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ORIGINAL RESEARCH ARTICLE

LASER LIHOTRIPSY IS SAFE AND EFFECTIVE TREATMENT FOR URETERAL CALCULI

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ABSTRACT

This is hospital based prospective study done in the urology unit of Chitwan Medical College, Bharatpur. All patients who were subjected for ureteroscopy and lithotripsy were included in the study between January 01, 2018 to May 31, 2018. Hundred patients with 116 stones were treated with the Holmium laser Versa Pulse P20 Laser Lithotripter. Overall stone clearance rate was 97%. The more the stone burden less was the stone clearance rate. The major complications were perforation and postoperative fever which occurred in 11% of each case. This procedure is a safe and effective treatment for ureteric calculi and is associated with a low complication rate and a high clearance rate. Laser lithotripsy is the optimum ureteroscopic method of treating ureteric.

Key words: Laser, Lithotripsy, Stone.

INTRODUCTION

The surgical management of both renal and ureteric calculi has undergone radical changes in the past decade and open surgery is now rare. Both extracorporeal shock wave lithotripsy,[1,2] and laser lithotripsy through small caliber instruments have revolutionized the management of ureteric calculi.[3-5] The management of ureteric calculi remains a significant part of the workload still today to the urologists. Thus, endourological techniques will remain an important primary or adjunctive procedure in the management of ureteric calculi.[6] The pneumatic lithotripter has a high chance of stone migration and an electro hydraulic probe generates large amounts of heat which may damage the ureter. Ureteroscopy itself has become safer with the advent of smaller caliber instruments. Laser lithotripsy has a wider safety margin than other methods of stone destruction within the ureter because energy generated in stone fragmentation is dissipated as photo acoustic energy rather than heat.

METHODS

This is the hospital based prospective study done in the urology department of Chitwan medical college, Bharatpur. All patients of age more than 14 years having ureteric stones, were subjected for ureteroscopy and lithotripsy were included in the study between January 01, 2018 to May 31, 2018. Patients who were not decided for ureteroscopy and unsterile urine were excluded from the study.

All the patients were admitted one day prior to surgery. For the stone evaluation, ultrasonogram followed by plane or contrast CT scan was done for the evaluation of stone size, location and number. All the patients were operated in the documented sterile urine.

A written informed consent was taken. The patients were given one dose of 3rd generation cephalosporin as a prophylactic antibiotic one hour prior to procedure. All the patients were given spinal anaesthesia meeting the criteria and then afterwards the patients were placed in modified lithotomy position. All ureteroscopy was done with semi rigid ureteroscope WOLF 9.8fr dual channel 5fr working port with irrigation device Intercavity Perfusion system, Guanghhou Jielun Medvices Co. Ltd. The stone were retrieved with biprong forceps.

Guide wire was placed in all cases prior to scoping the ureter. Laser energy was delivered through a 550um fiber by Versa Pulse P20 starting from low energy high frequency to high energy to achieve optimum effect. The power settings and the pulse count were recorded in each patient. If there was any suspicion of ureteric injury an on table retrograde ureteropyelogram was performed. All the patients were stented with double j stent after the end of the procedure with foley's catheterization.

The patients' demographic data, stone burden, location and post operative complications were recorded. All the patients were subjected for plane KUB X-ray prior to discharge with subsequent follow up for removal of double j stent at two weeks. At four weeks follow up the patients were performed for ultrasonography. If there were any suspicious of stone fragments the patients were subjected to plane CT KUB. Stone less than 4mm in the ureter was considered stone clearance.

RESULTS

Total of 100 patients with age range 18-80 years, with total of 116 stones were treated in the study. Mean age and sex differentiation are shown in table

1. Male were more predominant in the group.

Table 1: Age (years) and Gender

Age (mean in years ± SD)		**46.74 ± 14.99**
Gender	**Frequency**	**Percent**
Male	71	71
Female	29	29
Total	100	100

Table 2: Anatomic location of Ureteric stones

	Frequency	**Percent**
Lower	70	70
Middle	12	12
Upper	18	18
Total	100	100

Table 3: Size of the stone.

Mean stone size in mm	12.38
Std. deviation	3.277

Table 4: Stone categorization.

< 10 mm	18
10– 20 mm	80
>20mm	2

Table 5: Bilateral ureteric stones.

	Frequency	**Percent**
Absent	84	84
Present	16	16
Total	100	100

More common post operative complications were failed access to the stone and perforations. This may be due to that the patients were not preoperatively stented and the size of my scope was 9.8fr just to make uniformities in the study protocol. The perforation was all due to the laser fiber and all were managed with the stenting. All of the failed accesses were successfully managed with stenting. Retrograde migrations were all seen in the proximal ureter which were all subjected to extra shock wave lithotripsy or percutaneous nephrolithotomy. There were no cases of sepsis except for the mild fever. (Table 6)

Table 6: Post operative complications.

	Frequency	**Percent**
No complication	63	63
Failed access	9	9
Perforation	11	11
Retrograde migration	6	6
Fever	11	11
Total	100	100

Table 7: Hospital stays in days.

Mean	1.67
Standard deviation	0.922

Table 8: Stone clearance.

	Frequency	Percent
Clear	97	97
Not clear	3	3

DISCUSSION:

This study is primarily set to identify that laser lithotripsy is a safe and effective procedure or not. The overall clearance rate in this study was 97%. These results are comparable to other series using laser lithotripsy,[5, 7-10] in which clearance rates of 85-97% are quoted. Our results also compare favorably with those of extra corporeal shock wave lithotripsy for ureteric calculi,[2, 11-14] where clearance rates are in the order of 80-85%.

We believe that laser lithotripsy should begin at the lowest power setting as this gives a feel for the stone and the rate of fragmentation. The power settings can then be adjusted to fragment the stone with maximum efficiency and the least risk of propelling the stone back into the kidney. Small smooth stones are most likely to float especially at the upper ureter. Male patient, obesity and prostatic enlargement were significant factors contributing to failure of ureteroscopy. Patients with bilateral stones are best treated at same settings in my cases as all the cases were bilateral in position. The major complication of laser lithotripsy was failed access and perforation in 11% of patients, with minimal extravasation of dye. None of my cases were preoperatively stented before. The perforations were caused mostly by fiber trauma to the ureter or by blasting of stone fragments through the wall of a friable ureter during fragmentation. Impacted stones with obstruction and signs of infection where there is also edema and hyperemia of the ureteric wall are more difficult to treat and bleeding often obscures the view. The management of ureteric calculi continues to evolve.[15-17] Extracorporeal shock wave lithotripsy machines with x-ray imaging can treat ureteric calculi with reported success rates in the order of 80-85%. The results of ureteroscopic laser lithotripsy are similar, but this is an invasive procedure and carries with it the risk of ureteric injury. Laser lithotripsy is complementary to extracorporeal shock wave lithotripsy and may be used to treat steinstrasse and stones refractory to shock wave lithotripsy both in the ureter and kidney.

Extracorporeal shock wave lithotripsy for upper ureteric stones is the ideal treatment, as these stones may be difficult to reach with an ureteroscope, but this is only practical with machines that have x-ray localization. Extracorporeal shock wave lithotripsy for lower ureteric calculi necessitate placing the patient in the prone position and imaging may be difficult. Extracorporeal shock wave therapy with the added risk of ovarian irradiation is less attractive for lower ureteric calculi in females of reproductive age. There has been at least one reported miscarriage following this procedure.[18]

We have cleared all accessible lower ureteric stones irrespective of the location, which compare favorably with any series in the world literature. In Nepal many centre has no access to the extracorporeal lithotripsy and in this setting laser lithotripsy is doing the job as it is cheaper in cost than shock wave lithotripsy.[19,20] Ureteric stones often require urgent treatment and in this setting laser lithotripsy is an ideal and safe technique.

CONCLUSION:

The laser lithotripsy is safe and effective treatment for all the types of ureteric stone in spite of its invasiveness.

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