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Original article

Outcome of ureteral distensibility on the success of ureteroscopy: A prospective hospital-based descriptive study[☆]



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KEYWORDS

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Abstract

Introduction: “Difficult ureter” is a known problem that increases the complications during ureteroscopy.

Objective: To categorize ureters according to their distensibility, and to determine whether ureteric distensibility is associated with the success of ureteroscopy and its complications.

Subjects and methods: Between January 2010 and September 2012, we tested ureteral distensibility in 306 patients who had a unilateral single radiopaque ureteral stone, 6–20 mm in diameter. Ureteral distensibility was classified into two categories according to the maximum size of a ureteral dilator that could be introduced before ureteroscopy: non-distensible ureters, which admitted a dilator up to 10 Fr and distensible ureters, which admitted a dilator >10 Fr. Correlations between distensibility and the success rate and complications of ureteroscopy were determined.

Results: Overall, 102 patients (33.3%) had non-distensible ureters and 204 (66.7%) had distensible ureters. Distensibility was correlated with the success of ureteroscopy because initial ureteroscopy failed in 38.2% of non-distensible ureters. Ureteroscopy was successful in all distensible ureters. The incidence of ureteric injury was higher in non-distensible ureters than in distensible ureters.

Conclusions: Our results suggest that ureteric distensibility should be tested before ureteroscopy. Primary ureteroscopy is recommended in distensible ureters because of its low complication rates and favorable outcome. Pre-stenting may be necessary before ureteroscopy in non-distensible ureters; secondary ureteroscopy may be safer and more feasible in these settings.

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Introduction

Ureteroscopy has become the standard of treatment for ureteral stones. The term “difficult ureteroscopy” has recently emerged to describe a situation that affects about 10% of patients undergoing ureteroscopy. In 2011, Cetti et al. recommended pre-stenting in patients with narrow ureters to improve the likelihood of successful ureteroscopy, and to decrease the risk of complications [1].

The technological advances in ureteroscopy have helped to improve the potential to negotiate difficult ureters and more proximal stones with less complications using smaller semi-rigid and flexible scopes [2], yet a lot of centers do not have the luxury of continuously updating their scopes, and they have to deal with their patients using older (though often more robust) technologies [3].

Many urologists try to avoid forced ureteral dilation to allow passage of the ureteroscope [4]. We hypothesize that calibration of the ureter before ureteroscopy may be valuable to define ureteral “distensibility” and avoid complications such as ureteral injury as well as failure to reach the stone. To test our hypothesis, we classified ureters according to their distensibility and determined the associations between ureteric distensibility and the success of ureteroscopy and its complications.

Subjects and methods

This is a prospective hospital-based descriptive study performed between January 2010 and September 2012 in our tertiary referral endourology unit. The study included patients with a unilateral single radiopaque stone of 6–20 mm diameter that was located anywhere in the ureter, except in the intramural part. Children, pregnant females, patients with intramural stones, calculi anuria and patients with stones >20 mm in diameter were excluded from this study.

X-ray imaging of the kidney, ureter, and bladder, urinalysis, ultrasonography, and non-contrast computed tomography were performed in all patients. Patients eligible for ureteroscopy were invited to participate in this study and all procedures were performed electively. The data (patients’ age, sex, stone location, stone laterality and stone size) collection was conducted after written consent from the patients, and permission from our institutional ethics committee. The investigation was carried out in accordance with the declaration adopted by the 18th World Medical Association (WMA) General Assembly, Helsinki 1964, and as revised by 64th WMA General Assembly in Fortaleza, Brazil, October 2013.

All procedures were performed under spinal anesthesia by three experienced endourologists. Initially, a Zebra® guide wire (Boston Scientific) was introduced into the ureter bypassing the stone and reaching the renal pelvis. If an impacted stone prevented the passage of the guide wire, the wire was left just below the stone. Sequential Teflon™-coated ureteric dilators (Boston Scientific) were used to calibrate the entire length of the ureter below the stone. The aim of this procedure was to calibrate but not dilate the ureter. According to this calibration, the ureters were classified into two groups: non-distensible ureters that admitted dilators of ≤ 10 Fr and distensible ureters that admitted dilators >10 Fr.

Ureteroscopic lithotripsy was performed using a semi-rigid Richard Wolf ureteroscope (8.5 Fr tip, reaching 11 Fr at the proximal end)

and Swiss Lithoclast pneumatic lithotripter. Stone free status was defined as complete clearance (if stone completely disintegrated and retrieved outside the ureter) and partial clearance (if stone was incompletely disintegrated or retro-pulsed to kidney). Ascending ureterography was performed at the end of the procedure and before ureteral stenting. An open-tip ureteric catheter was routinely kept in place for 3 days. In case of ureteric injury, defined as partial mucosal discontinuity with or without contrast extravasation, a JJ stent was inserted for 1–3 months. Ureteric injury was considered incomplete if ureteric wall injury occurred without dye extravasation during ascending ureterography (which is done routinely at the end of the procedure). If dye extravasation was present, the injury was considered complete.

All patients were evaluated on the first postoperative day by plain X-ray imaging of the kidney, ureter, and bladder to assess the degree of stone clearance and to confirm the position of the stent. Patients with ureteric injury were followed in our inpatient department for 3 days. During hospitalization, abdominal ultrasound was repeated daily to confirm the absence of fluid collection. The presence of fever, hematuria, and bowel symptoms were also assessed. Three months later, patients underwent urinalysis; plain X-ray of the kidney, ureter, and bladder; and abdominal ultrasound to screen for residual stone fragments or hydronephrosis; as well as screened for urinary tract infection.

Data analysis

Statistical analyses were performed using SPSS for Windows version 16 (SPSS Inc., Chicago, IL, USA). A p value <0.05 was considered statistically significant.

Results

Patient disposition

A total of 306 patients were included in our study. Their mean age was 28 years (range 16–57 years). Primary ureteroscopy was performed in 267 patients and secondary ureteroscopy was performed after pre-stenting because of failure to reach the stone in 39 patients.

Associations of ureteral distensibility with patient and stone characteristics

Table 1 shows the degree of ureteric distensibility and its association with patient and stone characteristics. Ureteral calibration assessed before ureteroscopy revealed that 102 (33.3%) patients had non-distensible ureters and 204 (66.7%) had distensible ureters. Ureteral distensibility was significantly associated with stone location ($p=0.006$); 43.1% of the non-distensible ureters had middle ureteral stones. The patient’s sex, stone laterality, and stone size were not associated with the degree of ureteral distensibility.

Associations of ureteral distensibility with ureteroscopy outcome

For patients who had failed ureteroscopy (39 patients with non-distensible ureters), we failed to advance the ureteroscope more than 2–6 cm from the ureteric orifice. For these patients, a ureteric catheter was used as a pre-stent for 5 days in 21 patients and a JJ was used as a pre-stent for 2 weeks before secondary ureteroscopy in 18 patients. The type of pre-stent used depended on when the

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