Cessation of Ureteral Colic Does Not Necessarily Mean that a Ureteral Stone Has Been Expelled

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Purpose: We evaluated whether cessation of renal colic is consistent with an expelled ureteral stone or whether imaging may be indicated even in the absence of symptoms.

Materials and Methods: We performed a retrospective study of patients who presented to our institution with acute renal colic and ureteral stone, and were subsequently evaluated at a followup visit where they reported complete cessation of pain for at least 72 hours.

Results: Study inclusion criteria were met by 52 patients, who reported no pain for at least 72 hours at the time of the followup visit. A persistent ureteral stone was demonstrated in 14 of the 52 patients (26%) although they denied any associated symptoms. Multivariate logistic regression did not show an association between stone size or location and the likelihood of passage in this cohort.

Conclusions: Cessation of pain was associated with ureteral stone passage in almost 75% of this study cohort but 26% of patients still had persistent ureteral stones. We recommend routine followup imaging in all patients with ureteral stones to document stone passage and avoid the risks of silent ureteral obstruction.

Key Words: ureter, ureteral calculi, renal colic, diagnostic imaging, abdominal pain

Abbreviation and Acronym

KUB = plain x-ray of kidneys, ureters and bladder

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Urolithiasis is a worldwide health concern affecting approximately 1 of 11 people in the United States.[1] In patients with acute ureteral obstruction a rapid increase in ureteral pressure results in dilatation of the ureter and renal collecting system, which may cause renal colic.[2,3] The intervention rate of obstructing ureteral stones varies based on stone size. While stones less than 2 mm pass spontaneously 95% of the time, stones greater than 4 mm pass spontaneously only 50% of the time with the remaining 50% requiring intervention for stone removal.[4] In the absence of a concurrent urinary tract infection or unremitting renal colic current guidelines endorse a trial of spontaneous passage of ureteral stones less than 10 mm with periodic evaluation.[5,6] However, there is currently no consensus on the need for or type of imaging that should be obtained after a trial of spontaneous passage to determine whether a stone remains in the ureter. Furthermore, little data have been published in the literature examining the relationship between stone expulsion and the cession of patient pain.

The purpose of the current study was to determine whether resolution of symptoms reported by the patient is sufficient to determine that the patient has passed a ureteral stone or

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whether additional followup imaging is important to evaluate for a persistent ureteral stone.

METHODS

Institutional review board approval was obtained prior to study initiation. We performed a HIPAA (Health Insurance Portability and Accountability Act) compliant, retrospective review of the medical records of patients with acute colic who presented to a tertiary care academic medical center from 2010 to 2014. Study inclusion criteria were 1) imaging evidence of a single ureteral stone at the time of colic in the emergency department, 2) documentation of patient symptoms, including whether the patient had been pain free and symptom free for at least 72 hours at the time of the followup appointment, 3) definitive documentation of the presence or absence of a ureteral stone on followup imaging or ureteroscopic evaluation and 4) no patient history report of stone passage via the urethra. Patients who presented with multiple or bilateral ureteral stones were excluded from analysis.

Our practice pattern pertains to the patients included in this study. A patient seen in the emergency department with an obstructing ureteral stone and renal colic is typically seen in the urology clinic for followup 3 to 6 weeks after the initial stone event with followup imaging. If the patient has not passed the stone based on followup imaging at 6 weeks, the patient is offered observation, shock wave lithotripsy or ureteroscopy based on patient factors and the appropriateness of these treatments. In this retrospective study all patients with persistent ureteral stones elected and consented to ureteroscopy.

Statistical analysis was performed using SPSS®, version 22. Baseline variables are described using the mean ± SD or the percent as appropriate. Multivariate logistic regression analysis was done to examine the associations of stone size and location on the stone presence. Statistical significance was considered at $p < 0.05$.

RESULTS

Of the 52 patients who met study inclusion criteria 14 (26.9%) were female and 38 (73.1%) were male. Mean age was 51.2 ± 14.2 years (range 25 to 74). The table lists patient characteristics at the emergency department visit. At presentation 26 patients had right ureteral stones while the other half of the patients had left ureteral stones. Some degree of hydronephrosis was noted in 43 patients (82%) while 18% demonstrated no hydronephrosis. Mean axial stone diameter was 4.2 ± 2.2 mm and mean coronal stone diameter was 4.9 ± 2.4 mm. Stone location was in the ureteropelvic junction in 1.9% of cases, the proximal ureter in 28.8%, the distal ureter in 28.8% and the ureterovesical junction in 40.4%. Pain scores on a scale of 1 to 10 upon patient admission to the emergency department did not differ between those who did vs did not subsequently pass stones (mean 7.1 ± 2.7 vs 6.7 ± 3.6, p not significant). No patients demonstrated renal forniceal rupture at presentation

Patient demographics and characteristics at initial emergency department presentation

	No. Pts (%)
Overall	52
Male	38 (73.1)
Female	14 (26.9)
Hypertension	12 (23.1)
Diabetes mellitus	3 (5.8)
Nausea	20 (38.5)
Vomiting	12 (23.1)
Pain:	
Back	8 (15.4)
Abdomen	13 (25)
Flank (costovertebral angle)	37 (71.2)
Lower quadrant	12 (23.1)
Scrotum/labia	7 (13.5)
Hematuria	50 (96.1)
Dysuria	12 (15.6)
Frequency	4 (5.2)
Blood in dipstick	37 (71.1)
Leukocyte esterase	6 (11.5)
1st Stone episode	31 (59.6)
Stone history:	
Passage	21 (40.4)
Procedure	9 (17.3%)

No patient had gout or evidence of nitrates.

Mean time to followup evaluation was 35.8 ± 37.7 days. The followup imaging modality included KUB only in 1.9% of patients, renal ultrasound only in 48.1%, KUB plus renal ultrasound in 13.5% and computerized tomography in 30.8%. Of the 52 patients who met inclusion criteria (ie no pain for greater than 72 hours) 14 (26%) still had stones in the ureter. None of these stones was in a significantly different location compared to the location at the time of initial imaging. These persistent ureteral stones were detected by imaging, including KUB in 3 patients, computerized tomography in 9 and ureteroscopic evaluation in 3. Of note, the patients who underwent ureteroscopy were those who refused additional imaging for a variety of reasons. No patient underwent ureteroscopy which failed to reveal a stone. In the remaining 38 of 52 patients (74%) followup imaging showed interval passage of the ureteral stone in question.

At the time of followup microscopic hematuria was present in 50% of the patients who had passed the stone and 16% with persistent ureteral stones ($p < 0.05$). Multivariate logistic regression did not reveal any association of stone size or location with stone passage in our study.

DISCUSSION

Renal colic in patients with urolithiasis results from obstruction of the flow of urine when stones become lodged in the ureter.[3] Colicky pain is caused by the distension of nerve endings exacerbated by