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Case Report

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Laparoscopic Ureterolithotomy in a Patient with Severe Lumbar Scoliosis and Large Proximal Ureteric Calculi

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Abstract

This case report outlines the effective management and outcome of a 26 years old male patient with lumbar scoliosis and multiple large left ureteric calculi with moderate hydronephrosis. The patient visited the outpatient urology department with a complaint of left flank pain persisting for four months. Imaging revealed multiple large stones in the left proximal ureter, with the largest measuring over 3 cm. Because of the anatomical complexities associated with severe lumbar scoliosis and the significant stone burden, the patient was not an ideal candidate for extracorporeal shock wave lithotripsy (ESWL) or ureteroscopic lithotripsy (URSL). Instead, laparoscopic ureterolithotomy was successfully performed, yielding favorable results. This report examines the surgical approach, challenges, and benefits of laparoscopic ureterolithotomy in comparison to other treatment options, including percutaneous nephrolithotomy, open ureterolithotomy, extracorporeal shock wave lithotripsy, and laser lithotripsy.

Keywords: ***laparoscopic ureterolithotomy, scoliosis, ureteral stone, minimally invasive surgery, urolithiasis***

Introduction

Ureterolithiasis, or stones in the ureter, is a common urological condition. While most stones can be managed conservatively, large stones or those unresponsive to non-invasive methods may require surgery. Renal colic and hematuria are the hallmark symptoms of ureteral stones whereas abdominal or flank pain, urinary urgency, nausea, frequency and difficulty of urinating, and testicular or penile pain are less typical presentation of ureteral stones [1]. In patients with scoliosis, however, anatomical alterations pose significant technical challenges. The introduction of minimally invasive techniques like laparoscopic ureterolithotomy has transformed the management of large stones. A normal spine has no lateral curvature in the sagittal plane. However, when curvature occurs, it's known as scoliosis. Individuals with spinal deformities, such as scoliosis, are more prone to developing kidney stones (urolithiasis) due to factors like immobility, urinary tract infections, and stagnant urine flow. Notably, the incidence of urolithiasis is considerably higher in individuals with spinal deformities (1.4-4.03%) compared to the general population (0.24%) [2]. Impacted ureteral stones pose a significant challenge, even in patients with normal vertebral anatomy. Furthermore, scoliosis is characterized by complex three-dimensional spinal changes, affecting approximately 1% of the population [3].

Case Presentation

A 26 years old presented in the outpatient urology department with a complaint of persistent left flank pain which has been radiating back since 4 months associated with nausea and vomiting. Physical examination revealed no abnormalities. Routine blood and urine tests showed normal results. However, imaging studies revealed significant findings: a plain X-ray (KUB) detected multiple radio-opaque densities, with the largest measuring approximately 3x3 cm in the left upper ureter (**Fig. 1**). A subsequent CT scan confirmed the presence of a large left upper ureteric stone, causing mild to moderate hydroureteronephrosis and lumbar scoliosis (**Fig. 2 A & B**). Given the patient's scoliosis, which caused significant distortion of the left renal collecting system, the decision was made to perform laparoscopic ureterolithotomy. The patient was evaluated for anesthesia risks, and preoperative hydration was optimized to address his mild hydronephrosis. Under general anesthesia, the patient was placed in a modified flank position to optimize exposure of the left kidney and ureter while accounting for his scoliosis.

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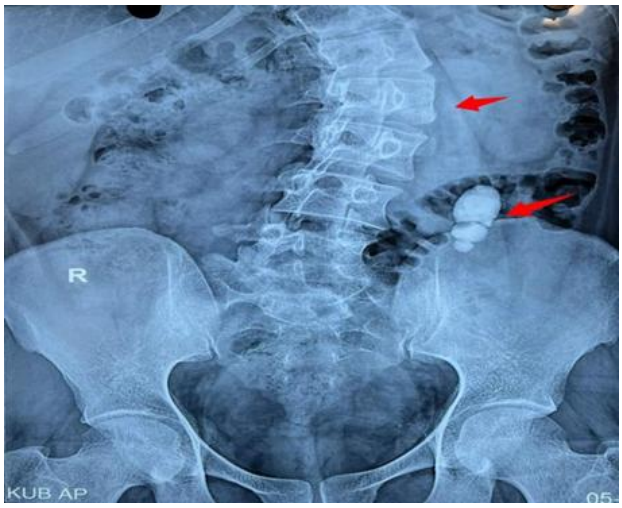

Fig. 1: X-ray depicting multiple radio-opaque densities and severe lumber scoliosis

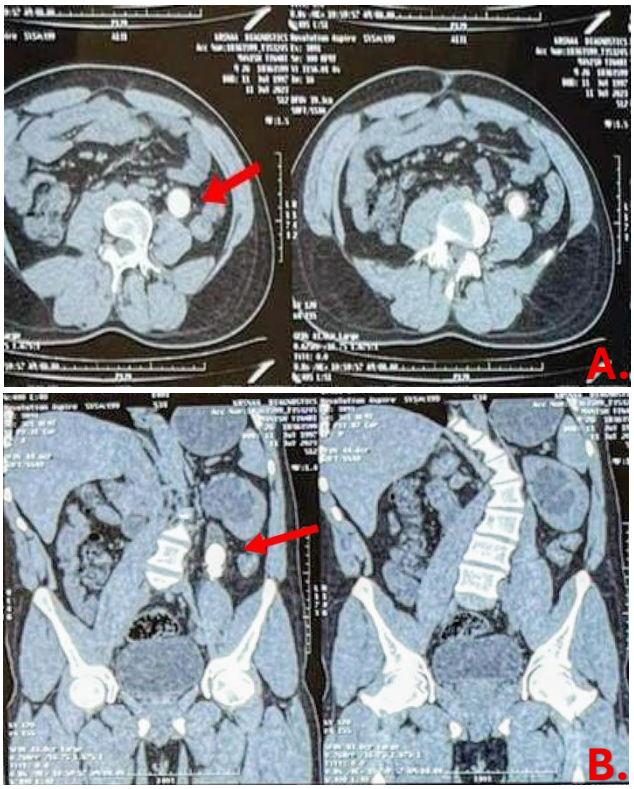

Fig. 2: NCCT KUB (A- axial section depicting large left upper ureteric calculus; B- coronal section depicting ureteric calculus and lumbar scoliosis)

Due to the anatomical shift from scoliosis, port placement was modified. The procedure was performed using a three-port technique: a 10mm umbilical port for the camera, along with two working ports – a 10mm port placed in the right mid-clavicular line at the level of the anterior superior iliac spine and a 5mm port positioned in the subcostal region. Adjustments in port placement were essential to optimize visualization and instrument handling. The ureter was dissected carefully to avoid injury to nearby organs, given the altered anatomy. The ureter was incised, revealing the large stone, which was successfully removed intact (Fig. no.3 and 4). A 24/6 Fr double-J stent was then placed to maintain ureteral patency postoperatively (Fig. no.5). The ureterotomy was closed with absorbable 3-0 vicryl suture. The patient's recovery was uneventful. The stent was removed four weeks post-surgery. At six-week follow-up, imaging showed no residual stones and renal function tests were within normal limits.

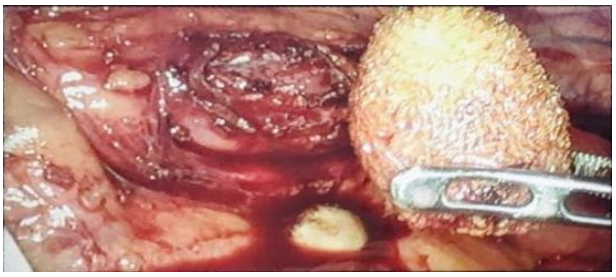

Fig. 3: Depicting removal of large ureteric calculus

Fig. 4: Multiple ueretic calculi

Fig. 5: Postoperative Xray KUB depicting left DJ stent

Discussion

Spontaneous passage of kidney stones occurs in approximately 86% of cases within 30-40 days, with stone size being a crucial determinant of passage time and likelihood [4]. Specifically, stones measuring around 8-9 mm have a relatively low passage rate of 25%. Managing impacted upper ureteral stones is especially challenging, particularly in patients with spinal deformities. Treatment options include ESWL, Retrograde Intrarenal Surgery (RIRS), Percutaneous Nephrolithotomy (PCNL), and open or laparoscopic ureterolithotomy. In cases of advanced scoliosis, the effectiveness of ESWL is diminished due to positioning difficulties and limited contact, leading to a lower stone clearance rate (44-73%). For stones larger than 2 cm or those with a complex anatomy, PCNL is the preferred treatment, particularly when alternatives such as ESWL and RIRS are not viable [5]. While PCNL is effective, it has higher risks, especially in patients with scoliosis due to limited access, increased organ injury risk, anesthetic challenges, and multiple sitting [6]. Modifications in patient positioning (prone, lateral, or

supine) and the use of fluoroscopic or ultrasound guidance are often needed [7]. Laparoscopic or open ureterolithotomy may be used if other treatments are not viable, though these options have higher morbidity and require advanced surgical expertise [8]. The laparoscopic approach is superior to open surgery as it reduces the risk of organ injury, surgical site infections, and hospital stay while being minimally invasive. Therefore, in this case, a laparoscopic procedure was performed.

Laparoscopic ureterolithotomy is an effective treatment for large ureteral stones, but scoliosis adds complexity due to altered anatomy [9]. Careful preoperative planning and intraoperative modifications can enable successful outcomes. However, ESWL and PCNL are challenging to perform in patients with scoliosis because of various underlying complications. As ESWL is limited to stone sizes up to 20 mm, this could not be performed in this case. Performing PCNL on patients with scoliosis poses significant challenges, primarily due to the risk of damaging surrounding organs that may be displaced or deformed during the procedure. Consequently, the presence of renal calculi combined with severe spinal deformity is regarded as a relative contraindication for PCNL. In patients with scoliosis, careful selection of the puncture site is crucial for establishing a safe percutaneous renal access channel. However, when the spine curves toward the unaffected side, the affected kidney is pushed deeper, heightening the risk of injury to adjacent organs during the procedure [10].

Conclusion

In patients with complex anatomical challenges such as severe scoliosis, laparoscopic ureterolithotomy can be a viable and effective alternative to PCNL. It offers the benefits of minimally invasive surgery with no need for auxiliary procedures, while still providing adequate access to the urinary tract for stone removal. It provides several benefits over open surgery, such as reduced postoperative pain, quicker recovery, and a shorter hospital stay. Careful preoperative planning and positioning are essential for successful outcomes, especially in cases with large stones. Given the patient's symptoms and imaging findings, laparoscopic ureterolithotomy is a reasonable choice, especially if PCNL is technically challenging due to the scoliosis.

Declarations

Patient Consent

Informed consent was obtained from the patient for publication of this case report.

Ethical approval

Not applicable

Conflict of Interest

No conflicts of interest.

Financial Disclosure

The author declares that this study received no financial support.

Authors' contributions

All authors were both involved in the conception and coordination of this report and drafted the manuscript. Additionally, all authors have read and approved the final version.

Availability of supporting data

All relevant supporting data for this case report are available upon request. Patient records and imaging data, including the ultrasound findings and photographs, are stored securely in the hospital's medical records system.

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