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ORIGINAL PAPER

Ureteroscopic treatment of urological calculi under sacral block anesthesia

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Abstract We evaluated the effectiveness and safety of ureteroscopic pneumatic lithotripsy (URS-PL) for the treatment of urological calculi under sacral block anesthesia. URS-PL was performed with a semirigid ureteroscope under sacral block anesthesia in 90 patients between January 2006 and April 2010. Calculi were located in the middle ureter in 20 patients, the distal ureter in 48 patients, the bladder in 20 patients, and the urethra in 2 patients. We carried out URS-PL in all patients under sacral block anesthesia with 20 ml 2% lidocaine. An objective pain score scale was used to assess patient pain and anxiety. Adverse events were recorded. The results showed the overall stone-free rate was 97.8%, the rate being 100% for calculi in the bladder, urethral and distal ureter, 90.0% for calculi in the midureter. The mean operative time was 25.2 min (range 10–60 min). We had perfect pain control in the majority of the patients. Patients' acceptance was very high. Only two patient required conversion to epidural block anesthesia. No anesthetic-related side effects occurred in all patients. These finding suggest that sacral block anesthesia is a safe and efficacious mend during URS-PL in urological calculi, especially those patients in the distal ureter and calculi <1 cm.

Keywords Urological calculi · Sacral block anesthesia · Ureteroscopic pneumatic lithotripsy

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Introduction

Since Hugh Hampton Young first passed a rigid ureteroscope into a dilated ureter in 1912, the field of ureteroscopy has expanded considerably. Particularly in the past decade, we have witnessed a proliferation in ureteroscopy such that it is now one of the most popular treatment options for patients with urolithiasis.

The advancement of ureteroscopy and related working instruments to manipulate or fragment urological calculi has significantly increased treatment options for urologists. For stone fragmentation, a variety of lithotriptors can be used, including ultrasonic, lithoclast, electrohydraulic, pneumatic and laser lithotriptors. Ultrasonic and lithoclast lithotripsy have reported favorable outcomes. They are safe and effective method for shone treatment [2, 3].

Usually general endotracheal anesthesia or epidural block anesthesia was used to treat urological calculus. However, a caudal block is an established anesthesia method for urologic procedures such as cystoscopy and circumcision in Japan. Caudal block anesthesia is also used for transrectal ultrasound (TRUS)-guided prostate needle biopsies [5]. Caudal block is a useful alternative to general anesthesia or total i.v anesthesia as it provides effective postoperative analgesia. The present study was undertaken to investigate the effectiveness and safety of caudal block in treatment of urological calculus.

Methods

Between January 2006 and April 2010, a total of 90 patients (49 men, 41women) whose mean age was 45.2 years (21–77 years) underwent ureteroscopic pneumatic lithotripsy (URS-PL) to treat urological calculus. Of the 90

patients, 20 stone located in middle ureter, 48 in lower ureter, 20 in bladder, 2 in urethra. Mean stone size 1.25 cm (0.5–3.1 cm) in diameter, as measured on preoperative intravenous urograms (IVUs) and ultrasonograms and recorded as the maximum diameter. Ureteroscopic procedures were performed in a standard fashion with an 8/9.8 F rigid ureteroscope under video monitoring. We used the ureteroscope for stones located in the middle and distal ureter, bladder and urethra.

All patients were placed to the left lateral position and a 22-gauge short-bevelled needle was inserted into the sacral hiatus to produce caudal anesthesia. A cold test was performed to confirm the effectiveness of the anesthesia. Patients received caudal block anesthesia with 20 ml 2% lidocaine in the left lateral decubitus position. The patient was then placed in the lithotomy position. Patients were placed in the standard lithotomy position. The ureteroscope was passed into the bladder through the urethra under visual monitoring, and a 0.035-inch guidewire was inserted into the ureteral orifice to facilitate passage of the ureteroscope. Balloon dilation was not performed. Stone fragmentation was achieved by means of pneumatic probes. Stone fragmentation was continued within the ureter until all fragments were <3 mm. After fragmentation, the stone pieces were left for spontaneous passage. Continuous low-pressure fluid flow was necessary to maintain visibility. Heart rate and arterial pressure were measured every 5 min after the administration of local anesthetic.

The patient was assessed to have an objective pain score (OPS). During and postoperative analgesia was assessed by the OPS scale (0–10 point scale) for 24 h (Table 1) [1]. The assessment was performed by specially trained nurses. The assessment was performed every 30 min during operation, then hourly postoperation.

A 5 F stent with both ends open was inserted into the ureter through the working channel of the ureteroscope under monitoring and left indwelling for 2–4 weeks. Postoperative radiographs were then taken. Stents were removed with a Wolf 20 F cystoscope under topical urethral anesthesia. All patients were followed with IVU, ultrasonography, or both 2–4 weeks after lithotripsy.

All the patients were discharged within 24 h after the procedures provided. Adverse events were recorded.

Table 1 The objective pain score (OPS)

Blood pressure	+10% preop	0
	10–20% preop	1
	>20% preop	2
Crying	Not crying	0
	Crying but consolable	1
	Crying, not consolable	2
Movement	None	0
	Restless	1
	Thrashing	2
Agitation	Asleep or calm	0
	Mild	1
	Hysterical	2
Verbal evaluation or body language	Asleep or states no pain	0
	Mild pain (cannot localize)	1
	Moderate pain (can localize) verbally or by pointing	2

Table 2 OPS and stone location

OPS	Bladder and urethra	Lower ureter	Middle ureter
≤3	22	40	9
4		8	9
5			2

Results

Most patients (88/90; 97.8%) were stone-free after a single ureteroscopic procedure. The stone-free rate stratified by stone location was 100% in the bladder, urethral and distal ureter, 90.0% in the midureter. Fragmentation was incomplete during pneumatic lithotripsy in one patient (stone located in miduerter) because of retrograde stone migration, and extracorporeal shockwave lithotripsy (ESWL) was used postoperatively.

The mean operative time was 25.2 min (range 10–60 min). All patients were hospitalized for 24–48 h for medical observation. No adverse events were observed. No patient complained of dizziness, tinnitus, visual disturbances or allergic reaction associated with inadvertent intravascular injection of lidocaine in our study (Table 2). Only two patient required conversion to epidural block anesthesia because of pain. One patient is a woman (27-year old). Stone is located in middle ureter and stone size is 2.5 cm. The other patient is woman (54-year old). Stone is located in midureter and stone size is 2.0 cm. Two patients felt pain during operation and have to converse to epidural block anesthesia.

Discussion

Although the optimal treatment for ureteral calculi located between the inferior border of the sacroiliac joint and the ureterovesical junction remains controversial, there is a trend toward ureteroscopic management. The present study was undertaken to investigate the efficacy of caudal block

anesthesia using 20 ml of 2% lidocaine. In general, the level of patient discomfort is difficult to quantify. In the previous three decades, the OPS has been proved satisfactory for the subjective measurement of pain. Because of its sensitivity, the OPS represents the best method for measuring pain or pain relief [4].

A caudal block is performed by injection of local anesthetic into the sacral canal, which contains the terminal part of the dural sac, ending between S1 and S3, but generally at S2, on a line joining the posterior superior iliac spines [6]. The five sacral nerve roots and the coccygeal nerve, which constitute the cauda equina, all transit the sacral canal. The anterior and posterior nerves of S1–S4 exit from the sacral canal by way of the anterior and posterior foramina, respectively. S5 and the minute coccygeal nerve exit laterally through the sacral hiatus and wind laterally around the sacrum and coccyx, respectively.

Because the sacrum has anatomic variations, it is believed that in some patients the caudal block will not be effective despite appropriate application. All of our patients who received caudal block had positive cold test results, confirming the effectiveness of the anesthesia. In addition, other objective methods such as testing the anal reflex or anal sphincter tone were used to confirm the success.

According to our results, stone size and location are the important factors that determine the success rate of sacral block anesthesia. The anesthetic duration time is about 1–2 h, so operation time could not be too long. If calculi are too large, operation time needs to be too long, then scral block anesthesia is not good. Normally, when calculi are <1 cm, operation time is about 0.5–1 h. Urethral of women is short, it is easy to operate. Moreover, calculi located in the distal ureter, it is easy to operate too. Operation time is short. Sacral block anesthesia is better when calculi are <1 cm and located in the distal ureter particularly in woman.

Carrying out lithoclast, lithotripsy under sacral block anesthesia may decrease the duration of patient hospitalization and operation cost. This is a safe and efficacious mend for providing satisfactory anesthesia in urological calculi. We recommend its routine administration in ureteral calculi, especially those patients in the distal ureter and calculi <1 cm.

References

1. Broadman LM, Hannallah RS, Belman AB, Elder PT, Ruttimann U, Epstein BS (1987) Post-circumcision analgesia—a prospective evaluation of subcutaneous ring block of the penis. Anesthesiology 67:399
2. Denstedt JD, Eberwein PM, Singh RR (1992) The Swiss Lithoclast: a new device for intracorporeal lithotripsy. J Urol 148:1088
3. Denstedt JD, Razvi HA, Rowe E, Grignon DJ, Eberwein PM (1995) Investigation of the tissue effects of a new device for intracorporeal lithotripsy: the Swiss Lithoclast. J Urol 153:535
4. Irani J, Fournier F, Bon D (1997) Patient tolerance of transrectal ultrasound-guided biopsy of the prostate. Br J Urol 79:608
5. Kitamura T, Fujiwara H, Nagata O (2001) Anesthetic management using propofol and fentanyl for transrectal ultrasound-guided prostatic biopsy. Masui 50:1209
6. Richard JW (1998) Caudal epidural blockade. In: Cousins MJ, Bridenbaugh PO (eds) Neural blockade in clinical anesthesia and management of pain, 3rd edn. Philadelphia, Lippincott-Raven