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Use of Lidocaine Jelly for Prevention of Inadvertent Retrograde Stone Migration during Pneumatic Lithotripsy of Ureteral Stone

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ABSTRACT

The success of URS depends on various factors including stone size, location degree of proximal hydronephrosis, and energy source used. Various techniques are used to minimize stone retropulsion but the majority of them are expensive. This study aims to study the efficacy of lidocaine jelly instillation proximal to ureteral stone during a semi-rigid ureteroscope for the prevention of retrograde migration and improvement in stone-free rate. ***Method****: 100 patients with 5 mm to 14 mm ureteral stones undergoing ureteroscopic removal using pneumatic lithotripsy were randomized into 2 groups. Group 1 (50 patients) had lidocaine jelly instilled proximal to the stone before fragmentation, and group 2 was the control group (50 patients). A 5Fr ureteral stent was advanced beyond the stone over the guidewire. Lidocaine jelly (2 ml) was instilled and all patients underwent ureteroscopy under spinal anesthesia with a 7Fr semi-rigid ureteroscope and a 4Fr working channel. Pneumatic lithotripsy was done.* ***Results****: Upward stone or fragment migration to the kidney occurred in 2 patients (4%) in the treatment group and 14 patients (28%) in the control group, which was a statistically significant difference (p=0.002). Although the mean operative time was slightly longer in the treatment group (36.56 ± 7 vs. 35.84 ± 12.5 minutes) the difference was not significant (p=0.450)* ***Conclusions:*** *Instillation of 2% lidocaine jelly just proximal to the stone in the ureter before starting ureteroscopic guided fragmentation of the stone using a pneumatic lithotripsy device is a simple and inexpensive option that can significantly reduce inadvertent stone migration and result in a higher stone-free rate.*

Keywords: Traditional medicine, Cloud computing, Real-time medical data

INTRODUCTION

The incidence of ureteric stones is rising and it has made the procedure of Ureterorenoscopy (URS) common in recent times [1,2]. The success of URS depends upon various factors such as stone size, location, degree of proximal hydronephrosis, and the energy source used to break the stone (pneumatic lithoclast/laser) [3].

Extracorporeal Shock Wave Lithotripsy (ESWL) is considered by many urologists to be the gold-standard primary treatment option for the management of ureteral stones. However, many studies have reported reduced efficacy compared with ureteroscopic intracorporeal lithotripsy [4]. Recent advances in the development of intracorporeal lithotripsy devices (and related surgical instruments) have meant that this technique is increasingly viewed as the frontrunner treatment modality for the treatment of ureteral stones [5].

One of the variables which dictate the success of URS is stone migration or retropulsion of stone during the procedure [5].

Stone migration can be due to the insertion of the ureteroscope, the pressure generated by the irrigant fluid, laser burst or pulsation (if lithotripter is pneumatic), and sparks from the electrode (if lithotripter is electrohydraulic).

Stone migration depends on the size and degree of calculus impaction and degree of proximal ureteral dilatation.

It has been reported that 3%-15% of stones in the distal ureter and 28%-60% of proximal stones undergo retrograde stone retropulsion, which can result in increased operative time, decreased stone-free rates, and the need for further auxiliary procedures (such as ureteral stenting, ESWL, and ureteroscopy) with associated morbidities and health-care costs [6-12]. Moreover, residual stone fragments can act as a nidus for recurrent stone formation, recurrent UTI, and renal colic.

Various novel devices are currently available to decrease/prevent stone retropulsion. These are either mechanical (wire-based or balloon-based) or gel-based [12,13]. These devices include stone baskets such as LithoCatch® (Boston Scientific Corp., Natick, MA, USA), Parachute® (Boston Scientific Corp., Natick, MA, USA), and Escape® (Boston Scientific Corp., Natick, MA, USA), as well as the Lithovac® suction device (Boston Scientific Corp., Natick, MA, USA), the Passport® balloon (Boston Scientific Corp., Natick, MA, USA), the Stone Cone® (Boston Scientific Corp., Natick, MA, USA), the PercSys Accordion® (Percutaneous System, Palo Alto, CA, USA), and NTrap® (Cook Urological, Spencer, IN, USA).

An alternative to these devices is BackStop® gel (Pluromed Inc., Woburn, MA, USA)-a reverse thermo-sensitive polymeric plug that is released beyond the stones in the ureter, forming a temporary plug that prevents retrograde stone migration [13]. Upon completion of fragmentation and extraction, BackStop® is dissolved by irrigation. However, the costs and availability of these are major issues.

The study aims to instill the lidocaine jelly proximal to the ureteral stone during a semi-rigid ureteroscope to the prevention of retrograde migration and improve the stone-free rate.

MATERIALS AND METHODS

100 patients with 5 mm to 14 mm ureteral stones undergoing ureteroscopic removal using pneumatic lithotripsy were randomized into 2 groups from April 2019 to March 2020 at Dr. S.N. Medical College, Jodhpur. Group 1 (50 patients) had lidocaine jelly instilled proximal to the stone before fragmentation, and group 2 was the control group (50 patients). A 5Fr ureteral stent was advanced beyond the stone over the guidewire. Lidocaine jelly (2 ml) was instilled and all patients underwent ureteroscopy under spinal anesthesia with a 7Fr semirigid ureteroscope and a 4Fr working channel. Pneumatic lithotripsy was done. Patients were followed at 24 hours with plain x-ray KUB, and at 2 weeks with NCCT KUB for residual migrated fragments. Stone migration was defined as proximal or upward stone migration to the kidney as determined by postoperative KUB or CT scan (Table 1).

Inclusion Criteria

- All patients older than 18 years
- Ureteric calculi of 5 to 14 mm

Exclusion Criteria

- Patients with impacted ureteric calculi
- Patients with PUJ calculi
- Patients with DJ stent *in situ*

Table 1 Laboratory results

	Study Group	Control Group
No. stone migration (%)	2 (4%)	14 (28%)
Percentage of Stone-free	96%	72%
Mean stone size (mm)	8.8	8.1

RESULTS

There were 50 patients in the study group and 50 controls. The 2 groups were comparable concerning age and stone size. Upward stone or fragment migration to the kidney occurred in 2 patients (4%) in the treatment group and 14 patients (28%) in the control group, which was a statistically significant difference (p=0.002). Although the mean

operative time was slightly longer in the treatment group (36.56 ± 7 *vs*. 35.84 ± 12.5 minutes) the difference was not significant (p=0.450). No significant complications (including ureteral perforation or avulsion) occurred in either group. However, 1 patient in the treatment group had significant postoperative colic requiring parenteral analgesics and 1 in the control group had a urinary tract infection. At 2 days postoperatively KUB was performed and 2 weeks postoperatively patients were followed with CT KUB. None of the patients in either group had retropulsion with the retrograde placement of a ureteral catheter. The stone-free rate at 2-week follow-up with CT KUB was 96% and 72% in the treatment and control groups, respectively, and the difference between the 2 groups was statistically significant (p=0.045).

DISCUSSION

Stones larger than 5 mm in diameter require intra-corporeal fragmentation before extraction through the ureteroscope. A wide variety of endoscopic lithotripters has become available for stone fragmentation including laser, electrohydraulic, and the pneumatic lithotripter. The pneumatic lithotripter uses compressed air to push a projectile in a handpiece against the end of a metal probe. Mechanical energy was transferred to the stone by the rod. The ballistic nature of the energy occasionally displaces calculi to unfavorable locations which necessitate additional procedures.

Endoscopic ureteral stone management has been made easier with the development of intra-corporeal lithotripsy techniques and stone removal equipment. These devices, in combination with better techniques, have resulted in stone-free rates of more than 95% with minimal morbidity. However, issues persist that prevent endoscopic treatment of ureteral calculi from consistently achieving 100% stone-free rates [14]. During ureteroscopic surgeries, retrograde calculus migration is still a serious issue.

According to one clinical study, ureteral stone migration from the proximal ureter occurs 40%-50% of the time, while migration from the distal ureter occurs 51% of the time [9].

The pressure of the irrigant fluid, the kind of energy source utilized for intra-corporeal lithotripsy, the site and degree of calculus impaction, and the degree of proximal ureteral dilatation all increase the risk of proximal fragment migration [15]. Smaller stones and higher proximal ureteral dilatation or hydronephrosis are more prone to migrate proximally [16].

Retrograde stone migration necessitates a longer operating time, more invasive endoscopy, and an increase in residual stones, necessitating secondary surgeries, all of which result in increased morbidity and cost.

Traditionally, surgeons have employed a variety of maneuvers to limit stone migration, including the reverse Trendelenburg position, which optimizes the effects of gravity and lowers irrigation pressure and flow rate.

However, these techniques reduce surgeon comfort and visibility, which can lengthen procedures [17].

Ali and colleagues recommended using lidocaine jelly to avoid retrograde ureteral stone displacement during lithotripsy [18]. Before applying kinetic energy, they placed a 6 Fr ureteral stent beyond the stone through an 8 Fr ureteroscope and infused 1 cc to 2 cc of lubricating jelly. This approach was used to treat seven patients. Stone displacement was avoided in all seven cases, and fragmentation was completed successfully.

To prevent retrograde stone displacement during pneumatic lithotripsy, Mohseni and colleagues used a 9.8 Fr ureteroscope with lidocaine jelly (2 ml of 2% concentration) instilled through a 5 Fr ureteral catheter through the ureteroscope working channel with a cut tip proximal to the stone [19]. They were able to place the catheter under direct view after making this alteration with the 5 Fr catheter. In 16 patients, lidocaine jelly was employed, and upward stone or fragment migration to the kidney occurred in two patients, resulting in an 87.5% success rate. However, in that study, its impact on the stone-free rate was not significant.

In our study stone retropulsion occurred in 4% of patients and the stone-free rates were statistically significant when compared with the control group.

CONCLUSION

Instillation of 2% lidocaine jelly just proximal to the stone in the ureter before starting ureteroscopic guided fragmentation of the stone using a pneumatic lithotripsy device is a simple and inexpensive option that can significantly

reduce inadvertent stone migration and result in a higher stone-free rate.

DECLARATIONS

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article..

REFERENCES

[1] Romero, Victoriano, Haluk Akpinar, and Dean G. Assimos. "Kidney stones: A global picture of prevalence, incidence, and associated risk factors." *Reviews in Urology,* Vol. 12, No. 2-3, 2010, pp. e86-96.

[2] Turney, Benjamin W., et al. "Trends in urological stone disease." *BJU International,* Vol. 109, No. 7, 2011, pp. 1082-87.

[3] Ahmed, Mahfuza, et al. "Systematic evaluation of ureteral occlusion devices: Insertion, deployment, stone migration, and extraction." *Urology,* Vol. 73, No. 5, 2009, pp. 976-80.

[4] Kijvikai, Kittinut, et al. "Shock wave lithotripsy or ureteroscopy for the management of proximal ureteral calculi: An old discussion revisited." *The Journal of Urology,* Vol. 178, No. 4, 2007, pp. 1157-63.

[5] Elashry, Osama M., and Ahmad M. Tawfik. "Preventing stone retropulsion during intracorporeal lithotripsy." *Nature Reviews Urology,* Vol. 9, No. 12, 2012, pp. 691-98.

[6] Hendrikx, A. J. M., et al. "Treatment for extended-mid and distal ureteral stones: SWL or ureteroscopy? Results of a multicenter study." *Journal of Endourology,* Vol. 13, No. 10, 1999, pp. 727-33.

[7] Bagley, Demetrius H. "Expanding role of ureteroscopy and laser lithotripsy for treatment of proximal ureteral and intrarenal calculi." *Current Opinion in Urology,* Vol. 12, No. 4, 2002, pp. 277-80.

[8] Chow, George K., et al. "Ureteroscopy: Effect of technology and technique on clinical practice." *The Journal of Urology,* Vol. 170, No. 1, 2003, pp. 99-102.

[9] Knispel, H. H., et al. "Pneumatic lithotripsy applied through deflected working channel of miniureteroscope: Results in 143 patients." *Journal of Endourology,* Vol. 12, No. 6, 1998, pp. 513-15.

[10] Osorio, Luis, et al. "Emergency ureteroscopic management of ureteral stones: Why not?" *Urology,* Vol. 69, No. 1, 2007, pp. 27-31.

[11] Lee, H. O., et al. "Stone retropulsion during holmium: YAG lithotripsy." *The Journal of Urology,* Vol. 169, No. 3, 2003, pp. 881-85.

[12] Dretler, Stephen P. "The stone cone: A new generation of basketry." *The Journal of Urology,* Vol. 165, No. 5, 2001, pp. 1593-96.

[13] Rane, Abhay, et al. "The use of a novel reverse thermosensitive polymer to prevent ureteral stone retropulsion during intracorporeal lithotripsy: A randomized, controlled trial." *The Journal of Urology,* Vol. 183, No. 4, 2010, pp. 1417-23.

[14] Lam, John S., Tricia D. Greene, and Mantu Gupta. "Treatment of proximal ureteral calculi: Holmium: YAG laser ureterolithotripsy versus extracorporeal shock wave lithotripsy." *The Journal of Urology,* Vol. 167, No. 5, 2002, pp. 1972-76.

[15] Hendlin, Kari, Derek Weiland, and Manoj Monga. "Impact of irrigation systems on stone migration." *Journal of Endourology,* Vol. 22, No. 3, 2008, pp. 453-58.

[16] Delvecchio, Fernando C., and Glenn M. Preminger. "Management of residual stones." *Urologic Clinics of North America,* Vol. 27, No. 2, 2000, pp. 347-54.

[17] Robert, M., et al. "Treatment of 150 ureteric calculi with the Lithoclast." *European Urology,* Vol. 26, 1994, pp. 212-15.

[18] Ali, Ayyaz A., et al. "A novel method to prevent retrograde displacement of ureteric calculi during intracorporeal lithotripsy." *BJU International,* Vol. 94, No. 3, 2004, pp. 441-42.

[19] Mohseni, Mohammad G., Saeid Arasteh, and Farshid Alizadeh. "Preventing retrograde stone displacement during pneumatic lithotripsy for ureteral calculi using lidocaine jelly." *Urology,* Vol. 68, No. 3, 2006, pp. 505-07.