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RETROGRADE VERSUS ANTEGRADE APPROACH FOR THE MANAGEMENT OF LARGE PROXIMAL URETERAL STONES

Surgery

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ABSTRACT

INTRODUCTION: Large impacted upper ureteric calculi management remains challenging for urologist. Extracorporeal shockwave lithotripsy (ESWL), ureteroscopic lithotripsy (URSL), Percutaneous nephrolithotripsy (PCNL) and laparoscopic or open ureterolithotomy are the various treatment available. The aim of the present study is to analyze several clinical, intraoperative, and postoperative factors and to compare the efficacy of retrograde versus antegrade URSL for the treatment of large proximal ureteral stones.

METHODS: 20 consecutive patients with upper ureteric stones were evaluated. Ultrasonography and intravenous urography (IVU) was performed in all patients before surgery. Patients who underwent APCVL or URSL were included in study and devided into two groups. Stone free rate, mean operative time and fluoroscopy time, complications and hospital stay were assessed. The findings in both groups were compared and statistically tabulated.

RESULTS: The two groups were comparable in age, sex, body mass index (BMI). The mean stone size was 15.32 ± 2.24 and 14.82 ± 1.82 mm in groups 1 and 2, respectively. In the Perc-URS group, 10 patients had complete calculus clearance through a single tract in one session of percutaneous surgery [Table 2]. The mean operative time was 66.05±21.7 min. In the URS group, 7 patients (70%) had complete stone clearance. The remaining patient underwent open ureterolithotomy. The mean operative time was 52.13 ± 17.3 min. Three patients (30%) experienced failure during the procedure[Table 2].

CONCLUSION: Antegrade ureteroscopy is an efficient and safe option for the management of large proximal ureteral stones. It may achieve high stone-free rates compared to retrograde ureteroscopy with the drawback of longer operative time, fluoroscopy time, and length of hospitalization.

KEYWORDS

Extracorporeal shockwave lithotripsy, ureteroscopic lithotripsy, Percutaneous nephrolithotripsy, Antegrade ureteroscopy.

INTRODUCTION:

Large impacted upper ureteral calculus defined as a stone is located above the lower border of the fourth lumbar vertebra, remaining fixed at the same site for at least six weeks[1]. Large impacted upper ureteric calculi management remains challenging for urologist. Extracorporeal shockwave lithotripsy (ESWL), ureteroscopic lithotripsy (URSL), Percutaneous nephrolithotripsy (PCNL) and laparoscopic or open ureterolithotomy are the various treatment available[2]. The treatment for patients with large impacted proximal ureteral stone remains controversial. The aim of the present study is to analyze several clinical, intraoperative, and postoperative factors and to compare the efficacy of retrograde versus antegrade URSL for the treatment of large proximal ureteral stones.

MATERIALS AND METHODS:

From november 2018 to may 2019, 20 consecutive patients with upper ureteric stones were evaluated . Institutional ethical committee approval was obtained before the start of the study. The advantages and disadvantages of both procedures were explained to the patients preoperatively and informed and written consent was obtained. Ultrasonography and intravenous urography (IVU) was performed in all patients before surgery. Patients who underwent APCVL or URSL were included in study. Stone free rate, mean operative time and fluoroscopy time, complications and hospital stay were assessed.

Inclusion criteria:

upper ureteric stone with longest diameter (10–20) mm by X-ray of kidney, ureter, and bladder (KUB) region and ultrasonography and located between the ureteropelvic junction (UPJ) and lower border of L4 vertebral body.

Exclusion criteria:

Patients with renal insufficiency, solitary kidney, ureteral stricture, ureteropelvic junction obstruction, bilateral obstruction, non opaque stones or simultaneous lower calculus were excluded from the study. Informed consent was obtained prior to surgery.

Medical history, clinical examination, routine laboratory tests including S.creartinine, complete blood count, coagulation profile, liver function), urinalysis, urine culture was done.

Antegrade ureteroscopy was performed in prone position. Following the insertion of a ureteral catheter, opacification of the collecting system and intraoperative fluoroscopy were utilized to identify the optimal calyx for puncturing. A guidewire was inserted through the collecting system and sent down into the ureter. The guidewire was exchanged with a 0.038 in extrastiff wire. Balloon dilatation was used to create a 30 F tract and a 15.5 F flexible nephroscope (Karl Storz GmbH & Co., Tuttlingen, Germany) was utilized to identify the stone. Fragmentation was done with 365 m Ho:YAG laser fiber and Medilas H Solvo laser generator (Dornier MedTech GmbH, Germany). Remaining fragments were removed with 2.2 F tipless stone basket. Following complete stone removal, a 26 F rigid nephroscope was inserted for inspection of the collecting system and inspection of the operating tract while the sheath was retracted. 18 F catheter was placed for drainage of the kidney.

Retrograde ureteroscopy was performed with the patient in lithotomy position. The procedure was initiated with cystoscopy and catheterization of the ipsilateral ureter with a 0.035 stiff-type, straight guidewire (safety wire) under fluoroscopic guidance. No access sheath was used in the present series. A 7 F semirigid ureteroscope (Karl Storz GmbH & Co., Tuttlingen, Germany) was used for ureteroscopy with

continuous irrigation system and stone fragmentation was obtained by 550 m laser fiber. Stone fragments were extracted by a 2.2 F nitinol basket. The Storz 7.5/8.4 Fr Flex-X2 (Karl Storz GmbH & Co., Tuttlingen, Germany) flexible ureteroscope was utilized for fragmentation in case of stone migration in the kidney. A double J stent or a ureteral catheter was used for ureteral stenting.

RESULTS:

20 patients were included in the study, ten patients underwent antegrade ureterolithotripsy and 10 patients underwent underwent retrograde ureteroscopy. The two groups were comparable in age, sex, body mass index (BMI). The mean stone size was 15.32 ± 2.24 and 14.82 ± 1.82 mm in groups 1 and 2, respectively. In the Perc-URS group, 10 patients had complete calculus clearance through a single tract in one session of percutaneous surgery [Table 2]. The remaining patient underwent open ureterolithotomy. The mean operative time was 66.05±21.7 min. In the URS group, 7 patients (70%) had complete stone clearance. The mean operative time was 52.13 ± 17.3 min. Three patients (30%) experienced failure during the procedure[Table 2].

Table 1: Patient demographics and clinical data

	Antegrade	Retrograde	P Value
No of patients	10(50%)	10(50%)	
Gender Male Female	 5 5	 7 3	
BMI	29±8.0	27±7.5	0.54
Side Right Left	 6 4	 7 3	
Stone size(mm)	15.32±2.24	14.82±1.82	0.213
Preoperative stenting Yes No	 6 4	 5 5	
Hydronephrosis < Grade 2 > Grade 2	 7 3	 6 4	

Table 2: Intraoperative parameters and postoperative outcomes.

	Antegrade	Retrograde	p Value
Procedure duration(min)	66.05±21.7	52±17.3	0.013
Fluroscopy time(sec)	172.7 ±50.6	45.6 ± 39.4	<0.001
Post operative stenting Yes No	 2 8	 3 7	
Length of hospitalization(days)	 2.27±0.8	 1.67±0.6	0.01
Postoperative complications Yes No	 3 7	 2 8	
Postoperative stone free Yes No	 10 0	 7 3	

DISCUSSION:

Choosing the optimal treatment modality for large proximal ureteral stones is challenging and it depends on several parameters [3]. Both antegrade and retrograde approaches are well-established techniques and both can be considered as therapeutic options with Improvements in endoscopic equipment, such as lithotripters and fiber optics. For proximal ureteral stone management, efficacy and safety of minimal invasive procedures have increased with Improvements in endoscopic equipment, such as lithotripters and fiber optics. For proximal ureteral stones management, efficacy and safety of minimal invasive procedures have improved. Nowadays, antegrade and retrograde URSL are considered the primary treatment options for patients with large upper ureteral stones{4}.

There is an ongoing research interest regarding the efficiency and safety of retrograde URSL and antegrade URSL for the management of large proximal ureteral stones. Retrograde URSL is a well-established treatment option as it has been reported in several contemporary studies. Stonefree rates may reach up to 87%. Retrograde approach combines efficacy and safety. The main advantage, compared to antegrade approach, is the usage of natural orifices and pathways minimizing, at least on a theoretical base, the risk for main complications[5,6].

The actual drawback of the technique is the increased risk of stone retropulsion into the kidney. Usually, large impacted proximal ureteral stones lead to high grade hydronephrosis. Another potential drawback is the technical difficulty of the procedure.

The advent of percutaneous nephrolithotomy emerged a trend towards antegrade approach in treating proximal ureteral stones. Usually, a flexible nephroscope is the instrument of choice for stone identification and fragmentation. Due to flexible nephroscope's larger caliber, compared to flexible ureteroscope, a better vision is provided.

When we are counseling a patient with large proximal ureteral stones, focusing on intraoperative and postoperative complications, it seems the common sense that antegrade approach encrypts a higher risk due to greater invasiveness. We found that there was no statistically significant difference between the 2 groups. The same result was revealed when we compared the severity of complications. Furthermore, high irrigation flow and outflow are keeping a clear visual field and consequently decreasing the potential for accidental mucosal injury and hemorrhage. On the other hand, antegrade approach is associated with longer procedure duration and length of hospitalization.

For retrograde and antegrade URSL Intraoperative fluoroscopy is mandatory. Fluoroscopy can be harmful for both patients and medical staff [7]. Despite the importance of this issue, there is no data in the literature relating to it. The results of our study revealed that antegrade approach had significantly longer fluoroscopy time and consequently greater radiation exposure.

Postoperative stenting was more common in retrograde approach compared to antegrade one. It is a standard step of our technique to conduct a retrograde urethrography following fragmentation and stone removal for evaluating ureteral integrity and patency.

CONCLUSION:

Antegrade ureteroscopy is an efficient and safe option for the management of large proximal ureteral stones. It may achieve high stone-free rates compared to retrograde ureteroscopy with the drawback of longer operative time, fluoroscopy time, and length of hospitalization.

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