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Short communication

Ureterorenoscopic Lithoclast Lithotripsy in the Management of Ureteric Stones; Does the Site of the Stone Affect the Results?

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Abstract
Ureteric stones carry a significant risk to the kidney function, high stress to the patients, and a high burden to the healthcare providers. Ureteroscopic Lithoclast Lithotripsy (URSL) is an efficient, cost-effective, safe treatment option for the treatment of ureteric stones. The current study aims to determine if the site of the ureteric stone might affect the result of URSL in the treatment of ureteric stones. Materials and Methods: A prospective interventional single-centre study that was carried out in the department of Urology in Ibn Sina Teaching Hospital in Sirt, Libya, in the period from January 2013 to December 2015. URSL was performed through Wolf semi-rigid ureteroscopes (7.5 F and/or 8.5 F). Results: The Study included 114 patients (76 males and 38 females). The average age was 42.5 years (age range 19-75 years). The number of stones managed was 114. Of them, there were 30 stones (26.32%) in the upper ureter, 15 stones (13.16%) in the mid ureter, and 69 stones (60.53%) in the lower ureter. Stone sizes ranged from 5 to 15 mm (Average stone size: 10 mm). Overall stone-free rate reached 86% (70% in proximal ureteric stones, 80% in mid ureteric stones, and 94.2% in lower ureteric stones). Discussion: URSL is least successful in proximal ureteric stones, and the best results were with (Distal) ureteric stones. In local current practice, it might be better to start with ESWL in upper ureteric stones. While Holmium, YAG laser lithotripsy remains the most successful and should be started when available. Conclusion: URSL is a safe and effective option in the treatment of ureteric stones, and it brings the best results in the case of distal ureteric stones. However, for stones in the proximal ureter, ESWL might be used first, or to go for YAG laser lithotripsy, which is superior.
Keywords. *Lithotripsy, Ureteric Stones, Kidney Function, Results.*

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Introduction

Urinary Stones (Urolithiasis) is a general term that is used to refer to stones those present within the urinary tract. The majority of stones are initially formed in the kidneys before their clinical presentation in different sites in the urinary tract [1]. However, Ureteral stones (ureterolithiasis) are usually considered more serious than kidney stones, since they carry a serious threat of obstructing the ureter, which is a narrower structure, increasing the risk for hydronephrosis and kidney damage [2]. In addition to their serious risk to kidney function, ureteral stones also present with various symptoms associated with excruciating flank pain, posing significant stress and challenges to patients and healthcare providers, respectively [3]. Many treatment options are available for the treatment of ureteric stones, and for the past three decades, Lithoclast Lithotripsy has remained a good option for the management of ureteric stones, offering a safe, effective, and inexpensive treatment modality [4-6]. However, the site of the stone in the ureter might influence the success of the URSL procedures. Either because the ureteral lumen's diameter differs along its passage, or because the stone location itself might affect its tendency for retropulsion (upwards migration), because of lithotripsy. The current study focused on providing good quality evidence to determine the effect of stone site (within the ureter) on the success rate of URSL.

Material & Methods

This is a prospective interventional single-centre study that was carried out in the department of Urology in Ibn Sina teaching hospital in Sirt, Libya. The study was carried out for a thirty-six-month period starting from January 2013 to December 2015. Patients diagnosed with ureteric stones who needed interventional therapy underwent therapeutic interventional ureteroscopic procedures for ureteric stones in various sites. Pediatric patients, pregnant women, patients older than 80 years, and patients with significant cardiovascular comorbidities were excluded from the study, yet they received the appropriate treatment in the department. Wolf semi-rigid ureteroscopes (7.5 F and/or 8.5 F) were used for stone fragmentation using the lithoclast lithotripter (EMS) with 0.8mm and 1mm lithotripters.

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Results

The Study included 114 patients (76 males and 38 females). The average age was 42.5 years (age range 19-75 years). Similarly, the total number of stones managed was 114. Of them, there were 30 stones (26.32%) in the upper ureter (proximal ureteric stones), 15 stones (13.16%) in the mid ureter, and 69 stones (60.53%) in the lower ureter (distal ureteric stones) (Figure 1). The stone sizes ranged from 5 to 15 mm (Average stone size: 10 mm).

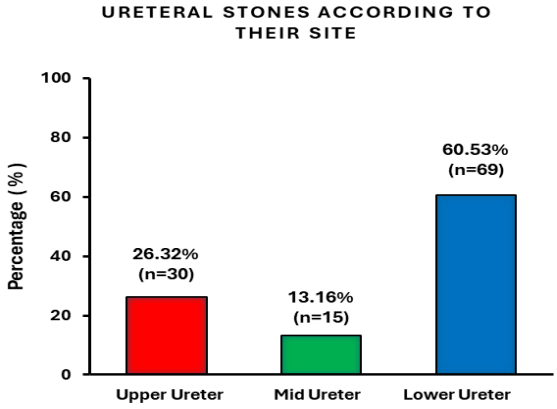

Figure 1. Location of stones within the ureter

The overall success (fragment-free rate) was 86% in the included patients (98 stones out of 114). In patients with upper ureteric stones, the success rate was 70% (21 out of 30), in patients with mid ureteric stones, the success rate was 80% (12 out of 15), and finally, in patients with lower ureteric stones, the success rate was 94.2% (65 out of 69) (Figure 2). In almost all successful cases, patients required a single session of lithoclast lithotripsy, while in 3 out of the 98 successful cases, the patients were stone-free after 2 sessions. The reason behind that is that the stone size is larger (15 mm or more).

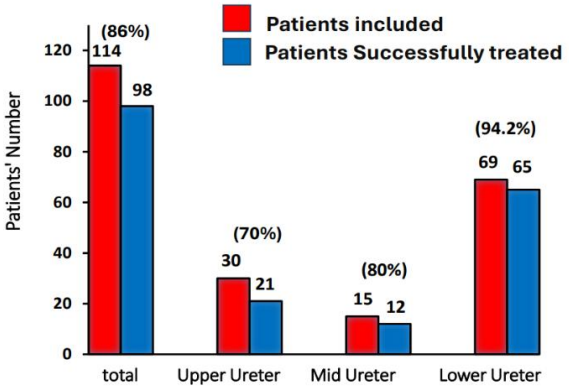

Figure 2. Lithoclast lithotripsy success rate

The failed URSL were mainly due to proximal migration (retropulsion) of the stone to the kidney (whole or part of the stone), especially with upper ureteric stones, due to large-sized stones (15 mm or more), or due to stricture or narrowing of the ureter and severely impacted stone. Details of these causes are listed in (Table 1) below.

Table 1. Summarizes the causes of treatment failure and the number of cases in each category

Causes of treatment failure	Upper Ureter	Mid Ureter	Lower Ureter	Total
Proximal migration to the kidney (whole or big fragment)	6	1	1	8
Narrow Ureter behind the stone	2	-	2	4
Large Size Stones	1	-	1	2
Impacted stone		2		2
Total	9	3	4	16

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Discussion

Lithoclast Lithotripsy found to be a good option for the management of ureteric stones [4-6]. It was found to be a safe and economic modality for the treatment of ureteric stones with a low rate of complications [7, 8]. Moreover, it is more cost-effective and successful when compared to extracorporeal shockwave lithotripsy [9].

The team working on the current study implemented their good experience in using various interventional modalities in the treatment of ureteric stones, including URSL, to answer the question of whether or not the stone location has an effect on the success of the procedure. Answer to this question will help urologists to use the treatment modality on the stone located on the sites where treatment has been proven to be most effective. The results of this study showed that stones located in the lower ureter are the most vulnerable to successful fragmentation with URSL. While stones located in the Upper part of the ureter (Proximal ureteric stones) are the least vulnerable to successful fragmentation. This could be related to the tendency of these proximal stones to migrate upwards to the kidney. Therefore, treatment of these distal stones might begin with ESWL, taking into account that the use of URSL is still cheaper and more effective, and can release stones that failed to clear with ESWL [9,10]. Therefore, other treatment modalities such as Holmium; YAG laser lithotripsy are more efficient in the treatment of these proximal stones [11,12].

Conclusion

Results of the current study indicate that lithoclast lithotripsy is a highly safe, efficient, and cost-effective method in the treatment of ureteral calculi. It is more efficient in the treatment of lower ureteric stones than upper ureteric stones. It may be better to use Holmium; YAG laser lithotripsy or to try ESWL for treating upper ureteric stone before proceeding to ureteroscopic management, unless it is strongly contraindicated.

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