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Outcome of elective versus emergency ureteroscopic stone surgery: Challenges in the post GIRFT era

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Abstract
Aim: To assess the safety, efficacy, stone clearance rate and challenges posed when providing an emergency stone service as recommended by the Getting It Right First time (GIRFT) report.
Methods: Retrospective analysis of the emergency and elective stone service carried out by a single dedicated stone endourologist in a district general hospital over a 4 year period. 52 patients undergoing emergency ureteroscopy (EMURS) were matched with 52 similar patients undergoing elective ureteroscopy (ELURS) and their outcomes were compared. A sub-group of 8 high risk patients who underwent EMURS were analysed separately.
Results: Target stone clearance was identical in both groups at 98.1%. Complete stone clearance in the EMURS group was 90.3% compared to 96.1% in the ELURS group. There was no increase in operative time in the EMURS group with a mean time of 38.9 minutes compared to 50.2 minutes in the ELURS group. Low complication rates were seen with a 2% complication rate in patients having ELURS compared to 8% for those undergoing EMURS. The sub-group of high risk patients had a target stone clearance rate of 100% with a complete stone clearance rate of 75%. No complications were seen in this group.
Conclusion: Emergency ureteroscopy is a safe procedure with low complication rates. This should therefore be offered to patients as the gold standard of care in appropriately selected patients presenting acutely with ureteric colic. The GIRFT recommendations to provide emergency stone surgery can be followed with good outcomes achievable.

Keywords: ureteroscopy, stones, ureteric stones, emergency ureteroscopy, primary ureteroscopy, hot ureteroscopy, kidney stone

Introduction

With an ever-increasing incidence of stones, resources to manage such patients have been stretched and waiting lists continue to increase daily. The Hospital episode statistics database (HES) from the United Kingdom has shown that hospital episodes for stone related disease increased by 63% from 2000 to 2010 [1]. This increasing incidence is not only seen in the western world but is also reflected in other countries such as Japan where the annual incidence of renal stones increased to 114.3 per 100,000 persons in 2005 compared to 54.2 per 100,000 persons in 1965 [2].

The Getting It Right First Time (GIRFT) initiative was a programme funded by the United Kingdom, Department of Health to improve operational efficiency in the National Health Service (NHS) by identifying variance in NHS care and learning from this [3]. The Urology GIRFT report published in July 2018, has shown that, around 20% of patients presenting with acute colic have a ureteric stent inserted as part of their management and in some hospitals over 50% of patients receive a ureteric stent during this acute episode [3]. The report noted, how such an interim measure is not the best option given the need for further procedures, the associated stent related symptoms and the potential for further hospital visits [3]. There is therefore a need for hospitals to be able to provide emergency ureteroscopy and lithotripsy services.

A meta-analysis of 681 patients showed an overall stone clearance rate of 87.3% in those patients undergoing emergency ureteroscopy for ureteral stones [4]. Patients benefit from emergency ureteroscopy as it can avoid repeated attendances to the emergency department with colic whilst on a waiting list for definitive stone management. There is also an economic benefit to be gained from emergency ureteroscopy as bed spaces within the hospital can be created freeing up beds for other acute admissions. A cost analysis study showed the overall cost of patients receiving emergency ureteroscopy to be in the region of £3104 in comparison to £4041 for those patients undergoing elective ureteroscopy later [5]. The cost of number of work days lost due to ill health and frequent re-attendances to the emergency department by the stone sufferer is more difficult to determine.

We compared a matched-cohort of patients who underwent emergency vs elective ureteroscopy in our unit. An independent subgroup of complex patients undergoing emergency ureteroscopy were also analysed separately. The aim was to analyse and assess the safety, efficacy and stone clearance rates between the two cohorts and

discuss the challenges of delivering emergency ureteroscopy in an NHS District General Hospital (DGH) in the post GIRFT era. Stone clearance was defined as no size significant fragments noted on ureteroscopy at the end of the procedure.

Methods

Retrospective analysis using the hospital electronic patient record system, on patients operated by a single dedicated stone endourologist, was carried out between November 2014 and December 2018. Emergency ureteroscopy was defined as ureteroscopic stone treatment which was performed during a patient's inpatient stay, normally following presentation to the emergency department with acute ureteric colic. Complex emergency ureteroscopy cases included patients who were admitted, needing prior emergency renal decompression due to an obstructing stone causing sepsis. This subgroup was separately analysed to show their more complex treatment pathway and as such, their clinical data would likely skew the average data and hence deemed inappropriate to analyse together with our main cohorts. Elective ureteroscopy was defined as ureteroscopic stone treatment done for patients who were admitted for a planned non-emergency procedure. Stone clearance was defined as the absence of stones radiologically, or the presence of clinically insignificant fragments less than 2mm.

All patients were consented prior to their procedure and for data analysis. All procedures were performed under general or spinal anaesthesia with antibiotic prophylaxis. 6.5F Karl-Storz® semi-rigid ureteroscopy or Olympus URF-P5 flexible ureterorenoscopy was used. For Flexible uretero-renoscopy, Boston Scientific Navigator™ 36cm or 46cm 11/13F ureteric access sheath was used. Lasertripsy was done using a 200µm Boston Scientific Flexiva™ Tractip laser fibre, with energy at 1.2J-1.5J x 10Hz-15Hz using a Holmium: YAG laser from EMS Swiss Laser Clast® (Nyon, Switzerland).

52 patients who had undergone emergency ureteroscopy were identified and were compared to 52 matched patients for demographics and stone characteristics. Data compared included age, sex, American Society of Anaesthesia (ASA) grade, BMI, stone location, stone size, pre- and post-operative drainage, target stone clearance rate, complete stone clearance rate, complications and length of stay. SPSS, version 17.0 (SPSS, Inc., Chicago, IL, USA) was used for statistical analysis. The Mann-Whitney U-test and Chi-square test was used to compare continuous and categorical data respectively. $p<0.05$ was considered statistically significant.

Results

Table 1: Comparative data of ureteroscopy stone treatment groups

Characteristics	Emergency (n=52)	Elective (n=52)	p value	Complex Emergency (n=8)**
Mean Age	52.9 ± 13.6	50.6 ± 13.2	n.s	78.3
Sex (M:F)	41:11	40:12	n.s	8:0
Mean ASA	1.7 ± 0.7	1.8 ± 0.5	n.s	3
Mean BMI	29.2 ± 10.6	28.9 ± 5.9	n.s	27.7
Mean Stone Size (mm)	7.0 ± 2.3	8.1 ± 4.9	U-test, p=0.04	21.6
Stone Position:				
Lower Ureter	34	34	n.s	3
Mid Ureter	4	4	n.s	1
Upper Ureter	14	14	n.s	4
Ipsilateral Kidney stone	8	10	n.s	3
Contralateral Kidney Stone	3	0	n.s	0
Pre-op Drainage:				
Nil	50	33	n.s	2
Nephrostomy	0	0	n.s	4
Stent	2	19	U-test, p<0.001	2
Procedure:				
Rigid URS + Laser	13	27	X_2-test, p= 0.004	2
Rigid URS + Basket	22	9	X_2-test, p= 0.005	0
Flexible URS + Laser	16	12	n.s	6
Flexible URS + Basket	1	4	n.s	0
Carried out by trainee	40%	38%	n.s	0%
Post op Drainage:				
Stent	44 (84.6%)	39 (75%)	n.s	7 (87.5%)
Ureteric Catheter	7	12	n.s	0
Nephrostomy	0	0	n.s	1
None	1	1	n.s	0
Stone Clearance:				
Target Stone Clearance	51 (98.1%)	51 (98.1%)	n.s	8(100%)

Complete Stone Clearance	47 (90.3%)	50 (96.1%)	n.s	6 (75%)
Repeat Treatment	2 (3.8%)	0 (0%)	n.s	2 (25%)
Complications:				
Readmission with Stent Pain	3	0	n.s	0
Sepsis	1	1	n.s	0
None	48	51	n.s	8
Mean Length of Stay (Days)	3.2 ± 2.5	1.2 ± 0.9	U-test, p<0.001	15
Mean Operative Time (mins)	39.4 ± 6.4	51.7 ± 9.0	n.s	114.7

n.s= Not statistically significant

**Complex emergency group not compared statistically

The emergency and elective groups were comparable in terms of age, sex, BMI, ASA grade and stone location as shown in Table 1. The elective group of patients had a slightly larger mean stone size (8.1mm vs 7.0mm, U-test, p =0.04).

For the emergency group, surgery was performed on average, 2 days after the patient's hospital admission, which is in keeping with National Institute for Health and Care Excellence (NICE) guidelines [6]. The main indication for emergency ureteroscopy was pain in 50 patients, the indication for the remaining 2 patients was due to acute kidney injury. Pre-operatively 2 patients in the emergency ureteroscopy group had a ureteric stent prior to their procedure, in contrast to 19 patients in the elective group who had a stent in situ pre-operatively. These are patients who would have presented on a prior admission and necessitated intervention for their ureteric colic.

The stone clearance rate in both groups was favourable, with 98.1% of patients achieving target stone clearance in each group. Complete stone clearance was achieved in 47 patients in our emergency group, whilst 50 patients in the elective group achieved complete stone clearance. Only 2 patients in the emergency ureteroscopy group required repeat treatment, with no patients in the elective group requiring further treatment. Overall 4 patients in the emergency group had a complication related to their ureteroscopy, whilst 1 patient in the elective group had a complication. The average length of stay for our elective ureteroscopy group was 1.2 days compared to 3.2 days for those patients who underwent emergency ureteroscopy.

The subgroup of complex emergency ureteroscopy cases (n=8), were older patients (Mean age 78.3 years) with comorbidities and higher mean ASA grade (mean ASA 3), larger stone size (mean size 21.6mm), and had longer mean duration of surgery (mean duration 114.7 mins). There was a longer duration from admission to ureteroscopy surgery (mean 10 days) as they needed decompression with a stent or nephrostomy, due to stone obstruction causing AKI/sepsis. There was 100% target stone clearance with no complication found in this cohort. The length of hospital stay was expectedly longer at 15 days, but with complete target stone clearance.

Discussion

Our comparative analysis has shown the feasibility of carrying out ureteroscopy in the emergency setting with favourable outcomes. The target stone clearance rate in our study of 98.1% in both groups was above that reported in previous studies for emergency ureteroscopy (89- 92%) [4, 5]. This may be because the majority of the stones in both cohorts were lower ureteric stones (65%) under 10mm, with cases performed or supervised by a dedicated stone endourologist, thus increasing the chances of stone clearance [7, 8]. This highlights the role of training in emergency ureteroscopy, without significantly affecting outcomes. Good training opportunities become available for the trainees, as they can learn ureteroscopy in the emergency setting providing good outcomes and minimising complication rates [9].

Post-operatively 75% of patients in the elective group and 83% of patients in the emergency group received a ureteric stent to aid with post-operative drainage. Our rate of ureteric stenting is slightly higher than that in the literature [10]. In a large study on 244 patients who underwent emergency ureteroscopy, 55.7% of patients had a ureteric stent inserted post-operatively and in the same study 53.9% of patients who had elective ureteroscopy had a ureteric stent inserted from a group of 659 patients [11]. The current NICE guidelines also advocate for the avoidance of ureteric stents following ureteroscopy for stones <20mm [6]. In our practice, most Flexible URS procedures are performed with the use of an access sheath, post-operatively a large proportion of these patients will have a ureteric stent inserted due to the potential risk of ureteral obstruction and strictures post procedure [12, 13]. 17 patients who had FURS in the emergency group needed stenting after the use of a ureteric access sheath. Excluding this cohort, 50% of patients in the emergency group had a ureteric stent inserted post-operatively. This would therefore make our post-operative stenting rates comparable to that seen in the literature for our emergency group. We would recommend limiting the use of ureteric stents post-operatively as recommended by the NICE guidelines, including in the emergency setting, as there are cost benefits by not having a second procedure to remove the stent, use of medications to prevent stent symptoms and reduced re-attendance to hospital with stent symptoms [14, 15].

The complication rate in our study was relatively low. Only 2 patients developed sepsis post- operatively, one from each group. Our overall complication rate was 2% in the elective group and 8% in the emergency group which is in keeping with findings in the literature of a complication rate between 7-13% in patients undergoing emergency ureteroscopy [16]. From our study, we have shown that emergency ureteroscopy is a safe procedure with low complication rates.

One of the greatest advantages of emergency ureteroscopy is the shortened patient journey to treatment success. As illustrated in Figure 1, delayed elective ureteroscopy could occur between typically 4 weeks to 4 months, depending on the unit's stone work burden, surgeon's workload and theatre capacity. As an example, for patients who have an emergency nephrostomy insertion, emergency ureteroscopy could shorten the further step of antegrade ureteric stent (which in our hospital can be variable between 1 to 2 weeks pending on the availability of an interventional radiologist). The patient will then need to return at a later date following insertion of their antegrade stent to have elective ureteroscopy. There can be a significant delay for the patient before their stone is actually dealt with and emergency ureteroscopy avoids such a delay. The longer length of stay at 3.2 days for our emergency group, was a result of some of these patients having had nephrostomies inserted prior to their ureteroscopy as they were unwell at presentation. As seen in our complex patient group, a small number of patients had nephrostomies inserted prior to having an emergency procedure. Although the numbers are small, our data have shown good treatment efficacy and safety despite emergency ureteroscopy being carried out only an average of 10 days post-decompression.

There are challenges in enabling emergency ureteroscopy in the busy NHS system. Our hospital trust operates on 2 sites, with urological emergencies being managed on a separate site from General Surgery, hence facilitating better access to an emergency theatre. In addition, we installed 4 laser-ready theatres and ensured that the majority of theatre staff are trained in operating the laser machine. Elective consultant activities are cancelled when on call to ensure surgeon availability for the emergency theatre.

Given the limited resources in the current healthcare system, we have shown the feasibility of emergency ureteroscopy with subsequent benefits for patients and the health system. Patients avoid a delay in their definitive treatment and lost work days are avoided due to repeat hospital visits whilst awaiting definitive stone treatment [17]. For the healthcare provider; hospital beds are utilised more effectively, lower costs are achieved in the long term, with unnecessary emergency and outpatient visits avoided. In our study several patients were followed up in a virtual stone clinic following their emergency ureteroscopy and subsequently discharged. This shows effective resource utilisation and is in keeping with the Getting it right first time (GIRFT) recommendations to improve emergency stone management and improve secondary care pathways [3].

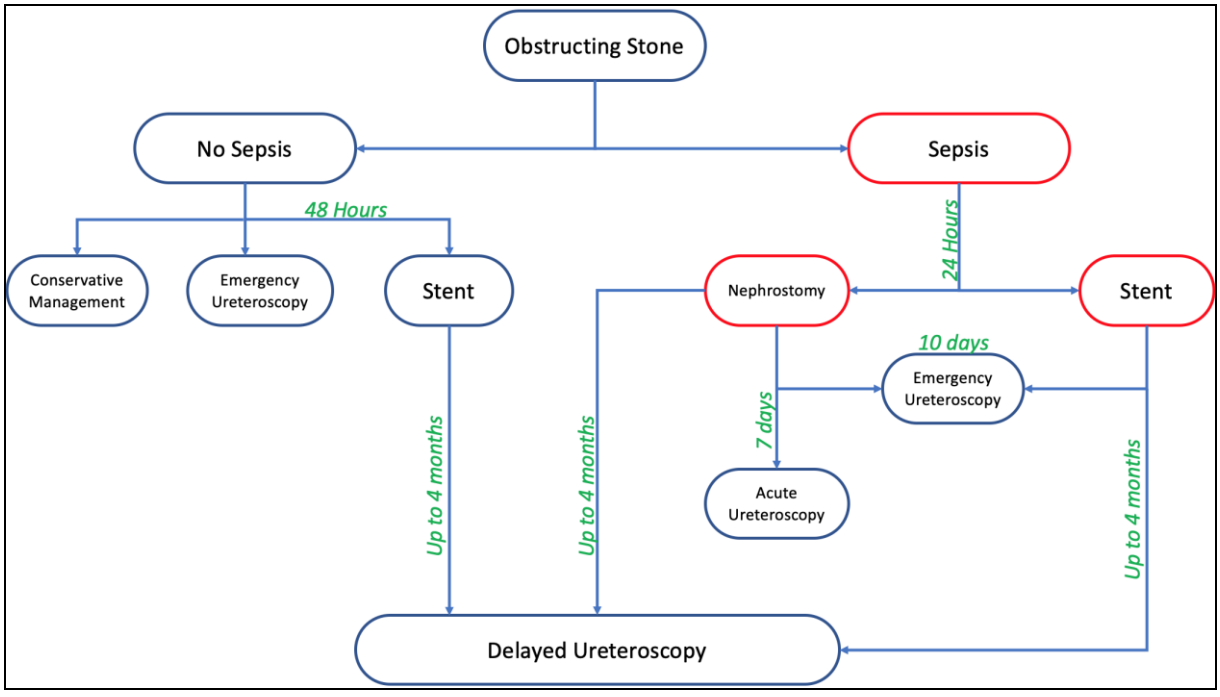

Fig 1: Flow chart of ureteroscopic treatment pathway of an obstructing stone

Conclusion

In conclusion, emergency ureteroscopy with the aim to achieve complete stone clearance should be the standard of care in those patients presenting with acute colic. Our study has not shown any significant difference in terms of stone clearance or complication rates when comparing patients who have undergone emergency ureteroscopy compared to those who have elective ureteroscopy. Logistical and organisational barriers should not be deemed as barriers to performing emergency ureteroscopy and appropriate pathways should be in place in all hospitals.

References

1. Turney BW, Reynard JM, Noble JG, *et al*. Trends in urological stone disease. BJU Int,2012:109:1082–1087.
2. Morgan MSC, Pearle MS. Medical management of renal stones. BMJ. BMJ Publishing Group,2016:i52. doi:10.1136/bmj.i52

3. Urology Surgery - Getting It Right First Time - GIRFT [Internet]. [cited 2020 May 21]. Available from: https://gettingitrightfirsttime.co.uk/surgical-specialty/urology-surgery/.
4. Picozzi SCM, Ricci C, Gaeta M, *et al*. Urgent ureteroscopy as first-line treatment for ureteral stones: A meta-analysis of 681 patients. Urol Res,2012:40:581–586.
5. Darrad M, Sibartie T, Inglis J, *et al*. Is acute ureteroscopy for painful ureteric colic cost effective and beneficial for patients? a cost-analysis. J Clin Urol,2017:10:17–21.
6. Overview | Renal and ureteric stones: assessment and management | Guidance | NICE [Internet]. [cited 2020 May 21]. Available from: https://www.nice.org.uk/guidance/ng118.
7. Wolff I, Lebentrau S, Miernik A, *et al*. Impact of surgeon's experience on outcome parameters following ureterorenoscopic stone removal. Urolithiasis,2019:47:473–479. [cited 2020 Sep 27]
8. Perez Castro E, Osther PJS, Jinga V, *et al*. Differences in ureteroscopic stone treatment and outcomes for distal, mid-, proximal, or multiple ureteral locations: The clinical research office of the endourological society ureteroscopy global study. Eur Urol,2014:66:102–109.
9. Johans C, Smelser W, DeRoche C, *et al*. Assessment of Patient and Surgical Variables Including Residency Training Level on Adverse Events After Ureteroscopy for Ureteral Stones: A Multivariate Analysis. J Endourol,2018:32:144–147.
10. Muslumanoglu AY, Fuglsig S, Frattini A, *et al*. Risks and Benefits of Postoperative Double-J Stent Placement after Ureteroscopy: Results from the Clinical Research Office of Endourological Society Ureteroscopy Global Study. J Endourol,2017:31:446–451.
11. Matani YS, Al-Ghazo MA, Al-Azab RS, *et al*. Emergency versus elective ureteroscopic treatment of ureteral stones. Can. Urol. Assoc. J. Canadian Medical Association; 2013;7 (7-8):470. doi:10.5489/cuaj.1402
12. Torricelli FC, De S, Hinck B, *et al*. Flexible ureteroscopy with a ureteral access sheath: When to stent? Urology,2014:83:278–281.
13. Giusti G, Proietti S, Villa L, *et al*. Current Standard Technique for Modern Flexible Ureteroscopy: Tips and Tricks. Eur Urol,2016:70:188–194. [cited 2020 Sep 27]
14. Segalen T, Lebdai S, Panayotopoulos P, *et al*. Double J stenting evaluation after ureteroscopy for urolithiasis. Prog. Urol,2019:29:589–595.
15. Bower PE, Pereira J, Al-Alao O, *et al*. Indications for stent omission after ureteroscopic lithotripsy defined: A single-institution experience with cost analysis. Arab J Urol,2019:17:206–211.
16. Zargar-Shoshtari K, Anderson W, Rice M. Role of emergency ureteroscopy in the management of ureteric stones: analysis of 394 cases. BJU Int,2015:115:946–950.
17. Strohmaier WL. Economics of stone disease/treatment. Arab J Urology. Taylor & Francis,2012:10(3):273-278. doi:10.1016/j.aju.2012.02.002