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An Ideal Treatment Modality for Large Ureteral Stones: Case Report

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ABSTRACT

Background: The open method of surgically removing kidney stones has been radically replaced by less intrusive minimally invasive methods since the advent of shock-wave lithotripsy (SWL) and subsequent technological developments in endoscopic techniques, such as ureterorenoscopy (URS) and percutaneous nephrolithotomy (PCNL).
Objective: We aimed to delineate Ideal treatment modality for large upper ureteral stones. **Subjects and methods:** A 47 years married male heavy worker and heavy smoker patient presented with right loin pain with hematuria 7 days ago increasing with time responded to NSAIDS. Management done using Ureteroscopy and percutaneous nephrolithotomy.
Results: Symptoms started with right loin pain and hematuria, with recent dysuria ultrasound showed bilateral back pressure. Urine analysis showed microscopic hematuria and creatinine was 2.2. Non-contrast CT showed right lower ureteric stone and left upper ureteric large stone and multiple sizable left renal stones and we removed all stones with our technique.
Conclusion: Push back of large upper ureteral stones and retrieval percutaneously using nephoscope was a good option specially if associated with renal stones with large burden.
Keywords: Large ureteral stones, Treatment modality, Nephroscopy.

INTRODUCTION

Hematuria (blood in the urine) and abdominal, flank, or groin pain are symptoms often experienced by those suffering from urinary tract calculi. One in eleven Americans will experience them throughout their lives, and the incidence is two to one among males compared to women [1]. When the amount of urine produced drops or the excretion of stone-forming substances including phosphate, cystine, uric acid, oxalate, and calcium rises, stones begin to develop [1].

Low levels of urine citrate, which inhibits stone formation, or high levels of urinary acidity are additional potential causes of calculi**.** The majority of patients who visit the emergency room due to renal calculi report severe pain. Kidney failure cannot be caused by a single event, although the renal parenchyma can be functionally lost due to damage to the tubular epithelial cells caused by recurring renal calculi [2-4].

When urine solutes crystallize into stones, a condition known as urolithiasis develops. Anatomical abnormalities that cause urinary stasis, insufficient urine volume, certain foods (such as those heavy in oxalate or sodium), infections of the urinary tract, systemic acidosis, certain drugs, and, very infrequently, heritable genetic variables like cystinuria can all contribute to urolithiasis. The vast majority of nephrolithiasis patients (75–85%) end up with calcium stones, the most common of which are calcium phosphate or calcium oxalate (monohydrate or dihydrate). The remaining primary varieties are cystine stones (1%-2%), struvite (calcium magnesium ammonium phosphate, 8%-10%), and uric acid (8%-10%) [5, 6]**.**

Low urine volume and insufficient hydration are the leading causes of kidney stones. Among the many chemical variables that might lead to the development of kidney stones, hypercalciuria, hyperoxaluria, hyperuricosuria, and hypocitraturia rank highest [7-8]**.**

Because 85% of patients with nephrolithiasis have microscopic hematuria on urinalysis, it is common for patients to come with hematuria. Imaging studies conducted for the purpose of evaluating hematuria (or for other, unrelated purposes) may unexpectedly reveal renal calculi, which can frequently cause no symptoms at all [9]. In the absence of infection or obstruction of the urinary tract by the calculi- in the kidney, at the ureteropelvic junction, or in the ureter-symptoms are very unlikely to manifest. Patients with renal colic, a form of acute, severe flank pain, are also likely to have stone disease. This discomfort may extend to other areas of the body, such as the groin, testicles, or labia, in addition to the abdomen. The agony is frequently intense, extremely painful, and occasionally colicky. Because of its embryonic origins, the urogenital tract is typically linked to nausea and vomiting in addition to the discomfort. Within 90 to 120 minutes, renal colic typically reaches its apex, and the pain radiation follows dermatomes T10 to S4. In the initial stage, known as renal colic, the patient may be roused from sleep by the intense, sporadic, and sometimes terrifying pain. The second stage, which could last for three or four hours, is characterized by more persistent agony. Mild pain alleviation is common in the third phase, although intermittent waves of discomfort (colic) may still be present. A duration of 4–16 hours is possible during this stage [10]**.**

For the most accurate diagnosis of urolithiasis and to learn more about the blockage that causes hydronephrosis, the "gold standard" imaging modality is a non-contrast abdomen and pelvic computed tomography scan [11]**.**

Although the kidney and upper ureter are the most common sites for extracorporeal shockwave lithotripsy to break up stones, the technique is applicable throughout the urinary tract [12]**.** No matter

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the size or location of the calculi, ureteroscopy is the treatment of choice. For ureteral stones, particularly those located in the lower ureter, the endoscopic technique of ureteroscopy with laser lithotripsy is the way to go in. The success rate of this method of stone removal is dependent on the surgeon's training and experience as well as the specifics of the kidney's structure [13].

Percutaneous nephrolithotomy is the gold standard for the treatment of big stones (>2.5 cm) located in the renal pelvis. In exceptionally challenging or complicated cases, a combination of ureteroscopy and percutaneous surgery may be employed [14-15]. In our case we aimed to delineate ideal treatment modality for large ureteral stones.

Clinical course: A 47 married heavy worker and heavy smoker male patient presented with right loin pain with hematuria 7 days ago increasing with time responded to NSAIDS with recent dysuria. Ultrasound showed bilateral back pressure. Urine analysis showed microscopic hematuria and creatinine was 2.2. Non contrast CT showed right lower ureteric stone and left upper ureteric large stone and multiple sizable left renal stones. The stone in the lower right ureter passed spontaneously at the operative day of intervention.

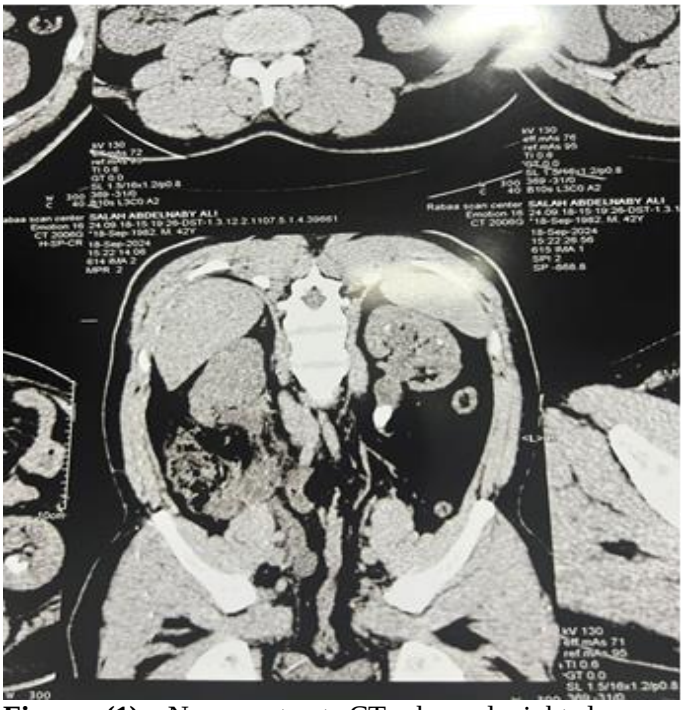

Figure (1): Non contrast CT showed right lower ureteric stone and left upper ureteric large stone and multiple sizable left renal stones.

Procedure:

Preoperative lab was requested and was normal except for elevated kidney function. On the operative day morning the right lower ureteric stone passed spontaneously. The plan was to do push back of the left upper ureteric stone to kidney and retrieval percutaneously. Operation done under spinal anesthesia and complete aseptic condition. Ureteroscopy done with push back of the stone and fixation of ureteric catheter (Figure 2).

Then the patient was put in the supine position. Lower calyceal puncture contrast guided on fluoroscopy and the dye was injected by ureteral catheter. Dilatation of tract and insertion of 30 French sheath. Stone was fragmented by pneumatic lithoclast and retrieval by nephoscope forceps. The patient was stone free on fluoroscopy (Figure 3). DJ fixed and urethral catheter with closure of the wound (Figure 4).

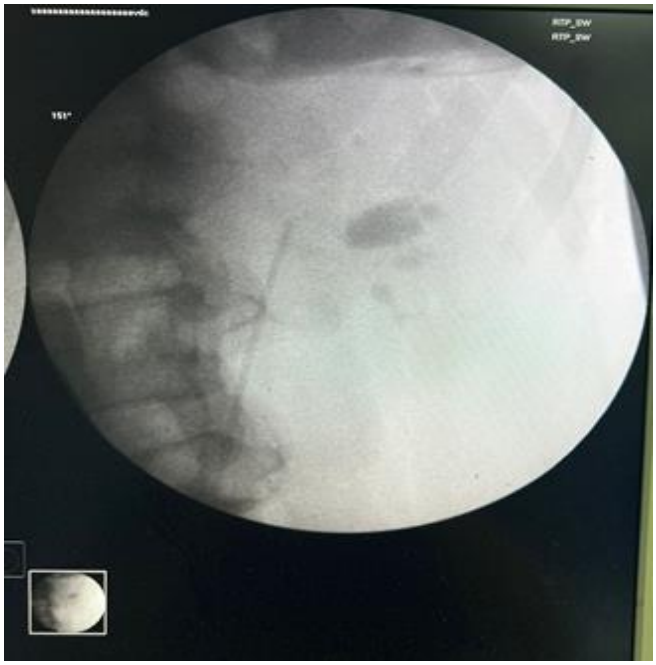

Figure (2): Ureteroscopy done with push back of the stone and fixation of ureteric catheter.

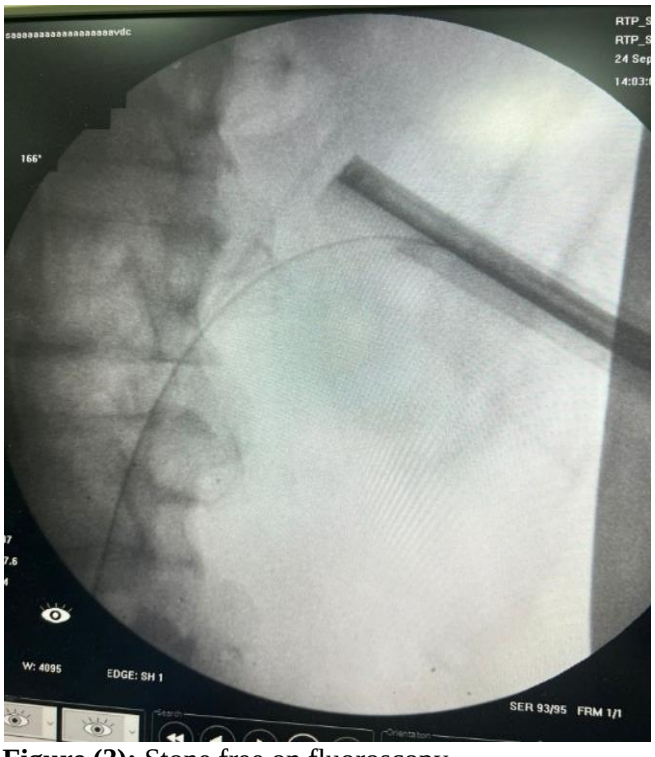

Figure (3): Stone free on fluoroscopy.

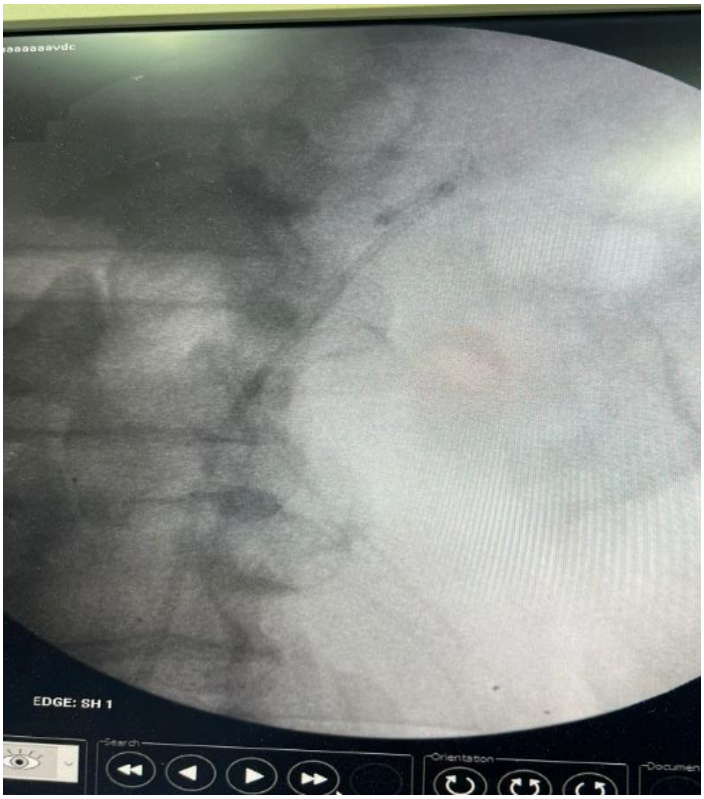

Figure (4): Double J stent fixed and urethral catheter with closure of the wound.

Post-Procedure:

A ureteral stent is usually implanted to aid in healing and to maintain ureteral patency once all stones have been appropriately fractured and removed. The ureteroscope was then withdrawn. The patient was closely observed for symptoms of problems, including infection, bleeding, or blockage, after the procedure. Three weeks following the treatment, the stent was removed to give the ureter and kidney time to recuperate. The entire process usually took around forty-five minutes.

DISCUSSION

Diagnostic and therapeutic procedures can be facilitated by ureteroscopy. When working with the distal ureter, it is best to use a rigid or semi-rigid ureteroscope. When navigating the upper ureter, renal pelvis, and calyces, the flexible ureteroscope is superior. Two methods exist for doing ureteroscopy: retrogradely through the urethra and antegradely through the percutaneous nephrostomy [8].

After a ureteral reimplantation, renal transplant, ileal conduit, or neobladder procedure, patients who develop an ectopic ureteral orifice benefit greatly from antegrade access. Ureteroscopy does not appear to cause any serious long-term damage to the kidneys or their ability to function. For instance, ureteral stricture is associated with a very low risk of around 1% [9-10].

The indications for endourology have been expanded to any site in the upper urinary system due to advancements in endourological tools, reductions in nephroscope size, and greater experience. This is the first study that we are aware of regarding the use of retrograde nephroscopy for the treatment of big distal ureteral stones [16].

The bigger caliber of the flexible nephroscope, as compared to the flexible ureteroscope, allows for superior vision, which is why we favor it over the latter. Patients with staghorn urinary tract stones have a far better chance of avoiding complications due to a shorter shock duration and less time spent fragmenting the stone when using a larger lithotripter, which is made possible by the expanded working channel [16].

A bigger working channel may allow for faster and more successful fragmentation in cases where massive stones block the ureteral lumen. It was necessary to improve visualization in order to manage optimal stone clearance for this patient, who also had several stones. In order to reduce the likelihood of further stone-related complications or additional surgery, the primary goal of stone surgery was to achieve a stone-free condition. Consequently, nephroscopy was the primary modality chosen to maximize the efficacy of stone removal. The increased risk of ureteral perforation and avulsion caused by the nephroscope's greater caliber compared to the ureteroscope is one drawback of employing a nephroscope. These drawbacks may be acceptable, nevertheless, in light of the potential gains from higher success rates and lower re-operation rates [17].

When looking for research comparing ureteroscopy with nephroscopy for the treatment of ureteral stones, we were unable to locate any. So, let's keep this conversation focused on comparing this patient's result to the earlier study. **Miller *et al.*** [18] was the only research we could locate that successfully removed a big distal ureteral stone from a patient with ureterocele using a 24-French rigid nephroscope. Using the ultrasonic lithoclast. They were able to break up and remove the huge stone from the distal ureter. Some of the stones were also fragmented using a 365-μm laser fiber. Their report did not mention any complications. Four months after the procedure, a CT scan showed no signs of stone recurrence. When patients were doing well up to fifteen months after the treatment, they checked in with them.

We think this case report can add to the growing body of evidence that nephroscopes are useful for removing large stones from the distal ureter. At its conclusion, the treatment did not reveal any complications, including ureteral perforation or avulsion. Also, there were no traces of broken stone. The results showed that nephroscopy was effective in the short-term. But, we didn't look at the patient's long-term results. But, we anticipate that the patient will have an excellent long-term prognosis with a good short-term outcome. We were able to remove the stone in about 45 minutes using our method, which involved pushing it back so that it could be fragmented.

Further, flexible ureteroscopy is less invasive than traditional ureteroscopy, but it is still a harsh procedure that might trigger varying degrees of inflammatory

stress reactions. Postoperative adhesion to endothelial function, renal function, and other functions can result in damage and circulatory malfunction due to the inflammatory stress response. Vasoconstriction and an inflammatory reaction can increase blood vessel permeability, which can be caused by a rise in PGF2α, PGE2, and KGF pain media production. Additionally, it has a strong correlation between the intensity of pain and the activation of slow excitation peptide, a substance that promotes tissue edema and pain **[18].**

CONCLUSION

Push back of large upper ureteric stones and removing it percutaneously by nephoscope is a good option specially if associated with large burden renal stones.

Conflict of interest: None.
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