Medical Expulsive Therapy is Underused for the Management of Renal Colic in the Emergency Setting

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Purpose: Although the 2007 AUA (American Urological Association) guidelines established it as first line therapy for ureteral stones less than 10 mm, widespread adoption of medical expulsive therapy has been low. We determined the current penetrance of medical expulsive therapy guideline recommendations and the efficacy of medical expulsive therapy in reducing the requirement for urological procedures after emergency department visits for ureteral stones.

Materials and Methods: In a retrospective analysis of patients seen in the emergency department we included 2,105 emergency department visits associated with an ICD-9 diagnosis of urolithiasis in which computerized tomography abdomen/pelvis scan was performed. Outcomes were reviewed for spontaneous passage or required urological procedure.

Results: Ureteral stones were found in 48.8% of patients, including 50.0% in whom medical expulsive therapy was prescribed. There was no significant difference between patients who did and did not receive medical expulsive therapy. Within 12 weeks of the initial emergency department visit there was no difference in the rate of urological procedures performed in those who received medical expulsive therapy or in the rate of return to the emergency department. Patients treated with medical expulsive therapy experienced a shorter time to spontaneous expulsion (7.1 vs 12.8 days, $p = 0.048$).

Conclusions: Medical expulsive therapy for renal colic in the emergency setting remains underused. Half of the patients who met criteria for medical expulsive therapy in this study did not receive the standard of care. Patients treated with medical expulsive therapy achieved spontaneous passage more quickly but there was no difference in the requirement for a urological procedure. These results highlight the need for personnel at emergency departments to better standardize care for patients with ureteral stones.

Key Words: kidney; ureter; urolithiasis; emergency service, hospital; standard of care

Abbreviations and Acronyms

CT = computerized tomography
ED = emergency department
LTF = lost to followup
MET = medical expulsive therapy
VAS = visual analog scale

Accepted for publication November 11, 2015.

No direct or indirect commercial incentive associated with publishing this article.

The corresponding author certifies that, when applicable, a statement(s) has been included in the manuscript documenting institutional review board, ethics committee or ethical review board study approval; principles of Helsinki Declaration were followed in lieu of formal ethics committee approval; institutional animal care and use committee approval; all human subjects provided written informed consent with guarantees of confidentiality; IRB approved protocol number; animal approved project number.

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MEDICAL expulsive therapy is a noninvasive method used to manage ureteral stones. Several types of MET are available in the ED setting, of which the α-adrenoreceptor antagonist (α-blocker) tamsulosin has been the most studied. The principal mechanism of action of α-blockers includes relaxing the smooth muscle of the ureter, allowing for passage of the stone.[1]

Several trials have demonstrated the efficacy of MET in the facilitation of spontaneous passage of stones in

0022-5347/16/1954-0987/0
THE JOURNAL OF UROLOGY®

http://dx.doi.org/10.1016/j.juro.2015.11.026
Vol. 195, 987-991, April 2016
Printed in U.S.A.

the ureter. These studies have shown that MET is associated with a higher passage rate, quicker time to passage and lower requirement of analgesics.[2–5] Other benefits of MET include the fact that it is a low cost option compared to invasive procedures.[6]

Direct comparison of tamsulosin with calcium channel blockers such as nifedipine have been mixed with several studies showing similar efficacy in expulsion rates[7] and others demonstrating better outcomes for α-blockers.[8,9] There is also evidence that α-blockers are associated with a lower incidence of complications than calcium channel blockers.[10] However, recently a large randomized, controlled trial revealed that MET provided no outcome benefit when comparing groups treated with tamsulosin, nifedipine or placebo by the requirement for additional intervention.[11] The benefits of MET seem unclear with such conflicting data.

Although advantages of MET have been demonstrated, its use in the ED setting has been low. In a survey of ED physicians in 2008 only 63% had used MET in practice.[12] Furthermore, while the 2007 AUA guidelines established MET with α-blockers as first line medical therapy for ureteral stones less than 10 mm,[13] in practice only 22% of patients with ureteral stones may receive the medication.[14]

The primary objective of this study was to determine adherence to the AUA guidelines of suggested management of ureteral calculi with MET. The secondary objective was to determine outcomes in patients treated with MET.

MATERIALS AND METHODS

With institutional review board approval we retrospectively analyzed the records of ED visits at hospitals in our health system between December 2010 and May 2013. We included a total of 2,105 patients with suspected urolithiasis identified by an ICD-9 code for urolithiasis (592, 592.0 and 592.1) who also underwent unenhanced CT during the ED visit.

Data on patient demographics, ED course including a 10-point VAS for pain and hospital discharge prescriptions were collected. Patient charts were analyzed for outcomes within 12 weeks of the initial ED visit. After discharge from the ED if telephone or visit records indicated the exact date of passage, time to expulsion was calculated. If no exact date was available but the patient was specifically noted to have passed the stone spontaneously or passage was confirmed by imaging, this was categorized as spontaneous passage. Patients with a stone initially diagnosed on CT who subsequently had evidence of passage in note or on imaging, or who underwent a urological procedure were considered to have received definitive followup.

Procedures were recorded if performed to manage the same ureteral stone found at the ED visit. These procedures included cystoscopy with stent placement, extracorporeal shock wave lithotripsy, ureteroscopy or percutaneous nephrolithotomy. When detailed information on the definitive outcome was not available for a patient, the patient was considered LTF. Patients were excluded from study if they had undergone a urological procedure within 30 days of the ED visit.

At the time of the ED visit CT scans were initially read by a radiologist. For study purposes CT scans were independently confirmed by a blinded urologist who characterized the size and location of each stone. Under high magnification stone size was determined by measuring the stone in its largest diameter in the axial plane. Ureteral stone location was defined as the proximal ureter if it was proximal to the sacroiliac joints, the middle ureter if it was located over the sacroiliac joints and the distal ureter if it was distal to the sacroiliac joints.

Continuous means were evaluated by the 2-tailed independent t-test while the chi-square test was used to evaluate categorical data. VAS pain scores were evaluated with the 2-tailed Mann-Whitney test. Numerical variables are expressed as the mean ± SD. Significance was considered at $p < 0.05$.

RESULTS

The records of 2,105 patients were analyzed. Ureteral stones were found in 1,028 patients (48.8%). MET was prescribed for 50.0% of patients with ureteral stones. Patients prescribed a MET regimen were given 0.4 mg tamsulosin daily except 2 who received doxazosin 1 mg daily. Additionally 7.2% of the 1,077 patients with no evidence of ureteral stones were prescribed an α-blocker. Patients with ureteral stones were older, more likely to be male and had higher initial VAS pain scores (table 1). Patients with no evidence of ureteral stones were equally as likely to have renal stones.

In patients with ureteral stones identified on unenhanced CT there were no significant differences in age, gender, serum creatinine or initial pain score between those who did vs did not receive MET (table 2). Stone location and size were similar in the 2 groups. Furthermore, time spent in the ED, pain scores at discharge home and the presence of concurrent renal stones were also similar.

Table 1. *Characteristics of patients who presented to ED with potential ureteral stones and underwent CT*

	Stone	No Stone	p Value
No. pts (%)	1,027 (48.8)	1,078 (51.2)	
% Male	62.3	42.9	<0.0001*
Mean ± SD age	46.7 ± 15.7	45.0 ± 17.1	0.014*
No. MET (%)	513 (50.0)	77 (7.1)	
Mean ± SD initial pain score	7.94 ± 2.4	7.47 ± 2.7	<0.0001*
No. renal stone (%)	326 (31.7)	364 (33.8)	0.35

* Statistically significant ($p < 0.05$).