

Analyzing the Effectiveness of Laser and Pneumatic Lithotripsy in the Treatment of Ureteral Stones Smaller than 1.05 Centimetres in Diameter a Multi-Center Study

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ABSTRACT

Objective: aims to compare the success rates of laser lithotripsy with pneumatic lithotripsy for removing ureteric stones less than 1.5 cm at a tertiary care hospital.

Method: This Multi-Center study was conducted in the urology department of Lady Reading Hospital in Peshawar total of 265 patients (125 in the PL group and 140 in the LL category) with ureteral stones were treated with ureteroscopic lithotripsy. The study's authors aimed to compare factors such as rates of stone-free patients, operation length, patient recovery time, length of hospital stay, stone migration, and complication rates.

Results: Age distribution, gender distribution, typical stone size, stone point, and level of complexity were all comparable between the two groups. The LL group stood out from the rest regarding stone repositioning, SFR, and MHS.

Conclusion: The [PL and LL] methods worked well and were safe for ureteral stones. However, the [LL] group may have had a greater SFR.

Keywords: comparing, pneumatic lithotripsy, ureteral stones

INTRODUCTION

Patients with urolithiasis may choose from a variety of therapeutic modalities like percutaneous nephrolithotomy, open stone surgery, laparoscopic ureter lithotomy, extracorporeal Shock wave lithotripsy (ESWL) and ureteroscopic procedures (1, 2). Before the advent of the tiny type ureteroscope and ESWL, the standard therapy was open surgery for ureteral stones. To diagnose and treat ureteral stones, a good image of the ureter is essential, and this is where ureteroscopic surgery comes in. Four) although holmium: yttrium-aluminum-garnet (Ho: YAG) is the most often used laser for the LL cycle, several others have been tried. (6) For stone fracture, many people turn to the Ho: YAG laser, a beat mode approach with a frequency of 2100 nanometers (nm) and a tissue entrance of 0.5 millimetres. Both PL and Ho: YAG lithotripsy have been shown to be effective (7). The Swiss lithoclast presses the stones apart with an oscillating metal indicator (8, 9). Ho: YAG laser pulses provide a heating effect by creating tiny bubbles of vaporisation (10). Shock waves generated by the sudden burst of the bubble at the fiber's tip are responsible for shattering the stones. (11) To assess the safety and effectiveness of ureteroscopic PL vs LL, we examined 260 patients who received the two procedures between July 2019 and March 2021.

METHODS

This multi-center study was conducted at department of urology Lady Reading Hospital in Peshawar, Pakistan. Between July 2019 and March 2021, 265 of 337 patients with ureteral stones were treated with ureteroscopic lithotripsy. (PL and LL were conducted retrospectively in 125 and 140 instances, respectively). Coagulopathy, significant musculoskeletal abnormalities, untreated coagulopathy, and renal abnormalities also eliminated. Both patients had a CT scan, urine culture, and kidney function test before surgery (NCCTS). The statistical work was done in SPSS 22. Quantitative information was evaluated using descriptive statistics such as mean and standard deviation and Student's t-test. To analyze the qualitative information, we used the Fisher exact and chi-square tests. There was statistical significance at the 0.05 level.

RESULTS

Table 1 compares the clinical and demographic features of the two

groups. Age, gender, stone size, and side were uniform. LL had higher ureter stones. SFR, stone migration, and MHS preferred LL (P 0.05), but MOT favoured PL (P 0.05). LL's poor proximal ureteral calculi treatment eclipsed its advantages. Table 2 lists post-op activities. Most PL patients had 1.5cm ureteral stones or edematous stones. Seven patients had flexible ureteroscopy and LL, and 32 had ESWL before double J stent removal. In the LL arm, particles retrobeat to the kidney nine times and divide in the renal pelvis or calyx seven and two times. Ureteroscopy wasn't possible in 2 instances. Twofold J's ureteral stent was in place for 1.5 months. PL patient opens ureteral hole. Laser ureterotomy and two-fold J stents were used to treat ureteral stenosis in two LL and one PL patient.

Table 1: Demographic and clinical features

Variable's	LL N=140	PL N=125
Age (Mean± SD)	41.1±3.9	38.2±4.5
Male, No. (percentage)	92 (68.4)	74 (64.4)
History of TUL, No. (percentage)	14 (9.8)	12 (9.3)
Stone location.		
Right side, No. (percentage)	83 (61.7)	72 (61.2)
Bilateral, No. (percentage)	5 (4.3)	6 (5)
Stone position		
Upper, No. (percentage)	34 (24.4)	17 (14.9)
Middle, No. (percentage)	27 (20.7)	33 (28.5)
Distal, No. (percentage)	73 (53.8)	64 (55.5)
[Stone diameter, (mm)]	9.7±2.5(9-17)	9.±2.2 (8-13)
[Number of stones, n]	1.1±0.4	1.1±0.1
[Duration of stone impaction]		
< 2 months, No. (percentage)	108 (81.8)	97 (84.3)
> 2 months, No. (percentage)	27 (19.4)	18 (17.5)

Abbreviation: TUL, transurethral lithotripsy, P ≥ 0.05.

Table 2: Retrospective Medical Notes

Variable	LL N=135	PL N=125	P-value
[Complications]			[≥0.05]
[Ureteral damage, number. (percentage)]	01 (0.6)	05 (4.4)	
[Postoperativ fever, (percentag)]	Number. 01 (0.6)	04(2.9)	
[Mucosal destruction, (percentage)]	Number. 05(2.8)	07 (5.8)	
[MOT ± SD, min]	[15.4 ± 3.05]	[11.01 ± 7.2]	[≤0.05]
[MHS ± SD, h]	[24.04 ± 2.2]	[27.2 ± 0.7]	[≤0.05]
[Immediate stone-free rank, number. (percentage)]	[128 (93.3)]	77 (65.2)	[≤0.05]
[Stone migration, number. (percentage)]	[41] (28.6)	08 (7.6)	[≤0.05]

DISCUSSION

Urinary stone therapy has advanced tremendously because to new technologies and discoveries. Ureteral calculus may be treated using less invasive methods. With PL, you can enjoy savings and safety without sacrificing privacy. The shifting of stones is also a cause for worry. The YAG laser is a reliable, powerful, and adaptable tool. Holmium laser lithotripsy results in smaller fragments than traditional methods. Reduced resistance to fragmentation by the Ho: YAG laser is associated with a decrease in calculi or stone formation. No of the stone's hardness or size, Ho: YAG LL is an effective treatment option for stone discontinuity that may be performed with several ureteroscopes. (14) Stone fragment mobility is reduced during laser lithotripsy, leading to a decreased SFR, MHS, and retreatment rates compared to PL. In a study of 300 patients who had holmium laser lithotripsy, Devarajan et al. (15) found a 91% success rate. There has always been a higher incidence of severe injury from upper ureter calculi. The Ho: YAG laser arm SFR was found to be 95% by Jeon et al. (16), while the lithoclast SFR was found to be 36.1%. (P 0.05). YAG is superior than PL for MOT. Though PL makes it easier to move large stones by breaking them up into smaller pieces, there are still certain particles that are too large to flow through the system without a container or grasper. Our research confirmed the claimed results. With YAG laser lithotripsy, ureter damage was reduced because of the low infiltration rates. Urinary tract injuries were less common in LL MHS than in PL. There were no issues found with the ureteroscopic Ho: YAG laser lithotripter. (17-20) A stone that stayed in a ureteral polyp for three months. Since PL polyps impeded ureteroscopic manoeuvrability, this treatment option was limited. The excision of three polyps with a laser usually clears the way for ureteroscopy. (17) The surgery was carried out by specialists with varying levels of expertise, which might affect the results we get. Although we conducted a review, we believe that our findings would be strengthened by the results of a randomised controlled trial.

CONCLUSION

Both the PL and LL procedures are helpful for ureteral stones, however the LL approach has a higher success rate for removing stones. The lower pushback rate of the LL technique compared to the PL method protected the stone fragmentation while treating upper ureteral calculi.

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