



CASE REPORT

Bilateral Synchronous 3-Port Trans-peritoneal Laparoscopic Ureterolithotomy: a Case Report

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Abstract

Trans-peritoneal laparoscopic ureterolithotomy is a well-established minimally invasive procedure for management of large impacted ureteric stones since the last 3 decades. We present a case of a 51-year old gentleman, who presented with bilateral large upper ureteric calculi with obstructive uropathy and azotemia, managed successfully with bilateral synchronous 3-port trans-peritoneal laparoscopic ureterolithotomy, and to our knowledge is the first such case to be reported in literature.

Keywords Bilateral large ureteric calculi · Minimally invasive surgery · Trans-peritoneal laparoscopic ureterolithotomy · Bilateral synchronous laparoscopic urologic surgery · Case report

Introduction

Trans-peritoneal laparoscopic ureterolithotomy (TLUL) is presently one of the well-established minimally invasive surgeries for large impacted ureteric stones. However, there has been no case of bilateral synchronous 3-port TLUL reported till now. We report one such uniquely managed case during the coronavirus pandemic.

Case Presentation

A 51-year-old gentleman presented with right flank pain of 2 months' duration in Oct 2020 to our tertiary care hospital. Patient had got an ultrasonography (USG) of the abdomen at a different center one month before, which revealed bilateral gross hydronephrosis and paper thin cortex due to bilateral large upper ureteric calculi. On admission, his lab parameters were as follows: haemoglobin — 11.4 mg/dl; total

leucocyte count — 6700/cumm; blood urea — 180 mg/dl; serum creatinine — 9.73 mg/dl; serum sodium — 130 mEq/l; and potassium — 3.9 mEq/l. Urine routine and microscopic examination were normal, and urine culture showed no growth. Patient was newly detected with hypertension on admission and managed with anti-hypertensives. He did not have any past history of urological intervention. Noncontrast computerized tomography (NCCT) scan of abdomen revealed bilateral large proximal ureteric calculi (right calculus measuring 2 cm with a radio-density of 1102 HU and left calculus measuring 2.96 cm with a radio-density of 604 HU) causing bilateral gross grade-IV hydronephrosis and severe cortical thinning (Fig. 1). The parenchymal thickness of right kidney was 9.6 mm in upper pole, 9.1 mm in mid pole and 3.4 mm in lower pole. In the left kidney, it was 8 mm in upper pole, 13 mm in mid pole and 5.9 mm in lower pole.

He underwent bilateral percutaneous nephrostomy (PCN), by interventional radiologist under both USG and fluoroscopy guidance (Fig. 2). Later serum creatinine settled to 3 mg/dl, after being on bilateral PCN for about 20 days. Right and Left PCN urine outputs were 1–1.5 l/day and 2–2.5 l/day, respectively. Patient was planned for synchronous B/L trans-peritoneal laparoscopic ureterolithotomy (TLUL) along with bilateral ante-grade double “J” (DJ) stenting under general anaesthesia. Initially, patient was placed under modified right lateral decubitus position and pneumoperitoneum was created through Veress needle technique; 3 ports were placed — one 10-mm camera port just above the umbilicus, one 10-mm working port in the midline

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Fig. 1 NCCT KUB Scan showing bilateral large upper ureteric calculi with gross hydronephrosis and cortical thinning



Fig. 2 X-ray KUB showing bilateral ureteric calculi with bilateral percutaneous nephrostomy

suprapubic region and one 5-mm working port in the midline epigastric region (Fig. 3a). He underwent left TLUL and ante-grade DJ stenting. Later, he was placed in left modified

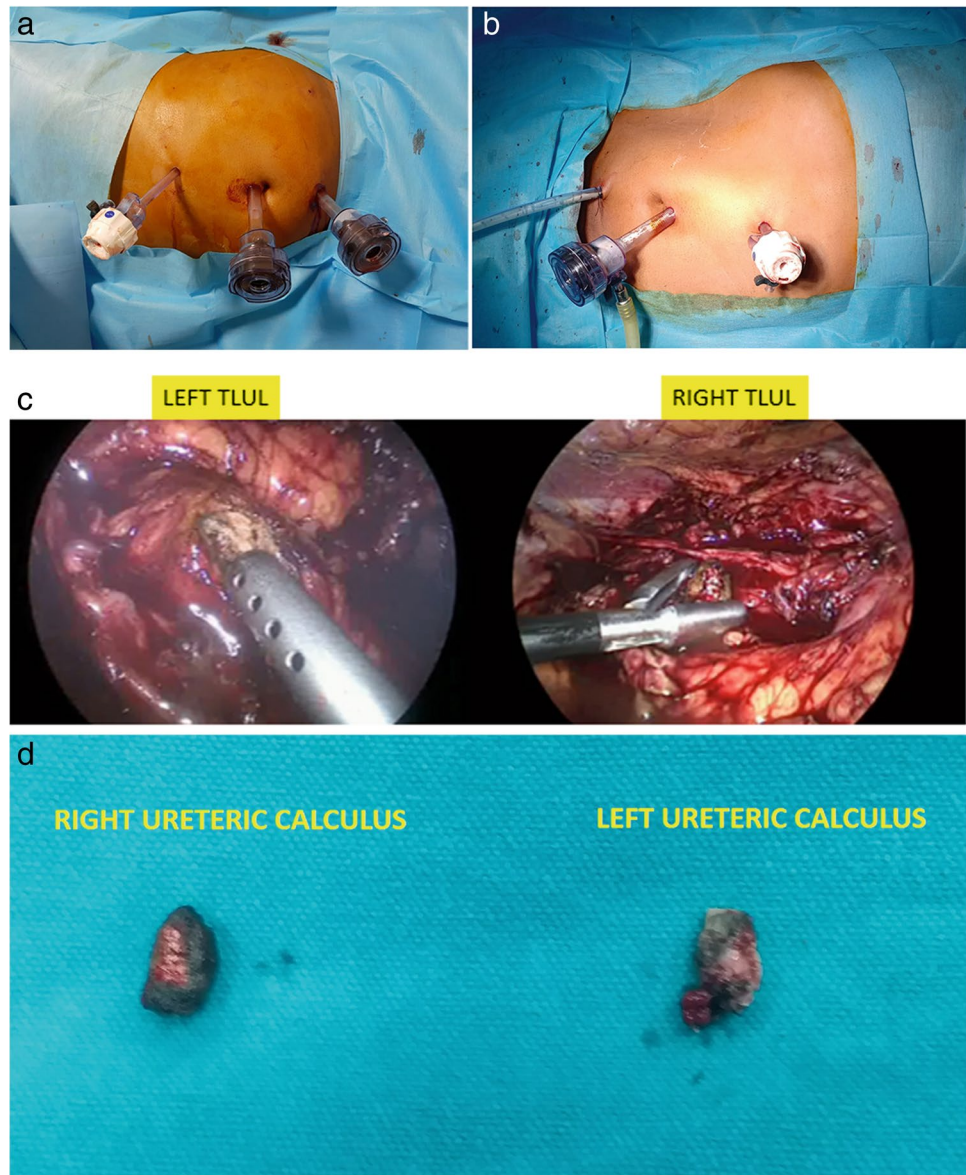
lateral decubitus position and underwent right TLUL and ante-grade DJ stenting using the same 3 ports. Both the left and right ureteric calculi were removed through the 10-mm suprapubic port, and a tube drain was placed through the same port site (Fig. 3b, c, and d). The ureterostomy was closed using polydioxanone-910 4–0 continuous sutures. Total duration of the surgery was only 150 min including the time taken for changing the patient's position, and there was no significant blood loss. Bilateral PCN catheters were removed on first postoperative day (POD) after confirming the satisfactory position of bilateral DJ stents (Fig. 4). Drain was removed on second POD, and he was discharged after removal of per-urethral catheter on third POD. Bilateral DJ stents were removed 1 month later, and his serum creatinine had settled to 1.5 mg/dl then. NCCT scan, done 2 months postoperatively, showed improvement of bilateral hydronephrosis to grade-III (Fig. 5). There was no significant change in haemoglobin level postoperatively. The composition of stones was 80% calcium oxalate monohydrate and 20% calcium oxalate dihydrate. Later, he underwent metabolic workup for urolithiasis, but no specific abnormality could be detected. He is presently on follow-up with nephrologist for chronic kidney disease.

Discussion and Conclusions

TLUL was first described by Raboy et al. for a 14-mm distal ureteric cysteine calculus which was not amenable to ureteroscopic laser lithotripsy [1]. Retroperitoneal LUL gained popularity when Gaur et al. described their technique of hydraulic balloon dilation that provided quick access to the retroperitoneum [2]. LUL with both trans-peritoneal and retroperitoneal techniques have been used for large impacted ureteric calculi, with stone size more than 15 mm, and it has been found that both approaches are effective. The trans-peritoneal technique has significantly shorter operative time and lower rate of open conversion but has a significantly longer time to oral intake [3].

In a case series of synchronous bilateral trans-peritoneal laparoscopic surgery for renal and ureteric stones, 3 patients underwent bilateral laparoscopic pyelolithotomy and a 11-year-old boy underwent right pyelolithotomy for renal pelvis stone and left ureterolithotomy for left upper ureteric calculus; 4 ports were used in these patients [4]. Linhui et al. have reported 2 cases of bilateral transumbilical laparoscopic single-site (LESS) surgeries in a single operative session. One patient underwent right ureterolithotomy and left varicocelectomy. The other patient underwent right simple nephrectomy for nonfunctioning kidney due to ureteric calculus and left ureterolithotomy; the total operative time was 340 min (120 min and 220 min, respectively) [5].

Fig. 3 **a** Modified right lateral decubitus position with 3 midline ports for trans-peritoneal laparoscopic left ureterolithotomy. **b** Modified left lateral decubitus position with 2 midline ports and drain through the suprapubic port after completion of trans-peritoneal laparoscopic right ureterolithotomy. **c** Left and right ureteric calculi seen intraoperatively, respectively. **d** Right and left ureteric calculi after laparoscopic extraction



But till date, no case of bilateral synchronous 3-port TLUL similar to ours has been reported in the literature. The decision to do such a procedure was taken considering the large size of the bilateral ureteric stones, both the kidneys showing adequate function in terms of good PCN urine output and also the thin built of the patient which allowed successful completion of the surgery with only use of 3 midline ports. Also, if the patient had undergone a metachronous surgery, he would have had to remain with the contralateral PCN for a longer duration affecting his quality of life and the surgeon would have had to deal with intraperitoneal adhesions during the second surgery. Moreover, the requirement to avoid additional operative slots, repeat admission and general anaesthesia to the patient during the difficult times of the coronavirus pandemic led the surgeon to think about

this innovative idea of bilateral synchronous 3-port TLUL, thus providing the patient the maximum benefit of minimally invasive surgery.

Our patient had a slower recovery of renal function after relief of obstruction. Urinary tract obstruction of longer than 4 to 6 weeks' duration is usually said to be irreversible based on animal experiments. But there has been a previous report showing three cases of long-standing urinary tract obstruction leading to apparent dialysis-dependent end-stage renal disease, where relief of obstruction eventually led to discontinuation of dialysis [6]. The duration of bilateral obstruction compatible with return of life sustaining renal function is poorly defined. In another study of 239 patients with renal failure caused by urolithiasis, the post-PCN fall in serum creatinine to less than 3 mg/dl was found to be the



Fig. 4 Satisfactory position of bilateral DJ stents on X-ray KUB on first postoperative day



Fig. 5 Postoperative NCCT KUB scan after removal of DJ stents, showing improvement of bilateral hydronephrosis

most reliable method of predicting future recovery of renal function after relief of obstruction with 97.8% accuracy [7]. Hence, it is always prudent to give the benefit of doubt and save the kidneys.

The other option for the management of this patient could have been bilateral single session percutaneous nephrolithotomy (PCNL), which has been found to be comparable to staged technique for bilateral renal calculi as regard to stone free rate and complications, along with significant reduction in the cumulative operative time and hospital stay [8]. But in our patient, the stones were in the upper ureter (right side — L4-L5 vertebrae level and left side — L3-L4 vertebrae level) (Fig. 2) and the ureters were tortuous; hence, it was decided to do synchronous bilateral TLUL and accomplished as well with significant reduction in the cumulative operative time and hospital stay.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s42399-022-01190-5>.

Author Contribution Single author study, responsible for all relevant contributions.

Data Availability Original data and material.

Code Availability Not applicable.

Declarations

Ethics Approval It is a case report, and ethics approval is not applicable.

Consent to Participate Written informed consent to participate was obtained from the individual participant included in the study.

Consent for Publication Written informed consent for publication was obtained from the individual participant included in the study.

Competing Interests The author declares no competing interests.

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