Trends in urological stone disease: a 5-year update of Hospital Episode statistics

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Abstract

Objective

To provide a 5-year follow-on update on the changes in prevalence and treatment of upper urinary tract stone disease in the UK.

Methods

Data from the Hospital Episode Statistics (HES) website (www.hesonline.nhs.uk) were extracted, summarized, analysed and presented.

Results

The total number of upper urinary tract stone hospital episodes increased slightly from 83,050 in 2009-10 to 86,742 in 2014-15 (4.4% increase). The use of shock wave lithotripsy (SWL) for treating all upper tract stones remained stable over the 5-year study period following a significant increase in previous years. There was a 49.6% increase in the number of ureteroscopic stone treatments from 12,062 in 2009-10 to 18,055 in 2014-15. Increase in ureterorenoscopy (flexible ureteroscopy) demonstrated the most rapid increase from 3267 to 6631 cases in the 5-year study period (103% increase). The gap between the total number of ureteroscopies and SWL treatments continues to narrow. Open stone surgery continued to decline with only 30 reported cases in 2014-15. Due to the continued rapid increase in the number of ureteroscopies performed, treatment for stone disease has continued to increase significantly in comparison to other urological activity.

Conclusion

This study provides an update on the changing landscape of the management of urinary tract stones in the UK. It demonstrates a sustained high prevalence of stone disease in the UK commensurate with levels in other developed countries. This study reveals a trend in the last 5 years to surgically intervene on a higher proportion of patients with stones. As in other countries, there is a significant increase in the use of ureteroscopy (particularly intrarenal flexible ureteroscopy) in the UK. These data have important implications for work-force planning, training, service delivery and research in the field of urolithiasis.

Introduction

Global literature reports an increasing prevalence of urinary stone disease. [1, 2, 3, 4, 5, 6]. Continued improvements in technology (flexible ureteroscopes, lasers, ultrasonic and pneumatic lithotripsy and refined shock wave lithotripsy (SWL) have made the treatments more effective, fast and comfortable for both patients and medical professionals. However, this results in increasing and substantial costs to health care systems. Furthermore, the indirect socioeconomic burden generated by sickness leave and medical follow-up is considerable [7]. Thus, the urological community should aim to deliver stone treatment as cost-effectively as possible with a shift towards ambulatory treatment wherever achievable.

The Hospital Episode Statistics (HES) is a database established in 1987 that collects information on the treatment of patients attending NHS hospitals and independent treatment centres in England [8]. Data are collected via patient administration and hospital information systems. Diagnoses are recorded using the International Classification of Diseases, 10th Revision (ICD-10), operative procedures are coded with the Office of Population Censuses and Surveys Surgical Operations and Procedures, Fourth Edition, Consolidated Version 1990 (OPCS-4). The database is an important source of information on public health in England. It is used by the Government, the National Health Service (NHS), and other organisations to enhance decision-making in healthcare.

This manuscript provides a five-year follow-up of previously published data on the trends in diagnosis and treatment of urinary stone disease in England [9].

Methods

Based on a study previously published by our group [9], annual datasets from the Hospital Episodes Statistics (HES) were analysed. The data are publically available online (http://www.hesonline.nhs.uk), the website also gives details on how the data are organised. ICD-10 diagnosis codes for the primary diagnosis of each finished consultant episode (FCE) were obtained to identify treatment episodes for upper urinary tract stone disease (N20.0, N20.1, N20.2, N20.9 and N23.X. Accordingly, OPCS-4 codes for primary procedures were applied to distinguish stone-related procedures and interventions as in our previous publication [9]. Data for other urological procedures and diagnoses were obtained from the same datasets for comparison. Statistical analysis was performed and graphs were generated using GraphPad Prism software (version 5).

Results

DEMOGRAPHIC DATA

Urolithiasis is a common disease and has been becoming more prevalent in the western world in recent years. However, this trend seems to be slowing down in England since 2010. The number of patients admitted to English hospitals with upper urinary tract stones as primary diagnosis has increased by 4.4% from 83,050 in 2009/10 to 86,742 in 2014/15 (figure 1). Patients treated solely in the community are not included in these figures. The annual prevalence is similar to 2010 and can be calculated at 0.16% (given an estimated population of 54 million in England [10]). Assuming a life expectancy of 81 years [11], the life time prevalence equals 13.0% and has not changed significantly since 2010. There is an increase of incidence among patients aged > 59 years whereas figures for children and patients aged 15-59 years remain largely unchanged. The mean age at diagnosis is stable at 49 years.

Over the study period there was an ongoing trend towards shorter hospital stays and day case management of stone-specific procedures (figure 2). The total number of bed days utilised for stone disease has fallen by 15.8% to a total of 80,000 per annum over the past five years whereas the number of day cases has continued to climb by another 9.7% to 31,000 each year during the same period. The number of emergency treatments remains constant but there is a further increase in the number of elective stone procedures (figure 3).

Fig. 1: Numbers of stone-related hospital episodes per annum 1998/99-2014/15. A: Breakdown by sub-diagnosis. B: Breakdown by age.

Fig. 2: Length of stay for emergency and elective stone episodes, mean (dark green) and median (light green)

Fig. 3: Numbers of patients receiving emergency (dark green) and elective (light green) treatment for upper tract urinary stones per annum

PROCEDURE DATA

Despite the more stable incidence of stone episodes over the past 5 years, the total number of ureteroscopic stone procedures continues to rise (figure 4).

The ureteroscopic treatment of ureteric stones is on a steady rise (36% increase since 2009/10). The retrograde endoscopic treatment of kidney stones using semi-rigid and especially flexible URS has

encountered a dramatic growth (103% increase since 2009/10).

Currently, in the UK, shock wave lithotripsy (SWL) is still performed more often than ureteroscopy but the total number of treatments each year has reached a plateau. While the numbers of SWL treatments for ureteric stones have been stable for many years, SWL for kidney stones was still on the rise until around 2010. Since then, treatment numbers are relatively stable each year.

Percutaneous nephrolithotomy (PCNL) data was first collected in 2006/07. After an initial increase, the number of cases per year has stabilised at around 1700 to 1800 per annum (figure 5). The number of open stone procedures continued to decline. In 2014/15 only 30 cases were recorded in England.

In comparison to other urological procedures, URS is by far the fastest-growing intervention in terms of numbers and largely accounts for the continuous rise of stone-related procedures.

Fig. 4: Comparison of the numbers of major and index urology procedures over the last 15 years. Red lines are stone-related procedures, green lines are other urology procedures. All endoscopic techniques to remove/ablate benign prostatic tissue are included under the TURP category. The TURBT category includes those cases in which bladder tumours were resected, but does not include diathermy ablation or biopsy and diathermy. ESWL includes treatment for renal and ureteric stones. Ureteroscopy includes treatment for ureteric and renal stones using semi-rigid and flexible instruments, it does not include retrograde pyelograms, diagnostic ureteroscopy or stent-related activity. The nephrectomy category includes partial nephrectomy, transplant nephrectomy, radical and simple nephrectomy and nephroureterectomy, using both open and laparoscopic techniques. PCNL was not coded separately in HES data before 2006/2007.

Fig. 5: Temporal trends for open stone surgery (A) and PCNL (B) with procedures per year.

Discussion

Working with the HES data has its limitations. Only treatment in hospitals is registered, so patients who are solely treated in the community are missed. The data quality correlates with the quality of coding for diagnoses and procedures. The internal quality control procedures for the acquired data at the Health and Social Care Informations Centre HSCIC which is responsible for HES are rigorous and described in detail on their website http://hesonline.nhs.uk. The quality of HES data for comparative analysis has been broadly assessed in a range of studies and was found to be reliable [attached references]. Assuming that errors in data entry are comparable over time, geographical area and between procedures, and given that a consistent documentation system has been used, the figures outlined in this article should be representative of the actual trends in incidence and surgical management of upper urinary tract stone disease.

On a global scale, the incidence of urolithiasis is still increasing but several developed countries have reported a stabilisation in growth. A group from Taiwan recently noted a decline in stone-related treatment episodes and the figures for Iceland are nearly constant [12, 13]. In the USA, there is growth especially amongst women, elderly patients and the black and hispanic communities whereas the

incidence rate for the male caucasian cohort is fairly stable [3]. A clear correlation of stone incidence with a lithogenic diet has been demonstrated [14].
It has been postulated that stone incidence reflects economic prosperity and growth [15].

In the UK, the incidence of upper tract urinary stones has experienced a significant rise during the first decade of this century as reported 5 years ago [9]. Since 2010, the incidence has remained relatively stable at around 85,000 per annum. It is still rising among the elderly, especially in patients over 75 years of age. This is likely to be a result of increasing life expectancy. Figures are constant for people in the working age-group as well as for children. This is in contrast to data from the USA that suggests an increase in the stone incidence in the paediatric population [16].

The vast majority of patients presenting to a hospital in England with stones are admitted for one or more nights (90% in the 2010-2015 cohort). This has remained constant. The data only includes patients seen by Urologists and Emergency Physicians in hospitals and not those who are treated only by their General Practitioner (GP). The utilisation of bed days for urolithiasis (emergency and elective treatment) continues to fall whereas the number of day cases continues to rise. This is related to the further miniaturisation of stone surgery with faster recovery but also to economic pressure to reduce the length of stay. However, the average length of stay for stone surgery seems to have reached a plateau in recent years. Waiting times for stone-specific procedures are rising and are an important issue in terms of patient satisfaction.

The management of stone patients and selection of surgical options differ between different countries despite comparable economic status due to national specificities in terms of health care politics and financial incentives [17]. Overall, surgical options are on the rise all over the western hemisphere [1, 2, 3, 4, 5, 6, 18, 19]. Medical expulsive therapy (MET) for ureteric calculi has been widely discussed and prescribed for years but recent data from a large randomised controlled clinical trial suggests it is ineffective [20]. It is unclear whether alternative options for conservative management will be developed in the future.

Open stone surgery has declined to very small numbers but is still occasionally performed. It should probably now be reserved as a specialist option for selected complicated cases.

Over the last 5 years, whilst (flexible) ureteroscopy is performed in ever increasing numbers, the increase in SWL treatment numbers has been much more modest. Fixed-site SWL is only available in a limited number of centres. Other centres rely on mobile lithotripsy units. This results in limited

access for urgent ureteric stones and may explain the lack of increase in utilisation of SWL for these stones. For renal stones SWL maintains high utilisation in recent years. This is in contrast with the rest of Western Europe and North America and likely to reflect variation in availability of lithotripsy machines, reimbursement rates and waiting times for ureteroscopy [2, 3, 5, 6, 19, 21, 22].
If the current trends continue, it would be expected that the number of flexible ureteroscopies will surpass the number of ESWL treatments in three years' time. It will be interesting to see if SWL continues to be used to treat as many renal stones in the coming years.
Currently SWL and ureteroscopy are in relative equipoise for the treatment of small to medium-sized kidney stones [23]. For ureteric stones, the stone clearance rate is higher in URS but ESWL has fewer complications and shorter lengths of stay [24]. Patients today often tend to choose a quick solution and if possible a single session treatment [22]. There seems to be growing socioeconomic pressure, especially in the working age group to avoid time off work. The UK based TISU and PuRE studies should help address these issues in due course.

The numbers of PCNL procedures have plateaued in recent years. PCNL is a more complicated procedure that requires longer operating time and specialist personnel from different departments. In the USA, PCNL is still on the rise. It is increasingly used in multi-morbid patients which is associated with a rising complication rate [18]. It will be interesting in future HES analyses to examine the impact of the emerging minimally invasive PCNL (e.g. ultramini-, micro-, and mini-PCNL)

Compared to other urological procedures, stone surgery and especially URS are gaining importance. The total numbers of major urology cancer procedures (prostatectomy, nephrectomy, and cystectomy) are increasing consistent with an aging population and better detection and diagnosis. Still, ureteroscopy is the fastest growing urological intervention. Given the relative stability in incident cases this may reflect a trend towards active treatment of non-obstructing and asymptomatic stones.

Based on this data, the endourological community have a responsibility to optimize metaphylaxis and patient education on lifestyle management to try to reduce the recurrence of urolithiasis, and establish as accurately as possible the relative roles of SWL and ureteroscopy in the management of urinary tract stones.

In conclusion, there continues to be a significant increase in numbers of procedures for managing urinary tract stones in the UK, although the incident number of stones seems to have stabilised over the last 5 years. If the UK follows the trends in other countries, we are likely to see ureteroscopy

overtake SWL for the first time in the next few years. This data would suggest that it is likely that the intervention rate for patients with stones is likely to continue to increase. Accordingly, appropriate provisions should be made for work-force planning, training, service delivery and research in the field of urolithiasis.

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