Day surgery renal stone management: Ureteroscopy and lasertripsy

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Abstract

Introduction: Incidence of renal stones is increasing worldwide and varies from 58 to 900 per 100,000, with a 9% lifetime risk of having renal stone related symptoms. Increasingly ureteroscopy (URS) coupled with laser fragmentation is being used safely within the day surgery setting for ureteral and renal stone management, with associated high stone-free levels and patient satisfaction. This audit set out to explore whether URS guided lithotripsy could be delivered effectively as a day surgery procedure within the District General Hospital (DGH) setting.

Method: Retrospective analysis of seventy seven (n = 77) day surgery patients who underwent URS guided lasertripsy for ureteric and renal calculi in a DGH between November 2016 – November 2017. All patients underwent ureteric stenting prior to the URS guided lithotripsy. Outcomes were compared against European Association of Urology (EAU) guidelines on the best clinical practice in use of URS in urolithiasis.

Results: Of the 77 patients who underwent URS and laser fragmentation, the average patient age was 54 years and there was a 2:1 male:female ratio. The total number of stones treated in all patients was 94. Of stones treated, 62% were ureteric (67% upper, 8% middle and 25% distal ureter), and 38% renal (11% upper pole, 22% middle pole and 67% lower pole). Average renal stone size was 8.9mm, with 64% ‹1cm, 36% 1-2cm and 0% ›2cm. The average ureteric stone size was 9.5mm, with 70% ‹1cm, 26% 1-2cm and 4% ›2cm. The average number of stones treated per case was 1.3, with an average 0.989 Watts of energy used. 88.3% of patients following URS guided stone fragmentation were stone-free. There was a 1.3% additional procedure rate, with one re-do URS and lasertripsy performed. The complication rate was 6.5% (n = 6), with only 2.6% (n=2) patients requiring admission for post-operative pain management.

Conclusion: The increasing prevalence of renal stones globally, associated with factors such as dietary changes and global warming, emphasises the need to develop effective management strategies. This audit demonstrated that URS guided stone fragmentation can safely deliver high stone free and low complication rates within the DGH setting.

Introduction

The worldwide incidence of renal stones (RS) varies from 58 - 900 per 100,000, whilst the UK lifetime prevalence of renal stone disease is 13% (1,2). There has been a significant worldwide increase in RS incidence over the past 15 years, which has been linked with an ageing population, higher levels of obesity and diabetes, plus environmental factors such as dietary and climate change (1). This has translated into a 70% increase in UK hospital attendances with RS, from 51,035 attendances in 2000 to 86,742 in 2015 (2). This increased RS disease burden and hospital attendance has seen RS treatment increase disproportionately compared to other urological activity; with ureteroscopy (URS) guided lasertripsy being performed more frequently than cystectomy, nephrectomy and radical prostatectomy combined (3). Although there are European guidelines for the ureteroscopic management of RS, this audit has looked to address that there is little published evidence demonstrating the safety and efficacy of URS lasertripy within district general hospital setting (4).

Methods

Retrospective analysis of seventy seven (n = 77) day surgery patients who underwent URS guided lasertripsy for ureteric and renal calculi in a DGH between November 2016 – November 2017. All patients underwent ureteric stenting prior to the URS guided lithotripsy. Outcomes were compared against European Association of Urology (EAU) guidelines on the best clinical practice in use of URS in urolithiasis.

Results

Of the 77 patients who underwent URS lasertripsy, the average patient age was 54 years and there was a 2:1 male:female ratio. The total number of stones treated was 94, of which 62% were ureteric (67% upper, 8% middle and 25% distal ureter, and 38% renal (11% upper pole, 22% middle pole and 67% lower pole). The average ureteric stone size was 9.5mm, with 70% <1cm, 26% 1-2cm and 4% >2cm. The average renal stone size was 8.9mm, with 64% <1cm, 36% 1-2cm and 0% >2cm. All renal stones treated via URS lithotripsy were <2cm, which is in compliance with EAU guidelines that Percutaneous Stone Removal (PSR) should be first line for renal stones >2cm. Also in accordance with the EAU guidelines, all cases were undertaken with the use of a holmium laser and placement of safety wire or ureteral access sheath. The average patient stone burden was 12.1mm. The average number of stones treated per case being 1.3, with an average 0.989 Watts of energy used. At three month follow up clinic, 88% of patients following day surgery URS lasertripsy were found to be stone-free on abdominal X-ray (AXR). Of the 12% of patients who were not stone-free at this 3 month follow up, only one re-do URS lasertripsy was performed; with the other patients successfully passing their residual fragments after a further 3 month period of surveillance. The re-do URS was required due to an inaccessible ureter despite the use of guidewires/access sheaths; and was successfully performed two months later with a stone-free outcome. The complication rate was 6.5% which was below the acceptable complication rate of 9-25% stated by the EAU guidelines. The Clavian Dindo classification of these complications would be 2 x(I), 2x(II), 1x(IIIb); including two

patients requiring overnight admissions for analgesia, two patients representing and requiring intravenous antibiotics for post-operative urosepsis and one patient requiring a re-do URS.

Discussion

The surgical management of RS can be dictated by several factors including stone size and location, as well as patient preference plus available local facilities and expertise (2). The management of RS has gravitated towards minimally invasive interventions such as Shock Wave Lithotripsy (SWL), URS Lasertripsy and Percutaneous Stone Removal (PSR) (5,6). This can be largely attributed to the vastly improved morbidity and complication rates associated with these modern endourological procedures (7). The number of URS lasertripsies performed in the UK has increased by 127% over the past 10 years, with 14,242 cases in 2015 compared to only 6283 in 2000 (3,5). There was also a 55% increase in the number of SWL cases performed, and a 149% increase in PSR (3,6). The inverse pattern has been observed in open surgery for RS, with an 83% decrease from 278 cases in 2000 to only 47 cases in 2010 (3).

The increasing use of URS lasertripsy can be accounted for by the technological advancements made in optics and endoscope miniaturisation, allowing URS to be performed quicker and more efficiently with improved stone free rates (SFR) (4). Furthermore, the progression from electrohydraulic and ultrasonic lithotripsy to Holmium lasertripsy has seen a reduction in ureteral injuries and increased efficiency in fragmentation of all stone compositions (8).

URS is being utilised in both standard RS patients but also increasingly in complex stone disease and patients with complicating comorbidites such as obesity, bleeding diathesis, pregnancy and solitary kidney (5).

Conclusion

URS lasertripsy achieves high SFR and low rates of additional procedures, however has been associated with high complication rate in the past (9). This audit however has demonstrated how URS lasertripsy is increasingly achieving higher SFR (88%) and lower levels of re-do procedures (1.3%); whilst maintaining an acceptably low complication rate (6.5%). This audit demonstrated that URS guided stone fragmentation can safely deliver high stone free and low complication rates within the DGH setting.

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