graft and an appropriate prosthetic design, cement is not essential to the overall success of this method. However, the extent of the initial migration did not accurately predict a successful outcome for the procedure. The absence of cement removes any confusion as to the location of any migration. All prostheses settled into the graft bed. These results should be extrapolated to other prosthetic designs with caution.

Presenter information: Sean, Masterson, The Royal London Hospital, London, United Kingdom,
seanmast@gmail.com

Thromboprophylaxis with oral factor Xa inhibitors in arthroplasty surgery: do they increase blood loss in clinic practice?

AJ Highcock, EJ Craghill, DJ Simmons [Mersey deanery, United Kingdom]

INTRODUCTION

Oral factor Xa inhibitors have recently been licensed for use as thromboprophylaxis in arthroplasty surgery. Phase IV trials have proven their efficacy in DVT/PE prevention with comparable rates in major adverse events, including major bleeding. We examined whether the introduction of rivaroxaban, an oral factor Xa inhibitor, increased total blood loss in patients undergoing primary arthroplasty surgery.

METHODS

Two groups were studied. The intervention group were prescribed rivaroxaban thromboprophylaxis 6-10 hours post-surgery, and the control group were prescribed low molecular weight heparin (dalteparin 5,000u) 6-10 hours post-surgery. All other factors were kept constant.

Pre- and post-operative haemoglobin levels (post-operative day 2) were recorded. Any requirement for transfusion was also documented. Actual drop in haemoglobin levels was compared between the two groups.

RESULTS

91 patients were prescribed rivaroxaban (48 THR and 43 TKR), and 71 were included in the control group (34 THR and 37 TKR). Baseline pre-operative haemoglobin were comparable ($p=0.43$; 13.0 vs 13.2g/dL), however, post-operative blood loss was significantly increased in the rivaroxaban group ($p<0.0001$; 3.6 vs 2.8g/dL).

Total knee replacements had a significant increase in post-operative blood loss in the rivaroxaban group ($p<0.0001$; 3.4 vs 2.6g/dL). Total hip replacement surgery had an increase in total blood loss in the rivaroxaban group, but this did not reach statistical significance ($p=0.33$; 3.8 vs 3.3g/dL).

More patients undergoing TKR required transfusion in the rivaroxaban group (0.07% vs 0.03%).

CONCLUSIONS

Oral factor Xa inhibitors significantly increase post-operative blood loss in total knee arthroplasty surgery when compared with LMWH. There is a subsequent increased requirement for blood transfusion and the potential complications related to bleeding and transfusion. These factors must be considered and balanced with the ease of oral anticoagulation when introducing these newer agents in arthroplasty patients.

Presenter information: Alan James, Highcock, National Health Service, Mersey deanery, United Kingdom, alanhighcock@hotmail.com

use of metaphyseal sleeves in revision total knee replacement

A Azam, S Agarwal, RL Morgan-Jones [Cardiff, United Kingdom]

Introduction

This study was undertaken to evaluate the early results of a new implant system - the metaphyseal sleeve - in revision total knee replacement. The femoral and tibial metaphyseal sleeves are a modular option designed to deal with metaphyseal bone loss and achieve cementless fixation over a relatively wide area in the metaphysis.

Methods

Over three years, femoral and/or tibial metaphyseal sleeves were implanted in 104 knees in 103 patients (54 male and 49 female). The clinical notes and radiographs of these patients were reviewed retrospectively. Thirty one patients had revision for infection, 42 for aseptic loosening, and 31 for instability, pain or stiffness. Eighty nine knees were revised as a single stage and 15 were done as two stage procedure. Minimum follow up is 12 months (average 18.5 months).

Results

At the time of final follow up the sleeves showed good osseointegration in 102 knees with no evidence of loosening or subsidence. In two knees, a progressive radiolucency was noted around the metaphyseal sleeve 6 months after the revision procedure. Both these patients were symptomatic. The inflammatory markers were raised and Tc-99 bone scan showed increased uptake in the delayed phase. Loosening of the sleeve was confirmed on CT scans. SPECT scan raised suspicion of focal infection around the sleeve in one patient.

Conclusion

The early results with the use of metaphyseal sleeves are encouraging. The sleeves provided firm fixation and structural support in patient with significant metaphyseal bone loss. This obviated the need for metal augments or bone graft. Further follow up will be required to evaluate the medium and long term results of this option. We believe the addition of cementless metaphyseal fixation is a useful tool in the armamentarium of the revision knee surgeon.

Presenter information: Amir, Azam, Cardiff and Vale University Health Board, Cardiff, United Kingdom, amirazam12@yahoo.com

The use of Anterior Cruciate Ligament scoring systems in the UK - who's using them? **M Varghese, M Ibrahim, S Barton, B Hopton [West Yorkshire, United Kingdom]**

Introduction: Anterior cruciate ligament (ACL) rupture is a common sporting injury, often managed surgically with patella-tendon or hamstrings autograft. Surgeons are under increasing pressure for open transparent assessment of their performance. Scoring systems can be used to assess outcome. More than 50 different scoring systems have been identified to assess the ACL deficient knee.

Aims: The survey is investigating the use of ACL scoring systems between knee surgeons in the United Kingdom as a method of assessing performance.

Method: 134 knee surgeons in the United Kingdom, performing ACL reconstruction, were asked to complete a written questionnaire regarding their use of scoring systems & outcome measures. Written questionnaires were sent and responses were received by post.

Results: 81 (60%) surgeons responded to the questionnaire by stating their preferred scoring system. 40 (49%) surgeons routinely use ACL scoring systems versus 41 (51%) surgeons who do not. The Lysolm (I and II) knee scoring scale and Tegner activity score were most commonly used (59%) followed by the Knee injury and osteoarthritis outcome score (KOOS) (12%) and International Knee Documentation Committee (IKDC) subjective knee score (9%).

Recommendations: The routine use of ACL scoring systems by 49% of surgeons raises the question - should all surgeons be using scoring systems in their ACL practice? This would be relatively easy to do as most patients are followed up post operatively for 6 months. This will help to adopt a transparent assessment of the performance of every consultant to the procedure they perform.

Presenter information: Mathew, Varghese, Airedale General Hospital, West Yorkshire, United Kingdom, matv2000@yahoo.com

The Aetiology, Early And Late Management And Outcomes Of 141 Multi-Ligament Injured Knees

M Jones, T Mahmud, A Narvani, I Hamid, J Lewis, A Williams [London, United Kingdom]

Methods: 139 patients with 141 multi-ligament injured knees [116 primary and 25 revision cases] were treated by a single surgeon. Data was collected on injury cause, the early management, the operative techniques, and rehabilitation regimes used and their evolution, and the outcomes of these cases. Outcome was measured by knee scoring [IKDC, Lysholm, knee outcome survey and SF36] Rollimeter, and radiographs including Telos stress Xray, plus clinical examination. All patients were older than 16 years and minimum follow-up was 18 months.

Results: 1 patient had died, and 2 others had ultimately been treated with arthroplasty. Of the remainder 61 patients [63 knees] attended for full assessment. Only 2 declined to be involved, another 7 agreed but did not attend and no contact was possible in 64 patients.

The mean age was 28 years, and there 111 males and 30 females overall. 36 were deemed to be 'high-energy' injuries and of these 14% had nerve lesions and 8.4% vascular lesions. In 97 'low energy' largely sporting injuries 9% had a foot drop, and 2% vascular lesions.

Better results and lower rates of re-operation were seen in cases operated up on within 3 weeks of injury, with lesser degree of original injury [according to Schenk classification], and when no previous attempts at reconstruction had been made. Early management of these cases was often poor- inappropriate use of casts and external fixators, there was often failure to assess the limb blood supply properly, and appropriate splintage and early physiotherapy was frequently not used especially with accompanying common peroneal nerve injury resulting in contractures.

3 deep infections and 2 cases of thrombosis occurred. There were no vascular complications, nor permanent nerve injuries.

These knees are never normal but early surgery can produce good outcomes. 5 of the bicruciate cases have returned to professional sport.

Presenter information: Mary, Jones, Chelsea and Westminster Hospital, London, United Kingdom, andywilliamsortho@hotmail.com

Long-Term Follow-Up of Autologous Chondrocyte Implantation: up to 12 years follow-up
SZ Nawaz, K Gallagher, B Dhinsa, R Carrington, JA Skinner, TW Briggs, G Bentley [London, United Kingdom]

Chondral injuries of the knee are extremely common and present a unique therapeutic challenge due to the poor intrinsic healing of articular cartilage. These injuries can lead to significant functional impairment. There are several treatment modalities for articular osteochondral defects, one of which is autologous chondrocyte implantation. Our study evaluates the mid to long term functional outcomes in a cohort of 828 patients who have undergone an autologous chondrocyte implantation procedure (either ACI or MACI), identifying retrospectively factors that may influence their outcome.

The influence of factors including age, sex, presence of osteoarthritis and size and site of lesion have been assessed individually and with multivariate analysis. All patients were assessed using the Bentley Functional Score, Visual Analogue Score and the Cincinnati Functional Score. Assessment were performed pre-operatively and of their status in 2010.

The longest follow-up was 12 years (range 24 to 153 months) with a mean age of 34 years at time of procedure. The mean defect size was 409 mm² (range 64 to 2075 mm²). The distribution of lesions was 51% Medial Femoral Condyle, 12.5% Lateral Femoral Condyle, 18% Patella (single facet), 5% Patella (Multifacet) and 6% Trochlea. 4% had cartilage transplant to multiple sites.

High failure rates were noted in those with previous cartilage regenerative procedures or evidence of early osteoarthritis and those with transplantation to multiple sites.

Autologous chondrocyte implantation is an effective method of decreasing pain and increasing function, however patient selection plays clear role in the success of such procedure.

Presenter information: Syed Zuhair, Nawaz, RNOH, Stanmore, London, United Kingdom,
sznawaz@hotmail.co.uk

A comparative study of locked fixation and non-locked plating for the treatment of tibial plateau fractures

J Littlechild, J Keating [Edinburgh, United Kingdom]

The outcome of 77 high energy tibial plateau fractures treated by locking or conventional plating was reviewed. The aim of the study was to determine if there was any advantage of locking plates in reducing the complication rates associated with fixation of these injuries. All patients had a high energy injury pattern (medial or bicondylar plateau fractures). There were 32 locked plates and 45 non-locking plates used.

Compartment syndrome complicated 5 patients (16%) in the locked plate group and 3 (7%) in the non-locked group ($p = 0.198$). Superficial infection occurred in 4 (13%) patients with locked plates and 7 (16%) patients with non-locked plates. Thromboembolic complications occurred in 3 (7%) patients treated with non-locked plates. There were no thromboembolic complications in the locked plate group ($p = 0.135$).

Overall, malunion of the plateau occurred in 10 (22%) patients treated with non-locked plates compared to 7 (22%) patients who received locked plates. This was due to residual malreduction in 4 (13%) patients in the locked plate group and 6 (13%) patients in the non-locked plate group at the time of surgery. In the remaining cases loss of reduction after fixation occurred in 4 (9%) patients who received non-locked plates and in 3 (9%) patients who were treated with locked plates. No statistically significant difference was noted in the treatment outcomes of patients managed with locked plates or non-locked plates, regardless of fracture severity.

We concluded that there is no definite advantage associated with the use of locked plating for high energy tibial plateau fractures.

Presenter information: Joseph, Littlechild, The University of Edinburgh, Edinburgh, United Kingdom, joelittlechild@hotmail.com

Manipulation Under Anaesthetic following Total Knee Arthroplasty: Does it work and who needs it?

D Cohen, M Cartwright-Terry, J Pope, J Davidson, A Santini [Liverpool, United Kingdom]

Purpose

To review the outcomes of patients undergoing manipulation under anaesthetic (MUA) after primary total knee arthroplasty (TKA) and to predict those that may require such a procedure.

Methods

We prospectively analysed all patients who required an MUA post TKA performed by two surgeons using the same prosthesis between January 2003 and December 2008 and compared them to a matched control group.

Pre- and post-operative range of movement was measured.

In addition, associated factors were identified including warfarin and statin use, diabetes and body mass index.

Results

Out of 1313 TKA, seventy-two patients required an MUA (5.5%) and were compared to a control group of 50 patients. The mean arc of motion preoperatively was 89.0° (MUA group) vs 92.2° (control) ($p=0.47$), at discharge 71.0° vs 76.8° ($p<0.05$) and at 6 weeks follow-up 64.0° vs 97.3° ($p<0.0001$).

Post manipulation the mean arc of motion was 108° on table, 83.1° at 3 months follow-up and 81.9° at 12 months. Patients whose manipulation was within 3 months of TKA (23 patients) improved their mean arc of motion from 53.6° to 78.0° ($p<0.0025$), those 3-12 months (42 patients) from 67° to 83.0° ($p<0.0001$) and those >12 months (7 patients) 81° to 89° ($p=0.32$).

Mean increase of extension was 3.7° on table and 3.6° at 12 months. Mean flexion increase was 40.5° on table and 15.7° at 12 months.

The relative risk factor for requiring an MUA was 6.97 warfarin ($p<0.05$), 1.58 statins, 2.85 diabetes and 1.17 obesity.

Conclusions

MUA for patients with stiffness after primary TKA improves their range of motion if done within 12 months, however only 40% flexion improvement is maintained.

Patients who required an MUA had a reduced range of motion at discharge.

Patients on warfarin therapy are more likely to develop stiffness.

Presenter information: Daniel, Cohen, Lower Limb Arthroplasty Unit, Royal Liverpool University Hospital, Liverpool, United Kingdom, docdannyc@hotmail.com

The Cornwall Experience Of Avon Patellofemoral Arthroplasty With 5 Five-Year Survivorship And Functional Results

AJC Vaughan, P Guyver, M Divekar, K Farmer, A Lee [Truro, United Kingdom]

Aim: We aim to show that our series of Avon Patellofemoral Joint Replacements (APFJR) with over 5 year follow up, have comparable functional, radiological and revision rate results to other published reports.

Methods: Retrospective analysis occurred of all consecutive cases of APFJR from October 1999 and January 2010. All operations were performed by the senior author (AL). Each patient had both clinical and radiological follow up. Patient demographics, pre and post op Oxford Knee scores and complications were all recorded. An independent post operative radiological review took place to check for loosening and progression of disease. Revision to Total Knee Replacement (TKR) was taken as the endpoint.

Results: 83 consecutive APFJR's were implanted in 56 patients for established isolated patellofemoral arthritis. The average age was 68.2(34-95) with 18 males and 38 females. The mean follow-up was 5.4 years (1.25 to 11). There were 5 revisions with the five-year survival rate being 95.2% (95% confidence interval 88.12% - 99.88%). The median Pre Op Oxford knee score was 17 of 48 points (interquartile range 11 to 21) showed significant improvement when compared to the median Post Op Oxford knee score of 35 (interquartile range 26 to 41) ($p < 0.001$). There was no loosening with the main complication being radiological progression of arthritis. There was one superficial infection and no deep infections. There was also one transient sciatic nerve palsy. These results compare very closely to those in the designing surgeon's series (Ackroyd et al JBJS Br 2007).

Conclusions: These results reveal satisfactory survivorship and functional outcome results in the medium term leading to increased confidence in the use of patellofemoral arthroplasty.

Presenter information: Alexander John Charles, Vaughan, Royal Cornwall Hospital, Truro, United Kingdom, alexvaughan102@hotmail.com

An analysis of time and money spent on investigating painful Total Knee Replacements
A-A Kassam, P Dieppe, A Toms [Exeter, United Kingdom]

Purpose

Great expense is accumulated in investigation and management, often with poor outcome, of a patient with a painful TKR. We aim to produce guidelines for their investigation and careful, successful management.

Method

We studied 42 cases of patients with a painful TKR. Costs were calculated of appointments, serological and radiological investigations for these patients and an average cost of investigating a patient was obtained. We also calculated costs of various forms of management, both surgical and non-surgical and correlated these with patient outcomes.

Results

41 patients with an average investigation time of 20 months had on average 4 Orthopaedic appointments for the investigation of a painful TKR. On average, 8 blood tests were performed along with 8 radiographs. The average cost of investigating a patient with a painful TKR was £2337.

22 patients underwent operative intervention compared to 19 having solely pharmaceutical intervention. There was a significant difference between the amounts spent in each group with £5051 spent per patient in the operative group compared to £190 per patient on the non-operative group. There was a higher percentage of patient improvement in the non-operative group.

Conclusion

Costs for investigation of a patient with a painful TKR were high because of exceedingly high numbers of repeated investigations. There is no guidance currently on how to manage painful TKR which is becoming an increasing clinical problem because of the increasing number of TKR's being performed per year. A lot of money is wasted on over investigating patients and performing operations that do not improve symptoms or prognosis. Careful thought needs to be given to careful investigation and management of patients in order to achieve optimal patient improvement.

We have proposed a protocol for the investigation and management that allows prompt diagnosis and intervention and helps improve symptoms while keeping costs down.

Presenter information: Al-Amin, Kassam, Royal Devon and Exeter NHS Foundation Trust, Exeter, United Kingdom, akassam@doctors.net.uk

Manipulation under anaesthesia post total knee replacement: Long term follow up.

D Yeoh, N Nicolaou, R Goddard, H Willmott, K Miles, D East, B Hinves, J Shepperd, A Butler Manuel
[Hastings, United Kingdom]

A reduced range of movement post total knee replacement (TKR) surgery is a well recognised problem. Manipulation under anaesthesia (MUA) is a commonly performed procedure in the stiff post operative TKR. Long term results have been variable in the literature.

We prospectively followed up 48 patients since 1996 from one centre, over an average of 7.5 years, (range 1 to 10 years) and report on the long term results.

During the study period 2.3% of TKRs underwent MUA. The mean time to MUA post TKR was 12.3 weeks (range 3 to 48). Pre MUA, the mean flexion was 53°. The mean immediate passive flexion post MUA was 97°, an improvement of 44° (Range 10° to 90°, $p < 0.05$). By one year, the mean flexion was 87°, an improvement of 34°, (range -15° to 70°, $p < 0.05$). At ten years the mean flexion was 86°, (range 55° to 100°, $p < 0.05$).

We found no difference between those knees manipulated before or after 12 weeks. In addition there was no difference found in those knees which had a pre TKR flexion of greater or less than 90°. There were no complications as a result of MUA. However, one patient was eventually revised at two years secondary to low grade infection.

Our findings show that MUA is safe and effective method at improving the range of motion in a stiff post operative TKR. The improvement is maintained in the long term irrespective of time to MUA and range of motion pre TKR.

Presenter information: David, Yeoh, Conquest Hospital, Hastings, United Kingdom,
david_yeoh@yahoo.co.uk

Superficial Anterior Vasculature and Surgical Approaches to the Knee **DF Russell, QA Fogg, CI Mitchell, B Jones [Glasgow, United Kingdom]**

Introduction: The superficial anterior vasculature of the knee is variably described; most of our information comes from anatomical literature. Descriptions commonly emphasise medial-dominant genicular branches of the popliteal artery. Describing the relative contribution of medial and lateral vessels to the anastomotic network of the anterior knee may help provide grounds for selecting one of a number of popular incisions for arthrotomy.

Aim: To describe the relative contribution of vessels to anastomoses supplying the anterior knee.

Method: Cadaveric knees (n = 16) were used in two cohorts. The first cohort (n = 8) were injected at the popliteal artery with a single colour of latex; then processed through a modified diaphanisation technique (chemical tissue clearance) before final dissection and analysis. This was repeated for the second cohort, but with initial dissection to identify potential source vessels at their origin. Each source vessel was injected with a different colour of latex. The dominant sources were determined in each specimen. **Results:** The majority of the specimens (n = 13; 81%) demonstrated that an intramuscular branch through the vastus medialis muscle was the dominant vessel. Anastomoses were most common over the medial side of the knee, both superiorly and inferiorly (3-5 anastomoses in all cases). Anastomoses over the lateral knee were infrequent (1 anastomosis in 1 specimen).

Discussion: The results suggest that anterior vasculature of the knee is predominately medial in origin, but not from the genicular branches as previously described. The network of vessels found in the anterior knee are thought to be the main supply to the patella, extensor apparatus, anterior joint capsule and skin. Optimum placement of incision for arthrotomy is a subject of debate. Considering the main blood supply to the anterior knee may help in choosing a particular approach.

Presenter information: David F., Russell, Glasgow Royal Infirmary, Glasgow, United Kingdom,
daves_postbox@hotmail.com

Do autologous blood re-infusion systems reduce the requirement for transfusion in patients undergoing total knee replacement? Is it a cost effective solution?

SC Mertes, S Raut, V Khanduja [Cambridge, United Kingdom]

Aim: The aim of this study was to determine the effects of using the Bellovac autologous blood salvage system on blood transfusion requirements, adverse event rate, post-operative length of stay (POLOS) and mobilisation in patients who have undergone a total knee replacement.

Methods: This is a retrospective analysis of 585 patients who underwent total knee replacement (TKR) at our institution between January 2008 and August 2009. All patients received an autologous blood salvage drain in theatre. Their medical records were reviewed to collect the required data.

Results: At the time of submission data on 415 patients was available. Overall 70% of patients were re-transfused (77% of males, 66% of females). In the remainder there was too little blood in the drain by the time the re-transfusion window had ended. Re-transfused patients were comparable to those not re-transfused in terms of age, BMI, comorbidity, pre-op mobility, anaesthetic type and pre-operative haemoglobin concentration. Re-transfused patients had significantly lower post-operative adverse event rates (22 vs 34% $p=0.012$) and allogeneic transfusion requirements (6.5 vs 15.6%, $p=0.0035$). These were not a result of the gender discrepancy. Numbers needed to treat with a re-infusion drain were 12.1 (95%CI 6.6 - 68.0) to prevent one adverse event and 6.6 (95%CI 4.6 - 11.7) to prevent one unit of allogeneic blood being transfused. POLOS and post-operative mobilisation were not affected, even after the elimination of patients with adverse events. Cost analysis showed that autologous re-infusion drains (£50 each) were not cost-effective in preventing allogeneic blood transfusion (vein-to-vein cost £135). One serious adverse event attributable to the re-infusion system occurred: a drain tip had to be removed operatively after becoming bent.

Conclusion: Autologous re-infusion systems are effective but not cost-effective in reducing blood transfusion requirement after TKR. Autologous re-infusion is associated with a reduced adverse event rate post-operatively.

Presenter information: Stephan Christian, Mertes, Addenbrooke's Hospital - Cambridge University Hospitals NHS Foundation Trust, Cambridge, United Kingdom, scm53@cam.ac.uk

The use of standard operating procedures in day case anterior cruciate ligament reconstruction

T Khan, W Jackson, D Beard, M Ahmad, R Spacie, R Jones, K Barker, A Price [Oxford, United Kingdom]

Background

A day case pathway for arthroscopic anterior cruciate ligament (ACL) reconstruction with Standardised Operating Procedures (SOPs) was established in our elective unit in May 2010.

Methods

Fifty consecutive patients undergoing arthroscopic ACL reconstruction performed between May 2010 and September 2010 (study group) were studied prospectively. SOPs were designed for each stage of the patient pathway, including pre-operative assessment, anaesthesia, surgical procedure, early mobilisation and discharge. We evaluated length of stay, readmission rates, complications, reasons for failure to discharge on the day of surgery and patient satisfaction (based on a telephone questionnaire). We performed a retrospective analysis of length of stay and complications in fifty consecutive patients who underwent ACL reconstruction prior to implementation of the day case pathway (November 2009 to April 2010). A cost analysis and assessed the potential annual savings in terms of inpatient bed cost for day case arthroscopic ACL reconstruction.

Results

80% of patients in the study group were discharged on the day of surgery with a mean length of stay of 0.22 days. This was significantly better than standard practice ($p < 0.05$, Mann-Whitney U test). There were no readmissions in either group. All patients were satisfied with the day case pathway. In the study group, 85% of patients were discharged on the day of surgery when SOPs were followed compared to 30% where SOPs were not followed. This difference was statistically significant. Analysing the workload of the two surgeons involved in the study, we estimate an annual saving of £30,230 for day case ACL reconstruction based on inpatient bed cost alone.

Conclusion

Day case arthroscopic ACL reconstruction is both safe and practical. It can be achieved with the use and adherence to Standardised Operating Procedures and provides significant cost savings. This has considerable implications if implemented nationally.

Presenter information: Tanvir, Khan, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, Oxford, United Kingdom, tanvirkhan@doctors.net.uk

Incidence of delayed recovery from peripheral nerve block in primary total knee replacement and its influence on length of stay.
R Singhal, KL Luscombe [Crewe, United Kingdom]

Introduction:

Many determinants of the length of stay (LOS) for primary total knee arthroplasty (TKA) have been described. Multimodal, pre-emptive analgesia, age, walking aid score and stair score are some of them. Single shot peripheral nerve block is a popular method to provide prolonged analgesia in immediate post operative period after TKA. Delayed recovery from the nerve block can delay the rehabilitation programme and subsequently lengthen the LOS when the multi disciplinary team discharge criteria are well defined and standardized. The aim of this study is to calculate the incidence of delayed recovery from the sciatic and femoral nerve block administered in cases of primary TKA and its influence on LOS.

Methods:

All the patients undergoing primary TKA and receiving forty milliliters of 0.375% of Bupivacaine for sciatic and femoral nerve block since April 2010 till January 2011 have been included in the study. Patients demographics, date and day of operation, time of nerve block, complete recovery from the nerve block post operatively and date of discharge were recorded prospectively.

Results:

Total 34 patients were included in the study. 24 patients recovered from the effect of peripheral nerve block on the post operative day one and 10 patients recovered on the post operative day two. Mean LOS of patients recovered on post operative day one is 4.8 days and mean LOS of those who recovered on post operative day 2 is 5.6 days.

Conclusion:

Almost one third of the patients receiving forty milliliters of 0.375% of Bupivacaine for sciatic and femoral nerve block recovered late. Delayed recovery from nerve block seems to increase the duration to achieve the discharge criteria after primary TKA. This information can be used favorably to influence the outcome by altering the concentration and amount of anaesthetic agent used.

Presenter information: Rohit, Singhal, Leighton Hospital, Crewe, United Kingdom,
singhal.rohit75@gmail.com

Cohort Study comparing Oxford TMK (mobile bearing TKR) with the AGC ; Is the TMK a failing Knee?

J Davidson, R Chana, K Miles, D East, HD Apthorp, PA Butler-Manuel [Hastings, United Kingdom]

Introduction

The Oxford Total Meniscal Knee (TMK by Biomet), is a total knee replacement with a multidirectional mobile bearing. As part of the evaluation of the TMK we compared our group of TMK knee replacements with an equivalent cohort of AGC total knee replacements.

Methods

Patients recruited to AGC trial from 1994 to 2001. 254 AGC knee replacements sequentially recruited in 210 patients. Patients recruited to TMK trial from 2001 to 2007. 221 TMK knee replacements sequentially recruited in 193 patients. Patients prospectively randomised to having uncemented HAC coated or cemented versions in both groups.

Each patient was reviewed pre-operatively, at 6 weeks, 6 months, 1 year and then annually.

All AGC & TMK TKR's were assessed clinically using HSS scores and radiographically. TMK group also assessed using AKSS and OKQ scores.

Results

AGC; 254 TKR (118 cemented, 136 HAC) Mean Age 67.5 (47-75yrs). Follow up 7 - 14 years. 4 revisions

TMK; 221 TKR (106 cemented, 115 HAC) Mean Age 67 (47-75yrs). Follow up 2 - 8 yrs. 5 revisions

No significant differences between cemented and HAC in either group.

HSS scores at 7 and 8 years are significantly better in the AGC group than the TMK group (83, 87 vs 82, 79)

The trend for the TMK group is decreasing scores annually, unlike the AGC group which are relatively constant from 7 -14yrs follow up.

Discussion

Although scores in the first few years appeared promising with the TMK TKR, it seems that TMK scores appear to decrease annually. These scores are significantly lower than those found in AGC group. There also appears to be a higher revision rate.

We aim to continue to follow up the TMK knee replacement closely to see if it fails significantly in the next few years.

Presenter information: Jerome, Davidson, Conquest Hospital, Hastings, United Kingdom,
jerome.davidson@gmail.com

**Does posterior capsular stripping improve range of motion in knee arthroplasty patients ?
A randomised controlled trial presenting one year outcomes.
B Hanratty, D Bennett, N Thompson, D Beverland [Belfast, United Kingdom]**

Introduction

Surgical technique is one factor that can influence knee motion. Increasing knee flexion following total knee arthroplasty (TKA) has become an important outcome measure. We tested the hypothesis that stripping of the posterior knee capsule could improve flexion and range of motion (ROM) following TKA.

Patients and Methods

Patients undergoing TKA were prospectively randomised into two groups - one group (62 patients) were allocated stripping of the posterior knee capsule (PCS), the other group (66 patients) no stripping (no-PCS). The primary outcome was change in flexion and ROM compared to pre-operative measurements at three time points; after wound closure, 3months and 1year post-operatively. Secondary outcomes were absolute measurements of flexion, extension, ROM and complications. All operations were performed by a single surgeon using the same implant and technique. All patients received identical post-operative rehabilitation.

Results

There was a significant gain in flexion after wound closure in the PCS group ($p=0.022$), however there was no significant difference at 3months or 1year post-operatively. Absolute values of extension ($p=0.008$) and flexion ($p=0.001$) 3months post-operatively were significantly reduced for the PCS group. The absolute value of ROM was significantly higher for the no-PCS group at 3months ($p=0.0002$) and 1year ($p=0.005$). There were no significant difference in the rate of complications.

Discussion

Posterior capsular stripping causes a transient increase in flexion that does not persist post-operatively. We do not recommend routine stripping of the posterior knee capsule in patients undergoing TKA.

Presenter information: Brian, Hanratty, Musgrave Park Hospital, Belfast, United Kingdom,
bmhanratty@yahoo.co.uk

Computer navigation versus conventional total knee replacement: A prospective, randomised control trial showing no difference in functional results at five years.

P Harvie, K Sloan, R Beaver [Perth, Australia]

We report our five-year functional results comparing navigated and conventional total knee replacement. To our knowledge this represents the first Level 1 study comparing function in navigated and conventional total knee replacement at five years.

An original cohort of 71 patients undergoing Duracon (Stryker Orthopaedics, St. Leonards, Australia) total knee replacement without patellar resurfacing were prospectively randomised to undergo operation using computer navigation (Stryker Image Free Computer Navigation System (version 1.0; Stryker Orthopaedics))(n=35) or a jig-based method (n=36). The two groups were matched for age, gender, height, weight, BMI, ASA grade and pre-operative deformity. All operations were performed by a single surgeon. Reviews were undertaken by senior physiotherapist blinded to participant status using validated outcome scoring tools (Knee Society Score, WOMAC Score and Short Form SF-36 Score). All patients underwent CT scanning of the implanted prosthesis as per Perth CT Knee Protocol to assess component alignment.

s After 5 years 24 patients in the navigated group and 22 patients in the conventional group were available for review. At 5 years no statistically significant difference was seen in any of the aforementioned outcome scores when comparing navigated and conventional groups. No statistically significant difference was seen between 2- and 5-year results for either group.

Due to the relatively low numbers in each group these data were compared with retrospective cohorts of navigated (n=100) and conventional (n=70) Duracon total knee replacements performed outwith this study over the same 5-year period. WITHIN the retrospective cohorts no statistically significant differences were found when comparing any of the aforementioned outcome scores. In addition, when comparing parallel scores between prospective and retrospective groups again no statistically significant differences were identified.

At 5-years post-operatively the functional outcome between computer navigated and conventional total knee replacement appears to be no different despite the better alignment achieved using navigation.

Presenter information: Paul, Harvie, Royal Perth Hospital, Perth, Australia, docpaul@live.co.uk

Periprosthetic Supracondylar knee fractures - Clinical and functional outcomes of three different methods of Management - Experience from three Trauma centres.

M Akula, W Reeves, S Gopal, E Tsiridis, P Stott, C Hatrick [London, United Kingdom]

The management of peri prosthetic supracondylarTKR fractures, in compromised local and systemic biology is quite challenging for a Surgeon. Method of management is principally determined by fracture configuration, quality of bone and stem and or cement and bone interface. We present our experience in treating these fractures, using locking plates, retrograde nails and distal femoral replacement prosthesis.

After approval by the institutional review board at each of the three participating Level I trauma centres, patients with a supracondylar femoral fracture above an existing TKR admitted between 2003 and 2010 were identified from the prospective institutional orthopaedic trauma databases. Sixty six cases were identified and case notes were reviewed by two authors. Clinical outcomes range of motion, weight bearing status, union time & complications analyzed. Functional outcomes analyzed using Oxford knee score & European quality of life score. All data were analysed using descriptive statistics (means and proportions). Adequate post-operative follow-up was defined as a minimum of 6 months.

Out of a total of 66 fractures , 54 cases were included for final analysis after implementing inclusion criterion. 35 cases were treated with locking plates, 16 treated with nails, and three cases with distal femoral replacement prosthesis. 97% cases healed at mean time of 4.65 months. Functional weight bearing status achieved in 3.2 months in Nailing group, & 5.7 months in Plating group with a p value of 0.01. Radiological union time is 5.4 months in plating group & 4.8 months in nailing group with a p value of 0.63. The mean post operative flexion is 98 degrees. The mean Oxford knee score was 29 points, and the mean European quality of life index is 0.614. We conclude the choice of implant is to be determined by biology of fracture & the patient.

Presenter information: Maheswara, Akula, London Southwest deanery, London, United Kingdom, maheswara.akula@gmail.com

FUNCTIONAL OUTCOME FOLLOWING REVISION KNEE ARTHROPLASTY: THE ROLE OF CONSTRAINT AND INDICATION FOR SURGERY

A Malviya, N Brewster, D Weir, J Holland, D Deehan [Newcastle upon Tyne, United Kingdom]

We wished to explore the influence of constraint and various indications of surgery on functional outcome following knee revision arthroplasty..

In this single centre, prospective study we have looked into the outcome of 175 revision knee replacement performed between 2003 and 2008 at a minimum follow-up of 1 year. In all these the level of constraint was increased from cruciate retaining or cruciate sacrificing knee replacement to either non linked constrained implant (condylar constrained) or linked constrained (rotating hinge) prosthesis.

At one year significant improvement ($p < 0.001$) of WOMAC pain, function and pain score was seen. Significant improvement ($p < 0.05$) was noted in physical functioning, role physical, bodily pain and social functioning components of SF-36 score. 69% were satisfied with the overall procedure.

WOMAC function, pain and stiffness score was significantly worse for patients revised for instability (27%) as compared to that for aseptic loosening (46%).

A significantly higher proportion of patients were satisfied with the procedure ($p < 0.001$); had a better quality of life ($p = 0.004$) and would have the surgery ($p = 0.005$) again in the aseptic loosening group as compared to the instability group. Level of constraint did not make any statistically significant difference in the outcome within either group.

The postoperative outcome scores for patients receiving two different levels of constraint was statistically not different. We found that increasing the level of constraint to linked constrained implant significantly ($p < 0.001$) deteriorated the ability to descend from stairs (Figure 4). Conversely it had a positive influence ($p = 0.01$) on ability to walk on flat.

In this prospective cohort study of a large group of patients we were not able to refute our null hypothesis that level of constraint would not influence functional outcome. We did note worse outcome in patients undergoing revision for instability irrespective of the degree of constraint used.

Presenter information: Ajay, Malviya, Freeman Hospital, Newcastle Upon Tyne, Newcastle upon Tyne, United Kingdom, malviya7@aol.com

Fixed or Mobile Bearing Unicompartmental Knee Replacement - A Randomised Controlled Trial

J Roche, B Joss, R DeSteiger, M Lisa, B Nivbrant, W David [Crawley, Australia]

There is ongoing debate on the benefits of fixed versus mobile bearing Unicompartmental Knee Replacement (UKR). We report the results from a randomised controlled trial comparing fixed and mobile bearing of the same UKR prosthesis. Forty patients were randomized to receive identical femoral components and either a fixed or mobile bearing tibial component. At 6.5 years follow-up 37% of the mobile bearing design had been revised and 14% for the fixed bearing design. The main reasons for revision were pain and loosening. These results are consistent with data from The Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR) that show a cumulative percent revision of 24.2% for the mobile bearing Preservation UKR at 6.5 years.

All locally explanted mobile bearings were examined microscopically, and 83% demonstrated significant backside wear. Constraint on the undersurface of the bearing coupled with a congruent upper surface may have contributed to the excessive revision rate.

This is the first randomised controlled trial examining mobile and fixed variations of the same UKR prosthesis and shows this design of UKR with the the mobile bearing has an unacceptably high revision rate and patients with this knee design should be closely monitored.

Presenter information: James, Roche, University of Western Australia, Crawley, Australia,
j.roche@doctors.org.uk

Patient Satisfaction after Total Knee Replacement - A prospective cohort study

S Shyamsundar, M Newey [Leicester, United Kingdom]

Introduction:

The relief of pain, restoration of functional activities and satisfaction of patients are the main outcomes of primary total knee arthroplasty (TKA). for the treatment of arthritis. We analysed patient satisfaction in the early post operative period following following TKAt.

Methods:

All patients who underwent TKAIN a 2 year period under care of the senior author was selected. The surgery was either performed by the senior author or by his trainee. Patients were evaluated with self-reported questionnaires prior to surgery followed by 2 and 6 months post-surgery. Medical Outcomes Study Short Form 36 (SF-36) was used to evaluate outcome. Patient demographics, post surgical complications and grade of surgeon performing the procedure were also obtained from the medical notes.

Results:

There were 94 consecutive patients with TKA. Mean age was 68.1 years. All patients suffered from osteoarthritis. All patients achieved significant improvements ($p=0.04$) in their SF-36 scores following surgery. There was no difference between grade of surgeons and outcome. None of the patients had any deep infections. Three of the patients developed DVT/PE. Two minor wound complications (blisters/superficial wound infection) were noted. Two patients had to go back to theatre one patient had a revision for malaligned femoral prosthesis and one patient had a manipulation under anaesthetic for stiffness. The patients who had complications had a slower improvement in their SF 36 questionnaires but at 6 months achieved similar scores to those without complications. Pain improved early ($p=0.05$) and plateaued while functional improvement was significant at 6 months check ($p=0.02$) rather than the 2 months check ($p=0.16$).

Conclusions:

At six months the patient satisfaction was consistent and uniform. Even those who had early complications were satisfied with the procedure. We conclude that short term patient satisfaction is very good for total knee arthroplasty in patients suffering osteoarthritis.

Presenter information: Srinivasan, Shyamsundar, University Hospitals of Leicester, Leicester, United Kingdom, sshyamsundar@hotmail.com

Rivaroxaban increases wound bleeding in hip and knee arthroplasty patients compared to Enoxaparin.

W Marlow, R Adam, J Walker, S Musthyala [Southport, United Kingdom]

Aim

This study aimed to determine whether Rivaroxaban causes increased wound site bleeding following total hip and knee arthroplasty.

Method

A retrospective audit of complications following hip and knee arthroplasty was conducted. Data was collected from notes and evaluated using Fisher's exact test and t-Test. Significance was determined if $p < 0.05$. The primary end-point was local wound site oozing or bleeding. Secondary end-points were drop in haemoglobin, drain output and infection.

Results

The Rivaroxaban cohort demonstrated a significant amount of increased wound oozing (27% vs. 0%) and major bleeding (24% vs. 0%) compared to the Enoxaparin group. Compared to those treated with other methods of thrombo-embolism prophylaxis, Rivaroxaban also significantly increased wound oozing (27% vs. 12%) and major bleeding (24% vs. 6%).

The Rivaroxaban cohort demonstrated a significantly increased drop in haemoglobin compared to a combined group treated with other methods of thrombo-embolism prophylaxis (3.0 vs. 2.4 g/dL).

There was no significant difference in drain volume or rate of infection between groups.

Conclusions

Rivaroxaban appears to cause increased wound site bleeding. Further use of Rivaroxaban at this centre was therefore discontinued. Prospective randomised controlled trial focused on wound complications is required to eliminate selection and reporter biases. The remaining questions are: Does this increased wound oozing cause increased infection or haematoma requiring drainage? Does it increase hospital stay? Does it affect joint function?

Presenter information: William, Marlow, Southport DGH, Southport, United Kingdom,
wjmarlow@doctors.net.uk

Hinge knee prostheses for complex knee arthropathies

H Gbejuade, M Hassaballa, J Wong, A Porteus, J Murray, J Robinson [Southmead Hospital, United Kingdom]

Introduction Patients with severe knee ligament instability remain a surgical challenge. Furthermore, in the presence of significant bone loss, constrained condylar revision implants may not be suitable. Hinged knee replacements have developed an important role in the management of instability in these subgroups of patients. Hinges also have an important role in case of rheumatoid arthritis, haemophilic arthropathy, neuropathic arthropathy, ankylosing spondylitis and as a limb salvage procedure.

Improving and satisfactory outcomes with Hinge knee prostheses is also possible due to design and material improvements over the years.

We present a review of 173 consecutive hinge knee arthroplasties (31 primary and 142 revisions) of 9 different models done in our institution between 1993 and 2009.

Method 173 consecutive hinges of 9 different types were studied. The common indications for the use of these Hinges include: severe instability, severe bone loss, recurrent dislocations, septic and aseptic loosening of prosthesis and as a salvage procedure where other prostheses have failed. Follow up period was 1 - 10 years. Validated knee scores such as American knee scoring system were recorded preoperatively and postoperatively at 1, 2 and 5 years. Postoperative complications, further management and outcome were also recorded.

Results The most common indication was found to be knee ligament deficiency leading to severe instability. The mean knee score improved from 24.4 preoperatively to 79.8 postoperatively.

Post-operatively, 4 of the Hinges required further revisions, 5 required manipulation under anaesthesia for stiffness, 3 new cases of joint infection and 2 cases required above knee amputation

Conclusion Hinge knee prostheses were found to provide a good outcome for pain relief, stability and a good functional outcome for complex primary and revision knee replacement cases that were beyond the scope of condylar replacement designs. The complications rate was low with 2 patients requiring above knee amputations

Presenter information: Herbert, Gbejuade, AOC Southmead Hospital, Southmead Hospital, United Kingdom, gbej1@yahoo.com

A prospective study of revision total knee replacements at a mean follow up of 11 years
P Chandran, K Patel, V Kumar, Y Hamed, P Kay, ML Porter [Wigan, United Kingdom]

Introduction

The aim of this study is to assess the functional outcome, patient perceived satisfaction and implant survival at a mean follow up of 11 years following revision knee replacement.

Patients and methods

All patients who had revision of total knee replacement using Endolink [Link, Hamburg] or TC3 [Depuy, Leeds] prosthesis between 1995 and 2002 at Warrington hospital, Warrington, were consented to take part in this study.

Data was collected prospectively which includes complications and functional assessment by Hospital for special surgery score, Oxford knee score and patient satisfaction questionnaire, pre-operatively and post-operatively at 2 years, 5 years and at the latest follow-up.

Between 1995 and 2002, 229 revision knee replacements were performed, 161 patients had TC3 prosthesis and 68 had Endolink, 65% were Females, the mean age was 68 yrs. 53 patients had intra-operative positive culture, 35 had 2 stage revision. 158 are still alive and are on regular follow up.

Results

At a mean follow up of 11 years [9-15], with revision of any reason as the end point the survival of revision knee replacement in our patient group is 89%. Further surgery was performed in 24 which includes 2 patients who had above knee amputation. The re-revision rate in the non-infected group [13%] was significantly higher compared to the re-revision in infected group [3%].

There was a significant improvement in HSS scores, Oxford scores and patient satisfaction following surgery; however the scores were on the lower side. The functional scores improved to a lesser extent in patients with proven infection.

Discussion and Conclusion

In our study group the implant survival for revision knee replacement using Endolink or TC3 prosthesis is 89% at a mean follow up of 11 years. The infected group had lower re-revision rates. The improvement in functional scores is lower following revision for infection.

Presenter information: Prakash, Chandran, Warrington Wigan and Leigh NHS Foundation Trust,
Wigan, United Kingdom, prakachandran@yahoo.co.uk

Outcome of revision surgery for infected Total Knee Replacement at a mean follow up of 11 years, a prospective study

P Chandran, K patel, V Kumar, Y Hamed, P kay, ML Porter [Wigan, United Kingdom]

Introduction

The aim of this study is to assess the functional outcome, patient satisfaction and implant survival at a mean follow up of 11 years following revision for infected total knee replacement.

Patients and methods

All patients who had revision of total knee replacement for infection between 1995 and 2002 at Wriglington hospital, Wriglington were consented to take part in this prospective study.

Data was collected prospectively which includes intra-operative cultures, complications and functional assessment by Hospital for special surgery score, Oxford knee score and patient satisfaction questioner, pre-operatively and post-operatively at 2 years, 5 years and at the latest follow-up.

Between 1995 and 2002, 61 revision knee replacements were performed for infection, 53 patients had intra-operative positive culture, 35 had 2 stage revision. 70% were Females; mean age at revision was 65 yrs. Most common organism was staphylococcus aureus in 30%, followed by staphylococcus epidermides in 22%. 36 are still alive and are on regular follow up.

Results

At a mean follow up of 11 years [9-15], 2 patients had above knee amputation following failure to control infection. No patients had further revision of the knee. 1 patient has chronic infection and is on long term suppressive antibiotics. With revision as the end point, the survival of the revision knee replacement for infection in our patient group is 96%. There was a significant improvement in HSS scores, Oxford scores and patient satisfaction following surgery; however the scores were on the lower side. There was no difference in functional outcome between the single stage revision and 2 stage revision group.

Discussion and Conclusion

In our study group the implant survival for revision of infected total knee replacement is 96%. There was a significant improvement in functional scores however the total scores are still low suggesting lower levels of function.

Presenter information: Prakash, Chandran, Wriglington wigan and leigh NHS foundation Trust, Wigan, United Kingdom, prakachandran@yahoo.co.uk

Conversion of a resurfacing Unicompartmental Knee Replacement to Total Knee Replacement - Is it as successful as primary Total Knee Replacement?

O Abouazza, T O'Donnell [Dublin, Ireland]

Reported advantages of unicompartmental knee replacement (UKR) over total knee replacement (TKR) include, quicker rehabilitation, better range of motion and improved proprioception and kinematics. These advantages have been enabled by improvements in prosthetic design, instrumentation, surgical technique and proper patient selection. Reported longevity of UKRs, regardless of design, still does not compare as favourably as that of TKR. Conversion of a UKR to TKR is likely to become increasingly commonplace as the popularity of UKR grows.

We retrospectively reviewed records of 56 consecutive patients (Group A), who underwent TKR for a failed UKR from 2003-2008. Information recorded included demographic data and limb alignment. We chose a cohort of 56 patients (Group B) who had undergone a primary TKR from the same surgeon's database that most closely resembled the study cohort in terms of sex, age, and BMI.

The average time the UKR was in place prior to revision was 48.3 months. The most common reason for revision was progression of symptomatic disease to other compartments, accounting for 52% of all revisions but 43% of patients didn't have isolated compartmental disease at time of the initial surgery. There was no significant difference between the 2 groups in all parameters. In group A, particulate bone graft was used to fill contained defects in 12 knees, augments were used in 4 knees, and stemmed prostheses were used in 2 knees.

While technically challenging, conversion of a UKR to a TKR is a successful procedure, with results similar to those of patients undergoing primary TKR. Due to the minimal resection of bone in the primary UKR procedure, the use of augments or stems when revising to a TKR is uncommon. This should reassure both surgeon and patient when considering a partial knee arthroplasty as an alternative to total joint replacement for unicompartmental degenerative disease.

Presenter information: Omar, Abouazza, UPMC Beacon Hospital, Dublin, Ireland,
omar.abouazza@gmail.com

Outcomes of Infected Revision Knee Arthroplasty in a Tertiary Referral Centre

J Stammers, S Kahane, S Malek, W Aston, J Miles, R Pollock, R Carrington, T Briggs, J Skinner [London, United Kingdom]

Introduction

Infection after knee arthroplasty is a devastating complication. Our aim is to present our outcomes of treating infected knee replacements at a tertiary referral centre.

Method

We performed a consecutive, retrospective case series of all revision knee arthroplasty for infection between January 2006 and December 2008. Case notes were reviewed and data recorded on the source of referral, operations prior to transfer, number and timing of operations at our institution, relevant blood results, microbiology, outcome and most recent follow up.

Results

During this 3 year period we performed 430 knee revision operations. 52 were performed for infection. 87% used custom made prostheses (SMILES, Stanmore Implants Worldwide). Forty four (85%) patients were referrals from other hospitals.

84% (21/25) had successful eradication where the referring hospital did not attempt revision and a 2-stage revision was performed at RNOH. Five primary knees from RNOH underwent a single 2-stage revision of which four are free of infection. Four of those remaining are on long-term antibiotics and one is awaiting further surgery.

In 19 cases from elsewhere and three from RNOH the initial 2-stage procedure failed to eradicate infection and a further 2-stage revision was performed. Of these, eleven patients were infection free, three remain on long-term antibiotics and eight have had an amputation.

There were no amputations following single 2-stage revision, however, the amputation rate is 42% where a second 2-stage revision failed.

Conclusion

After a single 2-stage revision procedure 82% are infection free at 29 months. Constrained, rotating hinge prostheses enable aggressive soft tissue debridement including ligament sacrifice. The success of performing a second 2-stage revision where previous attempt had failed dropped to 50% in contrast to the 77% success in repeat 2-stage revision of hips.

Presenter information: John, Stammers, Royal National Orthopaedic Hospital, Stanmore, London, United Kingdom, john.stammers@nhs.net

An evaluation of ligament balancing of total knee arthroplasty in various flexion angles using a CT-based navigation system

T Hiranaka, Y Hida, H Uemoto, M Doita, M Tsuji [Takatsuki, Japan]

In total knee arthroplasty (TKA), ligament balancing as well as leg alignment are fundamental in this operation. Although ligament balancing is adjusted at 0° to 90° of knee flexion, the importance of the other angles, which are frequently and actively used on a daily basis, is never considered. (OK) Computer navigation is invaluable for ensuring not only precise bone cutting but for in situ evaluation of kinematics. The aim of this study is to evaluate ligament balancing at various knee angles. In this study, 22 patients have undergone TKA (posterior stabilized mobile bearing type) using a CT-based navigation system. After implantation, valgus and varus stresses have been applied manually, and ligament balance is evaluated. Through the use of the navigation computer, the balance angle (BA) can be defined as the angle between the tibia and femur cutting plane under the valgus stress subtracted by that under the varus angle. A positive BA means that the medial side is looser than lateral side. Mean BA of knee flexion positions at 0°, 30°, 60°, 90°, 120° are, -1.5°, -4.8°, 5.1°, -0.9°, and -9.5°, respectively. Although a good ligament balance is accomplished at 0° and 90° of knee flexion, the lateral plane is looser than the medial plane at 30° and 120°, whereas the medial side is loose at the knee flexion position 60°. In conclusion, ligament balance is accomplished exclusively at a knee flexion angle of 0° and 90°. Further investigation is required to determine whether this imbalance can either be tolerated or should be resolved.

We evaluated ligament balancing in TKA at various knee angles using a computer navigation system.

Presenter information: Takafumi, Hiranaka, Takatsuki General Hospital, Takatsuki, Japan,
takafumi.hiranaka@gmail.com

Total Hip Replacement in Acute Intracapsular Proximal Femoral Fracture: The Role of Large Diameter Heads & Their Effect on Dislocation

S Kazzaz, G Cox, M Deakin [London, United Kingdom]

Introduction: Current literature supports the use of total hip replacement (THR) for the treatment of displaced intra-capsular proximal femoral fractures (DIPFF). Case series of patients receiving this treatment show dislocation rates higher than that of patients who have THR to treat osteoarthritis. Large diameter THR have mechanical advantages in terms of dislocation and their role in PFF has yet to be assessed.

Objectives: To assess the role of large-diameter total hip replacements on the rate of dislocation when used to treat displaced intra-capsular proximal femoral fractures.

Design: Single surgeon, case series

Level of evidence: Level IV

Setting: Level I trauma centre

Inclusion criteria:

1. Displaced intra-capsular proximal femoral fracture (Garden III & IV).
2. Independently mobile pre-operatively for distances greater than a mile, with no more than 1 stick as a mobility aid.
3. Abbreviated mental test score of 9/10 or greater

Exclusion criteria:

1. Patient under 60
2. Pathological fractures
3. 3) Additional fractures of the femur

Outcomes:

1. Mortality
2. Morbidity (Including dislocation)
3. Oxford Hip Score
4. SF12

Patients/Participants: Patients who presented between May 2006 and December 2008 and met the requirements had a CPTÒ (Zimmer) cemented femoral stem, using 3rd generation cementation techniques, and large diameter DuronÒ (Zimmer) head and cup (uncemented) inserted as a primary procedure via a modified Hardinge technique. Follow up was via routine clinic appointments, letter to GP and phone conversation with patient.

Results: 67 patients were selected (49 female) average age was 74.6 (67-87). Follow up was for an average of 14 months (3-39 months). No dislocations or deaths were recorded for this period of time.

Conclusions: This study suggests that the high rates of dislocation associated with THR for PPF can be limited by the use of large-diameter components. This study should be followed up by a multi-centre multi-surgeon study.

Presenter information: Sarmad, Kazzaz, RNOH-Stanmore, London, United Kingdom,
sarmadkazzaz@gmail.com

Sutures Reduce Wound Ooze Following Hip Fracture Surgery

DD McCaffrey, D White, D Kealey [Belfast, United Kingdom; Derry, United Kingdom]

Hip fracture patients are at increased risk of infection due to their age related poor medical health, immune response impairments and decreased capacity of wound healing. Wounds with delayed healing have been shown to carry a higher risk of developing infection than those which heal rapidly and uneventfully. Wound closure aims to accurately appose the skin edges thereby promoting rapid healing and restoration of the protective dermal barrier preventing underlying tissue from becoming colonized and invaded by potential pathogens. Failure to provide accurate skin apposition can result in delayed wound healing which is reflected by prolonged wound ooze. We hypothesized that skin closure via sutures is better at achieving skin edge apposition than wounds closed with staples, providing more rapid wound healing. We compared staples and sutures for wound closure in hip fracture patients by using ooze duration as an outcome measure. Duration of wound ooze was recorded in 170 patients. 65 wounds, closed with sutures, had an average duration of ooze of 1.82 days. 105 wounds, closed with staples, had an average duration of ooze of 4.97 days. This study suggests that sutures are superior to staples with regard to early wound healing in hip fracture patients.

Presenter information: Daniel Denis, McCaffrey, Royal Victoria Hospital, Belfast, United Kingdom, daniel.mccaffrey@doctors.net.uk

Are We Flatfooted In Our Investigation Of Acute Foot Injuries?

M O'Flaherty, A Wilson [Belfast, United Kingdom]

Objective: To assess the usefulness of radiographs alone to evaluate acute midfoot/forefoot injuries. We believe that foot injuries are often under-estimated and that CT scans should be routinely obtained to aid in their management and avoid additional morbidity for patients.

Materials & Methods: In 26 months, 255 patients had foot injuries requiring X-Rays. Of these patients, 94 (37%) had primary radiographs indicating midfoot or forefoot fractures, and 28 had subsequent CT scans. Radiographs were retrospectively re-evaluated with respect to fracture location, type, mechanism of injury and then compared with CT results.

Results: Of 255 patients, 213 (84%) had one or more fractures in their foot. A total of 397 fractures were seen with 105 patients having Os Calcis (41%) fractures. 94 patients (37%) had midfoot/forefoot fractures which included the 28 patients with subsequent CT scans. 56 patients (22%) had no injury. Of those patients with midfoot/forefoot injuries, 61 fractures were seen on plain radiographs and an additional 74 were identified on CT scanning.

The major mechanism of injury in these patients was Road Traffic Accident (26 patients [28%]). Commonly missed individual fractures on plain radiography were Metatarsal (29), Cuboid (12) and Cuneiform fractures (11). Nine of the 29 (31%) metatarsal bone fractures involved missed fracture-dislocations of the Lisfranc joint. Other new fractures included Talus (4), Navicular (3), Os Calcis (2) and Tibia (2).

48 required operative fixation, including 20 patients that underwent CT scanning.

We found that the sensitivity of radiographs in detection of midfoot fractures was low at 44%, and only 50% in forefoot injuries.

Conclusion: In patients with high energy foot injury, and those with suspected complex injury, the sensitivity of radiography is only moderate at best. We suggest that CT scanning as the primary imaging modality would lead to a decrease in their morbidity.

Presenter information: Maurice, O'Flaherty, Royal Victoria Hospital, Belfast, Belfast, United Kingdom, mof@doctors.org.uk

Nutritional status of elderly trauma patients presenting to a South Dublin Teaching Hospital

L Banks, N Byrne, S Henari, A Cornwell-Clarke, S Morris, J McElwain [Dublin, Ireland]

Background

It has been hypothesised that elderly orthopaedic trauma patients may be malnourished when compared to the general population. We conducted an observational study to identify if this was the case.

Methods

30 elderly trauma patients (≥ 65 years) admitted to the orthopaedic unit were recruited. Serum markers (albumin, urea, creatinine, sodium, potassium, haemoglobin, white cell count, platelets, lymphocytes, C-reactive protein, magnesium, calcium) anthropometric measurements (triceps skin-fold thickness, mid-arm circumference, body mass index) and short form mini-nutritional assessment (MNA-SF[®]) were carried out at presentation and at 3 months post-operation. Serum markers were also repeated at day 1 and day 3 post-operation.

Results

60% had an initial MNA-SF[®] score of ≤ 11 points indicating that they were at risk from possible malnutrition. However, median BMI at presentation was normal at 22.79 kg/m^2 (WHO guidelines) (Interquartile range [IQR] 19.8-28). Interestingly, a higher proportion of the group (67%) were below the 50th centile for age related BMI centiles. At follow-up (15 patients), there was no significant difference in anthropometric measures. The mean MNA-SF[®] had increased, but not significantly ($p = 0.121$).

Conclusions

It could be extrapolated from this study that elderly trauma patients may be at risk of malnutrition regardless of their BMI at presentation and should be screened using validated nutrition screening tools and monitored. The use of age specific centiles is also recommended. Further research is needed using larger sample sizes to confirm these findings.

Presenter information: Louisa, Banks, Adelaide and Meath Hospital, Dublin, Ireland,
louisabanks@hotmail.com

Minimally Invasive Percutaneous Plate Osteosynthesis For Distal Tibial Fractures **SK Nanjayan, D Deakin, S Milner [Derby, United Kingdom]**

Introduction Minimally invasive plate osteosynthesis (MIPO) is a relatively new surgical technique for the management of distal tibial fractures. The aim of this study was to determine the effectiveness of the MIPO technique for distal tibial fractures. **Methods** Between 2004 and 2010 twenty nine consecutive patients had distal tibial fractures treated with MIPO by the senior author. An anteromedial plate (Synthes®) was used for all patients. Case notes and radiographs of all patients were reviewed and data, including demographics, fracture classification, complications and fracture healing were recorded on a database. **Results** 29 Patients with a median age of 46 (range 25 - 82) were reviewed. 12 were female and 17 were male. Mean follow-up was 6.24 months. Using the AO classification there were 16 type A, 1 type B and 12 were type C fractures. Ruedi Allgower classification showed 6 Group I fractures, 5 Group II fractures and 2 Group III fractures. There were no open fractures. 5 patients had temporary external fixation prior to MIPO. 28 patients had associated fibular fractures of which 6 required open reduction and internal fixation (through a separate surgical incision). There were no post operative wound complications. No malunion or intraarticular displacement was noted radiographically. Two patients had delayed union but went on to heal without secondary procedures. There were no cases of non union. Two patients subsequently had their plates removed due to prominence of the metal work. **Conclusion** We conclude that the MIPO technique is safe and effective treatment for the management of distal tibial fractures and is associated with low complication rates.

Presenter information: Shashi Kumar, Nanjayan, Royal Derby Hospital, Derby, United Kingdom, shashikumartn@gmail.com

Implant failure in Subtrochanteric Fractures

D White, L Cusick, R Napier, J Elliott, A Adair [Belfast, United Kingdom]

To determine the outcome of subtrochanteric fractures treated by intramedullary (IM) nailing and identify causes for implant failure.

We performed a retrospective analysis of all subtrochanteric fractures treated by intramedullary nailing in Belfast trauma units between February 2006 and 2009. This subgroup of patients was identified using the Fractures Outcome Research Database (FORD). Demographic data, implant type, operative details, duration of surgery and level of operator were collected and presented. Post-operative X-rays were assessed for accuracy of reduction.

One hundred and twenty two (122) patients were identified as having a subtrochanteric fracture treated by IM nailing. There were 79 females and 43 males. Age range was 16 to 93 (mean 78). 95 (78%) cases were performed by training grades and 27 (22%) by consultants. Duration of surgery ranged from 73-129mins (mean 87mins). 47 patients (38.5%) were found to have a suboptimal reduction and 75 patients (61.5%) had an anatomical reduction on immediate post-operative x-ray. One year from surgery 73/122 patients were available for follow up. Of those patients with suboptimal reduction, 13/47 (27.7%) required further surgery. 8 required complete revision with bone grafting, and 5 underwent dynamisation. A further 6 patients had incomplete union. In the anatomical group, 4 patients underwent further surgery (5%). 3 required dynamisation and one had exchange nailing for an infected non-union. 3 patients had incomplete union at last follow up. 5/47 (10.6%) had open reduction in the suboptimal group compared to 25/75 (33.3%) in the anatomical group. Of the 27 cases performed by consultants, 13 (48%) were open reduction, compared to 17/93 (18%) by training grades.

This study has shown that inadequate reduction of subtrochanteric fractures, leads to increased rates of non union and ultimately implant failure. We recommend a low threshold for performing open reduction to ensure anatomical reduction is achieved in all cases.

Presenter information: David, White, Royal Victoria Hospital, Belfast, Belfast, United Kingdom, theafroking13@hotmail.com

Delayed debridement increases risk of deep infection among high grade open fractures
P Hull, R Jenkinson, J Essue, S Johnson, H Kreder [Toronto, Canada]

Background

Traditional recommendations suggest that open fractures require urgent surgical debridement to reduce infection. However, this has recently been challenged by a number of investigations. However, in many cases, these studies were not able to control for important confounding factors. The purpose of our study was to evaluate the relationship between delay to definitive surgical debridement while controlling for important confounders.

Method

364 patients with 459 open fractures treated at a level one trauma centre over four years were reviewed. Time to definitive surgical debridement was modelled as a predictor of infection while controlling for fracture grade, anatomic site of fracture, and presence of significant contamination. Time to debridement was modelled as both a continuous variable and as a categorical variable with cut-points at 6 and 12 hours of delay.

Results

46 deep infections occurred in 459 fractures (10%). There were no infections among grade one open fractures (0/55). Delay to debridement using cut-points of 6 hours and 12 hours was not associated with an increased infection rate. However, with delay to debridement analyzed as a continuous variable each additional hour of delay was associated with an increase in the odds of infection (OR=1.033 95%CI 1.01-1.057). Multivariable analysis also showed that infection was associated with tibial fractures (OR=2.44 95%CI 1.26-4.73), higher Anderson & Gustillo grade (OR=1.99 95%CI 1.004-3.954), and gross contamination (OR=3.12 95%CI 1.36- 7.36).

Among more severe open fractures the impact of delay to debridement translates into a larger absolute increase in probability of infection.

Conclusion

We recommend that higher grade open fractures be treated with definitive debridement as soon as possible given that the risk of infection increases in a linear fashion with time delay.

For severe open fractures, especially tibial, we recommend emergent debridement as soon as the patient has been resuscitated and is stable enough to undergo surgery.

Presenter information: Peter, Hull, Sunnybrook Health Sciences Centre, Toronto, Canada,
hullpd@gmail.com

Use of Proximal Femoral Nailing Antirotation (PFNA) for hip fracture fixation: A independent centre experience of a recently introduced implant
K Singiseti, P Mereddy, N Cooke [Stockton on Tees, United Kingdom]

Introduction:

Internal fixation of pertrochanteric fractures is evolving as newer implants are being developed. Proximal Femoral Nail Antirotation (PFNA) is a recently introduced implant from AO/ASIF designed to compact the cancellous bone and may be particularly useful in unstable and osteoporotic hip fractures. This study is a single and independent centre experience of this implant used in management of acute hip fractures.

Methods:

68 patients involving 68 PFNA nailing procedures done over a period of 2 years (2007-09) were included in the study. Average follow-up period of patients was 1 year. AO classification for trochanteric fractures was used to classify all the fractures. Radiological parameters including tip-apex distance and neck shaft angle measurement were assessed.

Results:

Average age of patients included in the study was 80 years. 18 patients died during the follow up period due to non-procedure related causes. Average tip-apex distance was 12.7 mm and radiological fracture union time was 5 months. Revision of short to a long PFNA was needed for periprosthetic fracture of shaft of femur in two patients. Two patients needed a complex total hip replacement eventually and further two patients had removal of the implant due to PFNA blade penetration through the femoral head.

Discussion:

PFNA is a technically demanding procedure and has a learning curve. Our experience shows that it is a useful implant in unstable pertrochanteric fracture fixation. A close radiological and clinical follow up is recommended due to the risk of late fracture and implant related complications.

Presenter information: Kiran, Singiseti, University Hospital of North Tees, Stockton on Tees, United Kingdom, kiransingiseti@gmail.com

A predetermined first patient on the trauma list can improve theatre start times
S Javed, C Peck, D Salthouse, M Woodruff [Preston, United Kingdom]

Introduction: The concept of a predetermined first patient on the following days trauma list (the golden patient) was introduced to our hospital in April 2009. The golden patient (GP) should already have been seen by an anaesthetist and be ready to be sent for by theatres early. The aim was to improve theatre start times following disappointing results from a previous in-hospital study. It has been shown by others to improve operation start times and could be used to improve trauma services and meet clinical targets more readily.

Methods: This prospective study involved the collection of planned trauma lists with the designated GP over November and December 2009. Data was collected from theatre logbooks and included patient demographics, theatre arrival, anaesthetic and operation start times. This was compared with the pre-GP data (January and February 2009). A two sample T-test was used to evaluate statistical significance between groups.

Results: Of the 55 planned trauma lists analysed, 42 had a designated GP on it (76%), 37 of which remained first on the actual trauma list (88%). The mean theatre reception arrival time for the pre-GP lists was 09:25 compared to 09:01 for the actual GP lists ($P < 0.001$). The mean anaesthetic start time for the pre-GP lists was 09:35 compared to 09:09 for the actual GP lists ($P < 0.001$). The mean operation start time for the pre-GP lists was 10:03 compared to 09:33 for the actual GP lists ($P < 0.001$). The start times for pre-GP lists compared with lists where no GP was selected were not statistically significant.

Conclusion: The introduction of the GP to our trauma lists has made a significant improvement to theatre start times. This simple concept has the potential to increase the productivity of trauma theatres in the UK, leading to improved care of trauma patients.

Presenter information: Saqib, Javed, Royal Preston Hospital, Preston, United Kingdom,
shehzada50@doctors.org.uk

Discharge Destination and Rehabilitation Following Neck of Femur Fractures in Patients Living in Their Own Home

S Nanjayan, C Brankin, R Warriar, T Abuzakuk [Derby, United Kingdom]

Introduction

There is conflicting evidence in the literature regarding outcome of patients living in their own home prior to a fracture neck of femur, when using discharge destination and rehabilitation as measures of outcome. We investigated the factors predicting outcome following neck of femur (NOF) fractures, in patients previously living in their own home

Method

Medical records of all 292 patients admitted to Royal Derby Hospital between January and October 2010 with a fractured NOF (who lived in their own home prior to admission) were obtained retrospectively. Data included patient demographics; type of surgical intervention; mobility status and level of independence before admission; nature of fracture and patients' ASA grade. Outcome measures including: number of days spent in hospital; number of days spent in rehabilitation; mortality; mobility on discharge; and discharge destination, were also sought. Data was analysed using SPSS Version 18.

Results

On discharge from the trust 101 (34.6%) patients returned to their own home. Twelve patients died before discharge from the trust. 5 patients (1.7%) needed nursing home care and one patient (0.3%) needed residential home care. Prior to their fracture 164 (56.2%) patients were able to walk indoors with no aids, which dropped dramatically to four (1.4%) patients at discharge. 150 patients needed a median number of 28 days of extended rehabilitation period. Higher pre-operative ASA grades were associated with a higher median number of days spent in hospital

Conclusion

A delay in surgery due to the patient being medically unfit was associated with a longer hospital stay, delay in surgery for administrative and logistical reasons however did not increase the median number of days spent in hospital. A longer extended rehabilitation period was associated with internal fixation with DHS/IM Nail, a higher pre-operative ASA grade, and a greater number of days from fracture to mobilisation.

Presenter information: Shashi, Nanjayan, Royal Derby Hospital, Derby, United Kingdom,
shashikumartn@gmail.com

Clavicle non-union: autologous bone graft is not a necessary augment for internal fixation
JF Baker, H Mullett [Dublin, Ireland]

Purpose

The aim of this study was to report the outcomes of a series of patients with clavicle fracture non-union who had undergone open reduction and internal fixation using a contoured locking plate without the use of distant bone graft.

Methods

Patients were identified using the hospital database. Records were reviewed to determine basic demographics, operative findings, and radiological outcome. Patients were contacted and details about initial injury and treatment, and return to work and sport were recorded. Disabilities of Arm, Shoulder and Hand (DASH) for both operated and non-operated shoulders were completed.

Results

15 patients with at least 6 months follow-up (average 12.4) were identified. The average age was 39 years. All patients were initially treated in a broad arm sling. All fractures were fixed with a pre-contoured locking plate and all went on to achieve clinical and radiological union. The average DASH on the operated side was 14.5 and 4.2 on the contralateral. All patients had returned to work and regular sport activities. One patient required plate removal due to local irritation.

Conclusion

The results of this small series suggest that use of distant bone graft is not necessary when performing ORIF for symptomatic non-union of the clavicle with appropriate preparation of fracture ends and adequate fixation.

Presenter information: Joseph F, Baker, Sports Surgery Clinic, Dublin, Ireland,
joseph.f.baker@gmail.com

Increased risk of peri-operative mortality after Cemented hemiarthroplasty for hip fracture surgery

M Hossain, G Andrew [Bangor, United Kingdom]

Introduction:

Following National patient safety alert on cement use in hip fracture surgery, we investigated the incidence and pattern of 72 hours peri-operative mortality after hip fracture surgery in a District General Hospital.

Methods:

We reviewed all patients who had hip fracture surgery between 2005-April, 2010. We recorded demographic variables, type of fracture, implant used, medical co-morbidity, seniority of operating surgeon and anaesthetist, peri-operative haemodynamic status, time and cause of death.

Results:

Over a 64 month period 15 cases were identified. Peri-operative death (PAD) was 1% (15/1402). 4/15 patients died intra-operatively. PAD was highest following Exeter Trauma Stem (ETS) implantation (5/85, 6%) and nil following Bipolar arthroplasty, Austin-Moore arthroplasty (AMA) or Cannulated screw fixation. PAD following total hip arthroplasty was 4% (1/25), Thompson's hemi-arthroplasty 2% (3/191), and Dynamic Hip Screw fixation 1% (6/695). Overall mortality after cemented implant was 2%. ETS implantation led to significantly increased peri-operative mortality compared to AMA ($p=0.004$). Operations were performed by both trainees (12) and Consultants (3). Both trainees (9) and Consultants (6) anaesthetised the patients. None of the patients belonged to ASA I or II (ASA III 6 and IV 9). All patients had significant cardio-vascular or pulmonary co-morbidity (Ca Lung 2, pulmonary fibrosis 1, end stage COAD 1, AF 6). Cemented implant insertion was followed by immediate haemodynamic collapse and death in 4/15, intra-operative haemodynamic instability in 1/15 and peri-operative instability in 5/15. Post-mortem was performed in 5/15: 2/5 were Pulmonary Embolism (PE), 2/5 bronchopneumonia and 1/5 Myocardial infarction (MI). 4/15 had suspected MI and 1/15 suspected PE.

Conclusion:

There was 1% risk of peri-operative death after hip fracture surgery. This risk was increased following cemented hemiarthroplasty and highest after ETS implantation. Risk was exacerbated in patients with pre-existing cardiovascular morbidity and independent of the seniority of the surgeon or the anaesthetist.

Presenter information: Munier, Hossain, Ysbyty Gwynedd, Bangor, United Kingdom,
munierh@doctors.org.uk

A study assessing whether patients can correctly identify the surgical procedure undergone after hip fracture surgery and the effectiveness of their informed consent
P Lee, A Morgan, S Batra, P Alderman [Cardiff, United Kingdom]

Background: Despite studies into patient consent and their understanding of the potential risks of trauma surgery, no study has looked at the patient's understanding of the procedure involved with neck of femur fracture surgery.

Method: Prospective analysis of 150 patients who had operative fixation of neck of femur fractures in a district general hospital. Patients were asked on the third post-operative day to select which procedure they had undergone from a diagram of four different neck of femur surgeries (cannulated screws, cephalomedullary nail, dynamic hip screw and hemiarthroplasty). Exclusion criteria for patient selection - mini mental score of < 20 and confusion secondary to delirium.

Results: All patients had signed consent form 1 which was matched to the procedure. All patients were consented by an FP2, CT1 or other SHO. The mean age of patients was 83years. 5% had cannulated screw fixation, 45% had a hemiarthroplasty, 42% had a dynamic hip screw and 8% had a cephalomedullary nail. 47% of patients could correctly identify the procedure they had undergone on the 3rd post-operative day.

Conclusions: This study shows that there are questions about the effectiveness of informed consent and patient understanding of the procedure before and after hip fracture surgery. We suggest that further detailed studies may highlight the need for alternative ways of communicating procedures to the patients or that more specialised training is required for those explaining hip fracture surgery to patients. Improvements in these areas might help ensure the true informed consent required.

Presenter information: Paul, Lee, Cardiff University, Cardiff, United Kingdom,
paul@medtaste.co.uk

Surgically managed knee dislocations: Return to function
R Khakha, J Gibbs, J Hull, A Perry, H Chissell, P Hill [Frimley, United Kingdom]

Introduction: It is now widely accepted that acute knee dislocations should be managed operatively. Most published studies are from outside the UK and from major trauma or specialist centres. The aim of the study is to report the functional outcomes of all patients presenting with an acute knee dislocation at our institution all of whom were surgically managed. The results were then compared to other published series. The hypothesis being that there would be no significant difference in the functional outcome scores between the groups.

Methods: All patients presenting with an acute knee dislocation over the last 15 years were included in the study. The patients were followed up using functional assessment scores: Knee outcome score (ADL), Knee outcome score (sports), Tegner Lysholm Scores and overall Patient Satisfaction. The patients were classified according to the Schecnk classification of knee dislocations.

Results: There were 22 patients in total, 21 male and 1 female. Average age was 42 years (range 16-54 years). The mean follow up was 6.3 years (range 1-15 years). The mean Knee Outcomes Score for ADL was 86% (68-100) and for Sports was 84% (44-100). The mean Tegner Lysholm Score was 82% (59-91) and the Overall Patient Satisfaction mean score was 77% (60-95). These results are comparable to other published data with no significant difference between the groups.

Conclusion: Satisfactory functional results can be obtained for surgically treated acute knee dislocations in a UK non-specialist centre.

Presenter information: Raghbir, Khakha, Frimley Park Hospital, Frimley, United Kingdom,
raghbir1@yahoo.co.uk

To cement or not to cement? Selective uncemented hemiarthroplasty in elderly patients with intracapsular hip fractures; the Highland experience.
S McKenna, S Kelly [Inverness, United Kingdom]

Current evidence suggests that we should be moving away from Thompson's hemiarthroplasties for patients with intracapsular hip fractures. Furthermore, the use of cement when inserting these prostheses is controversial. This study aims to show the Inverness experience.

We performed a retrospective review of all NHS Highland patients who underwent a hemiarthroplasty for an intracapsular neck of femur fracture over the last 15 years. Demographics and the use of cement were documented. Further analysis of this group was performed to identify any of these patients who required revision of their prosthesis. Patients requiring revision had their case-notes reviewed to identify the cause for further surgery.

From 1996 until present 2221 patients from the Highland area had a hemiarthroplasty for an intracapsular neck of femur fracture. 1708 were female (77%) and 513 male (23%). The ages ranged from 28 years to 104 years (mean 80 years, median 81). 2180 of this group had their operations in Raigmore Hospital with the remaining 41 at various centres throughout Scotland. 623 (28%) had a cemented hemiarthroplasty, with the remaining 1578 (72%) having an uncemented Thompson's hemiarthroplasty. The revision rate for the cemented group was 2% (13 of 623 patients). In the uncemented group it was 0.4% (6 of 1578). Reasons from revision included dislocation, periprosthetic fracture, infection and pain.

Current evidence from some joint registers regarding the use of Thompson's hemiarthroplasty in the elderly is discouraging. The use of bone cement in this group with multiple co-morbidities is not without its risks. Our data suggests that uncemented Thompson's hemiarthroplasties in low demand elderly patients with multiple co-morbidities can yield excellent results with less risk to the patients.

Presenter information: Sean, McKenna, NHS Highland, Inverness, United Kingdom,
s.mckenna@doctors.org.uk

How much improvement do we expect to see in Patients undergoing Volar locking Plate fixation for distal radius fractures in the first year?

S Baliga, A Johnstone, C Carnegie [Aberdeen, United Kingdom]

Introduction and Aim

Volar Locking Plates (VLP) have revolutionised the treatment of distal radius fractures allowing the anatomic reduction and stable fixation of the more comminuted and unstable of fractures. The benefits of this in terms of range of movement (ROM), pain and earlier return to work and daily activities is documented. However we were interested in was what improvements in wrist function patients made from 6 to 12 months after injury?

Methods

We retrospectively looked at a series of 34 consecutive patients that had undergone VLP fixation through a standard anterior approach followed by early physiotherapy. We documented standard demographics and assessed function in terms of Range of Movement , Grip strength (GS), Modified Gartland and Werley score (MGWS), Patient Rated Wrist Evaluation (PRWE) and the quick DASH questionnaire at six and twelve months

Results

Two patients were excluded from analysis as they failed to make both assessments. Of the 32 remaining (26 female:6 male) the mean age was 53.2yrs; range (26-78). On average GS, PGS, VAS function and pain did not improve. There was a modest improvement in Movement; Wrist Flexion-13 deg, Wrist Extension-14deg, Radial Deviation-7deg, Ulnar Deviation-9deg. There was no improvement in pronation and supination.

There was little improvement in qDASH, PRWE and mGW Scores with only a mean 1.8, 5.6 and 3.6 point improvement respectively.

Conclusion

Patients undergoing VLP fixation for distal radius fracture regain the majority of wrist function in the first 6 months and are unlikely to see improvement in function objectively and subjectively after this. We feel patients must be made aware of this prior to intervention and in the early post-operative period to optimise patient satisfaction.

Presenter information: Santosh, Baliga, Aberdeen Royal Infirmary, Aberdeen, United Kingdom, santoshbaliga@doctors.org.uk

Outcome of Expert Tibial Nailing for distal third tibial fractures **A Mahmood, JJ George Malal, S Abdul Majeed [Wirral, United Kingdom]**

Aim

The purpose of the study was to evaluate the results of Expert tibial nailing for distal tibial fractures.

Methods

All patients who had a distal third or distal end fracture of the tibia treated with the Expert tibial nail over a three year period at our institution were included in the study. A total of 44 distal tibial fractures in the same number of patients were treated with the nailing system. One patient died in the immediate post operative period from complications not directly related to the procedure and 3 were lost to follow up leaving a cohort of 40 patients for evaluation. 31 of the fractures were closed while the remaining 9 were open. The average age group of the cohort was 46.8 years with 26 males and 14 females.

Results

All 40 patients were followed up to full radiological union of their tibia fractures. The average time to radiological union was 12.5 weeks for the closed fracture group and 15.1 weeks for the open fractures. The difference in time to union between the two groups was not statistically significant. There was infection around a distal locking screw in a closed fracture which settled with screw removal. Three patients in the closed fracture group required dynamisation to hasten union while none required dynamisation in the open fracture group. No bone grafting was performed on any of the patients. One patient had non union of a distal fibula fracture which required plating of as an additional procedure.

Conclusion

The Expert tibial nail is an effective implant for the treatment of both open and closed distal tibial fractures with a low complication rate.

Presenter information: Aatif, Mahmood, Wirral University Teaching Hospital NHS Foundation Trust, Wirral, United Kingdom, aatifm@gmail.com

Plate fixation of mid-shaft clavicle fractures: A biomechanical comparison of unicortical, bicortical, locking and nonlocking options

LAK Khan, R Wallace, AWH Simpson, CM Robinson [Edinburgh, United Kingdom]

Background

Injury to the subclavian vessels is a recognised complication during plate fixation of clavicle fractures, one strategy to minimise this risk is the use of unicortical screw fixation. The aim of this study was to compare biomechanical properties of pre-contoured plate fixation using different screw fixation modes in a mid-shaft clavicle fracture model.

Methods

Fourth generation biomechanical clavicle sawbones with a mid-shaft osteotomy were plated in one of three modes: nonlocking bicortical, locking bicortical and locking unicortical mode. The specimens were then tested to failure in four-point bending and pull-off tests.

Results

Failure due to fracture through the sawbone was more common in nonlocking bicortical mode while plate bending was more common in the locking bicortical group. The ultimate load at failure was significantly lower in the locking bicortical group compared to the nonlocking bicortical group, however there was no significant difference between the locking unicortical group and nonlocking bicortical group.

In the pull-off tests 100% of nonlocking bicortical and locking bicortical plates failed by fracture of the sawbone. 100% of the locking unicortical plates failed by plate and screw pull-off from the sawbone. The load at failure was highest for the locking unicortical plate but this was not significantly different to the other groups.

Conclusion

This study shows that specimens fixed with locking unicortical screw fixation withstood comparable or superior loads in four-point bending and pull-off test when compared to nonlocking bicortical and locking bicortical screw fixation. In addition both locking screws and unicortical screws appear to provide a protective effect against periprosthetic sawbone fracture. Locking unicortical screw fixation of pre-contoured plates may be a viable alternative in the fixation of mid-shaft clavicle fractures.

Presenter information: Lukman Ahmed Kashif, Khan, Royal Infirmary of Edinburgh, Edinburgh, United Kingdom, kash_khan@hotmail.com

The risk of injury to the anterior tibial artery in the posterolateral approach to the tibial plateau. A cadaver study.

S Lidder, N Heidari, W Grechenig, H Clements, N Tesch, A Weinberg [London, United Kingdom; Graz, Austria]

Introduction Posterolateral tibial plateau fractures account for 7 % of all proximal tibial fractures. Their fixation often requires posterolateral buttress plating. Approaches for the posterolateral corner are not extensile beyond the perforation of the anterior tibial artery through the interosseous membrane. This study aims to provide accurate data about the inferior limit of dissection by providing measurements of the anterior tibial artery from the lateral joint line as it pierces the interosseous membrane. **Materials and Methods** Forty unpaired adult lower limbs cadavers were used. The posterolateral approach to the proximal tibia was performed as described by Frosch et al. Perpendicular measurements were made from the posterior limit of the articular surface of the lateral tibial plateau and fibula head to the perforation of the anterior tibial artery through the interosseous membrane. **Results** The anterior tibial artery coursed through the interosseous membrane at 46.3 +/- 9.0 mm (range 27 - 62 mm) distal to the lateral tibial plateau and 35.7 +/- 9.0 mm (range 17 - 50 mm) distal to the fibula head. There was no significant difference between right or left sided knees. **Discussion** This cadaveric study demonstrates the safe zone (min 27 mm, mean 45mm) up to which distal exposure can be performed for fracture manipulation and safe application of a buttress plate for displaced posterolateral tibial plateau fractures. Evidence demonstrates quality of reduction correlates with clinical outcome and the surgeon can expect to be able to use a small fragment buttress plate of up to 45mm as this is the mean.

Presenter information: Surjit, Lidder, The Royal London Hospital, London, United Kingdom, surjitliddle@me.com

Intramedullary fixation of diaphyseal clavicle fractures using the Rockwood Clavicle pin: A review of 68 cases.

P Ralte, S Grant, D Withers, R Walton, S Morapudi, R Bassi, J Fischer, M Waseem [Macclesfield, United Kingdom]

Purpose:

Plating remains the most widely employed method for the fixation of displaced diaphyseal clavicle fractures. The purpose of this study was to assess the efficacy and outcomes of diaphyseal clavicle fractures treated with intramedullary fixation using the Rockwood clavicle pin.

Methods:

We conducted a retrospective analysis of all diaphyseal clavicle fractures treated with intramedullary fixation using the Rockwood pin between February 2004 and March 2010. Sixty-eight procedures were carried out on 67 patients. Functional outcome was assessed using the Disability of the Arm, Shoulder and Hand (DASH) questionnaire and an overall patient satisfaction questionnaire.

Results:

There were 52 (77.6%) male and 15 (22.4%) female patients with an average age of 35.8 years. In 35 (51.5%) cases the injury was located on the dominant side. Fractures were classified according to the Edinburgh system with the commonest configuration being the Type 2B1 (47, 69.1%). The indications for fixation were; acute management of displaced fractures (56, 82.4%), delayed union (2, 2.9%), nonunion (8, 11.8%) and malunion (2, 2.9%). The average time to pin removal was 3.7 months and the average follow-up prior to discharge was 6.9 months. Sixty-six (97.1%) fractures united without consequence. Two (2.9%) cases of non-union were treated with repeat fixation using a contoured plate and bone graft. The most common problem encountered postoperatively was discomfort due to subcutaneous pin prominence posteriorly (12, 17.6%) which resolved following removal of the metalwork. The average DASH score was 6.04 (0 - 60) and 96.4% of patients rated their satisfaction with the procedure as good to excellent.

Conclusion:

Due to its minimally invasive technique, cosmetically favourable scar, preservation of periosteal tissue, avoidance of stress risers associated with screw removal and good clinical outcomes, the use of this device is the preferred method of treatment for displaced diaphyseal clavicle fractures in our hospital.

Presenter information: Peter, Ralte, Macclesfield District General Hospital, Macclesfield, United Kingdom, peter.ralte@gmail.com

Does the use of a track and trigger warning system reduce mortality in trauma patients?
MS Patel, M Jiggins, M Jones, S Williams [Leicester, United Kingdom]

Introduction: Track and trigger (TT) warning systems have been implemented nationally in an attempt to identify patients showing physiological deterioration and trigger an early response. Despite the lack of robust evidence, numerous different TTs have been implemented although having only been validated in the setting of emergency medical admissions. The EWS (early warning system) is one such example, and has not been validated in an emergency *trauma* setting.

Aim: To identifying whether the implementation an EWS system coupled with an outreach service had resulted in a reduction in the mortality within our trauma unit.

Method: The EWS was implemented in 4 Trauma and Orthopaedic wards in the summer of 2005. The number of emergency trauma inpatient admissions and deaths from January 2002 to December 2009 were obtained. The diagnosis, primary procedures and cause of death, if known, were noted. Unpaired T test was used for statistical analysis.

Results: 32,149 patients were admitted (55% male; 45% female) with 889 deaths (77% female; 33% male, $P < 0.0001$). 61% of admissions were due to proximal femoral fractures. The peak age of death was 71-80 years. Females had a considerably greater death rate throughout all of the years investigated as compared to males. A reduction has occurred in the mortality rate post-EWS implementation in male, female and total deaths, but this is not statistically significant.

Conclusion: Mortality has not significantly reduced since the introduction of EWS to our trauma unit. In view of the apparent lack of clinical effectiveness of the EWS/outreach partnership, we question the cost effectiveness of this initiative. A better system for identifying and treating medically unwell trauma patients needs to be developed, which is suited to elderly patients with co-morbidities.

Presenter information: Mohammed Shakil, Patel, Leicester General Hospital, Leicester, United Kingdom, shaqs@doctorsorg.uk

Warfarin Reversal for Hip Fracture Patients

P Holland, N Hyder [Crewe, United Kingdom]

Patients with hip fractures should have surgery within 36 hours of admission to hospital. This reduces mortality and is required for hospitals to receive the NHS Best Practice Tariff. Many patients with hip fractures take Warfarin and reversing the effect of this frequently delays surgery.

We report the results of a case-control study. The primary outcome measure was the number of patients with an INR of 1.7 or less on the day following admission to hospital. This is considered an acceptable INR for hip fracture surgery in our department. In the control group the dose of Vitamin K given was decided by the admitting doctor based on the patients' INR. In the intervention group all patients received 5mg of IV Vitamin K on admission. They had their INR rechecked at 6:00am the following morning and a further 2.5mg of Vitamin K was given if it was 1.8 to 2.0 and a further 5mg of Vitamin K was given if it was greater than 2.0.

350 patients with hip fractures were admitted to our department and 26 (7.4%) of these were taking Warfarin. The control group contained fourteen patients who had a mean INR of 3.3 on admission. The time taken to achieve an INR of 1.7 or less was one day for four patients; two days for nine patients and three days for one patient. The intervention group contained twelve patients who had a mean INR of 2.7 on admission. The time taken to achieve an INR of 1.7 or less was one day for eleven patients and two days for one patient. There were no complications caused by Warfarin reversal.

A high proportion of patients with hip fractures take Warfarin. This can be reversed promptly and safely using our protocol.

Presenter information: Philip, Holland, Mid Cheshire Hospitals NHS Foundation Trust, Crewe, United Kingdom, ph.holland@gmail.com

**Cemented versus uncemented hemiarthroplasty for intracapsular fractured neck of femur -
A national analysis of matched NHS patients**
S Jameson, P James, A Rangan, S Muller, M Reed [Newcastle, United Kingdom]

Introduction

Many elderly patients with intracapsular fractured neck of femur (NOF) undergo uncemented hemiarthroplasty despite the evidence suggesting that a cemented prosthesis reduces post-operative pain and leads to better mobility. However, no differences in surgical complications have been demonstrated. We aimed to compare the national data for complications following cemented and uncemented hemiarthroplasty in matched patient groups.

Methods

Hospital episode statistics (HES) data was analysed for 70-90 year olds with a Charlson co-morbidity score of 0 (no significant co-morbidities prior to fracture) who underwent hemiarthroplasty for intracapsular fractured NOF in the English NHS between January 2005 and December 2008. Surgical and medical complications were analysed. Odds ratio (OR) was used to compare patient groups.

Results

9533 patients underwent an uncemented and 15996 a cemented hemiarthroplasty. 18-month revision rate was significantly higher in the uncemented group (2.63% versus 0.89%, OR=3.02, 95% CI 2.45-3.71). There were no significant differences in 30-day reoperation, readmission and 18-month dislocation rates. Lower respiratory tract infection (LRTI, 4.29% versus 3.24%, OR=1.34, 95% CI 1.17-1.54) and 90-day mortality was significantly higher in the uncemented group (7.75% versus 4.86%, OR=1.64, 95% CI 1.48-1.82). There were no significant differences in rates of venous thromboembolism (VTE), myocardial infarction or cerebrovascular events. 90-day mortality following LRTI was 1.09 -1.89% compared with 0.18 - 0.30% following VTE.

Discussion

Revision rates in patients with uncemented hemiarthroplasty are three times higher than those of cemented. This national data supports the published functional benefits of cemented hemiarthroplasty. The higher rates of LRTI and death in the uncemented group could be a consequence of higher pain levels and poorer mobility in the post-operative period. LRTI results in six times more deaths than VTE after NOF fracture surgery.

Presenter information: Simon, Jameson, Wansbeck Hospital, Newcastle, United Kingdom,
simonjameson@doctors.org.uk

Factors Affecting the Incidence of Deep Wound Infection after Hip Fracture Surgery.
T Harrison, P Robinson, A Cook, M Parker [Peterborough, United Kingdom]

The purpose of the study was to identify factors that affect the incidence of deep wound infection after hip fracture surgery.

Data from a hip fracture database of 7057 consecutively treated patients at a single centre was used to determine the relationship between deep wound sepsis and a number of factors. Fisher's exact test and the unpaired T test were used. All patients were initially followed up in a specialist clinic. In addition a phone call assessment was made at one year from injury to check that no later wound healing complications had occurred.

There were 50 cases of deep infection (rate of 0.7%). There was no significant difference in the rate of deep sepsis with regards to the age, sex, pre-operative residential status, mobility or mental test score of the patient. Specialist hip surgeons and Consultants have a lower infection rate compared with surgeons below Consultant grade, $p=0.01$. The mean length of anaesthesia was longer in the sepsis group (76minutes) compared to the no sepsis group (65minutes), this was significant, $p=0.01$. The patient's ASA grade and fracture type were not significant factors. The rate of infection in intracapsular fractures treated by hemiarthroplasty was significantly greater than those that had internal fixation, $p=0.001$. The rate of infection in extracapsular fractures fixed with an extra-medullary device was significantly greater than those fixed with an intra-medullary device, $p=0.021$. The presence of an infected ulcer on the same leg as the fracture was not associated with a higher rate of deep infection.

In conclusion we have found that the experience (seniority) of the surgeon, the length of anaesthesia and the type of fixation used are all significant factors in the development of deep sepsis. These are all potentially modifiable risk factors and should be considered in the treatment of hip fracture patients.

Presenter information: Tim, Harrison, Peterborough and Stamford Hospitals NHS Trust,
Peterborough, United Kingdom, timharrison001@hotmail.com

Can a dedicated ward for patients with fractured neck of femur improve the outcome results of 30 days mortality rate and acute trauma bed stay?

S Horriat, A Marsh, M Ahmed, S Quraishi [Dudley, United Kingdom]

Objectives: to evaluate effect of a dedicated ward for patients with fractured neck of femur on length of acute bed stay and 30 days mortality rate.

Design: a retrospective study of two different cohorts of patients with fractured neck of femur, one admitted to a general trauma / surgical ward and the second to a ward dedicated for patients with fractured neck of femur.

Setting: a district general hospital affiliated to a University Teaching Foundation Trust

Cohorts: after application of inclusion and exclusion criteria, the first group includes 348 patients who have been diagnosed and admitted with a fractured neck of femur in a 12 months period starting from 01/01/2005. This group have been admitted to a general trauma / surgical ward. The second cohort includes 432 patients who have been diagnosed and admitted with a fractured neck of femur in a 12 months period starting from 01/05/2007. The second group have been admitted into a dedicated ward for patients with fractured neck of femur

Main outcome measures: lengths of hospital stay in a orthopaedic bed and 30 days mortality rate as main outcome measures. Secondary outcome measures considered to be theatre waiting time and discharge destination improvement.

Results: length of acute trauma bed stay has been reduced from 18.3 in the first group to 10.9 ($P < 0.01$) in the second group. Thirty days mortality rate did not show significant difference (10% vs. 10.8%). There were also some improvements in the secondary outcome measures including reduced theatre waiting time.

Conclusion: (with acknowledge of study design limitations) our study has shown a dedicated ward for patients with fractured neck of femur, could shorten acute trauma bed stay, but did not have significant effect on 30 days mortality rate.

Presenter information: Saman, Horriat, Dudley Group of Hospitals NHS Foundation Trust, Dudley, United Kingdom, saman.horriat@nhs.net

Pre-operative echocardiogram in hip fracture patients with a cardiac murmur.
P Jettoo, R Kakwani, S Junejo, I Talkhani, P Dixon [Sunderland, United Kingdom]

Hip fracture patients with a cardiac murmur have an echocardiogram pre-operatively in our unit. We assessed the impact of pre-operative echocardiogram on treatment of such patients, using National Confidential Enquiry into Patient Outcome and death (NCEPOD) report 2001 as gold standard. We undertook a retrospective audit of hip fracture patients (N=349) between 01/06/08 and 01/06/09. 29 patients had pre-operative echocardiogram (echo group). A computer generated randomised sample of 40 patients was generated from N, 'non-echo' group. Data was obtained from medical records and HISS. The groups were compared using Student's t test. Age and gender distribution were similar in both groups. 29 patients had pre-operative echo. Indication for echo was an acute cardiac abnormality in 4 cases. 25 patients had echo for no new cardiac problem (indication being cardiac murmur in 23 patients and extensive cardiac history in 2 cases). Cardiology opinion was sought in 5 cases. Most patients with aortic valve abnormality had surgery under general anaesthetic. No patient required cardiac surgery or balloon angioplasty pre-operatively. Patients having pre-operative echo had significant delay to surgery (average 2.7 days, range 0-6 days) compared to 'non-echo' group (average 1.1 days, range 0-3 days), ($P < .001$). There was no significant difference in length of stay and mortality at 28 days between the groups. We are now developing departmental guidelines for requesting echo in hip fracture patients with cardiac murmur to prevent unnecessary avoidable delay. We are developing a link with the cardiology department to expedite echocardiogram requests in hip fracture patients.

Presenter information: Prithee, Jettoo, Sunderland Royal Hospital, Sunderland, United Kingdom,
prittjett4eva@yahoo.co.uk

How to improve the management of hip fractures and increase cost savings; an effective strategy at the William Harvey Hospital

E leong, A Sadri, O Jaral, R Shafafy, D Neen, P Housden [Ashford, United Kingdom; Guildford, United Kingdom]

Introduction

Traumatic hip fractures are managed with nationwide standards, and are regularly audited and published. A previous audit last year at the William Harvey revealed 66% of hip fractures were operated within 48 hours, compared to the national average of 75%. We implemented a strategy to improve this target by introducing the 'Dawn Hip' - a hip fracture operation which is prepared for surgery at 8am on the Emergency (CEPOD) list.

Methods

Over a two month period after the introduction of the 'Dawn hip', the number of hip operations and start time, on the CEPOD list, were audited. Performance data were extrapolated from the National Hip Fracture Database (NHFD) and compared nationally.

Results

Three months prior to the 'Dawn hip' the average start time of surgery on the CEPOD list was 9.50am. In two months, since the introduction of the dawn hip, 67% of all trauma hip operations were done on the CEPOD list, mean start time of 8.38am. Data from the NHFD revealed 81% of traumatic hip fractures were operated on within 48 hours. The national average during the same time frame was 80%.

Conclusion

This is an effective strategy which increases efficiency of existing resources and improves hospital services and patient care. This not only optimises the care we provide for hip fractures, but also increases trauma list space for other pending trauma operations. By meeting nationwide targets, the hospital is rewarded with £495 per patient, which is used to further improve services and outcomes. In the current economic climate, this represents a method of optimising healthcare, increasing cost savings and maximising productivity and efficiency.

Presenter information: Edmund, leong, William Harvey Hospital, Ashford, United Kingdom,
edieong83@gmail.com

Fast-track Fractured Neck of Femur Pathway

J Kosy, R Blackshaw, S Evans, S Dolan, C Symonds, M Swart, S Knowles, A Fordyce, R Lofthouse [Torquay, United Kingdom]

Background

Patients with fractured neck of femur have historically received less attention than they deserve and have high morbidity and mortality. Literature suggests that speed to theatre reduces length of in-patient stay and complications.

Methodology

Using patients' expressed needs as a basis to redesign the service, a multidisciplinary project team mapped the current process of admission, simulated and mapped an ideal process. This resulted in a fast admission process for patients with suspected fractured proximal femur. Paramedics call a trauma coordinator based on the specialist ward who meets the patient at the door of the Emergency Department, escorting them to X-ray. The fracture is confirmed remotely by an experienced surgeon using PACS. Patients are taken to an optimisation area in the theatre complex for consultant orthopaedic and anaesthetic assessment prior to surgery the same day (utilising spare time on elective and trauma lists), or early the following day. Fascia-iliaca blocks are provided by trauma coordinators to improve pain control and reduce sedative effects of opiates, aiding early mobilisation. Measures include time to theatre, length of stay, and patient experience. Meaningful mortality and morbidity data will become available later.

Results

To date we have studied 79 patients (mean age 81 years) over ten weeks. Median time to theatre reduced from 42 hours to 22 hours (Range 2 - 78 hours). Median length of stay reduced from 10.5 days to 6 days (Range 2 - 20 days). Secondary improvements include list productivity, communication with relatives, patients' satisfaction. No increase in adverse events has been found and the anaesthetic team felt patients with chronic problems such as cardiac or renal failure were successfully operated on without unnecessary delays.

Future Developments

This new process is a permanent change; within six months we will have 250 cases to present, with results of additional metrics.

Presenter information: Jonathan, Kosy, Torbay Hospital, Torquay, United Kingdom,
jonkosy@yahoo.co.uk

Cemented hemiarthroplasty is associated with a higher early rate of mortality than uncemented hemiarthroplasty - fact or fiction?

T Al-Atassi, DTS Chou, C Boulton, CG Moran [Nottingham, United Kingdom]

Introduction

Cemented hemiarthroplasty for neck of femur fractures has been advocated over uncemented hemiarthroplasty due to better post-operative recovery and patient satisfaction. However, studies have shown adverse effects of bone cement on the cardio-respiratory system which may lead to higher morbidity and mortality. Therefore, in some institutes, the use of an uncemented prosthesis has been adopted for patients with a high number of co-morbidities. The aim was to compare early mortality rates for cemented vs. uncemented hemiarthroplasties.

Method

Cohort study of displaced intracapsular hip fractures treated with hemiarthroplasty between 1999-2009 at one institute. A total of 3094 hemiarthroplasties performed; out of which 1002(32.4%) were cemented and 2092(67.6%) were uncemented. 48hour and 30day mortality rates for the two groups were compared and a multivariate Cox regression model used to eliminate confounding factors. Significant confounding factor included age, sex, mini mental test score, medical co-morbidities, Nottingham Hip Fracture Score and delay to surgery.

Results

The study showed that, after eliminating confounding factors, 48hour mortality in the cemented group was 0.3% compared to 0.5% in the uncemented group ($p=0.388$). However, the adjusted 30day mortality rate for the cemented group (4%) was shown to be significantly lower than for the uncemented group (10.8%) ($p<0.001$).

Conclusion

The use of cement in hip hemiarthroplasty is not associated with an increased rate of mortality at 48hours or at 30days. Along with emerging evidence of better post-op recovery and patient satisfaction with the use of a cemented prosthesis, we support the use of cement for all patients undergoing hip hemiarthroplasty.

Presenter information: Talaat, Al-Atassi, Queens Medical Centre, Nottingham University Hospital, Nottingham, United Kingdom, atassi96@hotmail.com

Knee binding as a simple adjunct to stabilising pelvic injuries in the emergency setting.
J Foote, O Berber, G Datta, M Bircher [London, United Kingdom]

Introduction: Haemodynamically compromised patients with biomechanically unstable pelvic fractures need reduction of the pelvic volume to effect tamponade of bleeding bone and vessels. Knee binding, to help achieve this, is advocated in standard Advanced Trauma and Life Support teaching but it is rarely used. There are no reports in the literature as to the benefits derived from this simple manoeuvre. The aim of this study was to investigate whether there was an effect on symphysis pubis closure by binding the knees together and to quantify this.

Methods: 10 consecutive patients who underwent open reduction and internal fixation of pubic symphysis diastasis +/- sacroiliac joint fixation were recruited prospectively. These patients were transferred from peripheral hospitals to this National tertiary referral level 1 trauma centre for definitive pelvic fracture management. All patients had sustained Antero-Posterior Compression (APC) type pelvic injuries. In theatre, a centred antero-posterior (AP) radiograph was taken without any form of binding on the pelvis. A second AP radiograph was then taken with the knees and ankles held together with the hips internally rotated. Measurements of symphysis pubis widening were made of the digital images taken in theatre.

Results: The study population included 8 men and 2 women. The mean age was 50. The average percentage closure of the pubic symphysis, pre and post manoeuvre was 48%. The average percentage closure of the manoeuvre in relation to the final reduced symphysis, post fixation, was 67%.

Conclusion: Our impression is that this manoeuvre is rarely employed on patients with these types of injury. Emergency measures to reduce the pelvic volume and thus limit pelvic haemorrhage are well recognised. We have shown that this simple measure is a useful adjunct and that it has a measurable effect on reducing pubic diastasis.

Presenter information: Julian, Foote, St George's Hospital, London, United Kingdom,
julian.foote@btinternet.com

Functional outcome following unstable pelvic ring injuries treated with percutaneous iliosacral screws.

M Jones, A Johnston, D Swain, D Kealey [Belfast, United Kingdom]

The royal victoria hospital is a tertiary trauma centre receiving pelvic injury referrals for a population of 1.7 million. The use of ilio-sacral screw fixation with low anterior frame stabilisation has been adopted as the principle treatment for unstable pelvic ring injuries in our institution. We aim to describe our practice and outcomes following the use of percutaneous screw fixation of the pelvis.

The review included standardised assessment of health-related quality of life (SF-36) as well as the lowa pelvic score and Majeed pelvic injury outcome scores. Data was also collected on associated injuries, post-operative complications, nerve injury and pain scores.

A total case series of 45 patients undergoing percutaneous ilio-sacral screw fixation following traumatic pelvic injury were identified over a 5 year period. Of these 23 were contactable to follow-up or responded to questionnaire review.

The mean follow up was 680 days (range 151- 1962). The mean age was 33 (range 18 - 57). The mean SF- 36 physical and mental scores were 38 and 46 respectively. The mean Majeed score was 69 and lowa pelvic score was 65. The mean pain score was 3.5 (range 0 - 7). There were no incidences of deep infection, post-operative PE or nerve injury related to screw insertion.

Patients with isolated pelvic injuries performed better on outcome scoring however the low SF -36 scores highlight the severity of pelvic injuries

Presenter information: Morgan, Jones, Royal Victoria Hospital, Belfast, Belfast, United Kingdom,
morganjones101@hotmail.com

Pre Operative Carbohydrate Loading decreases Hyperglycaemia and Insulin Resistance in Hip Fracture Patients: Multicentre Randomized Controlled Trial

D Lui, D Bouchier Hayes, M Seamus, P Kenny, J McElwain, D Bennett [Dublin, Ireland]

Aims:

Hip fractures pose a significant burden on the healthcare system. Hyperglycaemia and a state of Type 2 diabetes exists post operatively. Being normoglycaemic has well documented benefits. Pre operative carbohydrate loading has been shown to have two good effects. It decrease hyperglycaemia post operatively and allows the patient to undergo less strict fasting protocols. Insulin resistance to date has not been examined in these patients and this was determined using a validated formula (HOMA/IR).

Methods:

Three trauma hospitals were enrolled and patients with hip fractures requiring operative fixation were enlisted. Exclusion criteria: diabetic patients and inability to imbibe. 100 neck of femur fractures were examined. 46 patients were fasted normally. 32 test patients were given a carbohydrate rich drink pre operatively the night before surgery and in the morning up to 2 hours prior to surgery. 22 patients were excluded. Serum random glucose and insulin levels were taken on admission. Fasting serum glucose and insulin levels were taken on day one post operatively.

Results

Control vs Trial average age: 82y and 75y. Admission glucose levels for Control vs Pre Op Loading: 6.5 vs 6.77 mmol/l. The average post operative Control vs Pre Op Loading: Glucose: 7.59 mmol/l vs 6.23mmol/. HOMA/IR in the control vs Pre Op loading group were: 1.86 and 1.2 compared to Post Op readings of 12 and 2. Paired T Test shows that there is significant decrease in hyperglycaemia and insulin resistance ($p < 0.05$).

Conclusions

Pre operative carbohydrate loading leads to a decrease in hyperglycaemia and insulin resistance after surgery for hip fractures. Furthermore, patients are permitted a more liberal fasting regime leading to improved patient well being and less anxiety. The morbidity associated with a hyperglycaemic diabetic state is well documented and avoidance of this may lead to a decreased burden on the healthcare system.

Presenter information: Darren, Lui, RCSI, Dublin, Ireland, darrenflui@gmail.com

Acute vs Late intervention in clavicle fractures

B Ollivere, K Elliott, A Das, P Johnston, G Tytherleigh-Strong, L van Rensburg [Cambridge, United Kingdom]

Purpose: The evolution of locked anatomical clavicular plating in combination with evidence to suggest that fixation of clavicle fractures yields better outcome to conservative treatments has led to an increasing trend towards operative management. There is no evidence however to compare early fixation with delayed reconstruction for symptomatic non- or mal-union. We hypothesize that early intervention yields better functional results to delayed fixation.

Methods: Between August 2006 and May 2010, 97 patients were managed with operative fixation for their clavicular fracture. Sixty eight with initial fixation and 29 delayed fixation for clavicular non- or mal-union. Patients were prospectively followed up to radiographic union, and outcomes were measured with the Oxford Shoulder Score, QuickDASH, EQ5D and a patient interview. Mean follow-up was to 30 months. All patients were managed with Acumed anatomical clavicular plates.

Results: The radiographic and clinical outcomes were available for all patients. Scores were available for 62 (62/97). There were no statistically significant differences in age ($p>0.05$), sex ($p>0.05$), energy of injury ($p>0.05$), number of open fractures ($p>0.05$) between the two groups. The mean quickDASH was 8.9 early, 9.1 delayed ($p<0.05$), Oxford Shoulder score was 15.7 early, 16.1 delayed ($p<0.05$). In the early fixation group 5 patients had wound healing complications, and 8 went on subsequently to have removal of prominent metalwork. In the delayed fixation group 2 had wound healing complications and 4 had removal of prominent metalwork. There were no statistically significant differences in the EQ5D quality of life questionnaire.

Conclusion: There are no statistically significant differences in shoulder performance, wound or operative complications between early and delayed fixation of clavicular fractures. Our series does not support early fixation of clavicular fractures, as results for delayed intervention in those who become symptomatic appear comparable.

Presenter information: Ben, Ollivere, Cambridge University Hospital NHS Trust, Cambridge, United Kingdom, ben@ollivere.co.uk

Seek and ye shall find - subtrochanteric stress fractures in patients on oral bisphosphonate therapy; an emerging problem.
CG Murphy, SJ O'Flanagan, P Keogh, P Kenny [Dublin, Ireland]

INTRODUCTION: The emergence of a new variant of subtrochanteric stress fractures of the femur affecting patients on oral bisphosphonate therapy has only recently been described. This fracture is often preceded by pain and distinctive radiographic changes, and associated with a characteristic fracture pattern. We undertook a review of this cohort of patients in our service.

METHOD: A retrospective review was carried out looking for patients with subtrochanteric fractures who were taking oral bisphosphonates presenting with a low velocity injury over a two year period. Clinical data and radiographs were assessed.

RESULTS: 11 fractures were found in 10 patients matching the inclusion criteria outlined. All were female, and taking bisphosphonates for a mean of 4.3 years. 5 of the 10 patients described prodromal symptoms, for an average of 7.8 months before fracture. Although all fractures were deemed low velocity, 5 of 11 were atraumatic. 3 patients have had bilateral subtrochanteric fractures. Presence of the distinctive radiological 'bleb' was common. Surveillance on 2 patients shows lateral cortical blebs on the contralateral femur which merit close follow up.

CONCLUSION: Patients taking oral bisphosphonate therapy may be at risk of a new variant of stress fracture of the proximal femur. Awareness of the symptoms is key to ensure appropriate investigations are undertaken. Following such a fracture surveillance of the contralateral femur is recommended, and the option of discontinuing bisphosphonates should be discussed.

Presenter information: Colin G., Murphy, Connolly Hospital, Blanchardstown, Dublin, Ireland,
cmurphy@rcsi.ie

Subtrochanteric Fracture Non-unions with Implant Failure Managed with the Diamond Concept

MA Ahmad, O Obakponovwe, M Mokawem, N Kanakaris, PV Giannoudis [Leeds, United Kingdom]

Background: The management of non-unions of subtrochanteric femoral fractures with associated implant failure is challenging. This study assessed the outcome of a cohort of patients treated according to the diamond concept.

Methods: Between 2005-2010 all patients with subtrochanteric aseptic non-unions presented post implant failure (Gamma Nail breakage) were eligible in the absence of severe systemic pathologies and comorbidities.

Demographics, initial fracture pattern, method of stabilisation, mode of failure of metal work, time to revision of fixation, complications, time to union, and functional outcome were recorded over a minimum period of follow-up of 12 months. The revision strategy was based on the "diamond concept"; optimising the mechanical and biological environment (revision of fixation, osteoinduction/BMP-7, osteoconduction/RIA harvested graft, and osteogenicity/concentrate of bone marrow aspirate).

Results: Out of 280 nailing procedures 12 (4.3%) cases met the inclusion criteria. A consistent mode of metalwork failure was recorded with initial breakage of the proximal distal locking screw followed by nail breakage at the lag screw level. Biomechanical SEM analysis of the nails revealed no structural damage besides the standard fatigue striation. Varus mal-reduction was present in all cases, with an average of 7.3 degrees (5-11). The average time to screw failure was 4.3 months (2-6) and nail failure was 5.9 months (4-10). All but one of the cases were revised to a 95 degrees blade plate and one to an Affixus nail. Time to union was 6.5 months (5-10). All but one of the cases by 12 months have returned to their preinjury level of mobilisation. **Conclusion:** Varus mal-reduction must be avoided in the initial stabilisation of subtrochanteric fractures. Proximal distal screw failure is predictive of future fracture non-union and subsequent nail breakage. The diamond concept for optimising mechanics and bone biology is a successful method for managing complex sub-trochanteric non-unions with failed metalwork.

Presenter information: Mudussar Abrar, Ahmad, Leeds NHS Trust, Leeds, United Kingdom,
mudussarahmad@hotmail.com

The Impact of a London Major Trauma Centre on the Management of Open Tibial Fractures **J Stammers, D Williams, O Berber, S Zainul Abidin, J Hunter, J Leckenby, M Vesely, D Nielsen [London, United Kingdom]**

Aims:

The BOA/ BAPRAS guidelines for the management of open tibial fractures (2009) recommend early senior combined orthoplastics input and appropriate facilities to manage a high caseload. St Georges Hospital is one of four London Trauma Centres fulfilling these criteria. Our aim is to determine whether becoming a trauma centre has affected referral patterns, number of operations and length of stay in patients with open tibial fractures.

Methods:

Data were obtained prospectively on consecutive open tibial fractures during two 8 month periods: before and after becoming a Major Trauma Centre (May 2009-Dec 2009 and April 2010- Oct 2010 respectively). Data on patient pathway including, admitting hospital, length of stay, timing and number of operations were recorded.

Results:

30 open tibial fractures were admitted during the 8 months after designation as a major trauma centre compared to 17 before (mean 3.75 vs 2.1 per month). 70% of patients came directly or as A&E hot transfers (previously 59%). There was a reduction in delayed transfers from hospitals without plastic surgery from 41% to 30%. Significantly, all Gustilo & Anderson grade III fractures had combined orthopaedic and plastic surgery input at 1st debridement (previously 8% ($p < 0.0001$)). Those admitted to SGH directly and hot transfers were in hospital 2 days less than delayed referrals (15.4 vs 17.8 days respectively), almost one operation less (2 vs 3.14 ($p = 0.16$)) and reduced time to definitive soft tissue coverage (57 vs 184 hours $p = 0.065$). Since becoming a trauma centre the average number of operations reduced from 4.52 to 2.3 ($p < 0.0004$) and average length of hospital admission fell from 23 to 16 days ($p = 0.054$).

Conclusions:

Since becoming a Major Trauma Centre, St Georges Hospital is managing more open tibial fractures. High turnover and adherence to the suggested guidelines has improved patient care with potential secondary cost benefits.

Presenter information: John, Stammers, St George's Healthcare Trust, London, United Kingdom,
john.stammers@nhs.net

Time to Theatre for Young Adult Intracapsular Hip Fractures **D Dargan, F Callachand, C Connolly [Belfast, United Kingdom]**

Introduction

Intracapsular fractures of the femoral neck in young adults are a surgical emergency. Recent literature reviews have questioned whether the timing of surgery reduces the incidence of avascular necrosis, non-union and revision. A study was performed to determine how many patients met a 12-hour target for operative fixation with this injury. Possible sources of delay to theatre were reviewed.

Methods

A Fractures Outcomes Research Database was used to identify patients aged 18-64 who were admitted to the Royal Victoria Hospital in Belfast between 1st Jan 2008 and 31st Dec 2009. Intracapsular fractures of the femoral neck which were treated with a 2-hole dynamic hip screw were included. Time of injury, time of presentation in A&E, time of admission to fracture ward, operation time, demographic data, and the mechanism of injury were extracted from the database.

Results

81 patients were identified who met the inclusion criteria. Median age was 56 years (range 26-64y). 64 injuries were low energy. 16 patients were alcoholics, 34 smoked cigarettes.

31 of 81 operations were performed within 12 hours of the injury. Of the delayed 50 patients, 25 sustained their injury between 1700-2359. 51 of 81 operations were performed on daytime lists (0900-1659), 23 in the evening (1700-2359) and 7 overnight (0000-0859).

Median time from injury to presentation at A&E was 1 hour 39 minutes. Time from A&E presentation to ward admission was 4 hours. Time from ward admission to surgery was 8 hours 13 minutes.

Conclusions

The time from ward admission to arrival in theatre accounted for the greatest delay, and is modifiable. Injuries which occur in the evening are often operated on the next day. The majority of the patients had low energy injuries, and a minority smoke cigarettes and abuse alcohol. The long-term implications of this delay will require further work.

Presenter information: Dallan, Dargan, Royal Victoria Hospital, Belfast, United Kingdom,
dallan_dargan@hotmail.com

iTrauma - The Use of Smartphones In The Assessment of Trauma Patients, an App For The Future?

M Crockett, S Guerin, J McElwain [Dublin, Ireland]

Background: The ability of modern smartphones to send and receive high quality digital images in real time has opened up a range of possibilities in "virtual" patient diagnosis from a remote location. This could have particularly useful applications in orthopaedics where images of x-rays or of limb injuries and wounds could be transmitted in a matter of seconds to off-site registrars or consultants for expert assessment.

Method : The details of 100 consecutive patients referred for orthopaedic opinion by the hospital Emergency Department were recorded including diagnosis, management and outcome. Photographs were taken of the patient's x-rays using the 3.2 megapixel camera of a smartphone. Ten senior orthopaedic registrars were asked to view the photographs on the 3.5 inch smartphone screen along with a brief summary of the patient's presenting complaint. They were then asked to make a diagnosis and formulate a brief management plan. A comparison was then made between the actual patient diagnosis and management and the "virtual" diagnosis and management plans made using images on the smartphone screen.

Results : 91% of diagnoses made and 77% of management plans made using the smartphone images tallied accurately with the actual patient diagnoses made by in house orthopaedic surgeons.

Discussion : This study demonstrates that an accurate diagnosis and management plan can be formulated for trauma patients from a remote location by viewing radiology images on a smartphone screen along with minimal clinical information. The routine use of electronically transmitted digitized radiographic images has the potential to improve clinical decision making for the care of patients with acute fractures. The use of smartphones in this way can be particularly useful when there is no "in house" orthopaedic cover or when advice from a senior colleague is required

Presenter information: Matthew, Crockett, Adelaide and Meath Hospital, Dublin, Dublin, Ireland,
matthewcrockett@rcsi.ie

Discontinuation of clopidogrel is not necessary in hip hemiarthroplasty

FS Hossain, R Rambani, H Ribee, L Koch, FS Haddad [Hull, United Kingdom; Wakefield, United Kingdom; London, United Kingdom]

Introduction

Premature cessation of clopidogrel in certain patients with cardiac conditions is associated with an increased risk of recurrent coronary events. Such patients often present with proximal femoral fractures requiring surgical intervention. Our aim was to ascertain whether it is necessary to stop clopidogrel preoperatively to avoid postoperative complications following hip hemiarthroplasty surgery.

Methods

A retrospective review of 102 patients with ongoing clopidogrel therapy and patients not on clopidogrel who underwent hip hemiarthroplasty for an intracapsular proximal femoral fracture was undertaken. Statistical comparison on pre- and postoperative haemoglobin (Hb), ASA grades, comorbidities, operative times, transfusion requirements, hospital length of stay (LOS), wound infection, haematoma and reoperation rates between the two groups was undertaken.

Results

There were 50 patients in the clopidogrel group (CG) and 52 in the non-clopidogrel group (NCG). The mean age was 83 years. There was no difference with respect to ASA grade, comorbidities (except cardiac comorbidities), age, gender and operation times between the two groups. The mean preoperative Hb was 12.5 g/dl and 12.6 g/dl respectively in the CG and NCG ($p=0.72$). The mean postoperative Hb was 10.8 g/dl and 11.1 g/dl respectively in the CG and NCG ($p=0.37$). 4 and 2 patients respectively required transfusions postoperatively in the CG and NCG ($p=0.37$). There was no difference with respect to LOS, wound infection, haematoma and reoperation rates between the two groups postoperatively.

Conclusion

Maintaining clopidogrel therapy throughout the perioperative period in high risk patients with intracapsular proximal femoral fractures is not associated with an increased risk of bleeding or complications following hip hemiarthroplasty surgery.

Presenter information: Fahad Siddique, Hossain, Hull Royal Infirmary, Hull, United Kingdom,
f.hossain@doctors.org.uk

Early Initial Antibiotics and Debridement Independently Reduce Infection in an Open Fracture Model

JG Penn-Barwell, CK Murrar, JC Wenke [Birmingham, United Kingdom; San Antonio, United States]

Introduction

Open fractures are common, and infection a frequent complication. There is still uncertainty regarding the urgency of initial treatment. The majority of animal studies indicate that early irrigation and debridement reduces infection; unfortunately, these studies often do not involve antibiotics. Clinical studies indicate that the timing of initial debridement does not affect the infection rate. These studies are observational and fraught with confounding variables. The purpose of this study was to control for these variables using an animal model incorporating both systemic antibiotics and surgical treatment.

Method

This study used a segmental defect rat femur model contaminated with *Staphylococcus aureus* and treated with a 3 day course of systemic cefazolin (5 mg/Kg 12 hourly) and surgical treatments, both of which were initiated independently at 2, 6 and 24 hour time points. After 14 days bone and hardware was harvested for separate microbiological analysis.

Results

These results show that the earlier systemic antibiotic treatment or surgery is initiated. When antibiotics are started at 2 hours, delaying surgical treatment from 2 to 6 hours significantly increases infection ($p=0.047$). However, delaying surgery to 24 hours increases infection, but not significantly ($p=0.054$). The timing of antibiotics had a more significant effect on the proportion of positive samples than earlier surgery. At the 2 and 6 hour treatments, the p value was 0.004 and for the 6 and 24 timings it was 0.003.

Conclusion

Surgery and antibiotics at 2 hours completely eradicates the bacteria, but surgical delay for 6 hours appears to allow the bacteria to form non-susceptible colonies. Delaying antibiotics to 6 or 24 hours had a profound detrimental effect on the infection rate regardless of timing of surgery. These findings are consistent with the concept that bacteria progress from a vulnerable planktonic form to a treatment-resistant biofilm.

Presenter information: Jowan G, Penn-Barwell, Royal Centre for Defence Medicine, Birmingham, United Kingdom, jowan@doctors.net.uk

Local Antibiotic Delivery by a Bioabsorbable Gel is Superior to PMMA Beads at Reducing Infection in an Open Fracture Model

JG Penn-Barwell, CK Murrar, JC Wenke [San Antonio, United States]

Introduction

Infection remains a common complication of open fracture despite the use of systemic antibiotics. Local delivery potentially allows a high concentration of antibiotics to be achieved in the wound, thus avoiding the side-effects and cost associated with systemic administration. Beads molded from polymethylmethacrylate (PMMA) arthroplasty cement are currently the clinical standard for local antibiotic delivery. However, beads are not an ideal local antibiotic vehicle. The purpose of this study was to evaluate whether a phospholipid gel might be a superior local antibiotic vehicle to beads.

Method

This study used a segmental defect rat model contaminated with *Staphylococcus aureus* and treated with similar amounts of local antibiotics delivered by gel or beads. The gel, called DFA-02, was a phospholipid vehicle containing 1.7% vancomycin and 1.9% gentamicin by-weight. Beads were manufactured using a standard technique with commercial PMMA cement and 3.3% vancomycin and 4% tobramycin by-weight. In the gel group, 1ml of DFA-02 was spread throughout the wound, a total of 36 mg of antibiotics. In the bead group, four 3 mm beads were placed in the wound, two in the defect and 2 the adjacent tissue envelope, a total of 60 mg of antibiotics. After 14 days bone and hardware was harvested for separate microbiological analysis.

Results

These results show that there was a significantly lower infection rate in groups treated with antibiotics delivered by gel compared to those treated with either ($p < 0.001$). antibiotic beads or no antibiotics at all. Quantitative cultures also demonstrate significantly less bacteria in the wounds that were treated with the gel ($p = 0.001$).

Conclusion

These results indicate that local antibiotics are superior at reducing infection when delivered in a gel rather than by beads. This study demonstrates that local antibiotic delivery vehicles that cover the entire wound bed may be more effective at reducing infection.

Presenter information: Jowan G, Penn-Barwell, US Army Institute of Surgical Research, San Antonio, United States, jowan@doctors.net.uk

Tibiototalcalcaneal Arthrodesis With A Compressive Retrograde Intramedullary Nail: The Exeter Experience Of 55 Consecutive Patients.

JM Taylor, RE Knox, PM Guyver, M Czipri, NJ Talbot, IT Sharpe [Exeter, United Kingdom]

Background: Tibiototalcalcaneal arthrodesis is an important salvage method for patients with complex hindfoot problems including combined arthritis of the ankle and subtalar joints, complex hindfoot deformities and failed total ankle arthroplasty. The aim of this study was to report the elective results of combined subtalar and ankle arthrodesis using one design of dynamic retrograde intramedullary compression nail-the T2 Ankle Arthrodesis Nail(Stryker)

Methods: Retrospective review identified 53 consecutive patients who had 55 tibiototalcalcaneal arthrodesis procedures by two surgeons(ITS and NJT) using T2 Ankle nail fixation. 3 patients died of unrelated causes before follow up was complete which left 50 patients(52 nails); the largest consecutive series in the use of this device. Mean follow up was 23.5(3-72) months with the average age of patients being 61(range 22-89) years. An 84% response was achieved to a function and patient satisfaction questionnaire. Main indications for treatment were combined ankle and subtalar arthritis(63%-33/52) or complex hindfoot deformities(23%-12/52). Outcome was assessed by a combination of Clinical notes review, clinical examination, and telephone questionnaire.

Results: 46 patients(83.6%) achieved union at a mean time of 3.7 months.8 patients required an allograft(femoral head) bone block procedure. 4 patients(10%) subjectively thought that the procedure was of no benefit or had a poor result whilst 35(83%) had a good or excellent result. The mean visual analog scale(VAS) score for preoperative functional pain was 7.1 compared to the mean post operative(VAS) score of 1.9($p < 0.001$). Complications consisted of 2 amputations, 2 deep infections and 5 removals of broken or painful screws. The use of preoperative functional aids and orthotics dropped from 32% to 18% and 22% to 18% respectively.

Conclusion: This device and technique is a safe and effective treatment of hindfoot arthrosis and deformity giving reliable compression and subsequent fusion with excellent results in terms of patient satisfaction and pain relief.

Presenter information: James M, Taylor, Royal Devon and Exeter Foundation Trust,, Exeter, United Kingdom, james.taylor@doctors.org.uk

Biomechanical Considerations for Achilles Tendon Reconstruction using Flexor Hallucis Longus Tendon.

A Young, S Evans [Cardiff, United Kingdom]

This study was undertaken to assess for equivalence or superiority in tendon reconstruction techniques. This is an *in vitro* analysis of several, different, reconstruction techniques for chronic Achilles tendon ruptures. The surgical techniques have been borne out of surgical preference rather than biomechanical principles with little published research into their comparability. Surgical preferences are a result of the supposed benefits of reduced operative time, single operative incision and decreased morbidity. An animal model, after human cadaveric tissue dissection to guide the specimen construction, was used to compare the different techniques using bovine bone and tendon and tested using a material testing machine. Ultimate load to failure was recorded for all specimens and statistical analysis of the results was undertaken.

A statistically significant difference was shown between all the techniques by analysis of variance. This will guide clinical application of these techniques. The use of bone tunnels, through which the flexor hallucis longus tendon can be passed, were found to be biomechanically superior, with regard to ultimate load to failure, to either bone anchors or end-to-end tendon suture techniques. Interference screws were found to have a large range in their ultimate load suggesting a lack of consistency in the results.. The mean of the bone tunnel group (482.8N, SD 83.6N) is significantly ($p < 0.01$) higher than the mean of the bone anchor group (180.2N, SD 19.3N), which is, in turn, significantly ($p < 0.01$) higher than the mean of the Bunnell group (73.7N, SD 20.9N). This study is larger than any previous study found in the literature with regard to number of study groups and allows the techniques to be compared side by side.

Presenter information: Andrew, Young, Cardiff University School of Engineering, Cardiff, United Kingdom, andrewfredyoung@gmail.com

Platelet-Rich Plasma is More Effective Than Cortisone for Chronic Plantar Fasciitis
R Monto [Nantucket, United States]

Chronic plantar fasciitis is a common condition but can be difficult to successfully treat. Platelet rich plasma (PRP), a concentrated bioactive component of autologous blood rich in cytokines and other growth factors, was compared with cortisone injection in the treatment of severe cases of plantar fasciitis resistant to traditional non-operative paradigms. Thirty-six patients (16 males 20 females) were prospectively randomized into two study groups. All patients had pre-treatment MRI and ultrasound studies consistent with plantar fasciitis. The first group was treated with a single ultrasound guided injection of 40 mg Depo-Medrol at the injury site and the second group was treated with a single ultrasound guided injection of un-buffered autologous PRP at the injury site. The cortisone group had an average age of 59 (24-74) and had failed 4 months (3-24) of standard non-operative management (rest, heel lifts, PT, NSAIDS, cam walker immobilization, night splinting, local modalities) and had pre-treatment AOFAS scores of 52 (24-60). The PRP group had an average age of 51 (21-67) and had failed 5 months (3-26) of standard non-operative management (rest, heel lifts, PT, NSAIDS, cam walker immobilization, night splinting, local modalities) and had pre-treatment AOFAS scores of 37 (30-56). All patients were then immobilized fully weight bearing in a cam walker for 2 weeks, started on eccentric home exercises and allowed to return to normal activities as tolerated and without brace support. Post-treatment AOFAS scores were PRP 95 (84-100) and cortisone 81 (60-90) at 3 months (CI 95% $p < .0001$), PRP 95 (86-100) and cortisone 81 (60-90) at 6 months (CI 95% $p < .0001$), and PRP 94 (86-100) and cortisone 58 (45-77) at 12 months (CI 95% $p < .0001$). Platelet rich plasma injection is more effective and durable than cortisone injection for the treatment of severe chronic plantar fasciitis refractory to traditional non-operative management.

Presenter information: Raymond, Monto, Nantucket Cottage Hospital, Nantucket, United States,
drmonto@hotmail.com

Review of Clinical and Functional Outcomes of Patients Treated for Ruptured Achilles Tendon Using Achillon Device

Y Agrawal, H Davies, C Blundell, M Davies [Sheffield, United Kingdom]

Introduction

Growing evidence in the literature suggests better clinical and functional outcomes and lower re-rupture rates with repair compared to non-operative treatment of ruptured Achilles tendon. There are however, concerns of wound infection, nerve injury and scar tenderness with the standard open technique using modified Kessler's repair. We aim to evaluate clinical and functional outcomes and complications in patients treated with minimally invasive Achillon device.

Materials and Methods

Prospectively collected clinical data was reviewed of all consecutive patients who underwent repair of the ruptured Achilles tendon using the Achillon device. Patients were contacted using a postal questionnaire for assessment of their functional status using the validated Achilles Tendon Total Rupture Score (ATRS) and compared with their uninjured side. The outcomes were compared to the published results.

Results

We present patient demographics; and clinical and functional outcomes of 140 consecutive patients who underwent repair of ruptured Achilles tendon using the minimally invasive technique between June 2007 to August 2010. Our complication rate was of two-three percent each of proximal DVT, scar sensitivity, superficial wound infection and no re-rupture after a minimum of 6 months. There was no case of nerve injury leading to permanent neurological deficit.

Discussion

This study demonstrates good clinical and functional outcomes from using the Achillon device in repair of ruptured Achilles tendon with a low complication rate comparable to other published series. We recommend Achillon device as a safe minimally invasive technique for repair of the ruptured Achilles tendon.

Presenter information: Yuvraj, Agrawal, Sheffield Teaching Hospitals NHS Trust, Sheffield, United Kingdom, yuvraj_90@yahoo.com

Ultrasound scanning of plantar fascia disease - basis for a new classification

E leong, J Afolayan, A Carne, M Solan [Guildford, United Kingdom]

Introduction

Plantar “fasciitis” is a common cause of heel pain and is usually treated in primary care with conservative measures. Intractable cases are difficult to treat. Currently, plantar fasciopathy is not routinely imaged and treatment is often empirical. To optimise the care of patients with intractable plantar fasciopathy, we concentrated cases into a unique “one-stop” clinic. Here they are clinically evaluated, undergo ultrasound scanning and begin targeted therapy at the first consultation.

Methods

Patients referred to the “one-stop” heel pain clinic over an 18 month period, all with symptoms lasting longer than 6 months and failed initial management, were prospectively followed. For this study all ultrasound scan reports were reviewed and the disease characteristics were examined.

Results

125 feet (120 patients) were found to have plantar fascia disease. 64% had typical insertional pathology only. The remaining 36% had **atypical** distal plantar fascia disease or a combination of insertional and distal disease. Patients with distal disease were found to have either distal thickening or discrete fibromas.

Conclusion

We have demonstrated a high proportion of atypical non-insertional plantar fascia disease in our group of patients with recalcitrant plantar heel pain. Those with atypical features typically prove to be the most resistant to treatments. We conclude that ultrasound scanning is valuable in determining location and characterising the pathology in the plantar fascia. Atypical characteristics, in this cohort of patients with recalcitrant plantar fasciopathy, would otherwise not be detected.

We propose a new classification for disorders of the plantar fascia. Rather than plantar fasciitis we prefer the terms: insertional fasciopathy or non-insertional fasciopathy. This is in keeping with current classification of Achilles tendinopathy. Empirical treatment is not adequate for recalcitrant plantar fasciopathies. By using our proposed classification system both current and future treatments can be better evaluated

Presenter information: Edmund, leong, Royal Surrey County Hospital, Guildford, United Kingdom,
edieong83@gmail.com

Ankle block in forefoot reconstruction- Does timing matter?

VK Singh, A Bansal, A Sott [Carshalton, United Kingdom]

Aim:

Forefoot surgery causes postoperative pain which requires strong painkillers. Regional blocks are now increasingly used in order to control postoperative pain especially in the first twenty four hours when the pain is at its worst. We conducted a study to see whether timing of ankle block i.e. before or after application of tourniquet shows any difference in efficacy in postoperative analgesia in first twenty four hours.

Material and Methods:

A randomised prospective study was conducted between September and November 2010 involving 50 patients (Two groups containing 25 patients each).

Group A had the Ankle block applied after and Group B had the Ankle block applied before application of tourniquet. Patients were given assessment forms to chart their pain and were assessed using a pain VAS at 4hrs and 24 hrs after surgery.

Results:

Both groups demonstrated good postoperative pain control. Average pain score at four and twenty four hours after surgery was 2.5 and 5 in Group A and 3.5 and 6.1 in Group B respectively. Pain was controlled better both at 4 and 24 hours postoperatively in Group A but this was not statistically significant.

Conclusion

A regional ankle block should be routinely used in forefoot surgery to control postoperative pain. The operating surgeon should perform the ankle block after the application of tourniquet as this provides better pain control.

Presenter information: Vinay Kumar, Singh, Epsom and St Helier Hospital, Carshalton, United Kingdom, orthopaedics@googlemail.com

Malreduction of syndesmosis-are we considering the anatomical variation?

S Mukhopadhyay, A Metcalfe, AR Guha, K Mohanty, S Hemmadi, K Lyons, D O' Doherty [Cardiff, United Kingdom]

Introduction: Previous studies have demonstrated the need of accurate reduction of ankle syndesmosis. Measurement of syndesmosis is difficult on plain radiographs. Recently, a difference of 2mm in anterior and posterior measurements at incisura of the inferior tibio-fibular joint on CT has been described as a measure of malreduction (depicted as 'G' for ease of description). Our practice changed towards routine post operative bilateral CT following syndesmosis fixation to assess the reduction and identify potential problems at an early stage. The aim of this primarily radiological study was to determine if the use of bilateral cross sectional imaging brings additional benefit above the more conventional practice of unilateral imaging.

Method: Between 2007 and 2009, nineteen patients with ankle fractures involving the syndesmosis were included in the study group who had bilateral CT post operatively. The values of 'G' and the mean diastasis (MD) were calculated, representing the average measurement between the fibula and the anterior and posterior incisura.

Results: When compared to the normal side, eight out of nineteen (42%) cases were found to have a residual diastasis even after fixation across the syndesmosis. However, if a standard value of G(2mm) was used for the injured leg only, all of the nineteen cases would have abnormal values of 'G' following reduction. The value of G for the injured side was poorly correlated with the mean inter-limb diastasis (MD, $R=0.23$).

Discussion: Our study has clearly demonstrated the need for individualising the assessment method to guide surgeons and radiologists prior to revision surgery. A standard value of 'G' of 2mm as the normal limit cannot be applied universally as apparent from the data presented in this study.

Presenter information: Sudiptamohan, Mukhopadhyay, University Hospital of Wales, Cardiff, Cardiff, United Kingdom, sudiptomohan@googlemail.com

Ultrasound-Guided Dry Needling and Percutaneous Paratenon Decompression for Chronic Achilles Tendinopathy

A Yeo, N Kendall, J Sunderarajan [West Sussex, United Kingdom]

Introduction

Chronic Achilles tendinopathy is a common overuse injury that affects both athletes and the general population. There are several treatment modalities, reflecting difficulties in its management. In particular, due to the well-recognised morbidity associated with surgical decompression, treatment has steered towards a less invasive route.

Dry needling has been suggested to be efficacious in managing other tendinopathies. This study therefore assessed dry needling and percutaneous decompression of the Achilles tendon as a novel treatment for this condition.

Methods

Twenty-two patients with 25 sonographically-confirmed chronic Achilles tendinopathy were prospectively enrolled. All were symptomatic for >6 months with 90% having tried and failed alternative conservative treatments.

Ultrasound-guided dry needling of neovascular areas and paratenon decompression was performed by a dedicated musculoskeletal radiologist on a 6-weekly basis until symptomatic resolution or no improvement was evident. Sonographic assessment of the tendon's thickness and neovascularity was undertaken. Following treatment, a standardized physiotherapy regime was adopted. At baseline and 6 weeks post-final procedure, visual analogue scores (VAS) at rest and during activity were obtained. Telephonic interviews were carried out 12 months post-treatment.

Results

22 tendons (in 19 patients) were successfully treated whereas 1 patient had spontaneous symptomatic resolution and 2 progressed to surgical intervention. The mean number of treatment sessions was 2.

Therapeutic intervention led to a significant improvement in VAS at rest (40.5 v 18.4, $p=0.0005$) and during activity (73.0 v 33.7, $p<0.0001$). At 12 months, 13 (68%) patients were >80% satisfied with the outcome of the procedure with 2 (11%) patients having complete resolution of their symptoms. >85% of patients were able to return to their sporting / leisure interests.

Conclusion

Dry needling and percutaneous paratenon decompression under ultrasound guidance for chronic Achilles tendinopathy, in conjunction with a standard physiotherapy protocol, shows promise as an alternative treatment for this chronic condition.

Presenter information: Andrea, Yeo, Western Sussex Hospitals Trust, West Sussex, United Kingdom, andreayeo@doctors.org.uk

Development and validation of the Sports Athlete Foot and Ankle Score: an instrument for sports-related ankle injuries.

I Winson, M Morssinkhof, O Wang, L James, H van der Heide [Bristol, United Kingdom]

Background: There is no valid Scoring system for use in a group of patients with a higher demand on ankle function. Problems that arise include ceiling effects, unable to detect change or no sports-subscale.

Methods: This study created a validated self-administered scoring system for ankle injuries in the higher performing athlete by studying existing scoring systems and key-informant interviews. The Sports Athlete Foot and Ankle Score (SAFAS) has been developed from interviews with athletes as well as expert professionals in the area of sports foot and ankle care. Twenty six athletes who had been patients were first interviewed before creating the final score. Foot and Ankle Outcome Score (FAOS) which had partially been validated formed the starting point, but was extended to produce a sports specific score. The derived score was then used in a second phase of the study.

Results: SAFAS as a self-administered region specific sports foot and ankle score was further validated in a group of 25 patients with a wide range of injuries and 14 athletes without an ankle injury. It contains 4 subscales :symptoms and swelling, pain, daily living and sports. Spearman correlation coefficients between the SAFAS and the Foot and Ankle Ability Measure (FAAM) are 0.88 for activities of daily living and 0.78 for sports activities. Content validity is established by key informant interviews, expert opinions and testing each subscale for patient satisfaction which gave a high satisfaction rate of 75%. Testing for Cronbach's alpha gave a good internal consistency of each subscale; 0.77 for symptoms, 0.92 for pain, 0.92 for daily living and 0.88 for the sports subscale. **Conclusion:** SAFAS is a measurement tool suitable for use by clinicians to assess differences in ankle function and disability between groups of athletes. Those that have been injured and those who have not.

Presenter information: Ian, Winson, AOC, Bristol, United Kingdom, ianwinson@doctors.org.uk

First metatarso-phalangeal joint arthrodesis using a dorsal Anchorage plate™ and plantar double-compression screw. A prospective, randomised study of 100 patients comparing two methods of joint preparation. Early results.

PJ Moroney, Y Tourné [Grenoble, France]

Introduction :

Arthrodesis of the 1st metatarso-phalangeal joint (MTPJ) is a common procedure in forefoot surgery for hallux rigidus and severe hallux valgus. Debate persists on two issues - the best preparation method for the articular surfaces, and the optimal technique for operative stabilisation of the joint.

Methods:

We performed 1st MTPJ arthrodesis in 100 patients randomized into two equal groups. In the first group, the articular surfaces were prepared using cup-and-cone reamers, whilst in the second group, 'flat cut' osteotomies were performed with an oscillating saw. In all other respects, their treatment was identical. Fixation was secured using a plantar double compression Fixos™ screw and dorsal Anchorage™ plate. Full weight-bearing was allowed on the first post-operative day. Patients completed self-administered satisfaction questionnaires, including an AOFAS and SF-36 score pre-operatively and at two and six months post-operatively. Clinical examination and radiographs were compared at zero, two and six months. Statistical analysis was performed using Instat.

Results:

Radiographic union of the 1st MTPJ was documented in 45/50 patients in the reamer group and 42/50 in the 'flat-cut' group at two months and in all patients at six months. The AOFAS score improved from a mean of 46 +/- 15 pre-operatively to 72 +/- 8 (out of 90) at two months and 83 +/- 4 (out of 90) at six months. SF-36 subscales for bodily pain and for physical function increased from 42.4 +/- 16.1 and 37.3 +/- 12.8 respectively pre-operatively to 82.2 +/- 11.2 and 84.6 +/- 9.3 respectively at six months. There was no statistically significant difference between groups.

Conclusions:

Arthrodesis of the 1st MTPJ with the Anchorage™ plate and compression screw gives excellent clinical and radiographic results. Preparation method does not affect early outcomes but may influence important technical points such as length of the first ray or inter-phalangeal angle.

Presenter information: Paul J, Moroney, Groupe Chirurgical République, Clinique des Alpes, Grenoble, France, p_moroney@hotmail.com

Successful surgical reconstruction of severe hind foot Charcot deformity can be achieved by internal fixation in diabetic patients

MO Ahmed, Y Morar, M Edmonds, V Kavarthapu [London, United Kingdom]

Hind foot Charcot deformity is a disastrous complication of diabetic neuropathy and can lead to instability, ulceration and amputation. The treatment of these patients is controversial. Internal stabilisation and external fixation have demonstrated variable results of limb salvage and some authorities thus advise patients to undergo elective amputation. We report a series of 9 diabetic patients with severe hind foot deformity complicated by ulceration in 5/9, who underwent acute corrective internal fixation with successful correction of deformity, healing of ulceration in 4/5 patients and limb salvage in all cases.

conservative measures such as total contact casting were tried in 5 patients had predominant varus deformity, 2 with valgus deformity and 2 with unstable ankle joints. 5 patients had developed secondary ulceration.

All patients underwent corrective hind foot fusion with tibio-talo-calcaneal arthrodesis using a retrograde intramedullary nail fixation and screws and bone grafting. One patient also with fixed planovalgus deformity of the foot underwent a corrective midfoot reconstruction.

Patients were followed up in a diabetic /orthopaedic multidisciplinary foot clinic and were treated with total contact casting. (Mean follow up time was 15.6 ± 6.9 months) In all patients the deformity was corrected with successful realignment to achieve a plantigrade foot. Healing of the secondary ulcers was achieved in 4/5 cases and limb salvage was achieved in all cases.

Three patients underwent further surgical procedure to promote bone fusion. One patient required removal of a significantly displaced fixation screw. Two patients had postoperative wound infections which that were treated with initially intravenous antibiotic therapy and then negative pressure wound therapy.

In conclusion, internal fixation for severe hind foot deformity together with close follow up in a multidisciplinary diabetic/orthopaedic foot clinic can be successful in diabetic patients with advanced Charcot osteoarthropathy and secondary ulceration.

Presenter information: Mohammed Omer, Ahmed, Kings College Hospital, London, United Kingdom, dromerahmed@gmail.com

Ankle fracture fixation - Plate osteo-synthesis versus intramedullary fibular nail.

G Tawari, R Kakwani, K Shankar [Gateshead, United Kingdom]

Introduction:

The primary goal of treatment of an ankle fracture is to obtain a stable anatomic fixation to facilitate early mobilisation and good functional recovery. Open reduction and internal fixation must be weighed against poor bone quality, compromised soft tissues, patient co-morbidities and potential wound-healing complications.

Controversy exists over optimal treatment of elderly patient population with osteoporosis. The presence of osteoporosis increases the level of difficulty involved with the surgical management in these patients.

MATERIALS AND Methods:

A review of two matched groups of 18 patients each, who underwent fixation for unstable Weber-B ankle fractures with intramedullary fibular nail (Group 1) and standard AO semi-tubular plate osteo-synthesis technique (Group 2) was conducted. Clinical and radiological fracture union time, and the time at mobilisation with full weight bearing on the ankle were used as comparative outcome measures.

Results:

The mean age of was 53.6 yrs and 55.5 yrs respectively. The mean follow-up was 5.4 months and 6.9 months respectively.

Clinical and radiological union was achieved earlier in patients treated with intramedullary fibular nail (7.3 weeks & 8.7 weeks respectively) compared with plate osteo-synthesis treatment (8.2 weeks & 9.8 weeks respectively) ($p=0.9$).

Patients achieved full weight bearing at 8.5 weeks in nailing group compared to 8.1 weeks in plate osteo-synthesis group ($p=0.52$).

One patient in the plate osteo-synthesis group had wound infection requiring removal of hardware after fracture union.

Conclusion:

Open reduction and internal fixation with the use of plates and screws based on the AO osteo-synthesis technique remains to be the most widely used modality of treatment for ankle fracture.

In our experience, the use of retrograde intramedullary fibular nail provides a similar fracture healing time and can be used as a viable alternative.

Advantages include a minimally invasive procedure, respect to fracture biology and feasibility in compromised soft tissue.

Presenter information: Gautam, Tawari, Queen Elizabeth Hospital, Gateshead, Gateshead, United Kingdom, gautamtawari@gmail.com

Treatment of ankle syndesmosis injuries: A comparative study between tightrope and screw fixation.

G Naqvi, A Shafqat, P Cunningham, N Awan [Drogheda, Ireland]

Aim

Ankle syndesmosis injuries are traditionally treated with syndesmosis screw. Tightrope is a relatively new technique which obviates the need of routine removal of implant. Aim of this study is to compare the tightrope fixation with syndesmosis screw fixation for ankle syndesmosis injuries.

Methods

This study comprised of 94 consecutive cases of distal tibio fibular syndesmotic injuries treated in our institute between 2007 and 2009. 49 cases were treated with Arthrex Tightrope™ while 45 were treated with syndesmosis screw. Mean age of patients were 37.7(18-69) years in tightrope group and 38(18-70) years in screw group. Patients were reviewed at an average of 6 months with clinical assessment and radiographic measurements for adequacy of syndesmotic reduction. The outcome of interest were, time to full weight bearing, American Orthopaedic Foot and Ankle Society (AOFAS) score, Foot and Ankle Disability Index (FADI) score and radiographic parameters for syndesmosis integrity including medial clear space (MCS), tibiofibular clear space (TFCS) and tibiofibular overlap (TFOL) on antero-posterior (AP) ankle radiographs.

Results

Average time to full weight bearing was 7.7 weeks in tightrope group and 8.3 weeks in screw group. There was no significant difference in mean post operative AOFAS score and FADI score between two groups. Post-operative radiographic measurements demonstrated satisfactory reduction of syndesmosis. 2 patients required removal of tightrope because of soft tissue complication over the lateral knot. 3 cases in screw group showed radiographic evidence of tibiofibular synostosis and 2 had screw loosening and 1 case of broken screw.

Conclusion

The results of this study indicate that Arthrex tightrope™ provides an effective method of syndesmosis stabilization which obviates the need for routine removal of implant and facilitates dynamic stabilization. We emphasize that surgeons must be aware of potential risk of soft tissue complications and further randomised controlled trials are recommended.

Presenter information: Gohar, Naqvi, Our Lady of Lourdes Hospital, Drogheda, Ireland,
drgoharabbas@hotmail.com

The saphenous nerve in foot and ankle surgery - its variable anatomy and relevance.

M Daniel, N Little, A Dray, M Solan [Dorchester, United Kingdom]

The saphenous nerve is classically described as innervating skin of the medial foot to the first metatarsophalangeal joint. Thus it is at risk in surgery to the medial ankle and foot. However the senior author has previously demonstrated that the dorsomedial branch of the superficial peroneal nerve consistently supplies the dorsomedial forefoot, and the description of the saphenous nerve is erroneous. We undertook a cadaveric study to assess its presence and variability.

21 cadaveric feet were dissected from a level 5 cm above the medial malleolus, distally. In 16 (76%) a saphenous nerve was present, 14 of these anterior to the saphenous vein. 2 of 16 terminated above the medial malleolus, thus only 66% (14/21) had a saphenous nerve present at the level of the medial malleolus. Half of these (7/14) terminally branched by the level of the tip of the malleolus. The mean distance reached in the foot was 46mm. Only two nerves reached the forefoot, at 97 and 110 mm respectively. At the ankle, the mean distance of the nerve from the tibialis anterior tendon was 9mm, and the saphenous vein 1.2mm.

Thus the nerve is highly variable, and when present usually terminates within 40mm of the ankle. Only 10% reach the first MTP joint. These findings are inconsistent with standard surgical text descriptions.

The nerve is at risk in distal tibial screw placement and arthroscopy portal placement, and should be included in local anaesthetic ankle block in forefoot surgery, as 10% of nerves reach this level.

Presenter information: Marsland, Daniel, Dorchester Hospital, Dorchester, United Kingdom,
danielmarsland@yahoo.co.uk

Ground Reaction Force Calcaneal Offset: A new tool for measuring hindfoot alignment

F Lintz, T Barton, W Harries, S Hepple, M Millett, I Winson [Bristol, United Kingdom]

Background

Traditional measurements of hindfoot alignment are based on the tibio-calcaneal angle and do not take the forefoot into account. We have developed an algorithm based on standard radiographs to calculate calcaneal offset using Ground Reaction Force (GRF).

Hypothesis

The GRF algorithm measures hindfoot alignment without using the tibial axis

Materials and Methods

Thirty six patients (40 feet) were included (21 female, 15 male). Mean age was 56 (SD:17). Weight bearing orthogonal radiographs were taken. Calcaneal offsets were measured using the tibio-calcaneal angles and the GRF algorithm. The two methods were compared using the Bland-Altman method.

Results

Ground Reaction Force Calcaneal Offset was in agreement with traditional measurement ($p < 0.05$) but individual discrepancies were found. Mean measured offsets were respectively -11.5 mm (SD:10.2) and -8 mm (SD:9.3) valgus. Mean bias between the two methods was -0.88 mm.

Discussion

The GRF algorithm successfully measured hindfoot alignment, and took into consideration the influence of forefoot position. The absence of a previous gold standard and variability related to radiographic protocols are a limit. Overall, angular measurements underestimated calcaneal offset. Individual discrepancies showed that including data related to forefoot position provided a more accurate assessment. This could be of particular clinical relevance for surgical planning. Unexplained total ankle replacement failures and diffuse arthritis after ankle fusion might be reduced by using this information preoperatively.

Conclusion

Ground Reaction Force could improve assessment of hindfoot alignment and provide useful information for surgical planning.

Presenter information: Francois, Lintz, Avon orthopaedic Center, Bristol, United Kingdom, francoislintz@gmail.com

A computed tomography evaluation of one hundred normal ankles, to ascertain what area of the medial malleolus to use as an intraoperative guide when aiming the drill for placement of a syndesmosis screw

MT Kennedy, S Leong, A Mitra, M Dolan [Cork, Ireland]

Classical AO teaching recommends that a syndesmosis screw should be inserted at 30 degree angle to the horizontal plane of the ankle. In practice accurately judging the 30 degree angle can be difficult, and there are several reports based on post operative CT scans demonstrating that a significant minority of patients have poorly operatively reduced syndesmosis injuries.

The CT scans of 100 normal ankles which had been performed as part a CT angiogram were retrospectively examined. The centroid of the fibula and tibia in the axial plane 20mm cephaloid to the talar dome was calculated. Since a force vector between the centroid of the fibula and the tibia in the axial plane should not displace the fibula relative to the tibia, a line connecting the two centroids was therefore postulated to be the ideal syndesmosis line. Where this ideal line passed through the postero-lateral border of the fibula, and through the medial malleolus was then noted.

The ideal syndesmosis line was shown to pass through the fibula with in 2mm of the postero-lateral cortical apex of the fibula, and the anterior half of the medial malleolus in 100% of the ankles studied. The measurements also demonstrate that there is no statistical or clinical difference between the syndesmosis measurements of left and right ankles in the same patient.

The results support the concept that in the operatively reduced syndesmosis, the anterior half of the medial malleolus can be used as a reliable guide for aiming the syndesmosis drill hole, provided that the fibular entry point is at or adjacent the posterior fibular apex. The measurement data also validates the efficacy of obtaining CT images of the contralateral normal ankle when trying to ascertain if a syndesmosis is malreduced.

Presenter information: Muiris T, Kennedy, Cork University Hospital, Cork, Ireland,
muiris_kennedy@yahoo.ie

Functional and T2-Mapping MRI Results of Autologous Osteochondral Transplantation of the Talus in 72 Patients

C Murawski, J Kennedy [New York, United States]

Introduction:

Osteochondral lesions of the talus are common injuries following acute and chronic ankle sprains and fractures, the treatment strategies of which include both reparative and restorative techniques. Recently, restorative techniques (i.e., autologous osteochondral transplantation) have become increasingly popular as a primary treatment strategy, in part due to the potential advantages of replacing "like with like" in terms of hyaline cartilage at the site of cartilage repair. The current study examines the functional results of autologous osteochondral transplantation of the talus in 72 patients.

Methods:

Between 2005 and 2009, 72 patients underwent autologous osteochondral transplantation under the care of the senior author. The mean patient age at the time of surgery was 34.19 years (range, 16-85 years). The mean follow-up time was 28.02 months (range, 12-64 months). Patient-reported outcome measures were taken pre-operatively and at final-follow-up using the Foot and Ankle Outcome Score and Short-Form 12 general health questionnaire. Quantitative T2-mapping MRI was also performed on select patients at 1-year post-operatively.

Results:

The mean FAOS scores improved from 52.67 points pre-operatively to 86.19 points post-operatively (range, 71-100 points). The mean SF-12 scores also improved from 59.40 points pre-operatively to 88.63 points post-operatively (range, 52-98 points). Three patients reported donor site knee pain after surgery. Quantitative T2-mapping MRI demonstrated relaxation times that were not significantly different to those of native cartilage in both the superficial and deep halves of the repair tissue.

Discussion and Conclusion:

Autologous osteochondral transplantation is a reproducible and primary treatment strategy for large osteochondral lesions of the talus and provides repair tissue that is biochemically similar to that of native cartilage on quantitative T2-mapping MRI. This may ultimately allow the ankle joint to function adequately over time.

Presenter information: Christopher, Murawski, Hospital for Special Surgery, New York, United States, murawskic@hss.edu

Suprascapular nerve injury during glenoid component insertion in reverse geometry total shoulder replacement: A Cadaveric model.

AJ Cassar Gheiti, DC Molony, J Kennedy, A Schepens, HJ Mullett [Dublin, Ireland]

Background: Reverse Geometry shoulder replacement requires fixation of a base plate (called a metaglene) to the glenoid to which a convex glenosphere is attached. Most systems use screws to achieve this fixation. The suprascapular nerve passes close to the glenoid and is known to be at risk of injury when devices and sutures are inserted into the glenoid. We investigate the risk posed to the suprascapular nerve by placement of metaglene fixation screws.

Materials and Methods: Ten cadaveric shoulder specimens were used. A metaglene was inserted and fixed using 4 screws. The suprascapular nerve was dissected and its branches identified. The screw tips and their proximity to the nerve and branches were identified and recorded.

Results: The superior and posterior screws posed most risk to the suprascapular nerve. The nerve was impaled by the posterior screw on 4 occasions and being within 5 mm of the nerve or a branch in 5 others. The superior screw was extra osseous on 4 occasions, making contact with the nerve on 3 of those 4 specimens and being within 2 mm of it on the 4th.

Conclusion: Metaglene fixation using screws poses a significant risk to the suprascapular nerve. Caution should be used when inserting the posterior and superior screws in particular. Short locking screws may allow adequate fixation while minimizing the risk of neurological injury.

Presenter information: Adrian J, Cassar Gheiti, Cappagh National Orthopaedic Hospital, Dublin, Ireland, ajcg@eircom.net

Does Reverse Shoulder Arthroplasty for Fractures Durably Restore Function in the Elderly ?

J-F Cazeneuve, Y hassan, A hilaneh [Laon, France]

The aim of this retrospective study is to expose results and complications of the reverse concept in trauma in elderly. We therefore ask whether clinically the patients recover a pre-broken state, whether the radiological follow-up show worrisome images and whether the rate of complications is important. We reviewed thirty-seven consecutive patients with 26 three- and four-part fractures and 11 fracture-dislocations, mean age 75 (range, 58-92 years) with a minimum follow-up of one year (mean, 7.3 years; range, 1-17 years). Eight complications occurred: 2 complex sympathetic dystrophies, 3 dislocations, 2 deep infections and one aseptic loosening of the base-plate leading to 3 re-operations and 2 prosthesis revisions. The mean Constant score dropped from 55 at one year follow-up to 52 (20 to 84) at last revision which represented 67% of the mean score for the injured side. Mean adjusted Constant score was 68. Only 58% of the patients were satisfied or very satisfied because of poor internal and external rotations avoiding nourishment with utensils, dressing and personal hygiene when the dominant extremity was involved. We observed two complete borders between the base plate and the glenoid, fourteen stable inferior spurs which did not affect function and twenty-one inferior scapular notches including ten of them with medial proximal humeral bone loss or radio lucent lines between the bone cement border and the humerus. Notching increased in size with longer follow-up. Notching, accompanied by changes in proximal humerus, was associated with the weakest mean Constant score (41). The functional result were not equal to the pre-injury state. When the dominant arm was affected, the patients lost frequently their autonomy. 60% of the radiological images found were worrying. 22% of the patients had a severe complication. New developments in design, bearing surfaces and surgical technique and long term studies may support the role of the reverse concept for fracture.

Presenter information: Jean-François, Cazeneuve, centre hospitalier, Laon, France, jean-francois.cazeneuve@ch-laon.fr

The effect of psychological status on pain and surgical outcome in patients requiring arthroscopic subacromial decompression

T Yeoman, C Wigerowitz [Dundee, United Kingdom]

Background

Preoperative depression and anxiety have been linked to poorer postoperative outcomes such as increased pain and longer recovery. Few previous studies have investigated these relationships in patients requiring upper limb orthopaedic surgery. This study aims to explore the relationship between preoperative depression and anxiety and postoperative shoulder pain and function in patients requiring arthroscopic subacromial decompression for impingement syndrome.

Methods

This prospective cohort study investigated a consecutive series of patients undergoing arthroscopic subacromial decompression in 2009/2010. Mental state, shoulder function and shoulder pain were measured using reliable and validated self administered scores; the Hospital anxiety and depression scale, the Oxford shoulder score and the Pain visual analogue scale. Questionnaires were posted to patients 2 weeks preoperatively and 3 and 6 weeks postoperatively.

Results

31 patients (20 female; 11 male; mean age 55 years; range 21-89 years) participated. Preoperatively, 9 (29%) patients were anxious, 9 (29%) were depressed and 5 were both anxious and depressed. Spearman's rank order correlation demonstrated no significant correlation between preoperative depression and anxiety and postoperative Oxford shoulder scores. Preoperative anxiety correlated significantly with preoperative Pain visual analogue scales ($p < 0.05$) but only moderately with the pain scale postoperatively. Preoperative depression was a powerful predictor of anxiety at both 3 and 6 weeks postoperatively ($p < 0.05$). Wilcoxon signed ranks test demonstrated significant changes in the Oxford shoulder scores, the Pain visual analogue scales and the Hospital anxiety and depression scales at 6 weeks postoperatively ($p < 0.05$).

Conclusion

Mental state improved significantly by 6 weeks postoperatively demonstrating the short term benefit of arthroscopic subacromial decompression surgery. Preoperative anxiety significantly correlated with preoperative shoulder pain. However preoperative psychological status did not significantly correlate with postoperative shoulder pain and function. Preoperative mental status does not predict the outcome of arthroscopic subacromial decompression in patients with impingement syndrome.

Presenter information: Thomas, Yeoman, NHS Tayside, Dundee, United Kingdom,
tomyeo_2000@hotmail.com

CT assessment of osteoporosis in the proximal humerus: an in-vitro study of the evaluation of cortical thickness

D Lim Fat, J Kennedy, R Galvin, FJ O'Brien, H Mullett [dublin, Ireland]

Introduction: The management of proximal humerus fractures in osteoporotic bone is a special challenge. However CT imaging represents a powerful tool for non-invasive assessment of bone strength and is being used in clinical research studies. Our aim was to use clinical CT in a novel way of accurately mapping cortical bone geometry in the proximal humerus. We planned to experimentally define the cortico-cancellous border in a cadaveric study and use imaging software to map out cortical thickness distribution. **Methodology:** With ethical approval we used fifteen fresh frozen human proximal humeri. These were stripped of all soft tissue and CT images taken with a GE VCT Lightspeed scanner. The humeral heads were then subsequently resected to allow access to the metaphyseal area. Using curettes, cancellous bone was removed down to hard cortical bone. Another set of CT images of the reamed specimen were then taken. Using Mimics imaging software [Materialise, Leuven] and a CAD interface, 3-matic [Materialise, Leuven], we built 3D model representations of our intact and reamed specimens. We first had to define an accurate CT density threshold for visualising cortical contours. We then analysed cortical thickness distribution based on that experimented threshold. **Results:** we were able to statistically determine the CT threshold, in Hounsfield Units, that represents the cortico-cancellous interface in the proximal humerus. Our 3D colour models provide an accurate depiction of the distribution of cortical thickness in the proximal humerus. **Discussion/Conclusions:** We propose a Hounsfield value of 700 for accurate cortical thickness mapping in the proximal humerus. Knowledge of regional variations in cortical bone thickness has direct implications for basic science studies on osteoporosis and its treatment, but is also important for the orthopaedic surgeon since our decision for treatment options is often guided by local bone quality.

Presenter information: Daren, Lim Fat, Adelaide and Meath Hospital, dublin, Ireland,
darenlimfat@yahoo.com

Outcome of revision total shoulder replacement after failure of Copeland shoulder resurfacing.

A JAISWAL, R Dodenhoff, S Hay, C Kelly [oswestry, United Kingdom]

Introduction

Aim of our study was to determine the outcome of revision total shoulder replacement after failure of Copeland shoulder resurfacing.

Methods

148 Copeland resurfacings were performed in our hospital by three experienced shoulder surgeon between 1995-2008. Seventeen have been revised in 16 patients over these thirteen years. We retrospectively analysed outcome of revision surgery in these patients.

Results

17 shoulders in 16 patients were revised. Mean age at revision was 66.6 years (range, 45-84). There were five males and 12 were females. Reasons of revision were painful glenoid erosion in seven shoulders, pain in five, loosening in two, rotator cuff tear in two and infection in one. Ten had total shoulder replacement, four had reverse polarity shoulder replacement, two had bipolar shoulder hemiarthroplasty, and one had shoulder replacement with Epoca shell. Constant- Murley scores improved from a mean preoperative score of 24 (range, 10-48) to 42 (range, 18-70) at mean follow-up of 3.2 year ($P < .05$).

Discussion

Revision of failed Copeland resurfacing significantly improves functional outcome of the patient. There is no study in the literature which has analysed outcome of revision of failed Copeland resurfacings. Surgeon should use appropriate revision prosthesis after analysing carefully the cause of failure.

Summary

Outcome of 17 revision shoulder replacement after failure of Copeland resurfacings were analysed. Most common cause of failure was painful glenoid erosion (41%). There was significant improvement in mean Constant score from 24 to 42.

Presenter information: ANUJ, JAISWAL, RJA orthopaedic Hospital, oswestry, United Kingdom, anujdr@gmail.com

Distal Humeral Fractures - Conservative management in selected cases

N Brownson, R Anakwe, L Henderson, M Rymaszewska, J McEachan, J Elliott, L Rymaszewski [Glasgow, United Kingdom]

Introduction:

Although the majority of adult distal humeral fractures are successfully treated with ORIF, the management in frail patients, often elderly with multiple co-morbidities and osteoporotic bone, remains controversial. Elbow replacement is often recommended if stable internal fixation cannot be achieved, especially in low, displaced, comminuted fractures. The "bag-of-bones" method ie early movement with fragments accepted in their displaced position, is rarely considered as there has been little in the literature since 10 successful cases were reported by Brown & Morgan in 1971 (JBJS 53-B(3):425-428). We present the experience of three units in which conservative management has been actively adopted in selected cases.

Methods:

44 distal humeral fractures were initially treated conservatively - 2004 - 2010. Mean age 73.9 yrs (40 - 91) and 34 F: 10 M. Clinical and radiological review at a mean follow-up of 2 years (1 - 6).

Results:

There were 18 AO Type A, 7 B and 19 C fractures. The range of elbow movement was extension/flexion 38/124, and pronation/supination 75/76 at their last follow-up. Using the Oxford elbow score (0 = worst / 4 best result), the mean pain score was 2.44 (range 1-4), 2.26 (0-4) for function, and 2.04 (0-4) for psycho-social, although several patients had early dementia. Only 5 subsequently underwent replacement out of 44 patients whose residual symptoms have not been sufficient to require surgery.

Discussion:

We believe that there is a role for initial conservative treatment in selected higher-risk patients, as initial early mobilisation within the limits of discomfort can give good functional results. There is a significant complication rate after fixation or replacement in elderly, frail patients, which includes infection, stiffness and loosening. Unnecessary operations can be avoided in the majority of cases, with replacement of a virgin joint at a later date only if required.

Presenter information: Nicholas, Brownson, NHS Greater Glasgow and Clyde, Glasgow, United Kingdom, nabrownson@googlemail.com

The Importance of the Position of the 'Kickstand' Locking Screw in Fractures of the Proximal Humerus: A Biomechanical Study

N Burke, J Kennedy, D Fitzpatrick, H Mullett [Dublin, Ireland]

INTRODUCTION

Locking plates are widely used in clinical practice for the surgical treatment of complex proximal humerus fractures, especially in osteoporotic bone. The aim of this study is to assess the biomechanical influence of the infero-medial locking screw on maintaining reduction of the fragments in a proximal humerus fracture.

METHODS

A standard 3-part proximal humerus fracture was created in fourth generation humerus saw bones. Each specimen was anatomically reduced and secured with a PHILOS locking plate. Eleven of the specimens had an infero-medial locking screw inserted, and 11 specimens did not. Each humerus sawbone underwent cyclical loading at 532N, as previous studies showed this was the maximum force at the glenohumeral joint. The amount of movement of the fracture fragments were recorded using an infra-red motion analysis device. Each specimen was then loaded to failure.

RESULTS

The fixation of a 3-part proximal humerus fracture was significantly more stable ($P < 0.05$) with the insertion of an infero-medial locking screw when compared to a similar fracture pattern without this strategically placed screw. The overall fracture fragment movement was significantly less in the group with the infero-medial screw inserted. The mean load to failure in the group with the infero-medial screw was also significantly more. A mean load of 900N was required for construct failure compared to 750N in the group without the inferomedial screw.

CONCLUSION

This study supports the importance of anatomical reduction and adequate support of the medial column on maintaining fracture reduction of proximal humerus fractures. The key placement of the infero-medial locking screw is of significant importance in creating a solid construct for proximal humerus fracture healing. This may reduce implant complications such as screw perforations, or the possible loss of reduction of fracture fragments.

Presenter information: Neil, Burke, Royal College of Surgeons in Ireland, Dublin, Ireland,
nei1burke@yahoo.co.uk

Consequence of proximal humeral fracture morphology on glenohumeral range of motion
A Majed, P Krekel, B Charles, R Neilssen, P Reilly, A Bull, R Emery [London, United Kingdom]

Introduction

The morphology of proximal humerus fractures varies greatly. The reliability of related fracture classification systems has been shown to be poor, raising the question whether a more objective measure entails improved predictability of surgical outcome.

Method

Using a validated system that simulates bone-determined range of motion of spheroidal joints such as the shoulder joint, we categorically analysed a series of 91 proximal humerus fractures. Morphological properties of the proximal humerus fractures were related to simulated bone-determined range of motion.

Results

The interobserver variability of range of motion assessment using our system showed excellent agreement (0.798). Maximal glenohumeral abduction and forward flexion of intra-articular fractures were 34.3 ± 6.6 SE and 60.7 ± 12.4 SE degrees. For fractures with a displaced greater tuberosity abduction was 75.0 ± 5.9 SE and forward flexion was 118.2 ± 4.9 SE degrees, whilst for fractures where both tuberosities had been displaced they were 60.0 ± 10.9 SE and 69.6 ± 13.4 SE degrees respectively. For non-intra articular fractures without displaced tuberosities movements were 89.3 ± 3.3 SE and 122.6 ± 3.4 SE degrees respectively. The head inclination angle was positively correlated with maximum abduction (0.362, $p = 0.014$). Offset was negatively correlated with maximum abduction, but not statistically significant (0.834, $p = 0.087$).

Conclusion

This study has demonstrated a novel and effective tool allowing the prediction of functional motion after proximal humeral fracture based on bone anatomy. The study demonstrates that intra-articular fractures generally have the worst prognosis with regards to bone-determined ROM. Fractures with displaced tuberosities show more motion limitations for abduction than for forward flexion. A reduced head inclination angle is a strong predictor of limited bone-determined range of motion for all types of proximal humerus fractures. No correlations were found between the maximum forward flexion range.

Presenter information: Addie, Majed, Imperial College London, London, United Kingdom,
a.majed@imperial.ac.uk

Should we repair rotator cuff tears in the elderly? Review of 69 arthroscopic cuff repairs in patients over 70 years.

J Wilson, P Robinson, P Norburn, B Roy [Manchester, United Kingdom]

The indication for rotator cuff repair in elderly patients is controversial.

Methods

Consecutive patients over the age of 70 years, under the care of a single surgeon, receiving an arthroscopic rotator cuff repair were reviewed. Predominantly, a single row repair was performed using one (34 cases) or two (30) 5mm Fastin, double-loaded anchors. Double-row repair was performed in four cases. Subacromial decompression and treatment of biceps pathology were performed as necessary.

Data were collected from medical records, digital radiology archives and during clinic appointments. Pain, motion, strength and function were quantified with the Constant-Murley Shoulder Outcome Score, administered pre operatively and at 1-year post operatively. Ultrasound scans were performed at one year to document integrity of the repair.

Results

Sixty-nine arthroscopic cuff repairs were identified in 68 patients. The mean age was 77 years (70-86). The median ASA grade was 2 (79%). The dominant side was operated on in 68% of cases. A range of tear sizes were operated on (5 small, 17 moderate, 29 large and 18 massive). The tendons involved in the tear also varied (supraspinatus 12, supra and infraspinatus 53, supraspinatus and subscapularis 2, supraspinatus infraspinatus and subscapularis 2).

Re-rupture occurred in 20 cases (29%). The mean Constant score increased from 23 (95% CI 19-26) to 59 (54-64) ($P < 0.001$). Where the repair remained sound, Constant score improved 42 points (95%CI 36-48). If the cuff re-ruptured, constant score also increased on average 12 points (95% CI 2-21). Re-rupture rate was highest for massive cuff repairs: ten out of eighteen (56%).

Conclusion

Arthroscopic rotator cuff repair in the elderly is a successful procedure. Approximately seven out of ten repairs remained intact after one year. Even where re-rupture occurs, a significant improvement in the Constant score was found.

Presenter information: James, Wilson, Trafford Healthcare NHS Trust, Manchester, United Kingdom, jameswilson@doctors.org.uk

Clinical and radiographic outcome of fixed-fulcrum TSR: the value of large-pitched screw fixation of a glenoid component

O Templeton-Ward, D Griffiths, D Higgs, M Falworth, I Bayley, S Lambert [London, United Kingdom]

The Bayley-Walker (B-W) total shoulder replacement (TSR) is a fixed-fulcrum constrained replacement, the glenoid component is an uncemented, hydroxyapatite (HA) coated, large-pitch, helical, tapered screw. Constrained shoulder arthroplasty places large stresses on the glenoid component and previous glenoid designs have been associated with high rates of loosening. The BWTSR was designed for the cuff-deficient shoulder where an unconstrained device would provide insufficient stability.

Retrospective review of consecutive B-W TSR performed by the Shoulder Service at RNOH between 1995 and 2008 was undertaken. Case note review identified indication and the specific end-point of glenoid revision. All available post-operative radiographs were examined for evidence of lucency in nine specific zones of interface between the glenoid screw and surrounding bone.

One hundred and five B-W TSRs in 103 patients were included, 24% of which were performed as revision of previous failed arthroplasty. In both groups, mean follow-up was over three years, and age at time of surgery was 67 and 63, respectively. In total, 8/105 glenoids required revision. Of those eight patients, two were cases of septic loosening. In both cases septic arthritis had been treated prior to primary implantation of the B-W. Of all nine specified areas of glenoid, tip lucency on x-ray appeared to be most strongly associated with need for glenoid revision. 5/9 cases with tip lucency progressed to loosening of the glenoid. Where tip lucency was not seen, 93/96 glenoid components remained secure, giving tip lucency a negative predictive value of 97%. Excluding the two infected cases, the glenoid remained secure in 97/103 patients undergoing BW-TSR with follow-up up to 13 years. The BW-TSR is a satisfactory and durable solution to the cuff-deficient shoulder in variety of challenging groups including younger patients and as a salvage procedure following failed, cuff-deficient arthroplasty.

Presenter information: Oliver, Templeton-Ward, Royal National Orthopaedic Hospital, London, United Kingdom, ojtw@doctors.org.uk

Mid-term Functional Outcome Following Treatment for Idiopathic Adhesive Capsulitis
BC Hanusch, J O'Donovan, M Brown, R Liow [Middlesbrough, United Kingdom]

Background: Adhesive capsulitis (frozen shoulder) is a debilitating condition affecting 2-5% of the adult population. Its aetiology is still unclear and there is no consensus on the most effective treatment. The aim of this retrospective study was to investigate the mid-term functional outcome of one specific treatment protocol.

Methods: Patients with a diagnosis of idiopathic adhesive capsulitis treated by one orthopaedic surgeon between 2004 and 2008 were identified from outpatient clinic letters. All patients had initially received conservative treatment, consisting of physiotherapy with capsular stretches and subacromial injections. Patients in whom conservative treatment failed underwent an arthroscopic capsular release. At a minimum of two years following diagnosis patients were sent the Oxford Shoulder Score (OSS [0 to 48]), Western Ontario Rotator Cuff Index (WORC [0 to 2100]) and a satisfaction questionnaire by post. In addition case notes were reviewed and type of treatment and range of movement (ROM) recorded.

Results: 60 patients with the diagnosis of idiopathic adhesive capsulitis were identified. 42 patients (70%) returned the completed questionnaires. Range of movement data was available from 43 patients (72%). Mean OSS was 41 (SD 10.7) and mean WORC 307 (SD 437.1). Analysis showed that patients in whom conservative treatment was successful had significantly better functional outcome scores in OSS and WORC and better ROM than patients who underwent surgery. Overall 33 patients (79%) were satisfied or very satisfied with the outcome of their treatment.

Conclusion: This study shows that patients who respond to conservative treatment have a better functional outcome than patients who undergo surgery following failed conservative treatment. Further studies are needed to directly compare the two types of treatment.

Presenter information: Birgit Christine, Hanusch, James Cook University Hospital, Middlesbrough, United Kingdom, bhanusch@doctors.org.uk

Partial Humeral Head Resurfacing for Focal Chondral Defects

RA Delaney, LD Higgins, JJP Warner [Boston, United States]

Background: Partial humeral head resurfacing using a stemless implant is a bone-conserving option in treatment of focal chondral defects. We report our experience using the Arthrosurface HemiCAP® device.

Methods: This is a retrospective study of patients with focal chondral defects of the humeral head, treated with partial resurfacing arthroplasty, with a minimum follow-up of 2 years. Mean patient age was 45.4 years (range 27 - 76). Patients were analyzed in 2 groups: those who underwent HemiCAP for an isolated humeral head defect, and those who had HemiCAP combined with biologic resurfacing of concomitant glenoid disease.

Results: 39 patients met inclusion criteria, 5 of whom had concomitant biologic glenoid resurfacing. 24 of 34 shoulders (70.6%) with HemiCAP alone demonstrated functional improvement and decreased pain. Mean forward flexion showed some improvement from 131 degrees pre-operatively to 158 degrees post-operatively ($p=0.004$). Mean Subjective Shoulder Value improved from 35.0% to 83.6% ($p<0.001$). ASES score improved from 29.8 to 77.7 ($p<0.001$). However, follow-up radiographs showed progression of glenoid disease in 20.6% (7 shoulders). 5 shoulders (14.7%) failed and were revised: 3 to total shoulder arthroplasty, 1 to hemiarthroplasty, and 1 patient underwent glenohumeral fusion. 5 (14.7%) had some pain at latest follow-up but were pursuing a course of conservative management.

In the group with associated biologic glenoid resurfacing, all 5 patients had ongoing pain and progression of glenohumeral arthritis requiring revision or glenohumeral fusion.

Conclusion: While 70% of patients with an isolated humeral head chondral defect had significant improvement in pain and function after HemiCAP, the outcomes were not superior to those published for complete humeral head resurfacing, or for stemmed prostheses. HemiCAP was not successful for patients with concomitant glenoid disease. Results for these patients were inferior to those published for total shoulder arthroplasty, and ultimately all were revised to a stemmed prosthesis or fused.

Presenter information: Ruth A, Delaney, Harvard Combined Orthopaedic Residency Program, Boston, United States, delaney.ruth@gmail.com

Management of grade III Acromioclavicular Joint dislocation using arthroscopic tight rope fixation

J Dabis, J Chakravarthy, S Kalogrianitis [Birmingham, United Kingdom]

The treatment of Grade III acromioclavicular joint (ACJ) dislocations has been a subject of much controversy, even as early as Hippocrates.

We describe a case series of 17 patients all of whom have had grade III dislocations of the ACJ. The patient population was young active adults.

Surgery was performed within four weeks in all cases. One Surgeon in the Queen Elizabeth hospital, University of Birmingham, performed the same procedure on all 17 patients.

A standard technique was used for tight rope fixation involving exposure of the base of the corocoid through the subacromial space using lateral and anterosuperior portals. The 4mm cannulated drill and Adapteur drill guide C ring assembled with corocoid drill stop adaptor was used. The corocoid was drilled 3 ½ cm from the ACJ. The fixation device is comprised of no. 5 fibrewire suture and 2 metal buttons, joined by a continuous loop. This is a low-profile double-metallic button technique.

Postoperatively all patients remained in a polysling for three weeks and postoperative rehabilitation was commenced after that point including physiotherapy supervised pendular exercises and gentle passive movements.

They were all seen six weeks and three months post operatively. Clinical and radiographic assessment was performed to assess the fixation.

Of our cohort of patients, one required revision open stabilization after sustaining a mechanical fall on the affected operated side.

At three months postoperatively all patients were satisfied with the functional outcome and were able to return to pre injury level of activity.

This technique provides a simple, reproducible, minimally invasive technique for acute ACJ dislocation, which expedites a functional recovery of this acute injury. It is a non-rigid fixation of the AC joint that maintains reduction yet allowing for normal movement at the joint.

Presenter information: John, Dabis, QUEEN ELIZABETH HOSPITAL, Birmingham, United Kingdom, johndabis@hotmail.com

Total shoulder replacement or hemiarthroplasty - Complication rates in the English NHS (2005-2010)

S Jameson, S Ahmad, P James, M Reed, J McVie, A Rangan [Newcastle, United Kingdom]

Background

A recent Cochrane review has shown that total shoulder arthroplasty (TSA) seems to offer an advantage in terms of shoulder function over hemiarthroplasty, with no other obvious clinical benefits. This is the first study to compare complication rates on a national scale.

Methods

All patients (9804 patients) who underwent either TSA or shoulder hemiarthroplasty as a planned procedure between 2005 and 2008 in the English NHS were identified using the hospital episodes statistic database. Data was extracted on 30-day rates of readmission, wound complications, reoperation and medical complications (myocardial infarction (MI) and chest infection (LRTI)), and inpatient 90-day DVT, PE and mortality rates (MR). Revision rate at 18 months was analysed for the whole cohort and, for a subset of 939 patients, 5-year revision rate. Odds ratio (OR) was used to compare groups.

Results

Mean age was 70.6 years for the TSA group and 69.3 for hemiarthroplasty. There were no significant differences in 30-day readmission (0.82% vs. 0.83%, OR 0.99 (95% CI 0.63-1.55)), wound complication (0.57% vs. 0.51%, OR 1.11 (0.63-1.94)), and reoperation rates (0.20% vs. 0.22%, OR 0.89 (0.36-2.19)). 18-month revision was significantly higher in the TSA groups (3.03% vs. 1.76%, OR 1.75 (1.33-2.28), but at 5-years no difference was seen (3.85% vs. 3.67%, OR 0.95 (0.46-1.91)).

The overall 90-day MR was 0.43% (42 patients). 0.58% had a LRTI and 0.29% had an MI. There were 13 DVTs (0.13%) and 22 PEs (0.22%, 5 fatal).

Discussion

Despite concerns regarding osteolysis around the glenoid peg after TSA, revision rates at 5 years were not significantly different to hemiarthroplasty. Except for 18-month revision rates, there were no differences in any of the outcome measures in this study. Methods of national data analysis described in this study can provide benchmark values for future subspecialty revalidation.

Presenter information: Simon, Jameson, Wansbeck Hospital, Newcastle, United Kingdom,
simonjameson@doctors.org.uk

Return to work after Cubital Tunnel decompression

AJ Bowey, L Athanatos, V Bhalaik [Wirral, United Kingdom]

Introduction

Cubital Tunnel syndrome is relatively common affecting 1 in 4000 people. The cubital tunnel serves as major constraint for the ulna nerve as it passes behind elbow. Therefore cubital tunnel decompression is a relatively simple operation to release the ulna nerve and resolve the patients' symptoms. There has been published data on return to work and normal activity after carpal tunnel decompression but not cubital tunnel.

Aim

To identify how long it takes our patients to return to work after cubital tunnel decompression.

Method

All patients who underwent cubital tunnel decompression in Wirral University Teaching Hospital NHS Foundation Trust between September 2006 and September 2010 were identified and sent a questionnaire.

Results

106 cubital tunnels were decompressed in the 4 year period. 66 patients returned the questionnaire (62% response). The average age at operation was 59 years (32-86years). The average time to return to work after surgery was 10 days (0-300days). Complications included painful scar, return of symptoms and chronic region pain syndrome, which lead the patient to change jobs (300days). Only one patient was self-employed, they had no time off work. 34 of our patient were retired. In 24 patients (36%) their symptoms either never resolved or returned, only worsening in 2 patients, stopping them returning to work their heavy manual jobs. The DASH score (work modules) post operatively was 38.3 over all working groups; this was lower in patients who didn't have a manual job.

Conclusion

Our patients, returned to work at around 10 days after surgery. People with jobs which involved no heavy lifting returned at 5 days compared to that of 40 days, in patients with manual jobs. Now we can give our patients more accurate information about how long it will take them to return to work, depending on their job type.

Presenter information: Andrew James, Bowey, Wirral University Teaching Hospital NHS Foundation Trust, Wirral, United Kingdom, andrewjamesbowey@hotmail.com

Normal Range of Motion Of The Shoulder: An Imprecise Benchmark

M Anderton, M Newton Ede, E Holt [Manchester, United Kingdom]

Aims:

Accurate knowledge of the normal shoulder range of movement (ROM) is imperative for evaluating pathology and clinical success. However, in orthopaedic texts, the quoted normal shoulder ROM has significant variation. Furthermore we suspect there is a high incidence of intra and inter observer error during shoulder ROM examination. The aims of our study were thus:

- (1) To perform a literature review and record the published values for normal shoulder ROM. Subsequently, to calculate the average of these published values.
- (2) To perform visual and goniometer measurement of shoulder ROM in 10 volunteers and assess the agreement between the two methods.

Methods:

A literature search of textbooks, Pub Med and scoring systems was undertaken. Statistical analysis was performed to identify the average value of shoulder movements. Two researchers (specialist trainees in T&O) prospectively assessed 20 shoulders in 10 healthy volunteers. Second observations were made after two weeks. Visual estimation and goniometry assessments were conducted. Bland Altman analysis was performed.

Results:

The literature review confirmed there to be a wide variation in the normal shoulder ROM. The published average and range values for specific shoulder movements were: forward flexion 165 (117-180), extension 54 (28-80), abduction 171 (117-189), internal rotation 74 (30-110), external rotation 83 (40-117).

ROM measurements showed a lack of agreement between visual and goniometer measurements and between time elapsed measurements. Significant intra and inter observer error was also identified. Abduction and external rotation were found to have the greatest disparity.

Conclusions:

There is stark variation in published figures for normal shoulder ROM. We present the average of published figures. Orthopaedic texts describe different methods for measuring shoulder ROM, which may lead to further confusion and error. Due to the results, we question the validity of including shoulder ROM assessment within accepted scoring systems.

Presenter information: Michael, Anderton, Manchester Royal Infirmary, Manchester, United Kingdom, mike.anderton@doctors.org.uk

Simple elbow dislocations: management, direct medical costs and clinical outcome.

D Morell, N Kanakaris, B Tan, PV Giannoudis [Leeds, United Kingdom]

Objectives: To evaluate the management, direct-medical-costs and clinical outcome profile of a large trauma unit with respect to simple elbow dislocations.

Methods: All simple elbow dislocations that were defined as not requiring acute surgical intervention, post-reduction, were considered between Jan-2008 and Dec-2010. Inclusion criteria consisted of age greater than 13; absence of major associated fractures, successful closed reduction, and follow-up as an outpatient. The management of these patients was classified in terms of immobilisation time into: short (< 2weeks), standard (2-3weeks) and prolonged (>3weeks). Direct-medical-costs were calculated based on current tariff rates associated with radiology, admission, theatre time (for reductions and recovery) and outpatient attendances. Clinical outcome was evaluated with respect to complications, secondary procedures, and time before discharge from clinic.

Results: Of 81 patients in total, 6% required reduction in theatre, 17% admission, 9% were referred to a specialist or had a complication and 42% DNA their final appointment. The mean length-of-immobilisation was 2.25weeks (range 0 -6weeks). The median direct-medical-cost was £893 per patient (range £418-£2,693). The median duration of patients' engagement with hospital services was 57days (range 3-831). There was no statistically significant relationship between length-of-immobilisation and time-before-discharge ($p=0.42$), or associated direct-medical-cost ($p=0.586$). In terms of clinical outcome the prolonged immobilisation group had a statistically significant worse outcome in comparison to the short ($p=0.30$) and the standard ($p=0.01$). The comparison between standard immobilisation and short resulted in a marginally ($p=0.08$) significant advantage of the first.

Conclusion: Prolonged elbow immobilisation is generally associated with increased stiffness and a higher rate of complications. For simple elbow dislocations time-to-mobilisation was variable, as well as the mode of follow-up. The use of standardised protocols of treatment is essential in this type of injuries that are usually managed in an outpatient basis, to minimise the variability between clinical teams, improve outcome, and minimise costs.

Presenter information: Daniel, Morell, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom, dmorell@doctors.org.uk

Accuracy of preoperative ultrasound scans in identifying rotator cuff tears

S Punwar, PW Robinson, N Blewitt [Bristol, United Kingdom]

Aim: The present study aimed to assess the accuracy of ultrasound scans in identifying both full and partial thickness rotator cuff tears at our institution.

Methods: Preoperative ultrasound scan reports were obtained from 64 patients who subsequently underwent arthroscopic subacromial decompression and/or rotator cuff repair. Data was collected retrospectively using our 2010 database. The ultrasound reports were compared with the arthroscopic findings. The presence or absence of partial and full thickness rotator cuff tears was recorded.

Results: Ultrasound correctly identified 18/25 (72%) of full thickness tears but only 1/13 (8%) of partial tears seen at arthroscopy. Of the remaining 12 partial tears seen at surgery, 6 were misdiagnosed as full thickness tears on ultrasound and 6 were not picked up at all. Five partial thickness tears were repaired and the rest were debrided. If both full and partial thickness tears are counted as true positives, ultrasound had a sensitivity of 70%, a specificity of 67%, a positive predictive value of 81%, a negative predictive value of 51% and an overall accuracy of 69%. If only partial tears are counted as true positives sensitivity decreases to 8% and positive predictive value to 20%.

Conclusion: A positive ultrasound is a strong predictor of a rotator cuff tear. However it is not accurate in identifying partial thickness tears or distinguishing them from full thickness ones. Of note 50 out of the 64 ultrasound scans in our series were ordered by the local musculoskeletal assessment team service (MATS). As full thickness tears can be anticipated with a reasonable degree of suspicion from history and clinical examination alone, we question the routine use of preoperative ultrasound in the evaluation of suspected cuff tears.

Presenter information: Shahid, Punwar, Avon Orthopaedic Centre, Bristol, United Kingdom,
shahpunwar@doctors.org.uk

Abstract: 1403

Topic: E. - Elbow and Shoulders Surgery

Autologous platelet concentrate injections for tendinopathies around the elbow.

M Pullagura, R Kakkar, R Kakwani, M Scott [Newcastle, United Kingdom]

Autologous platelet injections used in refractive cases of tendinopathy promote healing by triggering stem cell recruitment, angiogenesis and fibroblast stimulation. Blood taken from the patient is centrifuged to obtain platelet concentrates and is injected into the area around the damaged tendon. The aim of this study is look at the clinical efficacy of these injections for resistant tendinopathy around elbow. We looked at 26 patients (19 with lateral and 6 with medial) who failed to improve after physiotherapy, cortisone injections and application of epicondylar clasps and assessed the efficacy of platelet-rich plasma injections using Gravitational platelet separation system (GPS). The general satisfaction and Quick DASH (Disability of arm shoulder hand) functional score was recorded. There was a significant improvement of Q-Dash scores ($p=0.01$) at 3 and 6month follow-up for both lateral and medial epicondylitis. 70% of the people reported that they were satisfied with decreased pain and returned to their previous work. **Conclusion:** Autologous platelet substrate injections provide a good short term benefit with good to excellent relief of symptoms. This is an effective alternative before considering surgical release.

Presenter information: Mohan, Pullagura, North Tyneside General Hospital, Newcastle, United Kingdom, mohanpk73@yahoo.co.in

ISOLATED TROCHLEA FRACTURE CASE REPORT AND A REVIEW OF THE LITERATURE **SS Al-Nammari, N Al-Hadithy [London, United Kingdom; Barnet, United Kingdom]**

Introduction: -

Isolated trochlea fractures are very rare and have only been described previously as case reports.

Aims: -

To report on a case of isolated trochlea fracture and to present a review of the literature.

Results: -

There have only been four previous reports of isolated trochlea fracture. Our fifth case is included in the analysis of the literature given below.

Average age 26 (Range 12-33). 60% female, 80% left sided. Dominance only stated in 40% of cases- 50% dominant side. Mechanism of injury: 60% low velocity fall onto an outstretched hand, 40% high velocity- RTA & fall off horse- exact mechanism of injury unknown. Patients all presented with elbow held in flexion, pain and swelling over the medial aspect and a painfully reduced range of motion. Diagnosis made on plain radiographs in 80%, tomograms required in 20%. AP noted to be essential to differentiate from more common capitellum fracture. 20% of fractures associated with comminution. Management consisted of open reduction through a medial approach and internal fixation in 80% (20% headless screw, 20% k-wire, 40% 4.0mm partially threaded cancellous screws) and olecranon traction in 20%. Elbows were immobilised from 3 to 8 weeks. Time to union ranged from 6 weeks (80%) to 13 weeks (20%). Outcomes were uniformly excellent with 40% being asymptomatic with a FROM, 20% asymptomatic with 10 degrees loss of extension and 40% asymptomatic with 5-20 degrees loss of flexion. There were no reported complications.

Conclusion: -

These are rare injuries and can occur through high and low energy mechanisms. They tend to occur in younger age groups. Diagnosis can be made readily with plain radiographs- the AP is essential in differentiating it from the more common capitellum fracture. The prognosis for this intra-articular fracture is good to excellent.

Presenter information: Shafic Said, Al-Nammari, The Royal London Hospital, London, United Kingdom, shafic2@hotmail.com

Elbow Arthroscopy as a treatment for stiffness post Mason type II radial head fracture

D Morrissey, D Lim Fat, Y Katsuura, H Mullett [Dublin, Ireland]

Introduction

Elbow arthroscopy has evolved over recent years and is now employed for the diagnosis and treatment of a variety of different conditions. The exact indications for intervention remain unclear. The purpose of this study was to examine the subjective and objective outcomes of elbow arthroscopy and debridement following radial head fracture

Methods

In this study, a single surgeon series of 51 consecutive elbow arthroscopies performed in 51 patients between June 2006 and May 2009, for a variety of aetiologies was retrospectively reviewed. 21 arthroscopies were performed for the sequelae of radial head fracture. Pre- and post-operative ranges of motion (ROM) were assessed and recorded along with the Disabilities of the Arm, Shoulder and Hand (DASH) score. Clinical notes were reviewed to identify morbidities.

Results

The majority of patients were male (66%) and the average age was 35 years. The majority of radial head fractures were Mason type II ((64%). A statistically significant improvement in ROM of 27° was seen following arthroscopy. A significant improvement was noted in DASH score. One case of superficial wound infection was identified. There were no cases of nerve injury.

Conclusion

In this series of elbow arthroscopies performed following radial head fracture the procedure was a safe, well tolerated procedure with significant improvements in ROMs and DASH scores seen post-operatively. There was also minimal morbidity associated with the procedure.

Presenter information: David, Morrissey, Connolly Hospital, Blanchardstown, Dublin, Ireland,
dimorrissey@hotmail.com

Risk factors for early revision after shoulder arthroplasty: 7113 shoulder arthroplasties from the Australian Orthopaedic Association National Joint Replacement Registry
LAK Khan, RS Page, LN Miller, SE Graves [Geelong, Australia; Edinburgh, United Kingdom]

Aims

To report the rate of early revision (within two years) after shoulder arthroplasty and identify any patient, disease or prosthesis factors that may be associated with these early failures.

Methods

The AOA National Joint Replacement Registry has recorded 7113 shoulder arthroplasty procedures up to December 2009. Data recorded includes diagnosis, patient demographics and prosthesis details. The main outcome of this analysis was the time to first revision of all primary shoulder arthroplasty recorded by the Registry. The cumulative per cent revision (CPR) of shoulder arthroplasty procedures was estimated using the Kaplan-Meier method. Cox proportional hazard models were used to test significance between groups

Results

The CPR (95% CI) at two years for all diagnosis was 5.2 (3.1, 8.7) for hemi-resurfacing arthroplasty, 4.0 (2.9, 5.6) for hemiarthroplasty, 4.1 (3.1, 5.3) for conventional total shoulder arthroplasty (TSA) and 4.0 (3.0, 5.2) for reverse total shoulder arthroplasty (reverse TSA). Neither patient age nor sex were shown to affect the rate of revision for conventional and reverse TSA performed for osteoarthritis. The use of an uncemented conventional TSR performed for osteoarthritis is associated with a higher rate of revision when compared with cemented TSR (HR 4.71 (1.43, 15.45)) and hybrid TSR using a cemented glenoid component (HR 2.48 (1.45, 4.24)). Both the Univers 3D conventional total shoulder replacement prosthesis (adjusted HR 3.8 (1.52, 9.50) $p < 0.01$) and the SMR/SMR reverse total shoulder replacement (adjusted HR 2.0 (1.15, 3.28) $p = 0.01$) were prosthesis identified by the Registry as having a significantly higher rate of revision compared to all other prosthesis in the same class.

Conclusions

The Registry has identified an increased early rate of revision with the use of uncemented convention TSR. Two types of prosthesis were identified as having a higher than anticipated rate of revision compared to all other prosthesis in the same class.

Presenter information: Lukman Ahmed Kashif, Khan, Barwon Orthopaedic Research Unit, Geelong, Australia, kash_khan@hotmail.com

NASA designed Computerised Dynamic Posturography Analysis of Balance in Individuals with Shoulder Stabilisation Slings

A Memon, D Lui, S Kwan, H Mullett [Dublin, Ireland]

Introduction:

Computerized dynamic posturography (CDP), designed by NASA, is the most sensitive technique available for the balance testing. It provides objective assessment of balance control and postural stability under dynamic test conditions designed to reflect the challenges of daily life. We tested the balance of individuals with a shoulder stabilisation sling (SSS) objectively in this novel method.

Methods

36 healthy adults (14 females and 22 males; average age 22 years; range 20 to 35 years) were included in the study. The individuals didn't have any other neurological or systemic illnesses. They were then randomly divided into two groups; 18 each into Dominant Hand (DH) and Non Dominant Hand (NDH). Shoulder stabilization Sling (SSS) was then applied to DH or NDH Groups. All were right hand dominant. The balance was assessed in terms of Sensory Organization Test (SOT), Motor Control Test (MCT) and Adaptation Test (ADT). The sum of both DH + NDH scores compared with the standard composite norms.

Results and Conclusions

The balance of an individual is affected with the application of a SSS. Overall 31% of the individuals had abnormal equilibrium score with 21.87% imbalances. Interestingly individuals with the sling on NDH had 50% more falls than DH, which might seem counter intuitive. Sensory analysis also revealed abnormal results in individuals with sling. Most of the individuals with sling used both hips and ankles to maintain stability but on 33% of the occasions they used their ankles predominantly. RHD people, regardless of the side of sling use, had their COG either centred or left sided. Although the muscle response latency remained within the normal range, the lower number of quality factor on MCT's forward translation showed that the body's response to balance itself after unexpected stimulus is somewhat disturbed with the application of the sling.

Presenter information: Adeel, Memon, Beaumont Hospital Dublin, Dublin, Ireland,
dowite2003@hotmail.com

Ponseti casting for congenital talipes equinovarus: a new soft option - mid-term results.
A Prasthofer, M Brewster, N Parsons, GT Pattison, ID van der Ploeg [Coventry, United Kingdom]

This study is a mid-term follow up of an original series of 51 babies treated with a modified Ponseti technique for idiopathic CTEV using below-knee Softcast (easy removal and hygienic)¹ to determine whether this method is as effective as traditional above-knee plastering.

Methods: 51 consecutive babies were treated (April 2003-May 2007) and serial Pirani scores were recorded. Dennis Browne Boots (DBB) were applied when correction was achieved and an Achilles tenotomy was performed if necessary for complete correction. DBB were worn fulltime for 3 months and at night for 3.5 years.

Results: Of the original 51, 3 were lost to follow up and 3 were diagnosed with a neuromuscular condition and excluded. 45 patients (34 boys, 11 girls) (20 unilateral, 25 bilateral) were followed up for a mean of 55.3 months (range 36-85 months). Mean age at presentation was 16 days with a median Pirani score of 6.0 (5.5, 60). 75.7% required an Achilles tenotomy before DBB. Median Pirani score at tenotomy was 2.5 (2.0, 2.5). Time to boots (weeks) was mean 5.0 (4.2, 6.0) in the non-tenotomy group and 10.7 (9.8, 11.8) in the tenotomy group. 2 patients (3 feet) had residual deformity after plastering requiring surgery and 6 patients (8 feet) had recurrences requiring surgery (6 tibialis anterior tendon transfers, 2 other open procedures). We found a greater risk of operative intervention in girls and non-compliance with DBB. The estimate of 5-year (60 month) survival without surgery was 85% (96% CI; 70,99%).

Conclusion: Below knee Softcast allows correction of CTEV with comparable results to traditional above knee techniques. Consistent with current literature, our series found that compliance with DBB is one of the strongest predictors of success.

1-Brewster MB, Gupta M, Pattison GT, Dunn-van der Ploeg ID. Ponseti casting: a new soft option. JBJS(Br) 2008 Nov; 90(11): 1512-1515.

Presenter information: Anna, Prasthofer, University Hospital coventry and Warwickshire, Coventry, United Kingdom, annaprasthofer@me.com

Proximal Femoral Growth Following Prophylactic Pinning for Slipped Upper Femoral Epiphysis

G Cousins, J MacLean [Perth, United Kingdom]

Introduction

Prophylactic pinning of the contralateral hip in the treatment of slipped upper femoral epiphysis (SUFE) has been shown to be safer than continued observation of the contralateral hip. This treatment remains controversial due to the potential for harm caused to an apparently unaffected hip.

There is evidence that pinning of an already slipped epiphysis causes growth disturbance of the proximal femur, however this has been questioned in that the slip occurs at the hypertrophic layer of the growth plate with no damage to the germative layer.

Aim

To determine whether prophylactic pinning affects subsequent growth of the unaffected hip in cases of unilateral SUFE.

Method

In order to determine the effect of prophylactic pinning we compared radiographs of skeletally mature patients who had either undergone prophylactic pinning (group 1), pinning of the affected side only (group 2), and adults with no history of SUFE (group 3). We measured the articulo-trochanteric distance (ATD) and calculated the ratio of the trochanteric-trochanteric distance to articulo-trochanteric distance. These measures have been used in previous studies and have been shown to be reliable indicators of disturbed proximal femoral growth. As this was a pilot study we recruited 8 to each group.

Results

The absolute sum of the ATDs were 219mm (average 27.3mm) Group 1, 213mm (average 26.6mm) Group2 and 258mm (average 32.5mm). The average trochanter-trochanter:ATD ratio in group 1 was 2.7 (1.9 - 3.8) compared to 2.7 (2.3 - 3.2) and 2.3 (1.9 - 2.7) in groups 2 and 3 respectively.

Conclusion

Our results suggest no difference in subsequent growth between hips that are prophylactically pinned and those that are not. Abnormal growth was observed in unpinned hips suggesting undiagnosed SUFE in some cases. In this series pinning had no effect on proximal femoral growth in patients with SUFE.

Presenter information: Gerard, Cousins, Perth Royal Infirmary, Perth, United Kingdom,
gerard.cousins1@nhs.net

A 14 Year Longitudinal Comparison Study of Two Treatment Methods in Clubfoot: Ponseti vs Traditional

R Boden, G Nuttall, R Paton [Manchester, United Kingdom]

Background: The optimal management of idiopathic clubfoot has changed over three decades. Recently there has been an enthusiastic embracing of the Ponseti technique. The purpose of this 14-year comparative prospective longitudinal study was to directly assess the differences in results between these two treatment methods.

Methods: Over the period of this study there were 52,514 births in the local population and all newborns with clubfoot were referred directly to the Pediatric Orthopedic Surgeon. Patient demographics, the Harrold & Walker Classification, and associated risk factors for clubfoot were collected prospectively and analyzed. If conservative treatment failed to correct the deformity adequately, a radical subtalar release (RSR) was undertaken (the primary outcome measure of the study).

Results: There were 114 feet (80 patients): 64 feet treated 'traditionally' and 50 feet with the Ponseti technique. Idiopathic clubfoot was present in 76.25% of patients. Mean time to RSR was 33.3 and 44.1 weeks for the traditional and Ponseti groups respectively. In the traditional group 65.6% (CI: 53.4 to 76.1%) of feet underwent RSR surgery compared to 25.5% (CI: 15.8 to 38.3%) in the Ponseti group. When idiopathic clubfoot alone was analysed, these rates reduce to 56.5% (CI: 42.3 to 69.8%) and 15.8% (CI: 7.4 to 30.4%) respectively. The Relative Risk of requiring RSR in traditional compared to Ponseti groups was 2.58 (CI: 1.59 to 4.19) for all patients and 3.58 (CI: 1.65 to 7.78) for idiopathic clubfoot.

Conclusions: Introduction of the Ponseti technique into our institution significantly reduced the need for RSR in fixed clubfoot.

Presenter information: Richard, Boden, North Western Deanery, Manchester, United Kingdom,
rboden@doctors.org.uk

Screening for developmental dysplasia of the hip: auditing the SMAC and NIPE guidelines.
H Naseem, RW Paton [Blackburn, United Kingdom]

Developmental dysplasia of the hip (DDH) is the most common musculoskeletal condition diagnosed in neonates. Early detection is important in preventing future morbidity. Debate exists as to the optimal screening method. The Standing Medical Advisory Committee (SMAC) (1969) recommended clinical examination at birth and at 6 weeks. The Newborn Infant Physical Examination (2008) guidance advised ultrasound scanning for clinically unstable hips or for those with risk factors (breech presentation / family history). We audited the use of SMAC and NIPE guidance at Burnley General Hospital (BGH) and the Royal Blackburn Hospital (RBH), respectively, in patients with irreducible hips requiring surgery. RBH adopted the NIPE approach several years before its implementation. The effectiveness of the two guidelines was compared.

The records of the local paediatric orthopaedic surgeon were used to identify cases of irreducible hip dislocations requiring surgery, born in 2007-2008 at BGH and RBH. Maternity unit records provided information on birth statistics. BGH had 5382 live births and 7 irreducible hips. RBH had 7899 live births and 4 irreducible hips. This difference was not statistically significant (Fisher's exact $p = 0.13$). 3/7 BGH cases met SMAC criteria and of these 1 was referred. The remaining 2 had repeated clinical tests that were deemed normal. 6/7 would have been referred under NIPE. 3/4 cases at RBH met NIPE recommendations and were appropriately referred. BGH therefore had a higher number of irreducible hips despite a lower birth rate. This was not statistically significant but this may be due to case size. A greater proportion of the BGH cases would have been referred under NIPE guidance and the authors have recommended its adoption across both sites. It is advised to refer any hip for ultrasound scanning where clinical examination is equivocal. Small teams of experienced clinical examiners may prove to be useful.

Presenter information: Haris, Naseem, Royal Blackburn Hospital, Blackburn, United Kingdom,
harisnaseem@doctors.org.uk

The use of CRP within a clinical prediction algorithm for the differentiation of septic arthritis and transient synovitis.

R Singhal, D Perry, FN Khan, D Cohen, HL Stevenson, LA James, JS Sampath, CE Bruce [Liverpool, United Kingdom]

Background: Establishing the diagnosis in a child presenting with an atraumatic limp can be difficult. Clinical prediction algorithms have been devised to distinguish septic arthritis (SA) from transient synovitis (TS). Within Europe measurement of the Erythrocyte Sedimentation Rate (ESR) has largely been replaced with assessment of C- Reactive Protein (CRP) as an acute phase protein. We produce a prediction algorithm to determine the significance of CRP in distinguishing between TS and SA.

Method: All children with a presentation of 'atraumatic limp' and a proven effusion on hip ultrasound between 2004 and 2009 were included. Patient demographics, details of the clinical presentation and laboratory investigations were documented to identify a response to each of the four variables (Weight bearing status, WCC >12,000 cells/m³, CRP >20mg/L and Temperature >38.5°C). SA was defined based upon culture and microscopy of the operative findings.

Results: 311 hips were included within the study. Of these 282 were considered to have transient synovitis. 29 patients met criteria to be classified as SA based upon laboratory assessment of the synovial fluid. The introduction of CRP eliminated the need for a four variable model as the use of two variables (CRP and weight bearing status) had similar efficacy. Treating individuals who were non-weight-bearing and a CRP >20mg/L as SA correctly classified 94.8% individuals, with a sensitivity of 75.9%, specificity of 96.8%, positive predictive value of 71.0%, and negative predictive value of 97.5%. CRP was a significant independent predictor of septic arthritis.

Conclusions: CRP was a strong independent risk factor of septic arthritis, and its inclusion within a regression model simplifies the diagnostic algorithm. Nevertheless, this and other models are generally more reliable in excluding SA, than confirming SA, and therefore a clinician's acumen remains important in identifying SA in those individuals with a single abnormal variable.

Presenter information: Rohit, Singhal, Alder Hey Children's Hospital, Liverpool, United Kingdom, singhal.rohit75@gmail.com

Effectiveness of clinic based Ultrasound screening for Developmental Dysplasia of Hip (DDH).

GA Naqvi, SA Malik, O Adamec [Drogheda, Ireland]

Aim

The aim of this study is to assess the effectiveness of clinic based ultrasound screening by Orthopaedic surgeon for early diagnosis and treatment of developmental dysplasia of hip (DDH) in one stop clinic.

Methods

This prospective study included 395 infants (185 male and 210 female) (5.2% of study population) who were referred for screening over one year period. Average age was 12.5 weeks (1 day to 15 months). All infants were assessed for risk factors of DDH. Clinical examinations were performed by the senior author followed by ultrasonography of both of the infant's hips by the same orthopaedic surgeon, using the Graf technique. Alpha and beta angles were calculated and hips were classified according to Graf's classification system. Treatment of dysplastic and dislocated hips was started immediately in the form of Pavlic harness. Dislocated or unstable joints are followed-up weekly until stabilised while dysplastic joints on a monthly basis until normalising ultrasound parameters.

Results

Out of 790 hips examined 670 (84.8%) were labelled as normal. 120 (15.1%) hips in 84 patients were diagnosed as dysplastic or dislocated. Clinical examination only detected 39 patients out of 84, sensitivity of 46%. Average age of diagnosis was 12 weeks (3 days - 11 months). There were 14 cases of late diagnosis (> 4 months). 79 patients were successfully treated with Pavlic harness, 2 required traction and 3 were referred for surgical treatment.

Conclusion

Selective ultrasound screening is effective in early diagnosis of DDH and significantly reduces the duration of conservative treatment as well as the need for surgical intervention but does not completely eliminate late diagnosis of DDH. We find the concept of one stop DDH clinic highly effective and recommend that ultrasound training should be a part of orthopaedic curriculum.

Presenter information: Gohar Abbas, Naqvi, Our Lady of Lourdes Hospital, Drogheda, Ireland,
drgoharabbas@hotmail.com

The Usefulness Of CRP and ESR In Diagnosing Long Bone Osteomyelitis In Children - Are We Being Falsely Reassured?

KA Lammin, J Taylor, M Zenios [Manchester, United Kingdom]

Background

Osteomyelitis can be difficult to diagnose. Unlike septic arthritis no defined diagnostic criteria exist as a guide. Inflammatory markers are frequently utilized at initial presentation, (in addition to white cell count).

Methods

All radiologically confirmed cases of long bone osteomyelitis without septic arthritis, joint effusion or abscess, in paediatric patients, presenting to one hospital over an eighteen-month period were included. These patients were compared with all culture positive septic arthritides presenting to the same hospital within the same time period. Inflammatory markers taken on the day of admission were studied.

Results

Thirty-seven patients with long bone osteomyelitis and thirteen with culture positive septic arthritis were identified. The two groups were comparable with regards to age and gender. At presentation 65% of the osteomyelitis patients had an ESR less than 40mm/hour, 48% below 20mm/hour and 19% within the normal range. 23% of the septic arthritis patients had an ESR below 40mm/hour, and none had an ESR below 20mm/hour or in the normal range. The CRP was in the normal range in 46% of the osteomyelitis patients and none of the septic arthritis patients. The average ESR and CRP in the osteomyelitis patients were 47mm/hour and 35mg/L respectively, while in the septic arthritis group these were 72mm/hour, ($P < 0.021$), and 107mg/L, ($P < 0.028$).

Conclusions

The initial rise in inflammatory markers due to long bone osteomyelitis is significantly less than that in septic arthritis. A proportion of patients presenting with osteomyelitis have normal inflammatory markers at presentation. A high index of suspicion is required in diagnosing osteomyelitis, and inflammatory markers, while a useful adjunct to monitoring treatment, may offer false reassurance regarding the initial diagnosis.

Presenter information: Kimberly Ann, Lammin, Royal Manchester Children's Hospitals, Manchester, United Kingdom, klammin@hotmail.com

Ram's Taping: An effective truly non-operative strategy for congenital talipes equinovarus
A Singh, A Roshan, S Ram [London, United Kingdom; Patna, India]

Congenital talipes equinovarus occurs in 1.2 per 1000 live births in Europe and is twice as common in boys. Over the last decade, non-surgical management has re-established itself as the first line treatment; after long-term follow-up of surgically treated patients, revealed high rates of over correction, stiffness and pain. The commonly practiced non-surgical approaches are the Ponseti technique of serial manipulation and casting, and French taping. Ram's technique of taping is a truly conservative approach with a higher success rate to address this problem. Unlike French taping, it involves taping alternate days during the first week followed by twice in the second week, then once the following week, which is left in situ for a further two weeks. After the initial five weeks of taping, patients are provided with talipes splint for all time use, up till a year. This is followed by talipes shoes for walking and splint for nighttime use for another year. At the end of two years patients can wear normal shoes.

The study includes 225 patients with 385 clubfeet, who were treated with Ram's taping technique from September 1991 to August 2008. Inclusion criteria were age up to three months and previously untreated clubfeet. Average follow up was of 5.6 years. Outcome ratings at a minimum of two years were performed. Initial correction rate at the end of five weeks was 99%. A relapse of 21% was noted, two-third of which was salvaged via further taping and exercise, while remaining one third needed some form of surgical intervention. The comparative outcome for Ram's taping is better to Ponseti or French taping with good outcome in 93%, in comparison to 72% and 67% respectively. To conclude Ram's taping is a fast, more effective, less cumbersome and fully conservative approach of correcting the clubfoot deformity.

Presenter information: Ashok, Singh, Kings College Hospital, London, United Kingdom,
ashoksingh03@yahoo.co.uk

Epidemiology of vitamin D deficiency in children presenting to a paediatric orthopaedic service in the UK

JM Reed, J Davies, NMP Clarke, E Blake, A Jackson [Southampton, United Kingdom]

Background

Vitamin D deficiency may increase predisposition to a number of paediatric orthopaedic conditions and the prevalence of vitamin D deficiency is increasing in children in developed countries. The aim of this study was to determine the epidemiology of vitamin D deficiency and insufficiency in children presenting to a regional paediatric orthopaedic service. We also examined the relationships between vitamin D status, social deprivation and ethnicity.

Methods: Individuals, age < 18 years, presenting to the regional paediatric orthopaedic service at Southampton, UK from 2008 to 2010 were investigated. Deprivation index scores were calculated from indices of deprivation.

Results

187 children (97 male, 90 female, mean age 7.1 years) underwent serum 25-(OH) D level measurement. 82% were white British and 11% of Asian ethnicity. The calculation of the total deprivation index for the whole cohort showed 34 (18%) of subjects were in quartile 1 (least deprived), 54 (29%) in quartile 2, 49 (26%) in quartile 3 and 50 (27%) in quartile 4 (Most deprived). 60 (32%) had vitamin D insufficiency with 25-(OH) levels < 50nmol/l and 15 (8%) had vitamin D deficiency. No relation ship was identified between vitamin D level and social deprivation score.

Conclusions

There is a need for awareness of the prevalence of vitamin D deficiency in the paediatric orthopaedic population presenting with bone pain and lower limb deformity before commencing 'observation or orthopaedic surgical treatment'

Presenter information: Joseph Mathew, Reed, University of southampton School of Medicine, Southampton, United Kingdom, joereed@doctors.org.uk

HIP SEPTIC ARTHRITIS IN CHILDREN: INCIDENCE, PATHOGEN CHARACTERISTICS AND FUNCTIONAL OUTCOME

O Obakponovwe, G Mouzopoulos, H Tan, P Giannoudis [Leeds, United Kingdom]

Purpose: Determine the incidence of hip septic arthritis locally, the pathogen characteristics and functional outcome.

Methods: May 2007 - January 2010, children presenting to our institution with irritable hip symptoms were eligible. Exclusion criteria included systemic inflammatory diseases. Data collected included; demographics, clinical symptoms, haematological profile, ultra-sound reports, hip aspirate and arthrotomy, microbiology cultures, antibiotic therapy, length of hospitalisation and outcome. The minimum follow up was 6 months (6-24).

Results: Out of 210 children, 199 (135 males) met the inclusion criteria (mean age 5.3 years (0.15- 15)). The left hip was affected in 117 cases. On U/S 72 children had positive hip effusions, (mean 5.7 mm (1-10.5)). 60 children required admission and 41 cases had operative hip aspiration and washout, with a mean WCC of $10.4 \times 10^9/L$ (4.85-15.8) and CRP of 118(< 5 to 312). The mean length of hospital stay was 4.4 days (1-32). 25 of the samples cultured showed no growth, 3 of which were positive for gram+cocci on staining and 16 grew staphylococcus aureus, sensitive to flucloxacillin. 4 cases had positive radiological signs of disease sequelae on follow-up imaging (1 flattened femoral head, 1 grade II heterotrophic ossification of the hip, 1 minor degenerative changes and 1 major avascular necrosis of the femoral head). Functional sparing was common among this group of cases with preservation of excellent function in all but the case with major avascular necrosis, which had good function, with 1cm leg length discrepancy.

Conclusion: In this series of 210 consecutive patients, 41 (20.6%) cases required hip arthrotomy, 19 (9.5%) had a positive cultures, with 1 case of functional limitation. The most common pathogen isolated was staph. aureus. K. kingae species, which cannot be cultured from hip aspirates, was isolated from the blood culture in 2 cases, highlighting the need for blood culturing in suspected cases.

Presenter information: Oghor, Obakponovwe, University of leeds, Leeds, United Kingdom,
oghofori@hotmail.com

Open reduction for developmental hip dysplasia presenting between 12 and 18 months: medial or delayed anterior approach ?

E Shears, S Chan, CE Bache [Birmingham, United Kingdom]

The management of developmental dysplasia of the hip requiring open reduction between 12 and 18 months of age is controversial. We compare the outcome of medial approach open reduction (MAOR) versus anterior open reduction with Salter osteotomy (delayed until the child is of sufficient size) in such patients.

20 consecutive patients who underwent MAOR aged 12-22 months were reviewed at a mean follow-up of 3.5 years (range: 1.0-6.2 years). This group was compared to 20 controls who underwent anterior reduction and Salter osteotomy aged 18-23 months, with a mean follow-up of 4.1 years.

There was 1 re-dislocation (5%) in both the MAOR and control groups. 14 of the 20 (70%) MAOR patients required subsequent Salter osteotomy at a mean of 22 months post-reduction, with a further 3 patients under follow-up being likely to require one. There were 4 cases (20%) of post-operative avascular necrosis (Kalamchi & MacEwen Grade I) in the MAOR group and 5 (25%) in the control group.

All of the MAOR patients had good or excellent clinical results according to McKay's criteria, compared to 19 of the 20 (95%) controls.

Acetabular index at last follow-up was within normal limits in 16 of 20 (80%) MAOR patients; 3 of the 4 with abnormal acetabular indices had not (yet) undergone Salter osteotomy. All patients in the control group had acetabular indices (or centre-edge angles of Wiberg) within the normal range.

This study suggests that MAOR is a reasonable treatment for children requiring open reduction for developmental dysplasia of the hip presenting between the ages of 12 and 18 months. However, the majority are likely to require a subsequent Salter osteotomy.

Presenter information: Emma, Shears, Birmingham Children's Hospital, Birmingham, United Kingdom, shears@doctors.org.uk

Use of Bioabsorbable Pin in Innominate Osteotomy for correction of Developmental dysplasia of the hip

CK Chukwunyerenwa, T Murphy, P Connolly, D McCormack [Dublin, Ireland]

Innominate Osteotomy first described by Salter is one of the commonest procedures performed for the treatment of acetabular dysplasia in children presenting with Developmental Dysplasia of the Hip (DDH). We recently published a paper describing a new method of less invasive Innominate Osteotomy, which significantly reduces the operation time hence quicker recovery, without compromising outcome (J Pediatr Orthop B. 2010 Jul;19(4):318-22. Less invasive innominate osteotomy).

As part of the evolution of this procedure we now routinely use bioabsorbable pins instead of K-wires to secure the graft and maintain the acetabular correction. The rest of the procedure was exactly as described in our paper. The use of bioabsorbable pins eliminates the need for a second surgical procedure to remove the pins as described by Salter. This has both a risk reduction and a cost benefit as a result.

We prospectively followed-up 120 consecutive cases done using the bioabsorbable pins to determine the outcome. The average age at surgery was 24 months (18-52). The minimum follow-up was 6 months. The mean preoperative acetabular index was 36.2 degrees, whereas the acetabular index at latest follow-up was 14.7 degrees ($P < 0.0001$). We had no deep infection, three superficial wound infection. All osteotomies united by six weeks. There was no loss of correction.

We conclude that bioabsorbable pins can be used to secure the graft during Innominate Osteotomy without compromising the acetabular correction.

Presenter information: Chukwudi Kingsley, Chukwunyerenwa, Children's University Hospital, Temple Street., Dublin, Ireland, chukwunyerenwa@yahoo.com

Factors affecting avascular necrosis in slipped upper femoral epiphysis: A ten year perspective.

K Tsang, S Alshryda, M Ahmad, S Adedapo, R Montgomery [Middlesbrough, United Kingdom]

Aim: (1) To determine whether any difference exists in AVN risk between surgical reduction [Fish] or pinning-in-situ [PIS] of severe slips. (2) To review the different classifications of SUFE in relation to AVN.

Materials and Methods: 56 children presented with slipped upper femoral epiphysis (SUFE) from 1998 to 2008; 29 males, 27 females; mean age 12.8 years. The Loder & Southwick classifications were used. All slips were treated surgically. The mild and moderate groups were treated with a single pin-in-situ. The severe group had either surgical reduction [Fish femoral neck osteotomy], alternatively a single pin-in-situ, randomised by day of admission. Avascular necrosis of the femoral head (AVN) was the primary outcome measurement.

Results: There were seven cases of AVN (12.5%). 2/41 in the stable group developed AVN compared to 5/15 in the unstable group, statistically significant [Chi-Square $P=0.001$]. No patient in the mild group, one out of seven in the moderate group, and six out of 22 in the severe group developed AVN. In the severe slip group, the AVN rate in the PIS group was 40%, after Fish osteotomy it was 23.5%. This is not statistically significant, but the trend favours surgical reduction.

Conclusion and Significance: (1) Surgical reduction by Fish osteotomy is no riskier for AVN than pinning in situ for severe SUFE. Surgical reduction should therefore be performed to avoid gross deformity in these cases. (2) We have confirmed that the stability and the severity of the slip at presentation are the best indicators for predicting AVN.

Presenter information: Kai, Tsang, The James Cook University Hospital, Middlesbrough, United Kingdom, kst396@doctors.org.uk

The influence of obesity on presentation and outcome of Cauda Equina Syndrome **M Venkatesan, S Balasubramanian, J Braybrooke, M Newey [Leicester, United Kingdom]**

Background: The relationship between obesity and cauda equina syndrome (CES) has not been previously evaluated or defined.

Aim: The purpose of this study was to determine the effect of body habitus on the presentation and outcome of cauda equina syndrome.

Study Design: Single-centre case series.

Methods: A retrospective analysis was performed on 40 patients admitted with cauda equina syndrome. Data was collected regarding patient demographics, body mass index (BMI), co-morbidities, onset & mode of presentation and speed of functional recovery following surgery.

Results: There were 18 males and 22 females with an overall average age of 38.9 years. The average height was 167 cm, and the average weight was 95.3 kg, giving an average BMI of 30.3 Kg/m². There were 38% of patients who were overweight (BMI 25-29.5) and 41% of patients who were obese (BMI >30.)

The average duration of back or leg pain prior to presentation was 4.2 years for the obese group and 1.3 years for the non-obese group. Bilateral sciatica, urinary incontinence and dense peri-anal numbness were the predominant presenting features in the obese group. Onset of symptoms was fast and rapidly evolving in the obese group compared to the non-obese group.

In the non-obese group, 83% underwent surgery within 24 hrs as opposed to 42% in the obese group. There was no correlation between obesity and incidence of operative complications. Recovery of motor and sensory function appeared to occur more quickly in the non-obese compared to the obese group. Recovery of bladder continence was 90% in non-obese patients and 83% in the obese group at 6 months.

Conclusion: This is the first study exploring the impact of body mass index on CES presentation and outcome. Specific care in establishing an early diagnosis in obese individuals is imperative for timely intervention.

Presenter information: Muralidharan, Venkatesan, University Hospitals of Leicester, Leicester, United Kingdom, muraliv@doctors.net.uk

Survivorship analysis following odontoid peg fracture in elderly population **M Venkatesan, J Northover, B Wild, J Braybrooke [Leicester, United Kingdom]**

Background: Fractures of the odontoid peg are one of the commonest spinal injuries in the elderly population. In this population there is a higher risk of morbidity and mortality as a result of the injury. The magnitude of this risk has not been quantified in the literature.

Aim: To show a survivorship analysis in a cohort of elderly patients with odontoid peg fractures.

Method & Materials: A 6-year retrospective analysis was performed on all patients >65 years old admitted to a spinal unit with an isolated odontoid peg fracture. Actuarial (Life-Table) analysis was used to estimate survivorship from the date of fracture.

Results: A total of 32 patients > 65 years of age with isolated odontoid peg fractures were identified. There were 17 male and 15 female, with a mean age of 78 years and 86.7 years respectively. A low velocity mechanical fall was the commonest cause for the injury. The age distribution was unimodal in both sex, the greatest number occurring for the females in the 85-94 year age group and 75-84 years for the males. Overall, it was estimated that only 62.5 % would be alive by one year. The period of greatest mortality was within the first 12 weeks, a lesser contribution from then to one year, and had no impact on mortality thereafter. Males appeared to suffer a heavier mortality than females within the first year. At one year the male survival rate had fallen to 58.8% compared with a female rate of 66.6%.

Conclusion: We observed that odontoid peg fractures in the elderly are not benign injuries and are a cause of high mortality rates within the first three months of the injury. Patients who survived to one year following the injury were observed to have their risk return to age and sex matched rates for this population.

Presenter information: Muralidharan, Venkatesan, University Hospitals of Leicester, Leicester, United Kingdom, muraliv@doctors.net.uk

Outcome factors after operative treated thoracolumbar burst fractures **K Kabir, H Goost, O Weber, R Pflugmahcer, DC Wirtz, C Burger [Bonn, Germany]**

Introduction: The management of thoracolumbar burst fractures is controversial. The goal of our study was to evaluate whether the psychological factors or the late spinal deformities influence outcome and in particular quality of life following surgical treatment of burst fractures of the thoracolumbar spine.

Material and methods: In a retrospective analysis, we evaluated outcome in 45 patients in whom burst fractures of the thoracolumbar spine without neurological deficits were surgically treated between April 2001 and November 2004. For this purpose, patient charts, surgery reports and x-ray images were analyzed consecutively. 29 patients could be examined physically and the outcome could be evaluated with VAS spine core, quality of life according to short-form 36 (SF36) and Beck Depression Inventory (BDI) with a minimum follow up of 30 months.

Results: Mean VAS spine score was 60 ± 26 . Neither VAS spine score, nor quality of life results correlated with the following radiological findings: vertebral body angle, sagittal index and height of cranial disc space of the vertebra. Beck Depression Inventory (BDI) correlated with SF-36 score and VAS spine score ($p < 0.05$). Patients who were depressed showed significantly worse results in relation to the VAS spine score and the SF36 score ($p < 0.01$).

Conclusion: For the first time, we could show, that psychological factors have high influence on functional outcome and health related quality of life in operative treated thoracolumbar burst fracture independent of x-ray findings. Therefore, we recommend inclusion of psychological components in the treatment and outcome-evaluation of the thoracolumbar burst fracture in future.

Presenter information: Koroush, Kabir, University Hospital Bonn, Bonn, Germany,
koroushkabir@yahoo.com

Prospective study of Posterior Lumbar interbody Fusion and Posterolateral Fusion for Degenerative spondylolisthesis

A Sivaraman, F Altaf, A Jalgaonkar, R Kakkar, P Sirigiri, A Howieson, R Crawford [London, United Kingdom]

Aims: To determine whether the addition of an intervertebral cage improves the clinical outcome and fusion rate of patients undergoing posterolateral fusion after decompression for degenerative spondylolisthesis.

The surgical approach that should be used for degenerative spondylolisthesis is a controversial issue.

Decompression and posterolateral fusion (PLF) with or without lumbar interbody fusion (PLIF) is widely used.

Theoretical advantages in favour of PLIF include anterior column support, indirect foraminal decompression, restoration of lordosis, and reduction of the slip via ligamentotaxis. Despite numerous publications, the scientific support for the PLIF method is, however weak.

Methods: A prospective study was carried out including 59 patients with degenerative spondylolisthesis. Average age of patients was 66 years: 34 males and 25 females. Patients were divided into two treatment groups: Group1 - 32 patients with PLF and Group 2 - 27 patients with PLIF with cage. Minimum two years follow-up. Outcomes were assessed by measuring pre- and post-operative lordotic angles. SF-12 physical and mental health scores were recorded along with visual analogue scores for pain. Complications were also recorded.

Results: No significant difference in the post-operative lordotic angles achieved between the two techniques. Non-significant difference in the clinical outcomes between both techniques.

Conclusions: We have found the use of a cage to achieve lumbar interbody fusion in the treatment of degenerative lumbar spondylolisthesis does not confer any significant advantages in terms of restoration of lumbar lordosis, improvement in clinical symptoms, or relief of pain post-operatively.

Presenter information: A, Sivaraman, Barts and the London NHS Trust, London, United Kingdom, siva.raman@btinternet.com

A 5 year review of timing and response to abnormal somatosensory evoked potential (SSEP) monitoring during complex spinal surgery: does intervention by the surgeon influence outcome?

I Vanhegan, G Cannon, S Kabir, J Cowan, A Casey [London, United Kingdom]

Introduction. Evidence suggests that intra-operative spinal cord monitoring is sensitive and specific for detecting neurological injury. However, little is known about surgeons' responses to trace changes and the resultant neurological outcome.

Objective. To examine the role of intra-operative somatosensory evoked potential (SSEP) monitoring in the prevention of neurological injury, specifically sensitivity and specificity, and whether the abnormalities were reversible.

Methods. 2953 consecutive complex spine operations (male 36% female 64%, median age 25yrs) prospectively performed using spinal cord monitoring at a single institution (2005-2009). All traces and neurophysiological events were prospectively recorded by the neurophysiology technician. All patients with a significant neurophysiology event were examined clinically by a neurologist, separate from the spinal surgery team. Significant trace abnormality was defined as a decrease in signal amplitude of 50% or a 10% increase in latency. Timing of trace abnormality, surgeon's response and prospective neurological outcome were recorded. Sensitivity, specificity, positive / negative predictive value were calculated. A Chi-squared test was performed to assess the impact of intervention on neurological outcome ($p < 0.05$).

Results. 2953 operations involving SCM were performed and 106 recorded a significant trace abnormality. This most often occurred during instrumentation and the most common reaction was adjustment of metalwork. SSEP monitoring had a sensitivity of 100%, specificity 97.3%, PPV 24%, NPV 100%. There were 79 false positives and no false negatives in this series. Chi-squared test was not significant ($p=0.18$) possibly suggesting intervention did not affect neurological outcome.

Conclusions. Triggering events are uncommon and the development of a persistent neurological deficit is rare with an incidence of 0.85% in this series of 2953 operations. In the majority of cases detection of a monitoring abnormality prompts a corrective reaction by the surgeon. Of those with an abnormal trace 76% were neurologically normal at follow up.

Presenter information: Ivor, Vanhegan, University College Hospital London, London, United Kingdom, ivanhegan@nhs.net

Dose response and structural injury in the disability of spinal injury

MS Patel, P Sell [Leicester, United Kingdom]

Aim: To compare spinal outcome measures between patients reviewed for medico-legal compensation claims relating to perceived injury at work to those having sustained serious structural injury in the form of unstable thoraco-lumbar fractures requiring internal fixation.

Method: Two consecutive cohorts of 23 patients with healed spinal fractures and 21 patients with a perception of work related soft tissue injury were compared. Patient demographics and a range of outcome measures including Oswestry Disability Index (ODI), Low Back Outcome score (LBOS), Modified Somatic Perception (MSP) and Modified Zung Depression (MZD) indices were measured.

Results: 23 patients (8F; 15M) with spinal fractures (group 1) of average age 42 years (range 22-66) were followed up for a mean of 41 months (range 14-89, SD 23.3) post trauma and compared to 21 patients (6 females; 15 males) with self reported back pain (group 2) of average age 47 years (range 37-63), mean time since perceived injury of 42 months (range 12-62, SD 14.5). Both groups were comparable in terms of age and sex ($P = 0.254$ and 0.752 respectively).

The average ODI was 28% (SD 18.5) compared to 52% (SD 17.1) in group 1 and 2 respectively (P value: 0.000087); LBOS 40 Vs 20 ($P=0.000189$); MSP 4 Vs 10 (0.01069); and MZD 20 Vs 36 ($P=0.000296$).

Conclusion: Despite high energy trauma and significant structural damage to the spine, post-traumatic patients had better spinal outcome scores in all measures (ODI, LBO, MSP, MZD). This thereby defies 8 of the 9 Bradford Hill criteria of causation. The reasons for such differences are primarily psychosocial. Addressing obstacles to recovery may improve outcomes. There is no 'dose-response' curve to functional outcomes. In fact, uniquely the disability seems greater in the lower energy injury which is unique in trauma care.

Presenter information: Mohammed Shakil, Patel, Leicester General Hospital, Leicester, United Kingdom, shaqs@doctors.org.uk

The impact of modern spinal surgery on a major trauma unit **L Henderson, S Mc Donald, N Eames [Belfast, United Kingdom]**

Introduction:

Traditionally complex spinal surgery in Belfast has been performed at the Royal Victoria Hospital (RVH). Since an amalgamation the RVH has become effectively the level 1 trauma centre for the province. The ever increasing complexity of spinal surgery in addition to changes in practice such as the management of metastatic spinal cord, are placing significant demands on the service. At a time when resources are scarce trends in patient profiles are highly important to allow adequate planning of our service.

Aim:

To establish trends in patient profiles in a level one trauma centre also managing spinal pathology over the last 10 years and to examine the impact of this on our service.

Methods:

The Fracture Outcome Research Data base (FORD) was interrogated to provide data for patient profiles from 2000 to 2010.

Results:

In 2000 the most common admission was for a fractured neck of femur (n=950). This has not significantly changed over the ten years. In 2000 fractured tibia (n= 379), fractured forearms (n= 336), fractured ankles (n= 311) and spinal cases (n=351) were admitted. By 2009 a 32% increase had occurred in spinal admissions making them the second most common patient admitted to the unit. Of spinal case admissions, tumours have increased by 42%, spinal fractures by 10% , cervical disc surgery by 63% and suspected cauda equine cases by a staggering 342%.

Conclusions:

The throughput of spinal admissions to the unit has significantly increased between 2000 and 2009 making them now the second most common admission to the unit. The impact of this on bed days, theatre usage and oncall arrangements is huge and must be taken into account in strategic planning of our service especially given the background of ongoing financial constraint. The financial impact of this will be discussed.

Presenter information: Lynsey, Henderson, Royal Victoria Hospital, Belfast, Belfast, United Kingdom, lhenderson23@doctors.org.uk

Should we biopsy discitis before commencing treatment? A prospective study of 34 discitis biopsy specimens

D Thavarajah, P Mckenna, R Marshall, T Andrade, S Iyer [Reading, United Kingdom]

Aim

The purpose of our study was to see what the microbiological epidemiology of our discitis biopsy specimens were. In doing this we could identify if biopsy served a strategic and necessary purpose in the management of this potentially serious pathology.

Methods

At our institution the Combined Orthopaedic and Medical Microbiology Service (COMMS) reviews all patients on antibiotic treatment on a weekly basis and records data prospectively. We present a review of discitis patient data from a 28 month period (August 2008 - December 2010). Inclusion criteria included a first diagnosis of discitis, based on a history of pain, raised inflammatory markers (erythrocyte sedimentation rate, C reactive protein), MRI confirmation, radiological biopsy of disc, patients that had spinal procedures and patients that had no spinal procedures. Exclusion criteria included patients who did not have a disc biopsy or MRI scan diagnosis.

The outcome measure was discitis biopsy micro-organism.

Results

Thirty four cases were included, of which 25 cases were biopsy positive for a micro-organism. There were 11 different micro-organisms seen. The 3 most common micro-organisms were staphylococcus aureus, propionibacter acnes and streptococcus (P-value= 0.0423 Fishers exact test).

Conclusion

Radiological disc biopsy reveals variability in micro-organism pathology which will affect antibiotic management, treatment course and prognosis. We recommend radiological disc biopsy at the outset for optimum treatment, from culture sensitive antibiotics. Culture negative biopsies can be treated with consensus based empirical treatment in-line with discitis biopsy epidemiology.

Presenter information: Dushan, Thavarajah, Royal Berkshire Hospital, Reading, United Kingdom, dushanthavarajah@yahoo.com

Did repeat MRI scanning affect management of surgical level decompression of the lumbar-sacral spine?

D Thavarajah, M Yousif, P Mckenna [Reading, United Kingdom]

Introduction

MRI imaging is carried out to identify levels of degenerative disc disease, and in some cases to identify a definite surgical target at which decompression should take place. We wanted to see if repeat MRI scans due to a prolonged time between the initial diagnostic MRI scan of the lumbar sacral spine, and the MRI scan immediately pre-operatively, due to the desire for a 'fresh' MRI scan pre-operatively, altered the level or type of procedure that they would have.

Methods

This was a retrospective observational cohort study. Inclusion criteria- all patients with more than one MRI scan before their surgical procedure on the lumbar sacral spine, these were limited to patients that had either, discectomy, microdiscectomy, laminotomy decompression, laminectomy decompression and fusion, and posterior lumbar interbody fusion. Exclusion criteria- all patients with anterior approaches, all patients without decompression and all non lumbar sacral patients. Outcome measures were if there was a change between the pre-operative MRI scans, which would have changed the operative level of decompression, added other levels of decompression or type of surgery than primarily decided.

Results

84 patients were identified with our inclusion criteria with two or more pre-operative MRI scans. The repeat MRI did not change the surgical target for all 84 patients ($p < 0.05$).

Conclusion

Repeat MRI scanning does not alter the surgical target level, and therefore does not change management. It can delay the initial primary procedure which can lead to progressive neurology, which may be irreversible and should be avoided unless the distribution of neurology has changed.

Presenter information: Dushan, Thavarajah, Royal Berkshire Hospital NHS Foundation Trust, Reading, United Kingdom, dushanthavarajah@yahoo.com

Minimally Invasive Surgery (MIS) Techniques & Outcomes for Stabilisation/Correction of Single Level Thoracolumbar Spinal Fractures

A Kumar, C Lee [Lincoln, United Kingdom]

We hypothesised whether MIS techniques confer any benefit when treating thoracolumbar burst fractures.

This was a prospective, non-randomised study over the past seven years comparing conservative (bracing: n=27), conventional surgery (open techniques: n=23) and MIS techniques (n=21) for stabilisation and correction of all thoracolumbar spinal fractures with kyphosis of $>20^{\circ}$, using Camlok S-RAD 90 system (Stryker Spine). All patients previously had normal spines, sustained only a single level burst fracture (T12, L1 or L2) as their only injury. Age range 18-65 years.

All patients in both operatively treated groups were corrected to under 10° of kyphosis, posteriorly only. All pedicle screws/rods were removed between 6 months and 1 year post surgery to remobilise the stabilised segments once the spinal fracture had healed, using the original incisions and muscle splitting/sparing techniques. Patients were assessed via Oswestry Disability Index (ODI) and work/leisure activity status 1 year post fracture.

The conservatively treated group fared worst overall, with highest length of stay, poorest return to work/activity, and with a proportion (5/27) requiring later intervention to deal with post-traumatic deformity. 19/27 returned to original occupation, at average 9 months. ODI 32%.

Conventional open techniques fared better, with length of stay 5 days, most (19/23) returning to original work/activity, and none requiring later intervention. Average return to work was at 4 months. ODI 14%.

MIS group fared best, with shorter length of stay (48 hours), all returning to original work/activity at average 2 months, and none requiring later intervention. ODI negligible.

There was no loss of correction in either operatively treated groups.

The Camlok S-RAD 90 system is a powerful tool for correction of thoracolumbar burst fractures, and maintains an excellent correction.

MIS techniques provide the best outcomes in treating this group of spinal fractures, and offer patients the best chance of restoration to pre-fracture levels of activity.

Presenter information: Amit, Kumar, Lincoln County Hospital, Lincoln, United Kingdom,
mrakumar78@gmail.com

Pedicle Subtraction Osteotomy: The Clinical and Radiological outcomes for the correction of kyphosis in ankylosing spondylitis

B Dala-Ali, W Yoon, A Iliadis, J Lehovsky [London, United Kingdom]

INTRODUCTION

Pedicle subtraction osteotomy is a powerful technique for correcting sagittal imbalance in ankylosing spondylitis. There has been significant perioperative morbidity associated with this technique in the peer review literature. We present the Royal National Orthopaedic Hospital experience with a single surgeon retrospective study that was conducted to evaluate the outcomes in patients who underwent lumbar pedicle subtraction osteotomy for the correction of thoracolumbar kyphotic deformity in ankylosing spondylitis.

METHOD

Twenty seven patients underwent a L3 lumbar pedicle subtraction osteotomy and adjacent level posterior instrumentation between 1995 and 2010. There were 18 males and 9 females in the study. Events during the peri-operative course and post-operative complications were recorded. The radiological outcome and patient satisfaction were analysed with mean follow-up of one and a half years.

RESULTS

The mean operative time was three and half hours and the mean blood loss was 2290 mls. Final follow-up radiograph showed an increase in lumbar lordosis angle from 17 degrees to 45 degrees, whereas thoracic kyphosis angle remained relative stable. The sagittal imbalance improved by 85mm with the operation. Complications included loosening in two patients, one transient neurologic deficit and one infective non-union occurred overall. There were no mortalities from the surgery. Three patients developed junctional kyphosis and required a repeat operation.

There was an improvement in the Oswestry Disability Score from a mean of 29 to 16 after the surgery. All of the patients were satisfied with the results of the procedure and would recommend it to others.

CONCLUSION

Pedicle subtraction extension osteotomy is effective for the correction of kyphotic deformity in ankylosing spondylitis.

Presenter information: Benan, Dala-Ali, Royal National Orthopaedic Hospital, London, United Kingdom, benan@doctors.org.uk

What is the influence of pre-operative patient characteristics on the clinical outcome measures following cervical arthroplasty?

S Lakkol, R Taranu, G Reddy, B Chandra, T Friesem [Stockton on tess, United Kingdom]

Background:

The factors that are considered to be associated with successful clinical outcome following cervical arthroplasty surgery are patient selection, absence of facet joint changes and lack of pre-operative kyphosis. Even though many studies have cited the pre-operative demographic details of their patient groups, the effect of associated psychological co-morbidities (Depression/Anxiety), smoking history, gender, social benefits and employment status on the clinical outcome measures have not been reported. The aim of the study was to assess the influence of pre-operative patient characteristics on the clinical outcomes following cervical disc replacement.

Methods:

We included 126 patients who underwent single or multiple level cervical arthroplasty in our unit were included in the study. The clinical outcome measures such as Visual Analogue Score for neck pain (VAS-NP) and arm pain (VAS-AP); Neck disability Index (NDI), Hospital depression and anxiety scale and Bodily pain component of Short Form 36 questionnaires (SF-36 P) were recorded pre and post operatively. Statistical analysis was completed using SPSS 16.0 statistical package (SPSS Inc, Chicago, IL).

Results:

There were 60 males and 63 females. Average duration of follow up was 18 months (Range 10 -51). Out of 123 patients, 37 patients had a history of anxiety/depression, 25 patients gave history of smoking, 64 were actively working at the time of operation and 27 were receiving social benefits. We have found that gender; smoking status, associated co-morbidities, working and benefit status had no statistically significant contribution to clinical outcome measures in the follow up period.

Conclusion:

This is has been a first ever attempt to analyse the affect these psychosocial factors on the clinical outcomes following cervical arthroplasty. In our study, contrary to studies related lumbar surgeries, we conclude that there was no statistically significant contribution of these associated factors on the clinical outcomes in the early follow up period.

Presenter information: Sandesh, Lakkol, University Hospital of North Tees, Stockton on tess, United Kingdom, sandesh.lakkol@doctors.org.uk

Is multi level cervical arthroplasty as good as single level arthroplasty for cervical degenerative disc disease?

S Lakkol, S Aranganathan, G Reddy, R Taranu, T Friesem [Stockton on tess, United Kingdom]

Introduction:

In the last decade, single level cervical arthroplasty has proven its efficacy as one of the surgical treatment option for for patients suffering from cervical degenerative disc disease. Recent published reports on multilevel cervical arthroplasty using single implants have shown statistically significant results when compared to single level surgery. The aim of this study is to compare the clinical outcomes of multilevel cervical arthroplasty to single level cervical arthroplasty, when more than one type of implants were used.

Methods:

This is a prospective study of consecutive patients who presented to our unit in between June 2006 and November 2009. The maximum follow-up period was 51 months (mean=18 months). Several types of cervical arthroplasty devices have been used in this study. The clinical outcome measures such as Visual Analogue Score for neck pain (VAS-NP) and arm pain (VAS-AP); Neck disability Index (NDI) and the Bodily pain component of Short Form 36 questionnaires were recorded pre and post operatively. After confirming the normality of the data appropriate parametric (paired t-test) were used to assess the statistical significance ($p < 0.05$) between pre and post-operative values. Two sample T-test was used to assess the significance between the differences in mean scores between each group.

Results:

A total of 105 patients (37 single level, 68 multi-level) were included in the study. Mean age of patients was 51 years (Range 32-80) with Male: Female ratio of 9:10. All clinical outcome measures showed statistically significant improvement in the post-operative period in single as well as multilevel group. However, there was no statistically significant difference in the improvement in between single and multilevel surgeries.

Conclusions:

Our study results clearly demonstrate that multilevel cervical arthroplasty offers the same clinical outcome when compared to single level surgery, despite using different type of implant in multilevel surgeries.

Presenter information: Sandesh, Lakkol, University Hospital of North Tees, Stockton on tess, United Kingdom, sandesh.lakkol@doctors.org.uk

AN ASSOCIATION BETWEEN THE CENTER OF ROTATION AND CLINICAL OUTCOME IN PATIENTS IMPLANTED WITH A VISCOELASTIC TOTAL DISC REPLACEMENT

M Newton Ede, ERS Ross, B Rischke, B Joellenbeck, J Hipp, Z Kari [Manchester, United Kingdom; Zurich, Switzerland; Magdeburg, Germany]

Purpose: To determine if clinical outcomes are correlated with center of rotation (COR) in patients implanted with a viscoelastic total disc replacement (VTDR).

Methods: Fifty patients with single-level, symptomatic lumbar DDD between L4 and S1 were enrolled in a clinical trial of a VTDR across three surgical centres. A comprehensive, independent review and statistical analysis of both clinical and radiographic outcomes was performed and analyzed for correlations. Data from preoperative through 2 years were available. The COR was calculated for the index levels and compared to data for an asymptomatic population. Each COR coordinate was classified as abnormal if outside of the 95% confidence interval for an asymptomatic population.

Results: At most recent follow-up, 69% of the patients had achieved at least a 15 point Oswestry Disability Index (ODI) improvement. 76% of the patients achieved at least a 10 point improvement. At most recent follow-up, 78% of cases had a normal COR-X and 92% had a normal COR-Y. Results from three statistical tests show the association between COR-X and outcomes. 1) Based on latest available time point for each patient, the improvement in ODI score was significantly better for patients with a normal anterior-posterior (AP) coordinate of the COR ($P=0.03$). 2) Anterior COR corresponded with anterior placement of the device in the disc space, and patients were almost 7 times less likely to achieve at least a 15 point improvement in the ODI score if the COR was positioned too anteriorly. 3) This effect was also seen in the average AP coordinate of the COR for patients who achieved a 15 point ODI improvement.

Conclusions: A viscoelastic TDR can restore a normal COR. This is the first study to show that restoration of a normal COR correlates with a significant and clinically relevant improvement in patient disability.

Presenter information: Matthew, Newton Ede, Salford Royal Foundation Trust, Manchester, United Kingdom, newtonede@doctors.net.uk

General Practice Referrals of Cauda Equina Syndrome: Experience of a District General Hospital

R Walker, P Sturch, D Marsland [Dorchester, United Kingdom]

Aims

Cauda equina syndrome (CES) is a rare condition which requires urgent treatment to reduce the risk of long term neurological morbidity. Most authors recommend surgical decompression within 24 - 48 hours of the onset of symptoms, which may not be possible if there are delays in referral to hospital, performance of diagnostic imaging or poor access to a spine surgeon. We present a snap shot of referrals of patients with suspected cauda equina syndrome to the Orthopaedic department in a district general hospital including the diagnoses, management and outcome.

Methods

A retrospective review of 20 consecutive patients (mean age 49, 11 males, 9 females) referred via Primary Care to the orthopaedic on call team between April and December 2010 was carried out. Data were recorded including the clinical symptoms and signs on admission, time taken to undergo MRI, diagnosis and treatment.

Results

18/20 patients had red flag symptoms. Two patients with convincing neurological evidence of CES were transferred to the local neurosurgical unit for urgent assessment and surgical intervention. 12 patients required urgent inpatient MRI scans; mean time to MRI for these patients was 22 hours from the initial Orthopaedic assessment. Of these, none showed cauda equina and 3 were offered elective surgery for spinal nerve root compression. 14 out of 20 patients presented outside normal working hours when immediate access to MRI was unavailable.

Conclusions

The majority of patients in this study had red flag symptoms, although few actually had CES. Usually patients present in the evening when access to MRI is unavailable, potentially delaying the diagnosis. Such information may be useful to radiology departments to help plan out of hours services or help district hospital Orthopaedic departments develop protocols with nearby neurosurgical units for rapid patient transfer when CES is suspected.

Presenter information: Robert, Walker, Dorset County Hospital NHS Foundation Trust,
Dorchester, United Kingdom, robert.walker03@imperial.ac.uk

Is there a need for routine postoperative surgical follow up post Trapeziectomy or single digit Dupuytren's fasciectomy?

S Elnikety, M El-Husseiny, T Kamal, G Talawadekar, N Triggs, H Richards, A Smith [Margate, United Kingdom]

"No routine post-operative follow up" protocol has been implemented in NHS hospitals in different specialties for non complicated simple surgical procedures. In trauma and orthopaedics few studies to date reviewed this practice and reflected on the patients' opinion.

In this study we prospectively surveyed 121 patients (5 excluded) post simple Trapeziectomy and post single digit Dupuytren's fasciectomy over 2 years for their overall opinion of post operative care and if they would have liked to be seen by the surgeon in a routine post operative follow up clinic.

All patients included in this study had their operations done by one surgeon in one hospital and were seen by hand therapist within the first 2 weeks post operative and treatment protocol was followed with all patients. Before discharge from the hand therapy clinic all patients completed a Yes or No questionnaire survey.

106 patients (91%) were satisfied with their post operative management and 99 patients (85%) did not want to see the surgeon as post operative outpatient follow up.

This study reflects the successful application of "Hand therapy led follow up and discharge" policy with no routine post operative review by the surgeon in our organisation. We succeeded in reducing the waste in the NHS by avoiding 226 un-necessary routine follow up clinics over 2 years period and avoided the associated inconvenience to patients having multiple trips to the hospital. We advise implementing this practice for other common non complicated surgical procedures with possibility of giving the patient the option to request seeing the surgeon if needed.

Presenter information: Sherif, Elnikety, East Kent Hospitals NHS Trust, Margate, United Kingdom, elnikety@hotmail.com

The Southampton Dupuytren's Scoring Scheme

A Mohan, J Vadher, H Ismail, D Warwick [Southampton University Hospitals NHS Trust, United Kingdom]

Aim

To construct and validate a simple patient related outcome measure scheme to quantify the disability caused by Dupuytren's Disease thus enabling prioritisation of treatment, allow reliable audit of surgical outcome and support future research.

Methods

The Southampton Dupuytren's Scoring System (SDSS) was developed in a staged fashion according to the recommendations of Derby Outcomes Conference.

1. item generation from questionnaire filled in by 20 patients;
2. item reduction to create a 20-question proforma;
3. Internal consistency (Cronbach's alpha)
4. Test-retest (3 week interval testing on 61 patients)
5. Field management was used to assess the user friendliness of the scoring system.
6. Sensitivity to change Standardised response mean
7. Construct validity : ability of the SDSS to measure what it is supposed to measure. comparing SDSS with QuickDASH (Disability of Arm, Shoulder and Hand)

Results

Internal consistency:

Cronbach's alpha was 0.87. (Cronbach's alpha of 0.8-0.9 indicates acceptable reliability).

Test-retest reliability:

The test re-test correlation coefficient was 0.79 between SDSS scores at a three-week interval (high reliability).

Field-testing:

The SDSS ratings were found to be higher than the QDASH ratings evaluated by the patients who answered both questionnaires.

Sensitivity to change:

Standardised response mean was more sensitive for SDSS compared to QuickDASH (-1.76 vs -1.19 $p>0.05$)

Construct Validity:

To assess if the SDSS is measuring what is supposed to measure, we compared the SDSS with QuickDASH. A high significant correlation (Pearson correlation-0.598) was found between the two scoring-systems.

Conclusions

SDSS is a suitable disease-specific patient related outcome measure for DD. It has good internal consistency and is performs better than QuickDASH in terms of test-retest reliability and sensitivity to change. SDSS shows better field-testing attributes suggesting that it is a relatively more patient and practitioner friendly scoring-system. We propose the SDSS is a useful patient related outcome measure for DD.

Presenter information: Arvind, Mohan, Southampton University Hospitals NHS Trust,
Southampton University Hospitals NHS Trust, United Kingdom, arvindmohan74@hotmail.com

Early Computed Tomography for suspected occult scaphoid fractures

J Stevenson, D Morley, S Srivastava, C Willard, I Bhoora [Stafford, United Kingdom]

Introduction: Up to 16% of scaphoid fractures are radiologically occult; failure to diagnose scaphoid fractures may lead to delayed union, nonunion or avascular necrosis. Fractures may take weeks to be excluded and many patients are unnecessarily immobilised increasing work absence, clinical reviews and cost. The use of CT early in the management of suspected occult scaphoid fractures has been evaluated.

Methods: The radiology and clinical notes of all patients that had scaphoid CT scans over the preceding 3 years were retrospectively reviewed. 84 patients that had CT scans within 14 days from injury were identified.

Results: 64% of CTs excluded fracture (N=54) and these patients were mobilised promptly and reviewed within six weeks. No patients returned with any complications, such as carpal instability, from this management strategy. Mean number of clinic appointments for this group was 2.34 (range 2-6).

36% of CTs were abnormal (N=30). 7% revealed occult scaphoid fractures; 18% revealed occult carpal fractures of the triquetrum, capitate and lunate respectively and 5% distal radius fractures. All patients diagnosed with fractures were successfully managed with plaster immobilisation, with one case of regional pain syndrome.

Conclusions: Early CT immediately alters therapeutic decision making in suspected occult fractures preventing unnecessary immobilisation. Early CT also reduces clinic attendances for clinical and radiological review without increase in cost.

Presenter information: Jonathan, Stevenson, Mid Staffordshire NHS Foundation Trust, Stafford, United Kingdom, jdstevenson@doctors.net.uk

Non-surgical treatment of Displaced Scaphoid waist fractures: Meta-analyses of comparative studies

HP Singh, N Taub, JJ Dias [Leicester, United Kingdom]

Background: Scaphoid fractures with displacement have a higher incidence of nonunion and unite in a humpback position that can cause pain and reduced movement, strength and function.

Methods: The aim of this study is to review the evidence available and establish the risk of nonunion associated with management of displaced scaphoid fractures in a plaster cast. Electronic databases were searched using the MeSH (Medical Subject Headings) controlled vocabulary (scaphoid fractures, AND'd with explode displaced, or explode nonunion, or explode non-healing or explode cast immobilisation, or explode plaster, or explode surgery). As no randomised or controlled studies were identified, the search was limited to observational studies based on consecutive cases with displaced scaphoid fractures treated in a plaster cast. The criterion for displacement was limited to gap or step of more than 1mm. The 'random effects' calculation was used to allow for the possibility that the results from the separate studies differ more than would be expected by chance.

Results: Of the 27 articles identified, seven studies were eligible for the meta-analysis with a total of 1401 scaphoids. 93% (1311 scaphoids) of these scaphoid fractures healed in a plaster cast. 207 (15%) of all scaphoid fractures showed displacement of at least 1mm (Gap/step) between fracture fragments. Nonunion was identified in 18% (37/207) of displaced scaphoid fractures treated in a plaster cast. The pooled odds ratio of fracture nonunion between the displaced and undisplaced groups was five times higher with fracture displacement (pooled odds ratio: 5.5, 95%CI: 2.5-12.3; $p=0.00$, $I^2=54.6\%$). The pooled relative risk of fracture nonunion was 4.4 (95%CI: 2.3-8.7; $p=0.00$ $I^2=54.3\%$).

Conclusions: Displaced fractures of scaphoid have a four times higher risk of nonunion when treated in a plaster cast and the patients should be advised of this potential risk.

Presenter information: Harvinder Pal, Singh, Leicester Royal Infirmary, Leicester, United Kingdom, hpsinghjk@gmail.com

The Sauve-Kapandji Procedure: A neglected technique with good patient reported outcome measures.

PW Robinson, S Punwar, OJ Bradford, N Blewitt [Bristol, United Kingdom]

Study Aim: To evaluate the results of the Sauve-Kapandji procedure at a mean time of 4.9 years (0.8-10.3) post surgery using the Quick Disabilities of the Arm, Shoulder and Hand Outcome Measure (QuickDASH) and patient reported satisfaction.

Patients and Methods: We retrospectively analysed a cohort of 18 patients who had a Sauve-Kapandji procedure performed by the senior author (NB) between 2000 and 2010. Indications for surgery were DRUJ incongruity or instability causing ulnar sided pain or decreased forearm rotation. All patients were sent the QuickDASH questionnaire, a valid and reliable measure of physical function and symptoms in upper limb musculoskeletal disorders. There were 13 females and 5 males. Mean age at operation was 46 years (21-75).

Results: Mean QuickDASH score was 20.9 (0-61.4, n=14), with 0 representing good status and 100 poor status. The optional QuickDASH work module mean score was 10.9 (0-25, n=8) and the optional QuickDASH sports / performing arts module mean score was 40.6 (0-100, n=6). There was no correlation between patient age and QuickDASH score. 93% would recommend the procedure and have it performed again if they developed a similar condition. 100% union of the DRUJ arthrodesis was achieved. 61% underwent subsequent removal of metalwork at a mean of 1.9 years (0.7-6.0) post procedure. No problems relating to ulna stump instability were noted. There were no significant complications.

Conclusions: We found that the Sauve-Kapandji procedure is an effective and successful treatment option for post traumatic DRUJ symptoms, as determined by the QuickDASH score and excellent patient satisfaction, with low morbidity.

Presenter information: Peter W, Robinson, Avon Orthopaedic Centre, Bristol, United Kingdom, pwrobinson@doctors.org.uk

Outcome of Universal-2 Total Wrist Arthroplasty for Rheumatoid Arthritis: Our Experience at Wrightington

K Kailash, A Raza, S Mahalingham, S Talwalkar [Wigan, United Kingdom]

Introduction

Rheumatoid Arthritis is a chronic, progressive and disabling autoimmune disease. According to National Rheumatoid Arthritis Society it affects 0.8% of adult UK population. The management of advanced RA primarily focuses on pain relief. Arthrodesis has always been the standard for pain relief but it comes with the cost of sacrificing wrist function. On the other hand, Total Wrist Arthroplasty (TWA) offers not only pain relief but also preservation of function. RA involves multiple joints therefore the functional compromise from arthrodesis can be very disabling. Although wrist replacement started 40 years ago, in spite of significant advances in implant design and materials, the contemporary 3rd generation implants are still associated with significant complications.

Methodology

Outcomes of 88 Universal total wrist replacements were followed up, which were performed from 2002 to 2009 at Wrightington Hospital. There were 56 female and 24 male patients. 8 had bilateral TWA and 7 had a combination of TWA on one side with arthrodesis on the contralateral side. The average age was 56 years(22-88). Post-operatively patients had relatively preserved function with good pain relief. Minor complications included 16% joint stiffness (n=14), 9% residual wrist pain (n=8), 2.3% superficial infection (n=2), 1% neuroma (n=1) and 1% per-operative fracture of radius (n=1). The major complications were 3.4% revision (n=3) and 3.4% salvage arthrodesis (n=3).

Conclusion

Universal total wrist arthroplasty which is one of the 3rd generation wrist replacements has significantly lower complications. It is predictable option to preserve function and also pain relief in patients with advanced RA. The overall risk of major complications was 6.8% which is significantly lower than that quoted in literature which ranges from 11% to 26%.

Presenter information: Kailash, Kailash, Wrightington Wigan and Leigh NHS trust, Wigan, United Kingdom, kailash73pk@yahoo.com

Outcomes of a Specialist one-stop Dupuytren's percutaneous needle fasciotomy clinic

J Foote, V Nunez, L Dodd, J Oakley [Frimley, United Kingdom]

Introduction: An educated public are becoming increasingly aware of percutaneous needle fasciotomy (PNF) for the treatment of Dupuytren's contracture. We believe that it has an important place in the management of this condition and have set up the first dedicated one-stop clinic in England to perform this procedure.

Methods: A prospective study of 38 patients with Dupuytren's, who have undergone PNF have been recruited so far. The study population includes 34 men and 4 women. The average age is 66. The senior author has operated on 52 fingers including 47 MCP joints, 39 PIP joints and 2 DIP joints. The average Tubiana score is 2.2 bilaterally. We recorded contractures prior to PNF and immediately following the procedure, as well as any complications. At follow up we recorded the Patient global impression of change (PGIC), DASH scores, degree of straightness of the operated finger and whether they would have the procedure again or recommend it.

Results: For MCP joints the average pre treatment contracture was 42.7° and immediately post operatively it was 5°. For PIP joints the average pre treatment contracture was 46° and immediately post operatively it was 19.4°. 2 patients had small skin tears and 2 found it too uncomfortable to continue. No other complications. Mean follow up was 13 months (2-24). At follow up the average PGIC was 6.1 (very good) and the average DASH score was 25.9 (excellent). Subjectively only 2 fingers had returned to their original position with the rest remaining straight. All patients would have the procedure again and would also recommend it.

Discussion: To our knowledge this specialist clinic is the first of its kind in the NHS. We believe that it is an effective, safe procedure and our patients are highly satisfied with the results. It is also cost effective for our Department.

Presenter information: Julian, Foote, Frimley Park Hospital, Frimley, United Kingdom,
julian.foote@btinternet.com

Abstract: 705

Topic: H. - Hand Surgery

Ulna shortening - results and complications

R KAKWANI, L Turret, L Irwin, A Stirrat [NEWCASTLE, United Kingdom]

Objective: Retrospective study to assess the outcomes of ulnar shortening for TFCC tear and distal radial malunion.

Method: Retrospective note and x-ray review of all patients undergoing ulnar shortening over a ten year period along with a clinic assessment and scoring to date. The ulnar shortening was performed using the Stanley Jigs (Osteotec). A 5-6 holed DCP was used to stabilize the osteotomy site. Physiotherapy was commenced immediately following the surgery to promote pronosupination and wrist exercises.

Result: 28 patients studied with one subsequent death. 13 patients with an average age of 53 years underwent ulnar shortening for distal radius malunion, whereas 15 patients with an average age of 47 years had a primary indication of ulnar abutment with TFCC tear. Six patients underwent reoperation for non-union. 2 patients needed plate removal for prominent metalware. Patients undergoing the procedure for TFCC deficiency compared to radial malunion did worse, on functional scoring (DASH & SF36). Failure to place an interfragmentary screw was associated with a higher risk of non-union.

Conclusion Ulnar shortening is not a benign procedure, especially for the treatment of TFCC insufficiency. Interfragmentary screw placement is important in avoiding non-union.

Presenter information: RAJESHKUMAR, KAKWANI, SUNDERLAND HOSPITAL, NEWCASTLE, United Kingdom, rajeshkakwani@gmail.com

OUTCOMES OF METACARPOPHALANGEAL JOINT REPLACEMENTS CARRIED OUT IN A SEVEN YEAR PERIOD

J Broomfield, P Ralte, C Neophytou, M Waseem [Macclesfield, United Kingdom]

Introduction

Since November 2003 there have been 62 Metacarpophalangeal Joint (MCPJ) replacements carried out on 16 patients at Macclesfield District general hospital. 11 of the patients were female and 5 were male. The average patient age at the date of the procedure was 64.9 years of age, with an age range of 28 to 80. Of the 62 MCPJ replacements carried out, 58 were as a result of rheumatoid arthritis, with only 4 as a result of osteoarthritis. The primary objective of this study is to assess their outcomes to date.

Method

Data was collected retrospectively by means of case note review. Outcomes measured were patient rating of pain and function at post operative review, as well as post operative complications. All operations were carried out by a single surgeon using his standard operative technique and all replacements used the Neuflex Finger Joint Implant System.

Results

All 16 patients attended for post-op review. At the time of discharge 13 patients rated their outcome as excellent to good, 1 patient was deceased and 2 patients are currently under follow up with no complications. Of the total 62 joints replaced, 10 revisions were carried out. Of these, 3 are as a result of dislocation, 6 are for subluxation and 1 as a result of failure of the prosthesis. There were 3 other post operative complications. One was for superficial wound infection, 1 resulting from a prominent prosthesis and 1 hypertrophic scar.

Conclusion

From the data available we conclude that 81% of patients rated their outcome at discharge as good to excellent.

Presenter information: John, Broomfield, Macclesfield DGH, Macclesfield, United Kingdom,
johnbroomfield@doctors.org.uk

Functional Outcomes of Silastic Replacement of the the Trapezium for Osteoarthritis

N Burke, J Walsh, D Moloney, E Kelly [Dublin, Ireland]

This retrospective study evaluated 69 Swanson trapezium replacements performed between 1990 and 2009 for trapeziometacarpal osteoarthritis in 58 patients. Pain and function were assessed using the Michigan Hand Questionnaire (MHQ) and the Disability of the Arm, Shoulder and Hand (DASH) questionnaire. Patients had a mean age of 62 years at the time of surgery, with a mean time of 7.7 years from time of surgery to completion of the follow-up interview. The results showed good relief of pain and function with no significant deterioration with time from surgery. There were no gender differences or differences by age. The only differences observed were that those patients following surgery on a dominant hand indicated higher activities of daily living and work related activities. The authors conclude silicone trapezium replacement remains a good option for patients with painful trapeziometacarpal osteoarthritis that has not responded to non-operative treatment.

Presenter information: Neil, Burke, Cappagh National Orthopaedic Hospital, Dublin, Ireland,
nei1burke@yahoo.co.uk

Percutaneous Screw fixation for fractures of the scaphoid in an Irish regional trauma centre. A prospective review.

PS Waters, SJ Roche, ME O Sullivan [Galway, Ireland]

Although one of the smallest human bones, substantial morbidity can be associated with fractures of the scaphoid when appropriate orthopaedic intervention is delayed. Acute scaphoid fractures are commonly treated with cast immobilisation for 8 -12 weeks with regular radiological surveillance to ensure adequate healing and enable early detection of avascular necrosis. Despite best practice, a proportion of these fractures pose a significant clinical dilemma with the risk of non-union and the ever-increasing patient demand for early return to normal activity being important factors that need to be taken into consideration.

In this study, 76 patients requiring operative scaphoid fixation were evaluated. A total of 27 patients underwent percutaneous screw fixation. Waist fractures accounted for 66% (n= 18), proximal pole fractures 33% (n=8) and distal pole fractures 4% (n=1). There were 16 non-displaced fractures (59%) and 11 undisplaced fractures (41%). The average length of conservative treatment was 77 days (range: 2-256 days) Pre-operative and post-operative functional outcomes were measured. Radiological union rates and clinical outcomes were assessed. A standardised questionnaire was used to analyse patient procedural success rates and patient satisfaction levels.

In this study we report our experience with percutaneous screw fixation of the scaphoid. Patients treated with early percutaneous fixation returned to work earlier ($P < 0.001$) when compared to other methods of scaphoid fixation.

Significantly less follow-up was required for patients in the percutaneous group compared to all other groups ($P < 0.001$). The highest rates of patient satisfaction were seen in those treated with percutaneous fixation.

In conclusion percutaneous screw fixation of scaphoid fractures provides earlier bone union and avoids the need for prolonged immobilisation when compared to other treatment modalities. The potential economic benefit of an earlier return to work and less outpatient follow-up are important factors to incorporate into the choice of surgical treatment of scaphoid fractures.

Presenter information: Peadar Sean, Waters, UCHG, Galway, Ireland,
peadarwaters@hotmail.com

Management of 5th metacarpal neck fractures and its cost effectiveness
R MacGregor, HB Abdul-Jabar, M Sala, G Al-Yassari, J Perez [Harrow, United Kingdom]

We completed a retrospective case study of 66 consecutive isolated closed 5th metacarpal neck fractures that presented to our Hospital between September 2009 and March 2010. Their management was established by referring to outpatient letters and A&E notes. The aim of the study was to establish if it would be more efficient and cost effective for these patients to be managed in A&E review clinic without compromising patient care. Of these 66 patients, 56 were males and the mean age was 26 years (12 - 88 years). Four fractures were not followed up at our Trust, six did not attend their outpatient appointment, one did not require follow up. Of the remaining 55, reviewed at a fracture clinic, all but two were managed conservatively, with 47% requiring one outpatient appointment only. The cost of a new patient Orthopaedic outpatient appointment is £180 with subsequent follow up appointments costing £80 per visit, in contrast to an A&E review clinic appointment at a cost of £60. In view of the small percentage in need of surgical intervention; we highlight the possibility for these patients to be managed solely in the A&E department with a management plan made at the A&E review clinic with an option to refer patients if necessary, and the provision of management guidelines and care quality assurance measures. This, we believe, would maintain care quality for these patients, improve efficiency of fracture clinics and decrease cost. We calculate that even if only all the patients that required one follow up appointment could have been managed by A&E alone then the saving to the local health commissioning body over a six month period from within our trust alone, would have been £3000, which across all trusts providing acute trauma services within the NHS would amount to a substantial saving nationwide.

Presenter information: Rebecca, MacGregor, NORTHWICK PARK HOSPITAL, Harrow, United Kingdom, rmacgregor@doctors.org.uk

Efficacy and safety of collagenase clostridium histolyticum for Dupuytren's contracture: Results from two open-label studies conducted in the United States (JOINT I) and Australia and Europe (JOINT II)

T Lindau, C Bainbridge, B Cohen, H Kushner, T Smith, D Nguyen, P Szczypa, R Gerber [Derby, United Kingdom]

Introduction. Injectable collagenase clostridium histolyticum (CCH) is a minimally invasive non-surgical therapy with efficacy in correcting Dupuytren's contracture (DC). In the concurrently run JOINT I and JOINT II studies, designed to follow clinical practice, we evaluated the efficacy of ≤ 5 CCH injections in patients with DC.

Methods. JOINT I and II were multicenter, 9-month, open-label studies in which DC patients with primary flexion deformities $\geq 20^\circ$ received ≤ 3 CCH (0.58 mg) injections/joint (≤ 5 injections/patient) at 30-day intervals into joints prioritized by extent of contracture. After the first injection, patients could opt to receive up to 2 additional injections in same cord or other cords regardless of outcome for the first joint. The primary endpoint was reduction in contracture to $\leq 5^\circ$ 30 days after the last injection. Data from JOINT I and II were pooled.

Results. For the primary endpoint, 70% of MP (371/531) and 37% of PIP (128/348) joints showed a reduction in contracture to $\leq 5^\circ$ with CCH injections; 42% (223/531) of MP and 20% (69/348) of PIP joints reached success within 7 days of the first injection. Overall, 89% of MP (470/531) and 58% (202/348) of PIP joints showed clinical improvement (ie, $\geq 50\%$ reduction in contracture). Mean $\pm$ SD percentage changes in contracture were $84\pm 25\%$ for MP joints and $55\pm 41\%$ for PIP joints. The 2 most common treatment-related adverse events (AEs) localized to the injection site were edema peripheral and contusion. Two patients had treatment-related serious AEs (deep vein thrombosis; tendonitis), but no tendon ruptures or systemic reactions were noted.

Presenter information: Tommy, Lindau, Pulvertaft Hand Centre, Derby, United Kingdom, tommylindau@hotmail.com

CT arthrography of the wrist - Is it a useful investigation?

S Shyamsundar, K Jeyapalan, JJ Dias [Leicester, United Kingdom]

Aim This retrospective study reviewed the efficacy of a CT arthrogram in clinical decision making for wrist disorders.

Methods Sixty four consecutive CT arthrograms done in a three year period at Glenfield Hospital were selected. All patients were referred by hand consultants at the Glenfield Hospital and all investigations were performed by a single senior musculoskeletal radiologist. CT arthrograms focussed on the following areas: scapholunate interosseous ligament (SLIL), lunotriquetral interosseous ligament (LTIL), peripheral and central triangular fibrocartilage complex (TFCC) tears, and articular surface disorders. Referral and clinic letters for all patients were obtained. We collected patient demographic detail, prescan diagnosis and clinical plan, CT arthrogram findings, postscan diagnosis and clinical plan and the final outcome. A decision was made whether the scan helped in the clinician's management plan and if so how it helped.

Results There were 35 male and 29 female patients with a mean age of 44.1 years. The right wrist was involved in 42 and the left in 22 patients. Sixty three of the 64 patients had their management based on the CT scan. In 54 of these the CT arthrogram either confirmed and calibrated the diagnosis or identified a new diagnosis. In 10 patients the scan was normal and allowed patient reassurance. Thirty six patients had ulnar sided problems, 20 had radial sided disorders and eight had midcarpal abnormality. The most common abnormality noted was a TFCC tear (24). The next most common was chondral damage/arthritis (14) followed by scapholunate interosseous ligament tear (12). The diagnosis was either confirmed and its extent established (31) or identified in addition to the primary diagnosis (19).

Conclusions The CT arthrogram is a helpful tool in the management of intra-articular wrist pathology. We found it to be useful in both confirming and calibrating the diagnosis and also diagnosing occult pathology.

Presenter information: Srinivasan, Shyamsundar, University Hospitals of Leicester, Leicester, United Kingdom, sshyamsundar@hotmail.com

The Association of Carpal Tunnel Syndrome and Occupation: A Population Based Comparison of Prevalence

D Srikantharajah, PJ Jenkins, AD Duckworth, AC Watts, JE McEachan [Dunfermline, United Kingdom]

Introduction

The association of occupation and carpal tunnel syndrome (CTS) is unclear. Population based studies have failed to prove causal relationships between certain types of work and the onset of CTS. The aim of this study was to compare the incidence of CTS with the underlying regional occupational profile and assess differences in disease severity.

Methods

The study took place from 2004 to 2010 in a regional hand unit that was the sole provider of hand services to a health board. Occupation was classified according to the SOC2000 classification as published by the Office for National Statistics and compared with the National Census 2000 statistics. 1564 patients were diagnosed with CTS during the study period of which 852 were aged 16 to 74, in full time employment.

Results

CTS was less common among managers, directors and senior officials ($p < 0.001$), associated professional and technical occupations ($p < 0.001$), and process plant and machine operatives ($p = 0.013$). It was higher than expected in professional occupations ($p < 0.001$), skilled trade occupations ($p < 0.001$) and caring and other service occupations and elementary occupations ($p < 0.001$). Bilateral disease was highest in the skill trades group (80%). Process, plant and machine operatives had the highest rate of compensation claims (15.2%, $p = 0.001$), while the highest rate of exposure to vibration was in the skilled trades group (67%). There was a difference in preoperative grip strength ($p < 0.001$) and DASH score ($p < 0.001$).

Conclusions

The incidence of CTS varied between occupational groups. This study demonstrated a higher incidence of CTS in skilled trades and elementary occupations. There was also a higher than expected rate of CTS observed in professional groups and caring, leisure and other service occupations, but lower in machine and plant operatives. Disease severity varied according to occupational group.

Presenter information: Delukshan, Srikantharajah, Queen Margaret Hospital, Dunfermline, United Kingdom, delukshan@doctors.org.uk

K wiring of the Fifth Metacarpal - is the dorsal cutaneous branch of the ulnar nerve at risk? **E Conroy, O Flannery, J McNulty, J Thompson, E Kelly [dublin, Ireland]**

Introduction:

Antegrade K wiring of the fifth metacarpal for treatment of displaced metacarpal neck fractures is a well recognized surgical procedure. However it is not without complication and injury to the dorsal cutaneous branch of the ulnar nerve has been reported in up to 15% of cases.

Methods:

We performed a cadaver study to determine the proximity of this nerve to the K wire insertion point at the base of the fifth metacarpal. K wires were percutaneously inserted under image intensification in sixteen cadaver hands and advanced into the head of the metacarpal. Wires were then cut and bent outside the skin. This was then followed by meticulous dissection of the ulnar nerve from proximal to distal. A number of measurements were taken to identify the distance from the insertion point of the K wire to each branch of this nerve.

Results:

The distance from the insertion point at the base of the fifth metacarpal to the dorsal component of the nerve averaged 5.6 mm (range 1mm - 12mm) and from the volar component was 6 mm (range 1mm - 10mm). The heel of the wire was touching the nerve in five cases.

Conclusion:

Our findings highlight the importance of making a small incision and bluntly dissecting to bone at the base of the fifth metacarpal to protect the nerve. In addition, use of a tissue protector is vital when drilling the 2mm hole at the base of the fifth metacarpal. We have confirmed that the dorsal cutaneous branch of the ulnar nerve is vulnerable during insertion of an antegrade intramedullary K wire for treatment of neck of fifth metacarpal fractures.

Presenter information: Eimear, Conroy, Cappagh National Orthopaedic Hospital, dublin, Ireland,
eimearjconroy@gmail.com

Long term outcomes of 2 stage Dupuytren's contracture correction: A prospective single surgeon consecutive case series of 57 patients between 2003 - 2009.
SKL Chan, G Nitish, L Wicks, SC Deshmukh [Birmingham, United Kingdom]

Objective

To assess the long term functional and objective outcomes for 2 stage Dupuytren's contracture correction.

Methods

Patients with severe contracture were offered a 2 stage correction. This involved application of external fixator to distract the contracture over the course of 2 weeks and subsequent dermofasciectomy +/- skin graft to correct the residual deformity.

A series of 64 corrections in 57 patients were identified. In this cohort, 8 were lost to follow-up, 1 deceased. Pre-operative total range of active movement (TRAM), Tubiana grade and DASH/Michigan Hand Scores were recorded and compared to post-operative data.

Results

Average age was 61 (range 43 - 90), 45 male, 12 females. The average duration of follow-up was 29 months (range 6 - 71). Tubiana grade in these cases was noted as I in 0 cases, II in 12 cases, III in 22, IV in 18 cases.

The average pre-op TRAM was 73 degrees (range 20-110) compared with a post-operative TRAM of 153 degrees (range 50 - 200). Post operative DASH scores improved from 31.7 to 27.6.

Complications include stiffness (11%), infection (9%), CRPS (6%), graft failure (6%). There were no reported fractures.

Conclusions

Severe Dupuytren's contractures are difficult to treat. Two stage corrections are a viable option as long as the risks are explained. The results show a good improvement in range of movement. Long term follow-up show that the range of movement is maintained and function is not compromised. Complications rates are comparable to surgical alternatives.

Presenter information: Samuel K L, Chan, Royal Orthopaedic Hospital, Birmingham, United Kingdom, sammychan98@hotmail.com

Predicting the Outcome of Revision Carpal Tunnel Release

J Klena, JD Beck, P Maloney, J Brothers, JH Deegan [Danville, United States]

Purpose: To test the hypothesis that the result of steroid injection in the carpal tunnel in a patient with recurrent carpal tunnel symptoms would provide a good predictor of the outcome of later carpal tunnel release. In addition, other preoperative and intra-operative factors were evaluated to determine if they would predict the outcome of revision carpal tunnel release.

Methods: A retrospective review of all patients who underwent revision carpal tunnel release (CTR) for recurrent or persistent carpal tunnel syndrome (CTS) over a two year period was conducted. Inclusion criteria included a history and physical consistent with CTS, documented injection into the carpal tunnel and then had subsequent revision CTR. A total of 23 patients and 28 wrists met inclusion criteria. Patients were evaluated at 2 weeks, 6 weeks, 3 months and 6 months following surgical intervention. The charts were reviewed to determine the results of injection, the results of the revision surgery, as well as multiple personal characteristics and physical exam tests to determine if any predicted the outcome of revision CTR. DASH questionnaire score was used to evaluate subjective improvement.

Results: The flexor retinaculum was found to be incompletely released in 13 (46%) wrists. Ninety-two percent of people with incomplete release found at time of revision surgery had success following revision CTR although this was not found to be a significant predictor of success following revision CTR. Overall, presenting carpal tunnel symptoms were reported to be completely resolved in 15 (53.6%) patients, greatly improved in 8 (28.6%) patients and unchanged in 5 (17.8%) patients. Following revision CTR the average DASH score for those with resolved symptoms was 28.87. Average change in DASH from pre-operative level was 18.6. No patient characteristic or physical exam finding was found to predict success following revision CTR. Twenty-two (86.4%) of patients who had relief from injection had symptom relief/improvement with revision CTR whereas only 4 (13.6%) were not improved by the surgery. A higher percentage of those with relief from injection were cured by the surgery than those with no relief from the injection, 86.4% vs. 60%, although the difference was not statistically significant. The sensitivity and positive predictive value for injection predicting outcome of revision CTR was 86.4%. The specificity and negative predictive value were both 40%.

Conclusions: In contrast to the primary CTS, cortisone injection into the carpal tunnel is not a statistically significant predictor of success in the setting of revision CTR. However patients with a positive result from injection had an 86.4% success with revision CTR with an average DASH score of 28.87. This compares favorably to mean DASH scores of primary CTR. Relief from injection as a diagnostic test for success from revision CTR was found to have both high sensitivity and positive predictive value. Coupled with the components of history and physical examination findings injection provides a good screening test to establish success with revision CTR.

Presenter information: Joel, Klena, Geisinger Medical Center, Danville, United States,
jcklena@geisinger.edu

Post-traumatic implant-related infection of the tibia - experience at a tertiary referral centre **E Laugharne, D Bose, M Gill [Birmingham, United Kingdom]**

Aims: To identify the most common infecting organisms associated with deep infection and infected non-union of the tibia, as well as the rate of 'culture-negative' infections, at a tertiary referral trauma centre.

Method & Results: Electronic patients records and a microbiological database were searched for patients (military and civilians) who had a confirmed diagnosis of implant-related infection or infected non-union of the tibia from 2008 to 2010. There were 31 patients: 28 male, 3 female. Mean age 41yrs. 21 were open fractures, 8 closed and 2 not known. In 11 patients, tissue cultures were negative. In the remainder, 8 patients cultured one organism, 6 two organisms, 2 three organisms, and 2 four organisms. Only those with open fractures grew more than 2 organisms. Five patients (63%) with closed fractures were culture-negative. The most common organisms isolated were *Staphylococcus aureus*, coagulase-negative *Staphylococcus*, *Bacillus* and *Enterobacter cloacae*. There were 3 cases of MRSA infection, all in open fractures. The most frequently used antibiotics for definitive therapy were ciprofloxacin, rifampicin and vancomycin.

Conclusions: The majority of our patients had sustained open fractures. Staphylococcal infections were most common, along with *Bacillus*. Patient with open fractures were more likely to have polymicrobial infections. We had a high rate of culture-negative infections, particularly in the closed fracture group. This produces a challenge when it comes to antimicrobial therapy and stresses the importance of obtaining appropriate tissue samples before starting antibiotics.

Presenter information: Edward, Laugharne, University Hospital Birmingham, Birmingham, United Kingdom, edlaugharne@hotmail.com

Defining The Rattle. A Mechanical Study Of Three Different Types Of Limb Reconstruction Frames

P Smitham, K Wasim, A Hazlerigg, S Bhaaj, I McCarthy, P Calder [London, United Kingdom]

Introduction: Patients undergoing limb reconstruction with the Taylor Spatial Frame (TSF) often perceive that their frame is loose due to the rattle they hear when mobilising. Our aim was to determine how much and where this movement is in the various frame/bone constructs currently on the market.

Method: Using standard tibial saw bones three frames (TSF, Ilizarov and Hexapod) were made in an identical fashion. Constructs were cyclically loaded 4 times to 200 N in tension and compression using the Instron MTS. This was repeated three times. A seventh strut was also placed in the TSF construct and the tests repeated. Bones were then removed and the tests repeated for the frames alone.

Results: Movement was noted between the frame and bone in all the frames in compression (average 1.5mm) and tension (average 4.5mm). Frames alone in compression moved between 0.5mm (Ilizarov) and 1.2mm (hexapod). The rattle was audible and was apparent on the TSF more than the other devices. On measuring separate components of the TSF, the ring height measured 7.9mm compared to a screw gap of 8.05mm. The locking clasp mechanism of the strut moved 0.1mm, thus allowing 0.45mm movement between compression/extension.

Conclusion: This rattle is due to the combination of movement seen between the ring and screw fixation, the clasp mechanism and the universal joint. A seventh strut reduces this rattle by splinting the frame in compression or tension. All frames show movement between the frame and the bone. The stiffest bone/frame construct in tension/compression is the TSF followed by the Ilizarov and Hexapod frames. Further work is needed to determine what effect this movement has on fracture healing.

Presenter information: Peter, Smitham, Royal National Orthopaedic Hospital, London, United Kingdom, petersmitham@gmail.com

THE ENDO EXO FEMORAL PROSTHESIS: A NEW REHABILITATION CONCEPT FOLLOWING ABOVE KNEE AMPUTATION

H-H Aschoff, RL McGough [Lübeck, Germany; Pittsburg, United States]

Objective: The objective of this study is to determine the safety and functionality of a transcutaneously implanted, osteointegrated prosthesis in the rehabilitation of above the knee amputees.

Methods: The Endo-Exo Femoral Prosthesis (EEFP) is an ingrowth prosthesis similar to a fully coated femoral stem. It is implanted into the residual femur, allowed to osteointegrate, and exteriorized 6-12 weeks later. Connections then join the femoral stem to a prosthetic limb. The stoma matures and epithelializes, while solid bony ingrowth inhibits ascending infection. Implanted subjects are followed clinically for signs of infection, and are observed with regard to gait, strength, and proprioception. Subjective outcomes are determined using a specialized questionnaire.

Results: 43 patients were implanted between 1999 and 2009. Four of the 43 required removal: two for intramedullary infection, one due to stem fracture (replaced), and the last for soft tissue infection. The remaining 39 original prostheses remained. Two pertrochanteric fractures occurred, treated with ORIF. Two bilateral procedures were performed. Initially, twenty patients had chronic soft tissue irritation requiring debridement. This completely resolved by changing the connecting components to a highly polished cobalt chrome. All patients reported increased comfort when compared to socket use. The following additional advantages were observed: improved mobility and endurance, improved proprioception, decreased time required for prosthetic donning, lack of concern regarding changing body weight, and the absence of skin irritation. All patients reported an improvement in sense of position and tactile sensation, leading to an improved gait pattern.

Conclusions: Subjectively, the EEFP represents a significant improvement in terms of comfort. Since the introduction of high-gloss polished surfaces, soft tissue irritation is largely eliminated. Intramedullary infection has been negligible, as osteointegration seals the medullary cavity within 2-3 weeks. In summary, the EEFP appears to be an attractive option in transfemoral amputees.

Presenter information: Horst - Heinrich, Aschoff, Sana Clinics Lübeck, Lübeck, Germany,
h.aschoff@sana-luebeck.de

Modified Papineau procedure: The Cardiff Protocol

G Edwards, A Hall, R Morgan-Jones [Cardiff, United Kingdom]

We describe the results for the management of chronic osteomyelitis in long bones using a modified Papineau procedure. Fourteen consecutive patients were treated prospectively, mean age 54 years. All patients had an overnight stay in hospital with outpatient dressings. All patients had tibial fractures with an average prior number of surgeries of 3. Two were infected non unions , one managed with an ex-fix and the other in a cast.

Source of infection was following operative management of the original fracture in 10, 3 open fractures were managed with external fixation, one requiring bone transport. 1 cast, 1 childhood haematogenous.

Our modified Papineau procedure, involves removal of all avascular and infected tissue, opening the medullary cavity proximally and distally, compartmental debridement and copious saline irrigation. The wound is packed with Jelonet and Kaltostat and fresh dressings applied weekly. The wound is left to heal via secondary intention. Weekly dressing changes for the first 3 weeks and twice weekly thereafter as required. Jelonet and Kaltostat were used until wounds had fully granulated before changing to Jelonet only until epithelialisation had completed.

As part of the Cardiff protocol, no patient underwent bone grafting, skin grafting or flap coverage. A single dose of IV antibiotic was used to cover the operation, thereafter no antibiotic usage.

11 healed without further surgery. Average time to healing was 5 months (range 3-7 months), both non unions united giving results similar to other accepted techniques.

There were 3 residual infections, 2 due to inadequate debridement by the senior author requiring a single further compartmental debridement (Lautenbach debridement). 1 had an avascular bone edge requiring further local debridement.

We feel this modification of the Papineau procedure confers the following advantages; minimal surgical insult, early discharge, out patient management, avoids unnecessary antibiotics, good outcomes and most importantly, happy patients!

Presenter information: Gray, Edwards, University Hospital of Wales, Cardiff, Cardiff, United Kingdom, grayedwards1@doctors.org.uk

Decreasing Complications in Open Fractures with a Dual-Delivery Bone Graft **K Brown, B Li, T Guda, D Perrien, S Guelcher, J Wenke [San Antonio, United States]**

Introduction: Biocompatible polyurethane (PUR) scaffolds have been developed with tunable delivery characteristics for both growth factors and antibiotics and may reduce complications. The aim was to investigate their ability to simultaneously regenerate bone and reduce infection.

Methods: The implants were investigated *in vivo* in a contaminated rat femoral defect. There were 6 groups: the control groups were low (Group 1) and high (Group 2) dose rhBMP-2 (BMP) on a collagen sponge (current clinical Standard of Care); the experimental groups were low and high dose rhBMP-2 and PUR scaffold without (Group 3; Group 4) and with (Group 5; Group 6) vancomycin. Antibiotics release remains >20X MIC for 8 weeks, and the BMP is released over 3-4 weeks. The amount of bone regenerated was assessed using microCT and the underlying processes were delineated by histology. Bacterial levels were quantified using standard cultures and photon counts. Clinical signs of infection were noted in all animals.

Results:

Significantly ($p < 0.05$) more bone was formed in Groups 4,5 and 6 ($37.6, 38.5, 44.3\mu\text{m}^3$ respectively) compared to Groups 1, 2 and 3 ($14.2, 14.7, 9.0\mu\text{m}^3$ respectively). Furthermore, the clinical signs of infection were markedly reduced in Groups 4, 5 and 6 ($14.3, 6.7$ and 0% respectively) compared to Groups 1,2 and 3 ($40, 13.3$ and 25% respectively).

Discussion: The dual delivery of BMP and antibiotics had the desired effects of regenerating more bone and reducing clinical infection compared to the current standard of care. This bioabsorbable and osteoconductive scaffold therefore shows potential for use clinically to promote healing in severe open fractures.

Presenter information: Kate, Brown, Institute of Surgical Research, San Antonio, United States,
katevbrown@aol.com

Pitfalls in massive bone transport of tibia

S Bajaj, S Patel, DM Eastwood, PR Calder [Royal National Orthopaedic Hospital, Stanmore, United Kingdom]

Aim-

To evaluate the results and complications of bone transport in the treatment of massive tibial bone defects, using the Ilizarov method.

METHODS-

15 patients underwent bone transport using the Ilizarov technique to treat massive tibial bone defects. The average age of the patients was 8.7 years (3-24 years) and the mean bone defect was 10.8 cms. Following a latent period of 1 week, distraction of the transport doughnut was commenced at 1mm/24 hours in 4 quarterly turns. A docking procedure was performed in 7 cases which involved freshening of the bone ends and autogenous bone grafting from the iliac crest. Following docking the fixator was removed once the regenerate had consolidated.

RESULTS-

The fixators were removed after a mean 12.3 months (range 8-21 months). 1 patient required adjustment of the frame under anaesthetic due to translation of the docking doughnut and poor alignment.

All patients had at least one superficial pin site infection successfully treated with oral antibiotics. Deep infection at the docking site was seen in 1 patient needing debridement and split skin grafting. There were no neuro-vascular complications.

1 patient had a recurvatum deformity at the regenerate due to early frame removal. There were no early fractures. Re-fracture of the docking site occurred in one patient, 17 months after the removal of the original frame. This needed open reduction and internal fixation. Non union at the docking site was seen in 3 patients, needing open reduction, internal fixation with bone grafting (1 case) and excision of non-union and compression with a further frame (2 cases).

CONCLUSION-

Massive bone transport in the tibia is an orthopaedic challenge. This paper highlights the complications of this procedure. It confirms the viability of this method but emphasises careful counselling of both the patient and parents prior to the commencement of such difficult treatment.

Presenter information: Sunil, Bajaj, Royal National Orthopaedic Hospital, Stanmore, Royal National Orthopaedic Hospital, Stanmore, United Kingdom, bajajs2002@yahoo.com

Antibiotic Impregnated Bioabsorbable Carriers for Treatment of Chronic Intramedullary Osteomyelitis

AJ Roche, V Selvaratnam, S Mukhopadhyaya, N Unnikrishnan, Z Abiddin, B Narayan, N Giotakis, H Aniq, S Nayagam [Liverpool, United Kingdom]

INTRODUCTION

The treatment of chronic osteomyelitis involves a debridement of affected non-viable tissue and the use of antibiotics. Where surgery leaves a cavity, dead space management is practised with antibiotic impregnated cement. These depots of local antibiotics are variable in elution properties and need removal. We review the use of bioabsorbable synthetic calcium sulphate as a carrier of gentamicin and as an adjunct in treating intramedullary osteomyelitis.

METHODS

A retrospective review of cases treated consecutively from 2006 to 2010 was undertaken. Variables recorded included aetiology, previous interventions, diagnostic criteria, radiological features, serology and microbiology. The Cierney-Mader system was used to classify. Treatment involved removal of implants (if any), intramedullary debridement and local resection (if needed), lavage and instillation of the gentamicin carrier, supplemented with systemic antibiotics. Follow-up involved a survival analysis to time to recurrence, clinical and functional assessment (AOFAS-Ankle/IOWA knee/Oxford Hip) and general health outcome (SF36).

RESULTS

There were 31 patients (22 male, 9 female). The mean age was 47 years (20-67). Twenty-five cases were post-surgery (6 open fractures) and 6 were haematogenous in origin. The median duration of osteomyelitis was 1.6yrs. The bones affected were 42% femur, 45% tibia, 3% radius and 10% humerus. 11 cases had diffuse as well as intramedullary involvement. 9 cases underwent segment resection and bone transport. We identified Staph.Aureus in 16 and Coag.Neg.Staph. in 6 cases. The median follow-up was 1.7 years (0.5-5.6). The median scores attained were:AOFAS-78, DASH-32, IOWA-71, Oxford-32. There were two recurrences.

DISCUSSION

Dead space management of intramedullary infections is difficult. We describe a method for delivery of local antibiotics and provide early evidence to its efficacy. The treatment success to date is 93%.

CONCLUSION

Bioabsorbable carriers of antibiotics are efficacious adjuncts to surgical treatment of intramedullary osteomyelitis.

Presenter information: AJ, Roche, The Royal Liverpool and Broadgreen University Hospitals NHS Trust, Liverpool, United Kingdom, andyortho@googlemail.com

Accuracy of Spatial CAD™ in assessing the accuracy of mounting parameters

A Shoaib, MA Rashid, O Lahoti [London, United Kingdom]

Introduction:

Taylor Spatial Frame (TSF) is a six axis deformity correction frame and accuracy of correction depend on the accuracy of parameters input in to the web based software. There are various methods of obtaining frame and deformity parameters (13 in total) including the use of dedicated software known as Spatial CAD™. We tested the accuracy of Spatial CAD™ using a saw bone two ring frame construct of known parameters.

Materials and methods:

We mounted a two-ring (155mm) frame on a saw bone tibia and fibula unit and worked out the accurate mounting and deformity parameters. Then we obtained orthogonal and nonorthogonal antero-posterior and lateral images of frame using a metallic sphere of known dimensions placed at the level of the bone, to aid calibration of x-ray images. We also obtained orthogonal and non-orthogonal images without a calibrating sphere. We then uploaded the images in to Spatial CAD™ software and obtained the mounting and deformity parameters and compared with the real parameters.

Conclusions:

Spatial CAD is capable of yielding measurements within 1-2mm of actual measurements when Calibrated orthogonal and non-orthogonal images were used. Predictably it was inaccurate when frame hardware of known dimensions was used for calibration because the hardware was not in the same plane as the bone

Presenter information: Ahmed, Shoaib, King's College Hospital, London, United Kingdom,
drahmedshoaib@gmail.com

THE RESULTS OF SEGMENTAL LIMB LENGTHENING USING INTRAMEDULLARY SKELETAL KINETIC DISTRACTOR (ISKD)

MA Rashid, A Shoaib, WDI Groom, RK Varma, AFG Groom [London, United Kingdom]

Limb lengthening with an external fixator is a treatment subject to frequent complications. Prolonged periods in an external fixator interfere with all aspects of daily living. We describe our results with the ISKD (intramedullary skeletal kinetic distractor) system, an internal limb lengthening device. We used the ISKD in 12 patients from March 2006 to September 2010. Ten patients with average age of 44 years were included in this study as two patients had not completed the stage of consolidation. The mean follow up period was 30 months. One patient underwent tibial and nine femoral lengthening. The average lengthening desired was 43.2 mm (range 25 mm - 80 mm). The average lengthening achieved was 38 mm. The distraction index was 1.65 mm / day. The average time to full weight bearing was 10.1 months. Mean healing time was 14.7 months. The mean healing index was 113.8 days /cm. Two patients needed bone grafting. None of the patients developed infection, nail breakage or permanent joint stiffness. All patients were satisfied with the treatment and had excellent functional results. We conclude that the low rate of complications, higher patient acceptability and avoidance of external fixation makes ISKD a very attractive option for segmental limb lengthening.

Presenter information: Muhammad Anjum, Rashid, King's College Hospital, London, United Kingdom, anjumrashid@hotmail.com

Can ACL reconstruction be justified in the obese?

WK Hage, SR Bollen [Bradford, United Kingdom]

Introduction: It is widely accepted that intra-articular graft reconstruction with correct placement stands the greatest chance of abolishing symptomatic instability secondary to anterior cruciate ligament (ACL) deficiency. It is estimated that at least 100,000 ACL reconstructions are performed a year in the USA, where approximately 30% of the population are currently clinically obese.

In the UK obesity is a growing problem and as participation in exercise is seen as an important part of the strategy in improving the health of the nation, it is likely that there will be an increasing number of ligament injured patients from this sub group.

Does obesity prejudice outcome? There is very little published work on this association of obesity and ligament reconstruction. It has been reported that subjects with a BMI greater than 30 have 0.35 times the odds of success as subjects with a normal BMI.

Methods: We know the strains placed across the ACL in activities of daily living and the fixation strengths of most of the commonly used ACL reconstruction methods. Using mathematical modeling we can predict likely limits in patient BMI for the materials and rehabilitation regimens in common practice. The theoretical point where BMI is likely to prejudice outcome and cause early graft failure can be calculated. This has implications for patient selection, producing a procedure of limited clinical value. Mathematical modelling can also show the potential problems with weight gain in patient groups after successful ACL reconstruction. Can ACL reconstruction be justified in the obese?"

Presenter information: William K, Hage, Bradford Royal Infirmary, Bradford, United Kingdom,
william.hage@googlemail.com

Does the use of a hinged knee brace influence recovery after a medial collateral ligament injury? A randomised controlled trial
LAK Khan, E Will, JF Keating [Edinburgh, United Kingdom]

Introduction

The aims of this study were to undertake a prospective randomised trial to compare functional outcome, strength and range of motion after treatment of medial collateral ligament injuries by either early unprotected mobilisation or mobilisation with a hinged brace.

Methods

Patients were randomised into either unprotected mobilisation or mobilisation with a hinged brace. Assessments occurred at 2 weeks, 6 weeks, 3 months and 6 months. Outcome measures included validated questionnaires (International Knee Documentation Committee and Knee Injury and Osteoarthritis Outcome Score scores), range of motion measurements and strength testing.

Results

Eighty six patients (mean age 30.4) were recruited. There were 53 men and 33 women. The mode of injury was sport in 56 patients (65%) with football, rugby and skiing being the most common types of sport involved.

The mean time to return to full weight bearing was 3 weeks in both groups. The mean time to return to work was 4.6 weeks in the braced group and 4.1 weeks in the non-braced group ($p=0.79$).

Return to running was at a mean of 14.3 weeks in the braced group and 12.8 weeks in the non-braced group ($p=0.64$). Return to full sport was 22 weeks in the braced group and 22.1 weeks in the non-braced group ($p=0.99$). There was no significant difference in range of movement or pain scores between the two groups at 2, 6, 12 and 24 weeks.

Conclusions

The use of a hinged knee brace does not influence recovery after a medial collateral injury.

Presenter information: Lukman Ahmed Kashif, Khan, Royal Infirmary of Edinburgh, Edinburgh, United Kingdom, kash_khan@hotmail.com

Foot & ankle injuries in elite professional footballers: The findings of one English Premier League team

N Jain, D Murray, S Kemp, T McEvoy [Wolverhampton, United Kingdom]

Introduction:

Foot and ankle injuries are a common occurrence amongst all footballers. The aim of this study was to establish the frequency and variation of foot and ankle injuries within one English Premier League (EPL) professional football club over the course of a season and attempt to identify any factors associated with the injuries.

Method:

Data was collected prospectively for all foot and ankle injuries suffered by first team players over the 2008-09 and 2009-10 EPL season at one EPL club. Each player's demographics were recorded along with various factors concerning or influencing the injury including ground conditions, foot posture index score (FPIS), type of injury, ability to continue playing, recovery time, mechanism of injury and footwear type.

Results:

The most common injury was 5th metatarsal fracture seen in 33%. Lateral ligament sprain was seen in 28% and syndesmosis injury in 17%. The mean recovery time following 5th metatarsal fractures was 76 days. 67% of all injuries (100% of 5th metatarsal fractures) were sustained while wearing blade footwear, 17% wearing the more traditional studded footwear. Supination was the most common FPIS, present in 43%. 56% of injuries were in the dominant (kicking) side while 50% of injuries were sustained in the tackle. There were no ankle fractures observed.

Conclusion:

5th metatarsal fractures are the most common foot & ankle injury amongst professional footballers, ankle fractures are relatively rare in comparison. Injuries occur more frequently with blade footwear, with supination being the most common foot posture at the time of injury.

Presenter information: Neil, Jain, Wolverhampton Wanderers Football Club, Wolverhampton, United Kingdom, npmjain@hotmail.com

Serious Neck Injuries in Schoolboy Rugby - an audit of admissions to spinal injury units in the United Kingdom and Ireland

JGB Maclean [Perth, United Kingdom]

INTRODUCTION

Catastrophic neck injury is rare in rugby, however the consequences are invariably devastating. Schoolboys have previously been indentified as a group at risk. This study came about as a result of a recent increase in admissions of schoolboy rugby players to the National spinal injuries unit in Glasgow.

AIM

To audit schoolboy rugby admissions to spinal injury units throughout the United Kingdom and Ireland, in doing so to appraise the current state of data collection. To obtain estimates of playing numbers from the Home unions.

METHOD

Retrospective review of all 13 spinal injury units for records of cases subsequent to 1996. Representatives of each of the four home unions were contacted to confirm cases and establish playing numbers.

RESULTS

Records were available from 1996 in Scotland and Ireland and from 2000 in England and Wales. Two units collect prospective data, two had easily retrievable data. In the absence of any register data retrieval was challenging elsewhere.

Of the 37 cases 24 would be classified as catastrophic 13 as near misses.

The median age for injury was 17.

51% of injuries occurred in the tackle, 35% in the scrum. 92% of scrum injuries involved neurological damage, 61% with complete neurological loss at presentation, 8% with no neurological injury. Tackle injuries were associated with neurological damage in 42%, 26% with complete lesions and no neurological injury in 57%.

Estimates for playing numbers (U18 inclusive) approximate to Scotland 19,000, Wales 30,000, Ireland 40,000 and England 1,200,00.

CONCLUSION

- A persistent number of schoolboys were injured through the study period.
- Recording of serious neck injuries is inconsistent through the United Kingdom and Ireland.
- The numbers injured in Scotland were disproportionate in view of the relative playing populations.
- Whilst less frequent, scrum injuries were more often associated with spinal cord injury.

Presenter information: James G.B., Maclean, Perth Royal Infirmary, Perth, United Kingdom,
jamie.maclean@nhs.net

Study of validity parameters for clinical examination in meniscal injury

V Paringe, S Kate, B Mark [University of Nottingham, United Kingdom]

Introduction:

As modern day lifestyle is becoming more active so is the incidence of meniscal injuries on rise. An injury to the meniscus is a common orthopedic problem with the incidence of meniscal injury resulting in meniscectomy of 61 per 100,000 populations per year. The common practice in diagnosis of the meniscal injury involves clinical examination followed by radiological or arthroscopic confirmation. The clinical tests commonly performed are joint line tenderness (JLT), McMurray's Test (Non-weight bearing test) and Childress Test (Weight Bearing Test).

Aim:

In our study, we performed the comparative analysis of the validity parameters for components of clinical examination in form of Joint line tenderness, McMurray's test and Childress Test.

Methodology:

A retrospective analysis was performed on the database established using Orchard Sports Injury Classification System-8. Codes KC2 and KC3 (Meniscal injuries) were identified for single examiner for duration from 2004-2007. Out of 88 patients considered for the study, 62 patients were stratified in whom only clinical examination was performed followed by arthroscopic evaluation. The validity parameters considered were accuracy, specificity, sensitivity, positive predictive value (PPV) and negative predictive value (NPV).

Results:

Joint line tenderness had accuracy of 85.47%, sensitivity of 89.09%, and specificity of 57.14%, PPV of 94.23% and NPV of 40%. McMurray's test yielded a accuracy of 88.7%, sensitivity of 89.65%, specificity of 75%, PPV of 98.11%, NPV of 33.33% while Childress test accurately predicted meniscal injury 87.09% and was sensitive for 94.73% with specificity of 40%, PPV of 94.73% and NPV of 40%.

Conclusion:

We can summarise that though the JLT, McMurray's Test and Childress Test provide a variable yet effective diagnostic value, all through can provide a composite diagnostic yield improving the outcome of clinical examination in meniscal injuries.

Presenter information: Vishal, Paringe, University Hospital of Wales, Cardiff, University of Nottingham, United Kingdom, vishalparinge@doctors.org.uk

Injury Prevention Strategies in Skiers and Snowboarders

D Hansom, A Sutherland [Glasgow, United Kingdom]

With associated snow sports injury risks being well documented, the scope for preventative medicine is clear. This article focuses on potential precautions taken by skiers/snowboarders and how they vary between different snow sport groups. A total of 181 randomly selected individuals from the Whistler/Blackcomb Medical Centre, Canada, took part in this questionnaire-based cohort study, examining snow sports activity, preventive measures, and protective equipment use. Most individuals were ski area residents of advanced expertise, with 50% having had a previous snow-riding injury. The most commonly reported significant ski injury was anterior cruciate ligament (ACL) rupture, while in snowboarders, it was wrist fracture. Skiers were more likely to improve fitness levels before going onto the slopes, whereas crossover riders (both skiing and snowboarding) were more likely to take lessons. Most individuals used eye and sun protection and had adequately warm clothing. Beyond basic precautions, protective equipment and preventive measures are used infrequently. It is suggested that by increasing awareness and use of such equipment, injury rates may be reduced.

Presenter information: Donald, Hansom, NHS Greater Glasgow and Clyde, Glasgow, United Kingdom, jdhanom@gmail.com

Articular degeneration following partial lateral menisectomy. A myth or fairytale.

A Mitra, GK Barry [Cork, Ireland]

Introduction: Menisci performs multiple functions in the knee.

These depend largely on the structural integrity of the meniscus. Arthroscopic partial menisectomy is the treatment of choice for meniscal tears in adults.

There is conflicting evidence about the progression of degenerative changes in the medial or lateral compartment of the knee following menisectomy.

Aim: The aim of our study was to demonstrate the subjective, objective and radiographic outcome of arthroscopic partial lateral menisectomy in the intermediate term and to identify any association between age, sex, activity level, the type of meniscal tear, pre operative articular surface damage and the amount of meniscus resected on the outcome.

Materials and methods: Between 1999 and 2003, 152 patients in the 18 to 40 year age group underwent arthroscopic partial lateral menisectomy. A senior consultant orthopaedic surgeon performed all procedures. 72 patients were available for final clinical and radiological review.

Patient's subjective & objective assessments were undertaken using validated scoring systems. Musculoskeletal physiotherapist & radiologists performed clinical & radiological assessments independently. Progression of degenerative changes was recorded.

Results: All patients demonstrated initial improvement of symptoms lasting upto 2 ½ years followed by gradual deterioration of subjective symptoms. There was statistically significant deterioration in the IKDC & Lysholm scores. Radiological changes developed or progressed in 36.6% of the patients (P value <0.005). These changes were most marked in the 35 to 40 year age group.

There was no statistical correlation between clinical symptoms and radiological changes. No other statistically significant associations were demonstrated

Conclusions: Arthroscopic partial lateral menisectomy leads to progressive deterioration in clinical and radiological outcome in the Intermediate term. However there is no correlation between clinical & radiological outcomes.

Presenter information: Aniruddha, Mitra, University college hospital Cork, Cork, Ireland,
mitraani@gmail.com

IS CLINICAL EXAMINATION RELIABLE INDICATOR FOR MENISCAL INJURY? A COMPARISON WITH MR IMAGING

V Paringe, K Strachan, M Batt [University of Nottingham, United Kingdom]

Introduction:

Meniscal injuries are common cause of knee pain and resultant attendance to the orthopaedics or sports clinics. The current protocol stands as clinical examination at first contact and establishing a diagnosis with clinical indicators like joint line tenderness, McMurray's, Apley's and weight-bearing test for meniscal pathology followed by MRI scan to confirm the diagnosis. Either surgical or conservative management follows this. We aim to assess clinical examination alone provide sufficient evidence for further management of meniscal injury and does a role of MRI scan exist to corroborate the findings.

Methodology:

We retrospectively studied 88 patients attending the sports medicine clinic at Queens Medical Centre for the duration 2004-2007 examined by senior clinical assessor. We investigated the co-relation of the clinical and MRI findings to validate if there exists an actual clinical justification to use MRI scan in every patient

We divided the data in further subsets of 57 patients in whom both clinical examination and MRI scan were performed and were validated by arthroscopy. The data obtained was analysed for parameters of accuracy, sensitivity, specificity, positive predictive value [PPV] and negative predictive value [NPV]

Results:

The comparison of clinical examination against MRI scans alone in 88 patients provided a accuracy of 81.81%, sensitivity of 95.77% and specificity of 23.52%.

The assessment revealed that clinical examination yielded accuracy of 89.47%, sensitivity of 96%, specificity of 42 %, PPV of 92%, NPV of 60% while MRI scan was 87.70% accurate, 86% sensitive, with specificity of 100%, PPV of 100%, NPV of 57.14%.

Conclusion:

From the results yielded by the study we can conclude that in experienced hands the clinical examination is as robust as MRI scan for meniscal injury of knee and can negate the need for MRI scan to be performed in every painful knee with suspicious meniscal injury.

Presenter information: Vishal, Paringe, University Hospital of Wales, Cardiff, University of Nottingham, United Kingdom, vishalparinge@doctors.org.uk

Clinical management of bizarre parosteal osteochondromatous proliferation of bone - a series of 22 cases followed up to a maximum of 13 years

S Dawson-Bowling, O Berber, A Jalgaonkar, J Miles, W Aston, R Pollock, J Skinner, T Briggs [Stanmore, United Kingdom]

Introduction

22 cases of bizarre parosteal osteochondromatous proliferation (BPOP), or Nora's lesion, are described. These rare surface-based osteocartilaginous lesions typically affect the hands and feet. Histological diagnosis via surgical excision is considered mandatory due to difficulty in making a definitive clinical or radiological diagnosis.

Methods

Cases were retrospectively identified from the records of a regional bone tumour unit, dating from 1985 to 2009. Of 22 cases, 9 lesions involved the long bones of the hand, 7 the long bones of the feet, 1 case originated from a sesamoid bone of the foot and 5 cases occurred in long bones. The long bones affected were radius, ulna, femur (2) and tibia. Patient age ranged from 6 to 66 (average: 31.8); male to female ratio was 1.8:1. Diagnosis was based on combined radiological and histological features, and initial surgical treatment was excision in 21 cases, and 1 amputation, due to size of lesion on a toe.

Results

Follow-up ranged from 12-162 months (mean 32). Histologically the lesions typically comprised a central area of woven bone maturing into lamellar bone with overlying cartilage cap and fibrous tissue; no lesions had malignant changes. Recurrence occurred in 6 patients (27%); one patient had five clinically distinct episodes of recurrence over a 10 year period. The average recurrence period was 49 months (range 10-120). In patients with incomplete or marginal resection, recurrence rates were 29%, as opposed to 25% in patients with clear resection margins - this was not a statistically significant.

Discussion

We found no increase in recurrence rate in those patients where excision had been marginal as compared with complete excision; given the potential surgical morbidity inherent in resection, it may be that there is a role for a relatively tissue-conserving operative approach to the treatment of this condition, the management of which remains surgical.

Presenter information: S, Dawson-Bowling, Royal National Orthopaedic Hospital, Stanmore, United Kingdom, sebd_b@hotmail.com

Pre-operative embolisation of primary and secondary bone tumours is safe and effective
N Al-Hadithy, P Gikas, J Perera, W Aston, R Pollock, J Skinner, K Lotzof, S Cannon, T Briggs [Middlesex, United Kingdom]

The surgical treatment of bone tumours can result in large perioperative blood loss due to their large sizes and hypervascularity. Preoperative embolisation has been successfully used to downgrade vascularity, thus reducing perioperative blood loss and its associated complications. Prior to embolization era, blood loss as high as 18,500mL have been reported peri-operatively.

Twenty-six patients with a variety of bone tumours (average size 10.5x7.5x5.5cm), who underwent pre-operative embolisation between 2005 and 2009, were retrospectively studied. The group comprised of 17 females and 9 males. Their mean age was 38 years old. All patients underwent surgical resection within 48 hours of embolization. Mean blood loss was 796mL and required on average 1.1units of blood. We experienced no complications.

Pre-operative arterial embolisation of large, richly vascular bone tumours in anatomically difficult positions, is a safe and effective method of downstaging vascularity and reducing blood loss.

Presenter information: Nawfal, Al-Hadithy, Luton and Dunstable Hospital NHS Foundation Trust, Middlesex, United Kingdom, nawfal@yahoo.com

A review of the pattern of referrals for soft tissue sarcomas in the Mersey region

J Chan, CR Chandrasekar, Q Yin [Liverpool, United Kingdom]

Aim:

The aim of this study was to review the referral pattern of Soft Tissue Sarcoma (STS) in the Mersey region. We were interested in the referrals that came from other specialties [not primary care] and how they were managed before being finally referred on to the Tumour Unit.

Methods:

This was a retrospective review of 175 patients with a histological diagnosis of a STS.

Results:

Only 19 % of the patients (33/175) were direct referrals from primary care to the Tumour Unit. They were seen at a median time of 13 days (mean 17.2 days; range 1 - 89 days).

26% (45/175) had an unplanned excision at the hospital where they were initially seen. The median time from their first hospital appointment to the referral to the Tumour Unit was 61.5 days (mean 109.5 days; range 22 - 667 days).

55% (97/175) were referred from another hospital without definitive management. The median time from their first hospital appointment to the referral to the Tumour Unit was 24 days (mean 51.3 days; range 2 - 605 days).

Conclusion:

In the Mersey region, most cases of STS are still being referred from other hospitals. 26% of the patients underwent unplanned excision and this group had the longest delay in presenting to the Tumour unit. The awareness of the NICE guidelines on Sarcoma referral needs to be improved at Primary and Secondary care settings in the Mersey region to avoid delayed referrals and unplanned excisions.

Presenter information: Jason, Chan, Royal Liverpool University Hospital, Liverpool, United Kingdom, jhhchan@doctors.org.uk

Endoprosthetic replacement for malignant tumours of the distal humerus
J Chakravarthy, L Jeys [Birmingham, United Kingdom]

The distal humerus is a rare site for malignant neoplasms and represents 1% of all primary bone tumours. Endoprosthetic replacement is an attractive option as it can potentially improve function and provide good pain relief. We present our experience with the custom made Stanmore elbow endoprosthesis used after resection of malignant tumours of the distal humerus. Between 1970- 2009 we carried out 19 endoprosthetic replacements for malignant tumours of the distal humerus. 10 were a result of metastasis and 9 were primary bone tumours. 7 patients had a pathological fracture as their first presentation and 3 had pathological fractures after the diagnosis was made. 13 patients died between 96 to 5838 days following surgery. 4 patients underwent a revision EPR and one patient underwent two revision EPR's due to loosening. Two patients underwent maintenance procedures (rebushing) due to wear of the poly bushing. One patient underwent an above elbow amputation four years after surgery due to local recurrence. There were no post operative infections. There were no nerve palsies, periprosthetic fractures or wound problems. Surviving patients maintain a good TES Score. Our series is the largest series reported as we report our results of EPR for tumours of distal humerus only. It re-emphasises the rarity of these tumours and the benefits of maintaining function and good local control using a Distal humerus EPR.

Presenter information: Jagannath, Chakravarthy, Royal Orthopaedic Hospital, Birmingham, United Kingdom, csjagan@gmail.com

Bone Growth On Hydroxyapatite Collars In Massive Tumour Endoprostheses

B Sankar, R Refaie, S Murray, C Gerrand [Newcastle upon Tyne, United Kingdom]

Introduction: We aimed to determine the extent of osseous integration of the hydroxy apatite collars of tumour endoprostheses implanted in our unit. **Methods:** We identified 57 patients who had massive endoprostheses implanted over the last six years and reviewed clinical records and x-rays. There were 20 proximal femoral, 23 distal femoral, 6 proximal tibial, 8 proximal humeral and 1 distal humeral replacements. Patients fell into three groups: 1. Primary bone tumours, 2. Metastatic bone tumours and 3. Non-tumour indications. **Results:** There were 32 patients in Group 1. Mean age 32 (10-71) years. Mean follow up was 22 (12-60) months. Osseous integration of the collars was noted in 19 patients (60%). Eight patients had no bony ongrowth on the collars. Nine patients underwent revision, seven for aseptic loosening and one for infection. There were 23 patients in Group 2. Mean age 72 (45-83) years. The primary tumour was lung in four and renal in three. One patient had bilateral surgery. Mean follow up was 6 (4-9) months. One prosthesis required revision for aseptic loosening in spite of showing good growth over the collar. True osseous integration of the collar occurred only in one patient. There were two patients in Group 3: one with a distal femoral fracture non union who demonstrated good integration of the collar. The other had a revision for infected total hip replacement with no osseous integration. **Discussion:** Hydroxyapatite coated collars may help integration of massive endoprostheses, but ongrowth is not always seen. Integration is best after resection of primary bone tumours. Their role in metastatic tumour surgery is questionable.

Presenter information: Biju, Sankar, Freeman Hospital, Newcastle Upon Tyne, Newcastle upon Tyne, United Kingdom, bijusankar@doctors.org.uk

Primary Osseous Tumours of the Hindfoot: 55 years Experience with the Scottish Bone Tumour Registry

PS Young, SW Bell, EM MacDuff, A Mahendra [Glasgow, United Kingdom]

Introduction:

Bony tumours of the foot account for approximately 3% of all osseous tumours. However, literature regarding os calcis tumours comprises individual case reports, short case series or literature reviews with no recent large series. Literature on bony tumours of the talus is limited to case reports only.

Methods:

We retrospectively reviewed medical notes and imaging for all patients with calcaneal or talar tumours recorded in the Scottish Bone Tumour Registry since 1954. Demographics, presentation, investigation, histology, management and outcome were reviewed.

Results:

34 calcaneal tumours and 23 talar tumours were identified.

Calcaneal tumours: 2:1 male prevalence, mean age at presentation 30, average length of symptoms 9 months. 21 benign tumours including 6 unicameral bone cysts, 3 chondroblastoma, and a multitude of individual lesions. 13 malignant tumours comprising 6 osteosarcoma, 5 chondrosarcoma and 2 Ewings sarcoma.

Talar Tumours: male to female ratio 3:1, mean age at presentation 28, average length of symptoms 5 months. 20 benign including 7 osteoid osteoma, 4 chondroblastoma, and several individual lesions. 3 malignant lesions comprising 2 chondrosarcoma, 1 osteosarcoma.

Discussion:

Tumours of the hindfoot frequently are delayed in diagnosis due to their rarity and lack of clinician familiarity. They are more common in men, especially talar tumours, which are most commonly benign osteoid osteoma or chondroblastoma. Calcaneal tumours have 1 in 3 risk of malignancy and cover a wider variety of lesions. Outcome is dependant on early diagnosis, timely surgery and most importantly neo-adjuvant chemotherapy. Diagnosis is often made on plain radiograph but MRI is the gold standard.

Conclusion:

We present the largest case series of calcaneal tumours and the first case series of talar tumours from the Scottish Bone Tumour Registry. Despite their rarity clinicians should maintain a high index of suspicion as accurate and timely diagnosis is important to management and outcome.

Presenter information: Peter Smithson, Young, Glasgow Royal Infirmary, Glasgow, United Kingdom, peteryoung2@nhs.net

Ewing's Sarcoma of The Foot: Experiences of A Bone Tumour Unit
E Gillott, S Kahane, W Aston, TWR Briggs [Stanmore, United Kingdom]

Ewing's Sarcoma is a rare malignant tumour of soft tissue and bone, usually presenting in childhood or adolescence. It can occur anywhere in the body and is most commonly found in the pelvis and long bones, especially around the growth plates. Ewing's Sarcoma of the foot is rare.

We present the outcomes of treatment of the patients with Ewing's Sarcoma of the foot treated at The Royal National Orthopaedic Hospital over the past 10 years. Of the cases found, 2/3 of the patients had skeletal disease and 1/3 of the patients had extra-skeletal.

All patients received adjuvant and neo-adjuvant chemotherapy. All patients had limb salvage surgery followed by chemotherapy, except for one patient who was treated without surgery at the parents' request. All patients had regular chest imaging and MDT surveillance.

Age at diagnosis ranged from 15-31 years with a mode of 25 years. Male to female ratio was 5:1. Mean follow-up was 31 months (range 9-99 months). Musculo Skeletal Tumour Society (MSTS) scores were calculated and compared with other studies.

In summary, limb salvage surgery with adequate MDT surveillance is a viable alternative to amputation for patients with Ewing's Sarcoma of the foot..

Presenter information: Elizabeth, Gillott, Royal National Orthopaedic Hospital, Stanmore, United Kingdom, elizabethgillott@hotmail.com

Three different rare tumours of the hip treated with surgical excision using the Ganz approach

S Gulhane, D Meek, S Patil [glasgow, United Kingdom]

This case series highlights the use of the Ganz approach (trochanteric slide approach) and surgical dislocation for excision of fibrous dysplasia of the femoral neck, pigmented villonodular synovitis and synovial chondromatosis of the hip.

The first patient was a 16-year-old girl, who presented with pain in her hip, having fallen whilst playing football. Investigations revealed a fibrous dysplasia, which was successfully excised returning her to an active lifestyle.

The second patient was a 27-year-old lady, who presented having suffered left hip pain for four years. She was diagnosed with a pigmented villonodular synovitis, which was excised and the patient was able to return to the gym.

The third patient was a 41-year-old lady, who presented after experiencing right hip pain both at night and at rest for a year, without any trauma. She was diagnosed with synovial chondromatosis and returned to all activities of daily living.

The Ganz approach allows safe dislocation of the hip joint without the risk of osteonecrosis of the femoral head. We demonstrate that it is possible to obtain excellent exposure of the femoral neck, head and acetabulum to surgically treat these three tumours of the hip. The surgeon can thus be reassured that complete excision of the tumour has occurred.

Presenter information: Sandesh, Gulhane, southern general hospital, glasgow, United Kingdom, sandesh.gulhane@gmail.com

Local Control Decisions in Extremity Osteosarcoma - are we doing it right?

R Pearson, C Gerrand [Newcastle Upon Tyne, United Kingdom]

Background: Decisions about local treatment are important in osteosarcoma treatment. The purpose of this study was to review decisions about local treatment in one centre.

Methods: This was a retrospective review of the records of all patients with high-grade extremity osteosarcoma presenting to our centre between 1997 and 2008. Particular attention was paid to local control decisions.

Results: 54 patients were included, 37 were male. Median age was 18 (4.1 to 71.3 years). The anatomical location was distal femur in 33, tibia in 8, humerus in 7, ankle/foot in 3, fibula in 2 and clavicle in 1. 8 (14.8%) patients had metastases at presentation. 13 (24.1%) patients underwent primary amputation, predominantly in the early years of the series. The remaining 41 patients had limb-sparing surgery, 5 of whom had microscopically positive margins. 21 of 54 (38.8%) had >90% necrosis in the resected tumour.

3 patients had poor necrosis and positive margins. These were a 70 yo intolerant of chemotherapy, who refused amputation, developed LR and metastatic disease; a 15 yo with metastatic disease, who had a secondary amputation and metastatectomy and survived and a 43 yo who developed metastases and LR on chemotherapy. 4 further patients had local recurrence after LSS. All had poor necrosis after chemotherapy but adequate margins. All developed metastatic disease and 3 have died.

Overall survival was 60%. 5-year survival without metastatic disease at presentation was 65%.

Conclusion: Our series is similar to other centres. Challenges include older patients, poor response to chemotherapy and metastases.

Presenter information: Robert, Pearson, Newcastle University, Newcastle Upon Tyne, United Kingdom, robert.pearson@newcastle.ac.uk

Statins: a potential suppressor of MMP production by interleukin-1b stimulated chondrocytes

JF Baker, PM Walsh, KJ Mulhall [Dublin, Ireland]

Introduction

Matrix metalloproteinases (MMP) play a key role in cartilage degradation in osteoarthritis. Statins are a potential suppressor of MMPs. The aim of this research was to assess the efficacy of Pravastatin in suppressing MMP gene and protein expression in an in vitro model.

Methods

We stimulated normal human chondrocytes with IL-1b for 6 hours to induce MMP expression and then treated with Pravastatin (1, 5 & 10 mM) for a further 18 hours. Cells stimulated with IL-1b but not treated with Pravastatin served as controls. Real-time PCR was used to assess expression of MMP-3 and MMP-9 mRNA. MMP enzyme activity was assessed using a fluorescent MMP-specific substrate.

Results

MMP-3 mRNA expression was reduced at all concentrations tested with a significant reduction in the presence of 1 mM (0.75, $P < 0.05$) and 5 mM (0.75, $P < 0.05$). A significant reduction in MMP-9 expression was observed in the presence of 5 mM (0.81, $P < 0.05$) and 10 mM (0.71, $P < 0.05$). Analysis of culture supernatants revealed that Pravastatin treatment led to a reduction in total MMP activity with a significant reduction observed in the presence of 5 mM (60%, $P < 0.05$) and 10 mM (78%, $P < 0.05$).

Conclusions

We conclude that treatment with Pravastatin of stimulated human chondrocytes leads to a down regulation of selected MMP genes and a reduction in MMP enzyme activity. Our results are further evidence that statins may have a role to play in the treatment of OA and other disorders of cartilage degradation.

Presenter information: Joseph F, Baker, University College Dublin, Dublin, Ireland,
joseph.f.baker@gmail.com

THE EFFICACY OF ANTIMICROBIAL WOUND DRESSINGS USED IN THE MANAGEMENT OF MILITARY COMPLEX EXTREMITY INJURY: A PRE-CLINICAL RANDOMIZED CONTROLLED TRIAL

W Eardley, K Martin, E Kirkmann, J Clasper, S Watts [Birmingham, United Kingdom; Porton Down, Salisbury, United Kingdom]

Introduction

Extremity injury and complications such as wound infection remain a significant problem for the military. This study investigates the anti-microbial efficacy of four dressings in militarily relevant complex extremity injury.

Methods

Under general anaesthesia, the flexor carpi ulnaris of 24 New Zealand White rabbits was exposed to a high energy impact and then wounds inoculated with 10^6 colony forming units of *Staphylococcus aureus*. Dressings, gauze soaked in saline, Chlorhexidine or Betadine or Acticoat®, were randomised and applied 3 hours post injury, to replicate casualty evacuation. Once recovered animals were checked at least twice daily and body temperature recorded. Analgesia was administered once a day. At 48hrs animals were culled, the muscle harvested and analyzed by a blinded investigator. Group sizes of 6 were required to detect a statistically significant effect of a mean one log reduction in bacterial counts at 48 hours.

Results

No dressing gave a significant reduction in bacterial counts at 48 hours. A paired t-test of contamination versus recovered dose gave p values of 0.903, 0.648, 0.396 and 0.336 for saline, Acticoat®, chlorhexidine and iodine respectively. Contamination dose between groups compared using ANOVA showed no significant difference ($p=0.566$). Recovered bacterial loads between groups revealed no significant difference ($p=0.280$).

Conclusion

This study indicates that over a 48 hour period, dressings with reported anti-bacterial properties offer no advantage over saline soaked gauze in reducing the bacterial burden in a contaminated soft tissue injury. Future work will extend the study temporally and introduce multiple contaminants.

Presenter information: Will, Eardley, Academic Department of Military Surgery and Trauma, Birmingham, United Kingdom, willeardley@doctors.org.uk

A Biomechanical study comparing the dynamic hip screw with an X-Bolt in an unstable intertrochanteric fracture model of the proximal femur.

D Gibson, C Keogh, S Morris [dublin, Ireland; Derry, United Kingdom]

Introduction

Lag screw cut-out following fixation of unstable intertrochanteric fractures in osteoporotic bone remains an unsolved challenge. A novel new device is the X-Bolt which is an expanding type bolt that may offer superior fixation in osteoporotic bone compared to the standard DHS screw type device.

Aims

The aim of this study was to test if there was a difference in cut-out using the X-Bolt implant compared with the standard DHS system

Methods

Specimens of low density surrogate bone (5pcf) were inserted into a simplified biomechanical fracture model and had either an X-Bolt or DHS implant inserted. There were eight samples in each group. The fracture model was tested with an incremental cyclical loading programme in a Material Test System. Displacement, cycle count and force exerted were continuously recorded until cut-out of the implant.

Results

All of the specimens failed by varus collapse with superior cut-out and resulted in an automatic stop of the MTS. Specimens with the X-Bolt implant inserted lasted longer on cyclical count and withstood a greater force at cut-out compared with DHS specimens. The mean number of cycles to cutout in the DHS specimens was 4345 and in specimens with the X-Bolt inserted was 6898. The mean force at which cutout occurred in the DHS group was 1.025kN and in specimens with the X-Bolt inserted was 1.275kN. A statistically significant difference was observed with a P-value of 0.005 and a power of 87.2% with respect to cycle count and a P-value of 0.008 and power 84.8% with respect to force exerted at failure when comparing between the two groups.

Conclusion

This study shows that the X-Bolt device demonstrated superior cut-out resistance and withstood greater loads compared to the DHS in low density surrogate bone in an unstable fracture model under cyclical axial loading.

Presenter information: Desmond, Gibson, Royal College of Surgeons, Ireland, dublin, Ireland,
dessiegibson@hotmail.com

The optimisation of polymer type and chain length for use as a biological composite graft in impaction bone grafting: a mechanical and bio-compatibility analysis.

E Tayton, S Fahmy, A Aarvold, J Smith, S Kalra, A Briscoe, K Shakesheff, S Howdle, D Dunlop, R Oreffo
[Southampton, United Kingdom]

Aims.

Impaction bone grafting with milled human allograft is the gold standard for replacing lost bone stock during revision hip surgery. Problems surrounding the use of allograft include cost, availability, disease transmission and stem subsidence (usually due to shear failure of the surrounding allograft).

The aim of this study was to investigate various polymers for use as substitute allograft. The ideal graft would be a composite with similar mechanical characteristics as allograft, and with the ability to form *de novo* bone.

Methods.

High and low molecular weight (MW) forms of three different polymers (polylactic acid (PLA), poly (lactic co-glycolic) acid (PLGA) and polycaprolactone (PCL)) were milled, impacted into discs, and then tested in a custom built shear testing rig, and compared to allograft.

A second stage of the experiment involved the addition of skeletal stem cells (SSC) to each of the milled polymers, impaction, 8 days incubation, and then tests for cell viability and number, via fluorostaining and biochemical (WST-1) assays.

Results.

The shear strengths of both high/ low MW PLA, and high/low MW PLGA were significantly higher than those of milled allograft ($P < 0.001$, $P < 0.001$, $P < 0.005$ and $P < 0.005$) but high and low MW PCL was poor to impact, and had significantly lower shear strengths ($P < 0.005$, $P < 0.001$). Fluorostaining showed good cell survival on high MW PLA, high MW PCL and high MW PLGA. These findings were confirmed with WST-1 assays.

Conclusions.

High MW PLA and high MW PLGA performed well both in mechanical testing and cell compatibility studies. These two polymers are good contenders to produce a living composite for use as substitute human allograft in impaction bone grafting, and are currently being optimised for this use via the investigation of different production techniques and in-vivo studies.

Presenter information: Edward, Tayton, Southampton University Hospitals NHS Trust, Southampton, United Kingdom, edwardtayton@hotmail.com

Does increasing PLA scaffold porosity using supercritical CO₂ strategies enhance the characteristics for use as an alternative to allograft in impaction bone grafting?

E Tayton, M Purcell, A Briscoe, S Kalra, A Aarvold, J Smith, S Fahmy, K Shakesheff, S Howdle, D Dunlop, R Oreffo [Southampton, United Kingdom; Nottingham, United Kingdom]

Aims.

Disease transmission, availability and economic costs of allograft have resulted in significant efforts into finding an allograft alternative for use in impaction bone grafting (IBG). Biotechnology offers the combination of skeletal stem cells (SSC) with biodegradable polymers as a potential solution. Recently polymers have been identified with both structural strength and SSC compatibility that offer the potential for clinical translation.

The aim of this study was to assess whether increasing porosity of one such polymer via super critical CO₂ dissolution (SCD) enhanced the mechanical and cellular compatibility characteristics for use as an osteogenic alternative to allograft in IBG.

Methods.

High molecular weight PLA scaffolds were produced via traditional (solid block) and SCD (porous) techniques, and the differences characterised using scanning electron microscopy (SEM). The polymers were milled, impacted, and mechanical comparison between traditional vs SCD created scaffolds and allograft controls was made using a custom shear testing rig, as well as a novel agitation test to assess cohesion. Cellular compatibility tests for cell number, viability and osteogenic differentiation using WST-1 assays, fluorostaining and ALP assays were determined following 14 day culture with SSC's.

Results.

SEM showed increased porosity of the SCD produced PLA scaffolds, with pores between 50-100µm. Shear testing showed the SCD polymer exceeded the shear strength of allograft controls ($P < 0.001$). Agitation testing showed greater cohesion between the particles of the SCD polymer ($P < 0.05$). Cellular studies showed increased cell number, viability and osteogenic differentiation on the SCD polymer compared to traditional polymer ($P < 0.05$) and allograft ($P < 0.001$).

Conclusions.

The use of supercritical CO₂ to generate PLA scaffolds significantly improves the cellular compatibility and cohesion compared to traditional non-porous PLA, without substantial loss of mechanical shear strength. The improved characteristics are critical for clinical translation as a potential osteogenic composite for use in impaction bone grafting.

Presenter information: Edward, Tayton, Southampton University Hospitals NHS Trust, Southampton, United Kingdom, edwardtayton@hotmail.com

Tantalum trabecular metal - Addition of skeletal stem cells to enhance the bone-implant interface

JO Smith, BG Sengers, A Aarvold, ER Tayton, DG Dunlop, ROC Oreffo [Southampton, United Kingdom]

Recently, the osteoregenerative properties of allograft have been enhanced by addition of autogenous skeletal stem cells to treat orthopaedic conditions characterised by lost bone stock. There are multiple disadvantages to allograft, and trabecular tantalum represents a potential alternative. This metal is widely used, although in applications where there is poor initial stability, or when it is used in conjunction with bone grafting, loading may need to be limited until sound integration has occurred. Strategies to speed up implant incorporation to surrounding bone are therefore required. This may improve patient outcomes, extending the clinical applications of tantalum as a substitute for allograft.

Aim:

To use tissue engineering strategies to enhance the reconstructive properties of tantalum, as an alternative to allograft.

Methods:

Human bone marrow stromal cells (5×10^5 cells/ml) were cultured on blocks of trabecular tantalum or allograft for 28 days in basal and osteogenic media. Molecular profiling, confocal and scanning electron microscopy, as well as live/dead staining and biochemical assays were used to detail cell adherence, proliferation and phenotype.

Results:

Cells displayed extensive adherence and proliferation throughout trabecular tantalum. Samples cultured in osteogenic conditions showed abundant matrix production. Electron microscopy confirmed significant cellular growth through tantalum to a depth of 5mm. In contrast to cells cultured with allograft in both basal and osteogenic conditions, cell proliferation and biochemical assays showed significantly higher activity with tantalum than allograft. Furthermore, alkaline phosphatase (ALP) assay and molecular profiling confirmed no significant difference in expression of ALP, Runx-2, Col-1 and Sox-9 between cells cultured on tantalum and allograft.

Conclusions:

These studies demonstrate trabecular tantalum supports cell growth and osteogenic differentiation at least as well as allograft. Trabecular tantalum represents a good alternative to allograft for tissue engineering osteoregenerative strategies in the context of lost bone stock. Further mechanical testing and *in vivo* studies are on-going.

Presenter information: James O., Smith, University of Southampton, School of Medicine, Southampton, United Kingdom, jsmith@doctors.org.uk

Can Glucosamine protect against the toxicity of local anaesthetic solutions to human articular cartilage? An in vitro study.

A Gulihar, M Hadi, G Taylor [Leicester, United Kingdom]

Background: Continuous post-operative infusion of local anaesthetic solutions has been implicated as the causative factor in many cases of chondrolysis. Recent in-vitro studies have shown that even a single exposure to local anaesthetic can cause apoptosis and mitochondrial dysfunction leading to chondrocyte death. Glucosamine has been shown to have a protective and reparative effect on articular cartilage.

Aims: To compare the effect of a single exposure of different local anaesthetic solutions on human articular cartilage and to investigate the protective and reparative effects of Glucosamine on articular cartilage exposed to 0.5% Bupivacaine.

Methods: Chondral explants (n=354) were obtained from femoral heads of hip fracture patients undergoing hemiarthroplasty. Each specimen was exposed to one of 8 test solutions for one hour. The specimens were then incubated in culture medium containing radio-labelled 35-sulphur for 16 hours. The uptake of 35-S by each specimen was measured to give an estimate of proteoglycan metabolism.

Test solutions: 1. 1% Lidocaine 2. 2% Lidocaine 3. 0.25% Bupivacaine, 4. 0.5% Bupivacaine, 5. 0.5% Levo-Bupivacaine 6. Control solution of M199 culture medium. 7. To investigate its protective effect, 100 micrograms of Glucosamine was added along with 0.5% Bupivacaine 8. To investigate its reparative effect, Glucosamine was added after exposure to Bupivacaine for an hour.

Results: Compared to the control solution, the inhibition of proteoglycan metabolism was 64% with 1% Lidocaine($p < 0.001$), 79% with 2% Lidocaine($p < 0.001$), 61% with 0.25% Bupivacaine($p < 0.001$), 85% with 0.5% Bupivacaine($p < 0.001$) and 77% with 0.5% Levo-Bupivacaine($p < 0.001$). Adding Glucosamine reduced Bupivacaine toxicity to 30%($p < 0.001$). Glucosamine did not repair the damage caused by Bupivacaine, with inhibition of proteoglycan metabolism at 70%.

Conclusion: All local anaesthetic solutions were toxic to articular cartilage. The addition of Glucosamine to 0.5% Bupivacaine protected against its toxicity to articular cartilage but did not repair the damage caused.

Presenter information: Abhinav, Gulihar, Glenfield Hospital, Leicester, United Kingdom,
abhinavgulihar@hotmail.com

Inactivation of microorganisms isolated from infected arthroplasty using High Intensity Narrow Spectrum (HINS) light

S Gupta, M Maclean, JG Anderson, SJ MacGregor, RMD Meek, MH Grant [Glasgow, United Kingdom]

Introduction

Infection rates following arthroplasty surgery are reported between 1-4%, with considerably higher rates in revision surgery. The associated costs of treating infected arthroplasty cases are over 4 times the cost of primary arthroplasties, with significantly worse functional and satisfaction outcomes. In addition, multiple antibiotic resistant bacteria are developing, so to reduce the infection rates and costs associated with arthroplasty surgery, new preventative methods are required. HINS-light is a novel blue light inactivation technology which kills bacteria through a photodynamic process, and is proven to have bactericidal activity against a wide range of species. The aim of this study was to investigate the efficacy of HINS-light for the inactivation of bacteria isolated from infected arthroplasty cases.

Methods

Specimens from hip and knee arthroplasty infections are routinely collected in order to identify possible causative organisms and susceptibility patterns. This study tested a range of these isolates for sensitivity to HINS-light. During testing, bacterial suspensions were exposed to increasing doses of HINS-light of (66mW/cm² irradiance). Non-light exposed control samples were also set-up. Bacterial samples were then plated onto agar plates and incubated at 37° C for 24 hours before enumeration.

Results

More than a 4-log reduction in *Staphylococcus epidermidis* and *Staphylococcus aureus* populations were achieved after exposure to HINS-light for doses of 48 and 55 J/cm², respectively. Current investigations using *Escherichia coli* and *Klebsiella pneumoniae* has also shown these gram-negative organisms to be inactivated following HINS-light exposure, although higher doses are required.

Discussion

This study has demonstrated that HINS-light successfully inactivated clinical isolates from infected arthroplasty cases. As HINS-light utilises visible-light wavelengths it can be safely used in the presence of patients and staff. This unique feature could lead to possible applications such as use as an infection prevention tool during surgery and post-operative dressing changes.

Presenter information: Sanjay, Gupta, Southern General Hospital, Glasgow, United Kingdom, sanjaygupta@doctors.org.uk

**A New Technique For The Attachment Of Marker Balls To Anterior Cruciate Ligament Reconstruction Grafts For The Purpose Of Post-Operative Radiostereometric Analysis.
A Ashmore, D Beard, A Price, HS Gill [Oxford, United Kingdom]**

Aims: Interest in soft tissue Radiostereometric Analysis (RSA) is rising. Previous authors have tried, with varying levels of success, to use this technique to analyse the intra-substance portion of anterior cruciate ligament (ACL) graft constructs. These methods were either prone to large amounts of marker migration, deemed unsuitable for in-vivo use or, where alternative markers such as stainless steel sutures were used, lost the inherent accuracy that made RSA an attractive tool in the first place. We describe a modification of tantalum marker balls that allows for a new method of secure fixation to soft tissue in order to accurately analyse stretch, displacement and, potentially, dynamic movement using RSA.

Methods: 1.5 mm tantalum tendon markers were predrilled with 0.3 mm holes, allowing them to be sutured directly to soft tissue. Using a previously described ACL graft model, the amount of marker ball migration was then analysed using RSA after cyclical loading between 20 N and 170 N at 25 Hz for 225,000 cycles.

Results: None of 40 balls loosened or became detached from the tendon grafts after 225,000 cycles. Mean migration of the tendon attached marker balls was < 0.1 mm. The maximum imprecision in determining the distance between two markers as assessed by intra- and inter-observer variability was 0.082 mm. Analysis of elastic stretch, plastic stretch, stiffness and localisation of stretch within the graft model was possible due to the low migration levels.

Conclusions: This method of attachment of marker beads to soft tissue is simple, reliable and mechanically sound. This technique could potentially be used not only for the post-operative assessment of ACL reconstruction, but in all areas where soft tissue RSA is of interest.

Presenter information: Alexander, Ashmore, Oxford Orthopaedic Engineering Centre, Oxford, United Kingdom, alexashmore@hotmail.com

The Molecular Mechanism of Ischaemic Preconditioning in Skeletal Muscle Cells

C McGuire, P Walsh, K Mulhall [Dublin, Ireland]

Objectives: Ischaemic preconditioning (IPC) is a phenomenon whereby tissues develop increased tolerance to ischaemia and subsequent reperfusion if first subjected to sublethal periods of ischaemia. Despite extensive investigation of IPC, the molecular mechanism remains largely unknown. Our aim was to show genetic changes in skeletal muscle cells in response to IPC.

Methods: Firstly, we established an in-vitro model of IPC using a human skeletal muscle cell line. Gene expression of both control and preconditioned cells at various time points was determined. The genes examined were HIF-1 α , EGR1, JUN, FOS, and DUSP1. HIF-1 α is a marker of hypoxia. EGR1, JUN, FOS and DUSP1 are early response genes and may play a role in the protective responses induced by IPC. Secondly, the expression of HSPB8 was examined in a cohort of preconditioned total knee arthroplasty patients.

Results: HIF-1 α was upregulated following 1 and 2 hours of simulated ischaemia ($p = 0.076$ and 0.841 respectively) verifying that hypoxic conditions were met using our model. Expression of EGR1, FOS and DUSP1 were upregulated and peaked after 1 hour of hypoxia ($p = 0.001$, < 0.00 , and 0.038 respectively). cFOS was upregulated at 2 and 3 hours of hypoxia. IPC prior to simulated hypoxia resulted in a greater level of upregulation of EGR1, JUN and FOS genes ($p = < 0.00$, 0.047 , and < 0.00 respectively). HSPB8 was not significantly upregulated following IPC using the hypoxic model. It was, however, upregulated on an mRNA level in total knee arthroplasty patients ($p = 0.15$).

Conclusion: This study has validated the use of our hypoxic model for studying IPC in-vitro. IPC results in a greater upregulation of protective genes in skeletal muscle cells exposed to hypoxia than in control cells. We have demonstrated hitherto unknown molecular mechanisms of IPC in cell culture and in patients undergoing TKA.

Presenter information: Ciara, McGuire, Mater Misericordiae University Hospital, Dublin, Ireland,
ciarameganmcguire@gmail.com

The healing of a novel collagen based scaffolds compared to autogenous bone graft and rhBMP2-soaked collagen scaffolds in a long bone defect

F Lyons, J Gleeson, S Partap, K Synnott, J O'Byrne, F O'Brien [Dublin, Ireland]

The purpose of this experiment was to use an in vivo animal model to assess two optimised collagen based scaffolds that had demonstrated positive osteogenic properties using in vitro models. The two scaffolds; a collagen-glycosaminoglycan (CGAG) and a biomimetic collagen-hydroxyapatite (CHA) scaffold were developed in our laboratory using novel techniques to optimise mechanical properties for use in bone. Using a rabbit radius 15mm segmental defect the scaffolds were used alone as *off-the-shelf* bone graft substitutes and compared to autogenous bone graft (positive control) and an empty defect (negative control). In addition both scaffolds were used as delivery devices for recombinant bone morphogenic protein-2 (rhBMP2) using a low dose (50 micrograms per scaffold) to evaluate their potential as delivery devices as well as to compare to the scaffolds alone.

At the final 16 week time point, the CHA scaffold alone demonstrated excellent healing of the 15mm segmental with healing, as measured by x-ray, CT, and histology, equivalent to both autogenous bone graft and the CG scaffold containing rhBMP2. Finally, the CHA scaffold with rhBMP2 demonstrated complete anatomical healing at 16 weeks.

In conclusion, whilst this result is of importance to the application of rhBMP2 and also highlights the contribution of the scaffold, the most significant finding of this study is that the use of the CHA scaffold demonstrates efficacious healing compared to the current gold standard of autogenous bone graft. In addition, it compares equivocally to CG-BMP2, a representative commercial device in current clinical use, but without the cost and safety concerns. This suggests that the scaffold alone may be used as an effective *off-the-shelf* bone graft substitute, and as a result of this a clinical trial is planned for the near future.

Presenter information: Frank, Lyons, Royal College of Surgeons in Ireland, Dublin, Ireland,
franklyons@rcsi.ie

Proliferation and attachment capacity of human osteoblastic cells on antibacterial nanosilver surfacing coated with SiOxCy
C Fölsch, P Khalilpour, E Sagnak [Marburg, Germany]

The number of joint arthroplasties is increasing steadily worldwide and despite antiseptic precautions bacterial infection remains a serious complication. Contamination of implants within the early postoperative period and the formation of a biofilm is a main cause of revision surgery. Silver coating of implants offers the opportunity to prevent attachment of bacteria and biofilm formation which seems more effective than perioperative antibiotic prophylaxis could be. We developed a new nano-silver coating applied onto the metal surface.

Fibroblast cell lines are used as a standard for cytotoxicity testing but their ability to predict the conduct of a material in bone tissue is limited. Therefore a standardized osteoblast cell culture model was employed. The aim of this study was to evaluate the attachment capacity of hFOB 1.19 on PEEK and titanium in presence and absence of the antimicrobial coating. Currently no weight bearing implants with silver coating are available.

The silver particles were sputtered onto the surface in a chemical vapour deposition process. The size of the silver particles was 5-50nm. The cell culture plates were incubated for 2, 6, 16 and 48 hours. The attached cells were stained and the absorbance was measured with a micro plate auto reader.

The new nano-silver surfacing technique with covering SiOxCy creates significant more cell attachment on coated titanium compared with uncoated titanium and the cell adhesions on coated PEEK are less but still significantly improved in comparison to uncoated PEEK. The new surface coating can be assumed to enhance cell attachments and proliferation compared with other silver coating procedures. It seems beneficial that the new coating can be modified changing the kind of hydrophilicity, thickness and composition according to requirements. An in vivo study on the osseous integration of coated titanium in a huge animal model is in progress leading to a clinical trial.

Presenter information: Christian, Fölsch, University Marburg, Marburg, Germany,
christian.foelsch@t-online.de

Wound complications following Rivaroxaban administration - A multi-centre comparison with low molecular weight Heparin for thromboprophylaxis in lower limb arthroplasty
S Jameson, M Rymaszewska, P James, I Serrano-Pedraza, S Muller, A Hui, M Reed [Newcastle, United Kingdom]

Introduction

The National Institute for Health and Clinical Effectiveness recommends both low molecular weight heparin (LMWH) and Rivaroxaban for venous thromboembolic (VTE) prophylaxis following lower limb arthroplasty. Despite evidence in the literature that suggests Rivaroxaban reduces VTE events, there are emerging concerns from the orthopaedic community regarding an increase in wound complications following its use.

Methods

Through the orthopaedic clinical directors forum, Trusts replacing LMWH with Rivaroxaban for lower limb arthroplasty thromboprophylaxis during 2009 were identified. Prospectively collected Hospital episode statistics (HES) data was then analysed for these units so as to determine rates of 90-day symptomatic deep venous thrombosis (DVT), pulmonary embolism (PE), major bleed (cerebrovascular accident or gastrointestinal haemorrhage), all-cause mortality, and 30-day wound infection and readmission rates before and after the change to Rivaroxaban. 2752 patients prescribed Rivaroxaban following TKR or THR were compared to 10358 patients prescribed LMWH. Data was analysed using odds ratios (OR).

Results

There were significantly more wound infections in the Rivaroxaban group (3.85% vs. 2.81%, OR=0.72; 95% CI 0.58-0.90). There were no significant differences between the two groups for PE (OR=1.52; 0.77-2.97), major bleed (OR=0.73; 0.48-1.12), all-cause mortality (OR=0.93; 0.46-1.87) and re-admission rate (OR=1.21; 0.88-1.67). There were significantly fewer symptomatic DVTs in the Rivaroxaban group (0.91% vs. 0.36%, OR=2.51; 1.30-4.82).

Conclusion

This study is the first to describe the real impact of the use of Rivaroxaban in the NHS. When compared with LMWH in lower limb arthroplasty patients, wound infection rates were significantly higher following Rivaroxaban use whilst providing no reduction in symptomatic PE or all-cause mortality.

Presenter information: Simon, Jameson, Wansbeck Hospital, Newcastle, United Kingdom,
simonjameson@doctors.org.uk

Assessment of a new undergraduate module in musculoskeletal medicine

J Queally, F Cummins, S Brennan, M Shelly, J O'Byrne [Dublin, Ireland]

Despite the high prevalence of musculoskeletal disorders seen by primary care physicians, numerous studies have demonstrated deficiencies in the adequacy of musculoskeletal education at multiple stages of medical education. The aim of this study was to assess a newly developed undergraduate module in musculoskeletal medicine.

Methods: A two-week module in musculoskeletal medicine was designed to cover common musculoskeletal disorders that are typically seen in primary care. A previously validated examination in musculoskeletal medicine was used to assess the cognitive knowledge of ninety-two students on completion of the module. A historical control group (seventy-two students) from a prior course was used for comparison.

Results: The new module group (2009) performed significantly better than the historical (2006) control group in terms of score (62.3% versus 54.3%, respectively; $p < 0.001$) and pass rate (38.4% versus 12.5%, respectively; $p = 0.0002$).

In a subgroup analysis of the new module group, students who enrolled in the graduate entry program (an accelerated four-year curriculum consisting of students who have already completed an undergraduate university degree) were more

likely to perform better in terms of average score (72.2% versus 57%, respectively; $p < 0.001$) and pass rates (70.9% versus 21.4%, respectively; $p < 0.001$) compared with students who had enrolled via the traditional undergraduate route. In terms of satisfaction rates, the new module group reported a significantly higher satisfaction rate than that reported by the historical control group (63% versus 15%, respectively; $p < 0.001$).

Conclusions: In conclusion, the musculoskeletal module described in this paper represents an educational advance at undergraduate level as demonstrated by the improvement in scores in a validated examination. As pressure on medical curricula grows to accommodate advancing medical knowledge, it is important to continue to improve, assess, and consolidate the position of musculoskeletal medicine in contemporary medical education.

Presenter information: Joseph, Queally, Royal College of Surgeons in Ireland, Dublin, Ireland, josephqueally@gmail.com

A comparison of thrombo-prophylaxis regimes post elective primary lower limb arthroplasty

H Edwards, D Yeoh, S Dawson Bowling, N Ellens, D East, K miles, A Butler Manuel, H Aphthorp [Hastings, United Kingdom]

Introduction

Deep vein thrombosis(DVT) and pulmonary embolism(PE) are well-recognised complications following lower limb arthroplasty (Cohen et al, 2001). The National Institute for Clinical Excellence and British Orthopaedic Association recommend the use of both mechanical and chemical prophylaxis. At our institute regimens have changed reflecting new developments in the use of thombo-prophylaxis. Our aim was to assess the efficacy of these methods in preventing complications.

Methods

Since moving from Aspirin and compression stockings (TEDS) only, three different treatment methods were prospectively audited. Regimen 1 consisted of Aspirin (150 mg OD) and TEDS for 6 weeks (n=559). Regimen 2 used Clexane 40mg OD (n=400). Regimen 3 used Rivaroxaban (n=100) as licensed and Regimen 4 Dabigatran (n=100) as licensed.

We looked at symptomatic DVT/PE rates and rates of post op bleeding/haematoma. Patients were reviewed prior to discharge, and at a six-week follow-up. Any casualty attendances were also recorded up to 12 weeks post-operatively.

Results

Symptomatic DVT rates were 0.36% for Regimen 1, 0.25% for Regimen 2, 0% for Regimen 3 and 4. Symptomatic PE rates were as follows 2.15% Regimen 1, 2.0% Regimen 2, 0% Regimen 3, and 1% Regimen 4. Haematoma/bleeding rates were as follows 0.36% Regimen 1, 0.75% Regimen 2, 10% Regimen 3, and 8% Regimen 4. Returns to theatre for bleeding were 0.17% Regimen 1, 0% Regimen 2 and 4, and 2% Regimen 3.

Conclusion

Our move from Aspirin was based on local audit, which highlighted a higher than national average PE rate. A change towards oral based prophylaxis was based on ease of administration and potential reduction in costs. Although DVT/PE's were lower with the oral thrombo-prophylaxis, bleeding complications appear higher. This study highlights the need to monitor both VTE and bleeding rates when adopting any changes in protocol, with a view on individualised treatment on balance of risks.

Presenter information: Huw, Edwards, Conquest Hospital, Hastings, United Kingdom,
huw.edwards@nhs.net

Effect of Rivaroxaban on Return to Theatre Rates Following Total Hip and Knee Replacement

C Jensen, R Morrell, A Steval, P Partington, M Reed, S Muller [Ashington, United Kingdom]

Introduction: Rivaroxaban has been recommended for routine use as a thromboprophylactic agent in patients undergoing lower limb arthroplasty. Trials supporting its use have not fully evaluated the risks of wound complications related to rivaroxaban.

Method: A retrospective cohort analysis of 1558 consecutive patients who underwent total hip or knee replacements within the same hospital during a 19 month period (2009-2010) was performed. The first 489 patients (Group 1) were given tinzaparin postoperatively as per NICE guidance. The following 559 patients (Group 2) were given rivaroxaban. Concerns regarding wound complications prompted a change back to tinzaparin for the next 510 patients (Group 3.) Other than the thromboprophylactic agent used there were no other differences in the pre and postoperative treatments of all these patients.

Results: Nine of the 489 patients in Group 1 (tinzaparin) (1.8%, 95% CI 0.9-3.5%) returned to theatre with wound complications within 30 days compared with 22 out of 559 patients in Group 2 (rivaroxaban) (3.94%, 95% CI 2.6-5.9%.) This increase in RTT rate was statistically significant ($p=0.046$.) After reverting back to tinzaparin 8 out of 510 patients in Group 3 (tinzaparin) (1.6% 95% CI 0.74-3.1%) returned to theatre. This reduction in RTT rate was statistically significant ($p=0.02$.) Combining the tinzaparin groups (1 and 3) and comparing with the rivaroxaban group (2) further increases the significance of our observations. Tinzaparin RTT was 1.7% (95% CI 1.0-2.7%) compared with rivaroxaban RTT of 3.94% (95% CI 2.6-5.9%) ($p=0.01$.)

Discussion: We observed a significant rise in wound complication necessitating further surgery after a change in thromboprophylactic agent from tinzaparin to rivaroxaban, followed by a significant reduction after reverting back to tinzaparin. We call for further independent randomised controlled clinical trials examining wound related complications with respect to new pharmacological treatments.

Presenter information: Cyrus, Jensen, Northumbria Healthcare NHS Trust, Ashington, United Kingdom, jensen@doctors.org.uk

Aspirin versus rivaroxaban following elective primary lower limb arthroplasty - an analysis of complications and efficacy.

T Akram, O Templeton-Ward, S Yousaf, R Hargrove [London, United Kingdom]

Following the outcomes of the RECORD trials the protocol of extended thromboprophylaxis in patients undergoing elective primary total hip or knee arthroplasty has been changed in our institution.

Between June 2008 and May 2009 patients were offered extended thromboprophylaxis with 150mg of aspirin daily, commencing preoperatively on admission and continuing for a total of six weeks. From June 2009 onwards patients were treated with 10mg of rivaroxaban once daily for two weeks following total knee and five weeks following total hip arthroplasty commencing 4 to 6 hours postoperatively. Our cohorts were 700 patients before and after the introduction of the new regimen. The two groups were matched for age, sex and type of operation. All patients with no contraindication to treatment with aspirin or rivaroxaban respectively undergoing elective primary total hip or knee arthroplasty were included in the study. Patients receiving warfarin on admission were treated with warfarin postoperatively and were excluded.

We have compared the two treatment protocols in terms of safety and efficacy. Results focus on 4 safety outcome measures including mortality, haemorrhagic complications, transfusion requirements and infection rates and 2 efficacy outcome measures including thromboembolic complications and length of inpatient stay.

Rates of DVT were equal in the two cohorts ($P < 0.005$) as were the mortality rates. Transfusion requirements post-operatively were not affected by the introduction of the new regimen however there was a significant increase in both return to theatre rates and prolonged wound ooze ($P < 0.005$). Infection rates were slightly higher in the cohort treated with rivaroxaban but this was not statistically significant.

We conclude that further trials need to be done to confirm the suitability of routine use of rivaroxaban.

Presenter information: Tahira, Akram, Frimley Park Hospital, London, United Kingdom,
ojtw@doctors.org.uk