

Is it feasible and cost-effective to perform emergency ureteroscopic treatment for acute ureteric colic?

Abstract

Purpose: Ureteroscopy is one of the treatment options for the management of refractory ureteric colic. Emergency Ureteroscopy can provide significant symptomatic relief and may reduce the number of hospital attendances compared to Elective Ureteroscopy. Data regarding cost, however, is scarce.

Materials and methods: In this retrospective review, all patients who underwent ureteroscopic treatment for ureteric colic in the year 2015 were identified. Patients who underwent ureteroscopic during an emergency admission for acute ureteric colic were classified as having had Emergency Ureteroscopy, while those who underwent elective ureteroscopy for ureteric colic were classified as having had Elective Ureteroscopy. Exclusion criteria included urinary tract infection, sepsis, prior ureteroscopic procedures and/or ureteric stenting. The primary outcome evaluated was cost; secondary outcomes included number of preoperative attendances for colic, operative outcomes and complications, as well as hospital re-attendances.

Results: A total of 88 patients were identified, with 31 in the Emergency group, and 57 under the Elective group. EM was associated with significantly higher procedural and overall costs ($p < 0.001$), but reduced hospital attendance for colic ($p < 0.001$). There were no significant differences between both groups in terms of stone clearance rate and postoperative reattendances.

Conclusion: Emergency ureteroscopy management of ureteric colic is a reasonable treatment modality that reduces hospital attendance and has similar treatment outcomes as elective ureteroscopic treatment; albeit associated with higher financial costs.

Volume 4 Issue 4 - 2017

Siying Yeow

Khoo Teck Puat Hospital, Singapore

Correspondence: Siying Yeow, Khoo Teck Puat Hospital, 90 Yishun Central, Singapore, Tel +6590922082, Email siying.yeow@mohh.com.sg

Received: November 29, 2016 | **Published:** April 10, 2017

Introduction

Conventional modalities of management of acute ureteric colic included placement of a ureteric stent or nephrostomy tube.¹⁻³ Emergency ureteroscopic stone clearance is one of the emerging treatment modalities for acute ureteric colic, due to advancements in the field of endourology allowing safe and effective treatment with minimal morbidity. To date, there have been no published studies regarding the costs and outcomes of emergency ureteroscopy compared to elective ureteroscopy. Emergency ureteroscopy for definitive stone clearance may reduce costs, hospital reattendances for symptoms and prove to have comparable outcomes as elective ureteroscopy.

Materials and methods

This is an Ethics Board Committee-approved retrospective review of all patients who underwent ureteroscopy for definitive management of ureteric colic was performed from 1st January 2015 to 31st December at our institution. A total of 91 patients were identified. One patient from the Emergency ureteroscopy (EM) group and 2 patients from the Elective ureteroscopy (EM) group were excluded due to missing data. The exclusion criteria were the presence of an active urinary tract infection, sepsis, absence of colic symptoms at presentation, previous ureteric instrumentation and/or procedures, and

previous ureteric stenting. All patients were diagnosed with ureteric calculi either on X-ray, intravenous urography (IVU), or Computed Tomography (CT) imaging. The location of the calculi were defined as follows: upper ureter – from renal pelvis to superior sacroiliac joint; midureter – between superior and inferior sacroiliac joint; distal ureter – between inferior sacroiliac joint to vesicoureteric junction. All 88 patients underwent semirigidureteroscopy, with the possibility of using Holmium laser lithotripsy, forceps retrieval of stones and ureteric stenting if necessary.

Ureteroscopy was performed under general anaesthesia, with a 6.4F dual-channel semirigid ureteroscope (Olympus) under fluoroscopy. Laser lithotripsy was available if needed, with a 280nm Holmium laser fiber (Lumenis). Ureteric stenting, when performed, was done under fluoroscopic guidance with a multilength 6F ureteric stent (Boston Scientific). Ureteric stenting was performed at the discretion of the clinician, in cases with significant stone impaction, ureteric oedema, tight ureters with failure of access/requiring staged procedure(s), and in the presence of intraoperative ureteric injury. Stone-free status was confirmed at the end of the surgery with both endoscopic and fluoroscopic assessment. Statistical analysis was performed using SPSS (Statistical Package for the Social Sciences, Version 21.0). Chi-square test, linear regression and ANOVA test were used to compare parameters between the different groups.

Results

The baseline parameters of both groups are seen in Table 1. There was no significant difference in the distribution of the stone locations in both groups. Patients who underwent EM had smaller calculi compared to EU (median = 5mm vs 8mm). The majority in both groups had only a single calculus with a similar proportion of stone location being in the distal ureter or vesicoureteric junction (VUJ). Patients who underwent EU had a statistically higher number of preoperative attendances compared to those who underwent EM. In terms of surgical outcomes, EM was associated with a more challenging intraoperative environment with 32.4% of the patients having difficult ureteric access due to a tight ureter or a difficult ureteric angle. Proximal stone migration was encountered in 6.5% and 3.2% required the use of the flexible ureteroscope due to stone retropulsion intraoperatively.

Table 1 Patient and stone factors

Variable	Emergency URS (EM)	Elective URS (EU)	p Value
Stone size (mm)			< 0.001
≤ 5	18 (58.0)	9 (15.8)	
6-10	11 (35.5)	36 (63.2)	
> 10	2 (6.5)	12 (21.1)	
Range	2-12	2-20	
Median	5	8	
Multiple stones	3 (9.7)	3 (5.3)	NS
Stone location			NS
Proximal ureter	7 (23.3)	9 (15.8)	
Mid-ureter	2 (6.7)	11 (19.3)	
Distal ureter	10 (33.3)	30 (52.6)	
Vesicoureteric Junction (VUJ)	7 (23.3)	5 (8.8)	
Multiple locations	2 (6.7)	1 (1.8)	
Need for ureteric stenting			0.08
Yes	18 (58.1)	21 (36.8)	
No	13 (41.9)	36 (63.2)	
Number of hospital attendances before surgery			< 0.001
1	15 (48.4)	6 (10.5)	
2	8 (25.8)	10 (19.6)	
3-5	8 (25.8)	37 (72.5)	
6-10	0 (0.0)	4 (7.8)	
Range	1-5	1-9	
Median	2	3	
Average	1.9	3.5	

Significantly, intraoperative complications, the need for staged procedures, stone-free rates, operative duration, and postoperative hospital reattendance rates were not significantly different between the 2 groups. Intraoperative complications included 1 case of ureteric perforation in the EM group and 3 cases of submucosal ureteric injury in the EL group. Staged procedures were required in 6 patients in the EM group for the following reasons:

Difficult stone access due to tight ureter in 3; Stone retropulsion into kidney in 2; and ureteric perforation in 1 after stone clearance-this patient underwent ureteric stenting and interval retrograde pyelogram and ureteric stent change.

Staged procedures were required in 5 patients in the EL group for the following reasons:

Difficult stone access due to tight ureter in 3; Incomplete stone fragmentation due to tight ureter in 1; And submucosal ureteric injury in 1 due to ureteric strictures distal to stone requiring ureterotomy-this patient underwent ureteric stenting intraoperatively and had interval retrograde pyelogram and ureteroscopic evaluation. A higher proportion of those in the EM group required ureteric stenting (58.1% vs 36.8%) but this did not reach statistical significance. In terms of costs, EM was associated with a significantly higher cost of USD 943.3 for the primary procedure alone, and USD 1103.7 when the costs of staged procedures e.g. stent removal are included as well. On linear regression analysis, each additional day of hospitalization was an independent factor resulting in a significant additional cost of USD330.8 (p < 0.001). The placement of a ureteric stent was associated with an additional cost of USD 429.2 but this did not reach statistical significance (p= 0.16) (Table 2 & 3).

Table 2 Surgical outcomes

Factor	EM	EL	p value
Intraoperative findings			
Tight ureter/difficult ureteric cannulation	8 (25.8)	7 (12.3)	NS
Difficult ureteric angle	2 (6.5)	1 (1.8)	NS
Proximal stone migration	2 (6.5)	0 (0.0)	NS
Need for flexible URS	1 (3.2)	0 (0.0)	NS
Passed stone at surgery	4 (12.9)	4 (7.0)	NS
Failure of stone access			NS
Due to tight ureter	3 (9.7)	3 (5.3)	
Retropulsion back to kidney	2 1	3 0	
Intraoperative complications			0.66
Yes	1 (3.2)	3 (5.3)	
No	30 (96.8)	54 (94.7)	
Need for staged procedures			NS
Yes	6 (19.4)	5 (18.8)	
No	25 (80.6)	53 (93.0)	

Table continued

Factor	EM	EL	p value
Operative duration (minutes)			
Median	40	41	NS
Average	46	42	
Range	5-117	5-89	
Need for DJ stent insertion			
Yes	18 (58.1)	21 (36.8)	0.08
No	13 (48.9)	36 (63.2)	
Stone-free post-op			
Yes	27 (87.1)	52 (91.2)	NS
No	4 (12.9)	5 (8.8)	
Postoperative sepsis	0 (0.0)	0 (0.0)	NS
Duration of stay			
0	0	52 (91.2)	< 0.001
1	2 (6.5)	5 (8.8)	
2	14 (45.2)	0	
3	8 (25.8)	0	
4	7 (22.6)	0	
Median	2	0	
Range	1-4	0-1	
Factor	EM	EL	p value
Postoperative hospital reattendance			
Yes	2 (6.5)	2 (3.5)	NS
No	29 (93.5)	55 (96.5)	

Table 3 Average cost and overall cost

Average cost (USD)	EM	EL	P value
Primary procedure	3011.1	2067.8	< 0.001
Cost of primary procedure and stent removal	3269.5	2242.7	0.001
Overall cost, including staged procedures	3502.2	2398.5	< 0.001

Discussion

EM has comparable stone-free rates and operative outcomes as elective ureteroscopy, albeit at a significantly higher cost. The cost of EM can be largely attributed to the duration of stay-93.5% stayed for at least 2 days. This can be attributed to the following factors: failure after a trial of medical expulsion therapy (MET) would lead to the clinical decision for emergency ureteroscopy; the median waiting time for emergency surgery was 26h; and most patients would stay an additional day post-surgery for symptom monitoring before they are discharged. In contrast, EL is performed as Day Surgery procedures.⁴⁻⁶

Conclusion

EM is a reasonable option for acute management of ureteric colic, with comparable outcomes and stone-free rates as elective ureteroscopic surgery. Although overall costs are higher compared to elective surgery, patients enjoy quicker symptom relief, earlier return to work with potential reduction in health-related productivity loss.

References

1. Gettman MT, Segura JW. Management of ureteric stones: issues and controversies. *BJU Int.* 2005;95(suppl 2):85-93.
2. Joshi HB, Obadeyi OO, Rao PN. A comparative analysis of nephrostomy, JJ stent and urgent in-situ extracorporeal shock wave lithotripsy for obstructing ureteric stones. *BJU Int.* 1999;84(3):264-269.
3. Preminger GM, Tiselius HG, Assimos DG, et al. Guideline for the management of ureteral calculi. *J Urol.* 2007;178:2418-2434.
4. Sarica K, Tanriverdi O, Aydin M, et al. Emergency Ureteroscopic Removal of Ureteral Calculi After First Colic Attack: Is There Any Advantage? *Urology.* 2011;78(3):516-522.
5. Lotan Y, Gettman MT, Roehrborn CG, et al. Management of Ureteral Calculi: A Cost Comparison and Decision-Making Analysis. *J Urol.* 2002;167(4):1621-1629.
6. Youn JH, Kim SS, Yu JH, et al. Efficacy and Safety of Emergency Ureteroscopic Management of Ureteric Calculi. *Korea J Urol.* 2012;53(9):532-563.