

CASE REPORTS

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Successful single-stage transperitoneal laparoscopic ureterolithotomy in a solitary functioning renal unit with multiple large ureteric calculi along its entire length

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Abstract

Background: Laparoscopic ureterolithotomy bridges the gap between open and endourologic procedures as it is minimally invasive and overcomes a few of the disadvantages of open ureterolithotomy. We report a case of a solitary functioning renal unit with at least 12 large ureteric calculi coursing along the entire length of the ureter and involving the renal pelvis presenting with obstructive uropathy which was subsequently successfully managed with laparoscopic ureterolithotomy.

Case presentation: A 50-year-old male patient presented with obstructive uropathy with CT suggestive of solitary functioning right kidney with right ureter showing at least 13 large ureteric calculi and large renal pelvic calculi. Right transperitoneal laparoscopic ureterolithotomy was performed. All the renal and ureteric calculi were successfully removed.

Conclusion: Thus, laparoscopic ureterolithotomy with only three ports can be used to remove any burden of calculi along the course of the entire urinary tract being successful in a single stage with minimal morbidity.

Keywords: Laparoscopic, Ureterolithotomy, Ureter

1 Background

In the present endoscopic era, the indications for open surgery for stone disease range from 1.0 to 5.4% [1–4]. The use of laser has further increased the interest of urologist in ureteroscopic stone fragmentation of even multiple large ureteric calculi [5]. Although ureterolithotomy has its own set of drawbacks, it still holds ground in stones which are inaccessible and difficult to fragment by endourologic procedures [6]. Laparoscopic ureterolithotomy bridges the gap between open and endourologic procedures as it is minimally invasive and overcomes a few of the disadvantages of open ureterolithotomy. There have been few case reports of

laparoscopic ureterolithotomy being successfully used for giant calculus and multiple calculus involving lower and mid-ureter; however, none to our knowledge have tackled multiple ureteric calculus coursing along the length of the ureteric and the renal pelvis. We report a case of a solitary functioning renal unit with at least 12 large ureteric calculi coursing along the entire length of the ureter and involving the renal pelvis presenting with obstructive uropathy which was subsequently successfully managed with laparoscopic ureterolithotomy.

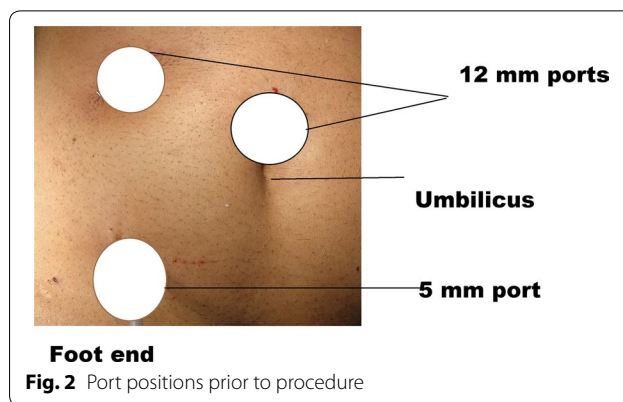
2 Case presentation

A 50-year-old male patient presented with fever, oliguria, vomiting and bilateral flank pain since 3 days. On clinical examination, patient was conscious with a pulse rate of 100 and blood pressure of 130/90 mmHg. The patient had bilateral pitting pedal oedema and abdominal

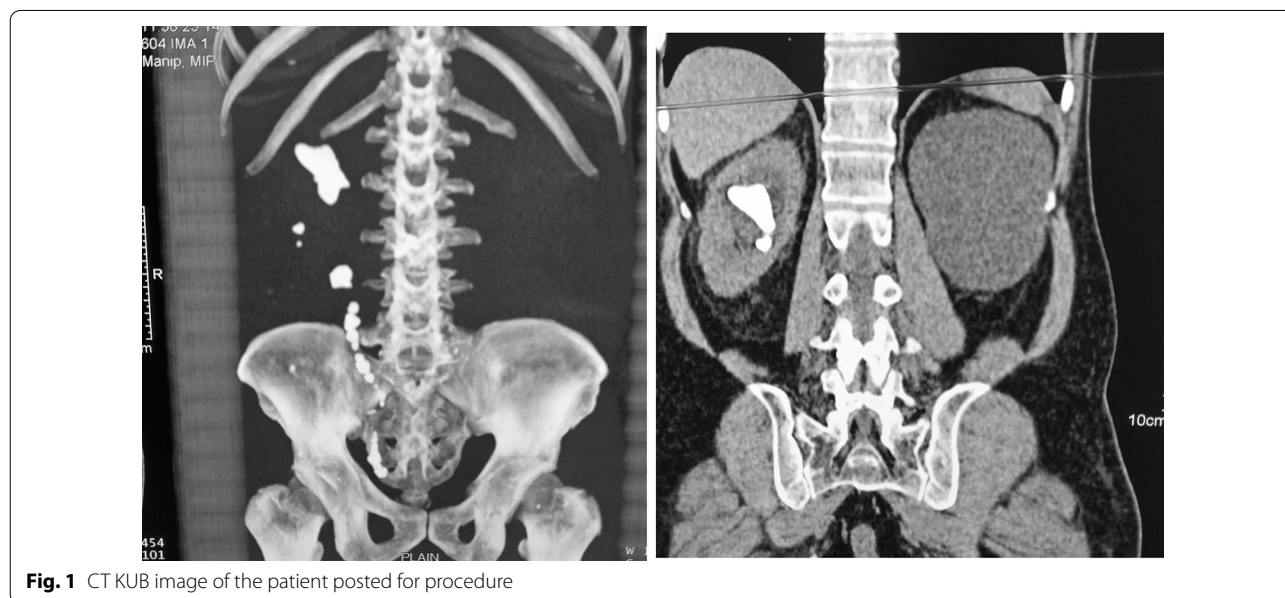
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distension. On investigating him further, he had haemoglobin of 10.6 gm/dL with complete blood counts of 18,900/cmm and platelets of 1.5 lacs/cmm. Renal function tests revealed BUN of 24 mg/dL and creatinine of 9.4 mg/dL, and electrolytes and liver function tests were within normal limits. CT KUB with 3D reconstruction was done which showed left gross hydronephrosis with paper-thin parenchyma and a 26 × 19 mm sized calculus at the left PUJ. Right kidney showed moderate hydronephrosis with multiple (at least 13 calculi identified) calculi in the entire right ureter, the largest calculus measures 19 × 16 mm in size. A 5.0 × 2.5 cms sized calculus is noted in the right renal pelvis extending into the lower calyx. Few (5) 8–10-mm calculi are noted in the right renal calyces (Fig. 1). The patient was diagnosed to have acute kidney injury, and bilateral percutaneous nephrostomy (PCN) was inserted which drained turbid urine. Urine from PCN grew *Klebsiella* sp. sensitive to meropenem, and antibiotic was started accordingly. On reassessment after 5 days, the patient had a creatinine of 3.5 mg/dL and daily urine output from left PCN was 100 mL and from right was 1300 mL. EC scan revealed nonfunctioning left kidney with right kidney having an ERPF of 60 mL/min. After the urine culture was sterile, patient was posted for right transperitoneal laparoscopic ureterolithotomy.

The patient was given right flank-up position, and ports were inserted after creating pneumoperitoneum with a Veress needle (Fig. 2). Ascending colon and peritoneum reflected medially and kidney identified. Ureter was traced from below upward till renal pelvis, and stones were palpated along the course of ureter.



Incision was taken over the stone in lower ureter medially and ureter opened; nine stones were retrieved from mid- and lower ureter (Fig. 3). Upper ureteric incision of 2 cms was taken extending into the pelviureteric junction, and two upper ureteric stones were removed and one pelvic removed. 6/26 Fr. DJ stent was kept over guide wire (Fig. 4). Ureteric incisions were closed with 3.0 Vicryl continuous sutures over 6/26 Fr. DJ stent. All stones were secured in a retrieval bag (Fig. 5) and removed outside through port-site incision. Abdominal drain of 16 Fr was kept. Blood loss was 100 mL, and operative time was one and a half hour. All the stones retrieved are placed sequentially as were present in the ureter, which is demonstrated in Fig. 6. Post-operative image of abdomen is shown in Fig. 7.



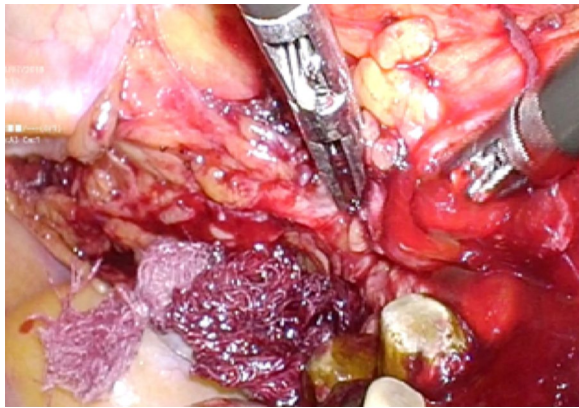


Fig. 3 Incision on ureter with the removal of stones

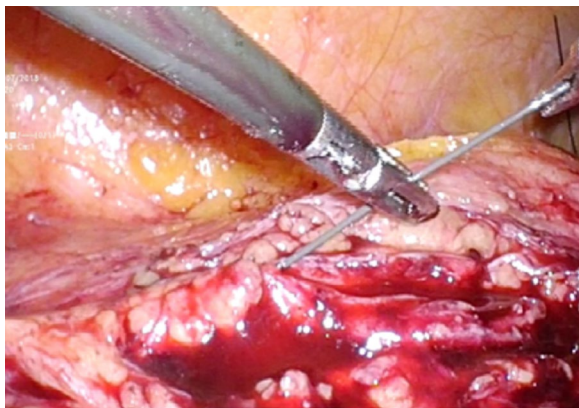


Fig. 4 DJ stent insertion after ensuring complete clearance

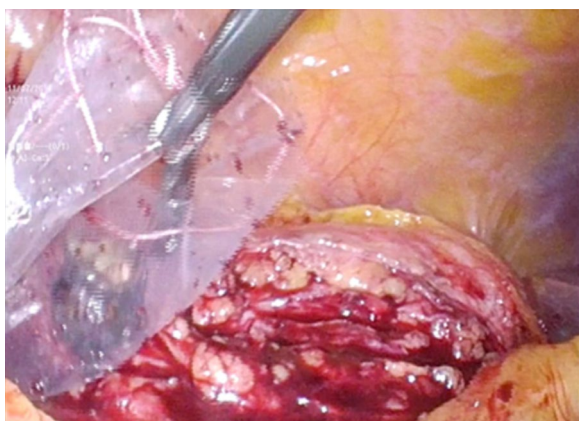


Fig. 5 Retrieval of stones in the endobag



Fig. 6 All stones retrieved arranged in order

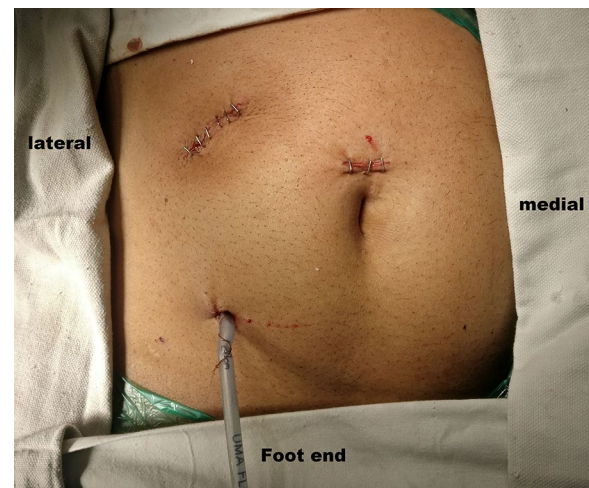


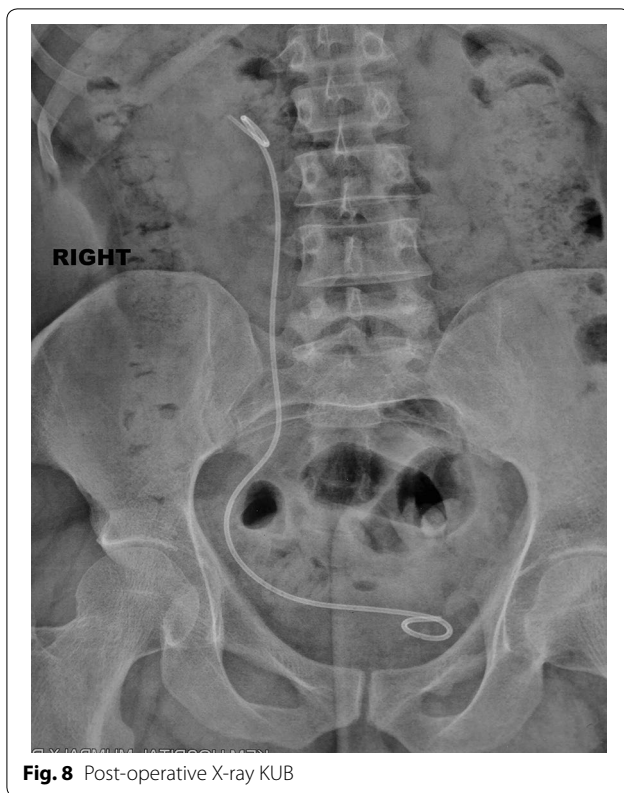
Fig. 7 Post-operative image of the patient

Post-operative course was uneventful with a nadir creatinine of 3.2 mg/dL and daily output of 1.5 L. Drain was removed on post-operative day 3, per urethral catheter

on day 4 and right PCN on day 7. Post-operative X-ray and USG revealed residual nonobstructive 8-mm calculi in right lower pole (Fig. 8). DJ stent was removed on post-operative day 21.

3 Discussion

Impacted renal pelvic calculi as well as multiple ureteric calculi coursing along the entire length of the ureter in a solitary functioning kidney with acute obstructive uropathy pose unique challenges. Despite advances in



endourology, ureteroscopy has reintervention rates of 2–7% for multiple large calculi [7, 8]. This case could have been managed with staged endourologic procedures—ureteroscopy and laser fragmentation of lower and mid-ureteric calculi followed by push back percutaneous nephrolithotomy. However, every additional procedure would have meant subjecting the patient to the risk of urosepsis and acute kidney injury [9]. Open ureterolithotomy in this case would have resulted in a long muscle cutting incision, and the stones were present along the entire length of the ureter. Previous literature has reported prolonged hospital stay and increased post-operative pain with open ureterolithotomy [10].

In tertiary care centre with expertise of laparoscopy, both European and American urology association recommends the use of laparoscopic ureterolithotomy in large ureteric calculi. Therefore, a laparoscopic approach was planned for this patient.

Port insertion is the one of the most important steps in performing laparoscopic procedures successfully. In this case as well, port placement was planned as described to gain access to the entire length of ureter and the renal pelvis. Localization of the ureter and its dissection were easy as the ureter was dilated. On having palpated the lower ureteric calculi and hooking below the lowermost calculi, a clean incision was taken with a knife. Diathermy

was avoided as it decreases the vascularity and may result in injury by lateral currents [11]. Mid-ureteric calculi were removed from the same lower ureteric incision. Each stone was carefully retrieved and bagged, thereby avoiding losing any stone in the peritoneal cavity which is a major disadvantage of transperitoneal over retroperitoneal laparoscopic ureterolithotomy. Upper ureteric incision was used to retrieve the upper ureteric and renal pelvis calculi, and double J stent was placed laparoscopically which saved operative time. The incisions were meticulously sutured. Double J stent was used as mentioned in the previous literature to prevent complications like urinoma post-operatively in multiple large impacted calculi [12]. All the bagged stones were retrieved through an incision over the 12-mm port site to avoid slippage of any stone.

Laparoscopic procedures have their own set of disadvantages of injury to the viscera and loss of stone in peritoneal cavity as compared to endourologic procedures [13]. However, following principles of laparoscopy meticulously as mentioned above, the advantages outweigh these disadvantages in patients with such a large burden of stones and history of acute kidney injury. Also, perioperative antibiotics and urinary diversion helped prevent post-operative complications.

4 Conclusion

Thus, laparoscopic ureterolithotomy with only three ports can be used to remove any burden of calculi along the course of the entire urinary tract being successful in a single stage with minimal morbidity as laparoscopy helps visualize the entire ureter and renal pelvis after appropriate port insertion and meticulous dissection.

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Authors' contributions

SUK gave idea and collected the patients' data and analysed them. BP and DK were involved in study design and followed the patients post-operatively. SKP wrote the paper with revision. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was approved by the Research Ethics Committee of the Seth G.S. Medical College and K.E.M., reference number of approval: IEC 2018/02/213. The patient included in this study gave written informed consent to participate in this research.

Consent for publication

The patient included in this study gave written informed consent to publish.

Competing interests

The authors declare that they have no competing interests.

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