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PATIENT-REPORTED OUTCOME 32 TO 37 YEARS FOLLOWING SURGICALLY TREATED OR NON-SURGICALLY TREATED ACUTE ANTERIOR CRUCIATE LIGAMENT INJURY

Author Block: S. R. Filbay^{1,2}, C. Andersson³, C. Ardern², H. Gauffin², J. Kvist^{2,4}; ¹Univ. of Oxford, Oxford, United Kingdom, ²Linköping Univ., Linköping, Sweden, ³Linköping Hosp., Linköping, Sweden, ⁴Karolinska Inst.t, Stockholm, Sweden

Abstract:

Purpose: As many as one in four individuals develop knee osteoarthritis within ten years of anterior cruciate ligament (ACL) injury. However, the prevalence of knee impairment and the impact of the ACL-injured knee on quality of life (QOL), more than 30 years after ACL injury is unclear. Additionally, the impact of meniscus injury, surgical or non-surgical ACL treatment, and knee function at mid-term follow-up on patient-report outcomes (PROs) beyond 30 years of injury is uncertain.

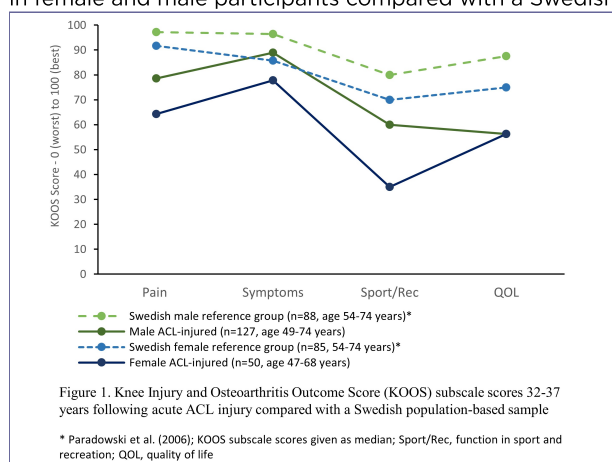
This study aimed to: i. Evaluate PROs 32-37 years following acute ACL injury ii. Assess whether ACL treatment, baseline meniscus injury and knee function at mid-term follow-up were related to differences in PROs at 32-37 year follow-up

Methods: From 1980-1985, 293 patients who ruptured their ACL <14 days previously were allocated to early surgical (augmented or non-augmented repair) or non-surgical ACL treatment based on an odd or even birth year. ACL surgery was performed at Linköping Hospital (Sweden) within 24 (mean 5±4) days of injury. Concomitant injuries were diagnosed arthroscopically within 21 days of injury. At mid-term follow-up (mean 4±1 (range 3-7) years after ACL injury) quadriceps strength limb symmetry index (LSI), hamstrings strength LSI and one-leg-hop for distance LSI were assessed.

At long-term follow-up, all patients aged 16-40 years at the time of injury were invited to complete the Knee Injury and Osteoarthritis Outcome Score (KOOS), ACL-QOL and EQ-5D. Mann-Whitney U tests compared outcomes between sub-groups (ACL surgically treated vs. non-surgically treated within 24 days of injury; ACL surgically treated vs. non-surgically treated at 32-37 year follow-up; baseline meniscus injury vs. no baseline meniscus injury; mid-term quadriceps strength LSI ≤89% vs. ≥90%; mid-term hamstrings strength LSI ≤89% vs. ≥90%; and mid-term one-leg-hop LSI ≤89% vs. ≥90%). To detect clinically meaningful differences in the KOOS (>9-points), we required n=32 in each sub-group.

Results: 225 patients were eligible for 32-37 year follow-up. To date, 177 patients (79%) have completed questionnaires (age 59±6, range 47-74 years; 28% female). 101 patients (57%) had initial non-surgical ACL treatment and 65 patients (37%) had not had ACL surgery at long-term follow-up. 10 people (6%) had received a knee replacement (n=7 ipsilateral; n=1 contralateral; n=2 bilateral).

PROs for all participants at 32-37 year follow-up were: (median(IQR)) KOOS-Symptoms, 71(54, 89); KOOS-Pain, 86(64, 97); KOOS-Sport/Rec, 53(25, 75); KOOS-QOL, 56(39, 69); ACL-QOL 70(48, 88); EQ-5D, .80(.73, 1.0). KOOS scores were impaired in female and male participants compared with a Swedish population-based sample (Figure 1).



There were no differences ($p>0.26$) in PROs between patients initially treated with ACL surgery vs. no surgery (Figure 2), no differences in PROs between patients who had and had not received ACL surgery at long-term follow-up ($p>0.34$), and in those with (59%) and without baseline meniscus injury ($p\geq 0.12$).

A LSI ≤89% for quadriceps (29%) or hamstring strength (17%) at mid-term follow-up was not associated with long-term PROs ($p>0.10$). Patients with a one-leg-hop LSI ≤89% at mid-term follow-up (16%) reported worse KOOS-Symptoms (61(48, 75) vs. 75(54, 89), $p=0.03$); KOOS-Pain (69(50, 97) vs. 86(67, 97), $p=0.02$); KOOS-Sport/Rec (30(15, 75) vs. 55(30, 76), $p=0.04$); KOOS-QOL (44(31, 63) vs. 58(44, 69), $p=0.03$); and ACL-QOL scores (45(34, 75) vs. 72(53, 90) $p=0.003$ 32-37 years after ACL injury (Figure 2).

	KOOS Symptoms	KOOS Pain	KOOS Sport/Rec	KOOS QOL	ACL-QOL	EQ-5D
Initial ACL surgery (n=76, 43%)	71(54, 86)	84(64, 97)	50(30, 85)	56(38, 67)	72(49, 91)	.80(.77, 1.0)
No initial ACL surgery (n=101, 57%)	75(54, 89)	86(64, 97)	55(25, 75)	56(44, 69)	69(47, 87)	.80(.73, 1.0)
ACL surgery 32-37 years (n=112, 63%)	71(54, 89)	85(64, 97)	50(25, 75)	56(38, 69)	72(47, 88)	.80(.73, 1.0)
No ACL surgery 32-37 years (n=65, 37%)	75(54, 86)	86(65, 99)	55(30, 83)	56(44, 69)	68(52, 86)	.80(.73, 1.0)
Baseline meniscus injury (n=73, 41%)	71(50, 86)	81(61, 97)	50(25, 75)	56(38, 63)	70(48, 87)	.80(.73, 1.0)
No Baseline meniscus injury (n=104, 59%)	75(61, 89)	88(67, 97)	58(30, 80)	63(42, 69)	71(48, 88)	.80(.76, 1.0)
Quadriceps strength LSI ≤89% (n=44, 29%)	77(54, 89)	88(65, 97)	50(25, 75)	60(38, 69)	74(43, 89)	.80(.73, 1.0)
Quadriceps strength LSI ≥90% (n=107, 71%)	71(53, 86)	84(61, 97)	53(25, 81)	56(43, 67)	69(51, 89)	.80(.73, 1.0)
Hamstring strength LSI ≤89% (n=25, 17%)	79(59, 82)	83(64, 94)	50(28, 65)	63(53, 69)	71(50, 86)	.80(.73, .80)
Hamstring strength LSI ≥90% (n=125, 83%)	71(54, 89)	85(61, 97)	55(25, 80)	56(38, 63)	70(48, 91)	.80(.73, 1.0)
One-leg-hop LSI ≤89% (n=25, 16%)	61(48, 75)*	69(50, 97)*	30(15, 75)*	44(31, 63)*	45(34, 75)*	.80(.73, .80)
One-leg-hop LSI ≥90% (n=128, 84%)	75(54, 89)*	86(67, 97)*	55(30, 76)*	58(44, 69)*	72(53, 90)*	.80(.73, 1.0)

Figure 2. Long-term patient-reported outcome presented according to ACL treatment, baseline meniscus injury and mid-term knee function sub-groups

*p<0.05; scores are median(IQR); ACL, anterior cruciate ligament; LSI, limb symmetry index; KOOS, Knee Injury and Osteoarthritis Outcome Score; Sport/Rec, function in sport and recreation; QOL, quality of life

Conclusions: KOOS scores were impaired 32-37 years following acute ACL injury compared with a Swedish population-based sample. ACL treatment (surgical or non-surgical) and baseline meniscus injury was not associated with long-term PROs. A one-leg-hop for distance LSI ≤89% at 3-7 year follow-up was associated with more pain and symptoms, worse sport/recreation function and reduced QOL 32-37 years after ACL injury.

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[Osteoarthritis Research Society International](#)
1120 Rt. 73, Ste. 200
Mt. Laurel, NJ 08054, USA
vconverse@oarsi.org

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