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New Technique

Novel technique (Ramalingam technique) of port site retrograde intra renal surgery through exteriorized ureter during laparoscopy

Occurrence of significant sized renal calculi along with ureteric pathology is not uncommon. We presented two patients: one with significant sized renal calculi along with lower ureteric stricture, and second case with significant sized renal calculi with primary obstructive mega ureter needing surgery for both the renal calculi and ureteric pathology. In both patients laparoscopy was done, and the ureter was mobilised and divided just above the level of the pathology and exteriorised through the nearest sited port, and retrograde intra-renal surgery (RIRS) was done using flexible ureteroscope and laser. Subsequently laparoscopy was resumed, and ureteric reimplantation directly into the bladder or with a Boari flap was done. The entire procedure was completed in a single stage. This novel technique of exteriorizing the ureter through the laparoscopic port site for flexible ureteroscopy in a case of lower ureteric pathology with renal stone is an advantageous option to manage both pathologies in a single stage. It has a better stone clearance than shock wave lithotripsy and less morbidity than percutaneous nephrolithotomy (PCNL).

The first case was a 37 year-old female presented with pain right loin for 1 year. She had a history of stricture lower ureter for which laser incision was done in 2016. Computed tomography (CT) urogram revealed stricture lower ureter with calculi in the ureter and a 14 mm upper calyceal calculus (Fig. 1A). Consent was obtained for port site RIRS cystoscopy, and right retrograde pyelogram was done which revealed a stricture about 10 cm from the vesico-ureteric junction (Fig. 1B). Laparoscopy was done, and the ureter was divided above the level of the stricture and was brought out (exteriorised) through the 10 mm port at the right iliac fossa (Fig. 1C). The calculi in the lower ureter were retrieved and flexible ureteroscopy was passed (Fig. 1D) and the calculus in the kidney was fragmented satisfactorily with laser (Fig. 1E). A diagrammatic representation illustrated the position of the flexible ureterorenoscopy (Fig. 1F). Subsequently a stent was placed and the ureter was pushed back into abdomen (Fig. 1G). A 10 mm trocar was repositioned and laparoscopy was resumed. Bladder was filled to about 300 mL Bladder flap (Boari flap) with a length of 10 cm and a base of 5 cm was raised. Boari flap ureteric reimplantation was completed (Fig. 1H and I). Tube drain was placed and ports were closed.

The second case was a 42 year-old male presented with left loin pain. CT urogram revealed primary obstructive mega ureter with 15 mm calculi in the left kidney. Using 4 ports laparoscopy was done and the ureter was dissected. The ureter was divided just above the level of narrowing of the primary obstructed mega ureter. The cut proximal end of the ureter was brought out through the 10 mm port in the left iliac fossa. Flexible ureteroscope was passed through the exteriorised ureter and the calculus was fragmented with laser. All the stone fragments were retrieved. Stent was placed easily while the ureter was extracorporeal. Subsequently nipple was created in the lower ureteric end. The ureter was then pushed back into the peritoneal cavity and laparoscopy resumed. Bladder was filled to about 300 mL. Cystotomy was made near the dome (to facilitate RIRS in case of stone recurrence) and ureteric reimplant was done laparoscopically.

The procedure was completed in 240 min in Case 1 and 160 min in Case 2. Both did not have any major complications. Drain was removed on the third day and catheter was removed after 2 weeks. Stent was removed after 6 weeks (Fig. 1J). CT scan done in Case 1 after 9 months showed stone clearance and fairly decompressed hydronephrosis (Fig. 1K and L). Post procedure imaging showed stone clearance and decompressed collecting system and ureter and a wide Boari flap in Case 2 (Fig.1M and N).

Ureteric pathology like ureteric stricture or primary obstructive megaureter with renal calculi is a challenging situation. Here there is a need for lower ureteric surgery and renal surgery. Ureteric reimplantation directly into the bladder or using a Boari flap by laparoscopic approach is well established [1]. The renal calculi cannot be dealt with

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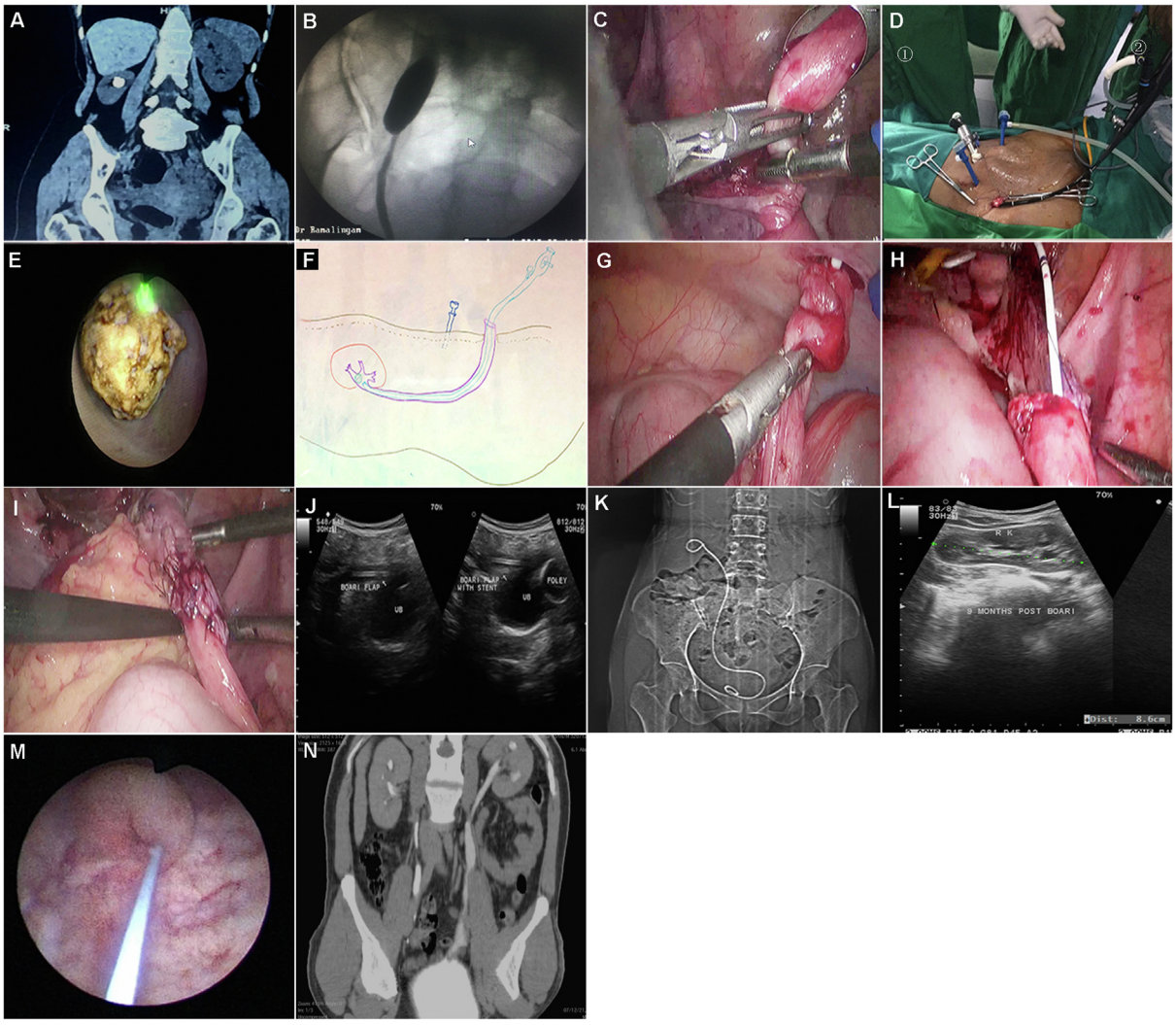

Figure 1 Operative related images. (A) Computed tomography scan showing a 14 mm right renal calculus; (B) Right retrograde pyelogram confirming long lower ureteric stricture; (C) Right ureter mobilised up to pelvic brim and brought out through 10 mm flank port; (D) Flexible ureterorenoscopy advanced through the exteriorised ureter; (E) Laser lithotripsy done and fragments basketed out; (F) Diagrammatic representation of the procedure; (G) Ureter stented, pushed back into the peritoneal cavity; (H) Boari flap reconstruction in progress; (I) Boari flap completed and omentum wrapped; (J) 2 weeks post-operative ultrasonogram scan of Boari flap; (K) Post-operative plain computerized tomogram of Case 1 showing clearance of renal stone; (L) Post-operative ultrasonogram of Case 1 showing regression of the hydronephrosis; (M) Post-operative cystoscopic view of Nipple valve reimplantation of Case 2; (N) Computerized tomogram showing good drainage of left ureter of Case 2.

RIRS as the stricture will not permit passage of the ureteroscope. Options are laparoscopic ureteric reimplantation and PCNL in the same sitting or in two sittings. PCNL certainly causes some damage to nephrons and is more morbid. The other possible option is passing a flexible cystoscope or nephroscope through a 10 mm port and introducing it into the pelvis through a pyelotomy incision after or before completing the laparoscopic procedure for the lower ureteric obstruction. Bowel forceps or other similar instruments have also been used to retrieve the calculi in the renal pelvis through a pyelotomy using an appropriately placed trocar. Energy source used to fragment significant sized calculi can be laser or pneumatic lithotriptor. The other option is to complete the laparoscopic management of the ureteric pathology initially and do RIRS as a second stage. However, the site of ureteric reimplantation may not always be conducive for passage of the access sheath or ureteroscope. Shock wave lithotripsy to the renal calculi as a second stage is also another option if the density of the stone is suitable.

We used this technique of bringing out the ureter through the laparoscopic port site. This allows the flexible ureteroscopy to be passed through the divided ureteric end to fragment the renal calculus using laser. As the ureteric end is exteriorised for RIRS, there is no spillage of the irrigating fluid or fine stone fragments inside the abdominal cavity. In RIRS, there is no damage to the nephrons as in PCNL.

Şahin et al. [2] described a method of using flexible cystoscope through the laparoscopic port to retrieve calculi which may migrate into the kidney during laparoscopic ureterolithotomy. Similar procedure has also been reported for staghorn calculi wherein a cystoscope was passed through the 10 mm laparoscopic port into the pelvis through a pyelotomy incision to give a better clearance of the calculus [3].

Ureteroscopic stone extraction has been described with retroperitoneoscopic ureterolithotomy for significant sized ureteric stone with multiple renal calculi [4]. However, the authors passed the flexible ureteroscope through the laparoscopic port and then passed it into the renal pelvis through a ureterotomy incision in contrast to our technique of directly passing the ureteroscope into the exteriorized ureter. Obviously, there is always a spill of the irrigating fluid and fine stone fragments through the ureterotomy site into the peritoneum.

Rigid ureteroscopy was performed by Chen et al. [5] through a 16 Fr catheter sheath placed directly into the pelvis to remove secondary calculi during laparoscopic pyelolithotomy. Here the angulation was difficult due to the rigid ureteroscope used and the spilled irrigation fluid had to be sucked out. In addition, there always will be a risk of shearing of the pelvis while manipulating a rigid ureteroscope. The authors mentioned that rigid ureteroscope was easier to manipulate and work with than a flexible nephroscope. Notably, the authors had used only 5 mm and 3 mm ports.

Similarly the use of flexible cystoscope or nephroscope or direct removal of the renal calculus with a bowel holding forceps for concomitant removal of renal pelvis stones during laparoscopic pyeloplasty has been reported [6]. The emphasis is on the placement of the trocars in alignment with the pyelotomy to reach all the possible calyces to retrieve the maximum possible calculi.

We have also performed similar procedure of using 10 mm right angle forceps to retrieve a secondary partial staghorn calculus through 20 mm port in a case of left pelviureteric junction obstruction with secondary calculus through laparoscopic port during pyelolithotomy.

The drawback in this technique of passing the scope through an ureterotomy or pyelotomy incision is that the fluid used for irrigation causes flooding of the peritoneal cavity along with the fine fragments of the calculi. However, in our technique of port site exteriorization of the ureter, there is no spillage of the irrigation fluid and no scattering of the fine fragments of calculi.

Ramalingam et al. [7—9] reported six patients who had port site exteriorization of bowel and ureter for ileal conduit, ileocystoplasty, ileal ureter, and tailoring of mega ureter. Port site exteriorization avoided a formal incision to bring out the bowel or ureter. Air leak which can occur following closure of an abdominal incision during conventional laparotomy and laparoscopy assisted procedures was avoided. The vascularity of the exteriorized ureter was not affected. In the experience, we could bring out the ureter through the port without any tension or compromise of its vascularity. However, in obese patients with a thick abdominal wall, it is likely to be difficult. We also did not note any stricture or necrosis of the ureter due to compromise of the vascularity.

Therefore, this novel technique (Ramalingam technique) of exteriorizing the ureter through the laparoscopic port site for flexible ureteroscopy in a case of lower ureteric pathology with renal stone is an advantageous option to manage both pathologies in single stage. Extracorporeal RIRS is a safe and effective procedure. To our knowledge, this is the first report of this novel technique.

Author contributions

Study concept and design: Manickam Ramalingam.
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Data analysis: Manickam Ramalingam, Kallappan Senthil, Sivasankaran Nacimuthu.
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Critical revision of the manuscript: Manickam Ramalingam, Kallappan Senthil, Sivasankaran Nacimuthu.

Conflicts of interest

The authors declare no conflict of interest.

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