

## Laparoscopic assisted percutaneous nephrolithotomy (PCNL) in ectopic kidneys: Two different techniques

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**Abstract.** Two patients presented with calculi in ectopic kidneys. Complete clearance of calculi was achieved by laparoscopic assisted percutaneous nephrolithotomy (PCNL), by different but related techniques. In one patient with prior history of open pyelolithotomy, the anterior surface of the kidney was exposed by mobilizing the overlying sigmoid colon laparoscopically and the percutaneous tract was established into the desired calyx under combined laparoscopic and fluoroscopic control. In the second patient, the tract was established between the major mesenteric vessels without any mobilization of the bowel. Herein, we outline the nuances of these two related techniques, and the indications and contraindications for their use for laparoscopic assisted PCNL in ectopic kidneys.

**Key words:** Calculus, Ectopic, Laparoscopy, PCNL, Percutaneous, Stone

### Introduction

The risk of injury to surrounding abdominal viscera and major vessels makes percutaneous nephrolithotomy (PCNL) in an ectopic kidney a challenging procedure. Use of laparoscopic guidance provides visual control of the process of initial puncture and tract placement that allows safe performance of a PCNL in abnormally located kidneys. We recently treated two patients with calculi in ectopic kidneys; one had a pelvic kidney, while the other had an iliac kidney. The techniques employed are the subject of this presentation.

### Patients and methods

Two men, both aged 35 years, presenting with symptomatic calculi in ectopic kidneys (Figure 1, 2) were treated with anterior transperitoneal PCNL under laparoscopic guidance. One of the patients had prior history of open pyelolithotomy for calculi in the left pelvic kidney, while the second patient had no prior intervention for stone in the right iliac kidney. Preoperative intravenous

urography and non-contrast computed tomography was done to localize the stone and select the appropriate access site in relation to surrounding vital structures. Other preoperative investigations included assessment of renal function, urinalysis, and stone-risk metabolic profile

### Technique

In the lithotomy position, under general anesthesia, a 6F open-ended ureteral catheter was introduced retrograde into the ectopic kidney. In the first patient, with the previously operated pelvic kidney, a Veress needle was inserted through a 1.5 cm umbilical incision, pneumoperitoneum created and 12 mm visualizing laparoscopic trocar (Ethicon) was inserted into the abdominal cavity. Secondary ports, 10 and 5 mm, were inserted, in the right and left iliac fossae respectively and the table tilted 30° Trendelenburg and to the right. Dense adhesions were encountered in the pelvis and the left paracolic gutter and the sigmoid colon was adherent to the anterior surface of the kidney. Using a combination of blunt and sharp dissection, the sigmoid colon was dissected off the

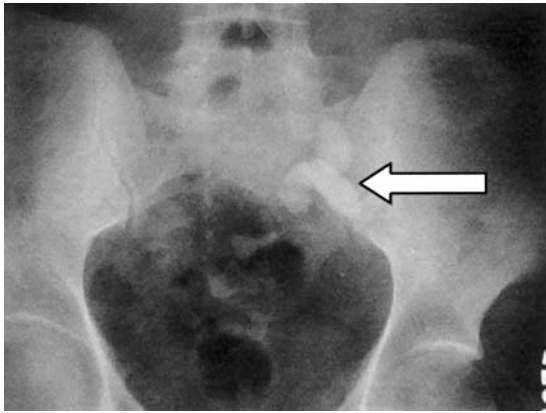


Figure 1. X-ray KUB showing stones in the ectopic left pelvic kidney overlying the left ala of the sacrum.

surface of the kidney and the anterior surface of the kidney was exposed.

In the second patient (who was quite slender with a body mass index of 21), the primary port was placed at the left border of the left rectus abdominis, at the horizontal level of the umbilicus. Two additional ports, 10 and 5 mm, were inserted in the midline, one handbreadth above and below the umbilicus. The mesentery of the small bowel was draped over the ectopic kidney in the right iliac fossa. Since the patient was quite slim, there wasn't much fat in the mesentery and the pulsations and course of the mesenteric vessels could be seen clearly, and this prompted us to proceed with laparoscopic guided puncture without mobilizing



Figure 2. X-ray KUB showing a stone in the ectopic right iliac kidney overlying the 4th lumbar vertebra.

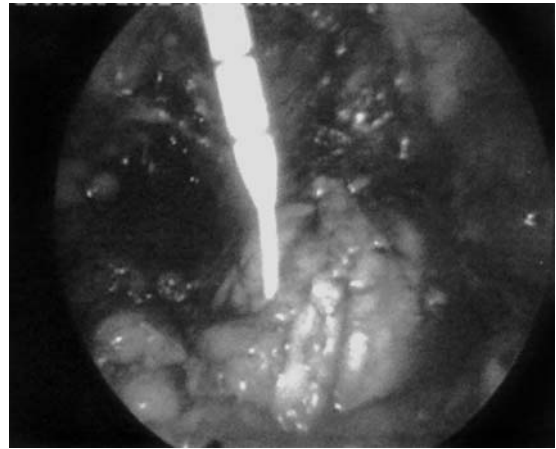


Figure 3. Laparoscopic view of percutaneous tract directly onto the anterior surface of the left pelvic kidney after mobilization of the sigmoid colon.

the bowel and the mesentery off the anterior surface of the kidney.

Iodinated contrast was injected retrograde through the ureteral catheter and the puncture made into the desired calyx under fluoroscopic and laparoscopic control directly onto the kidney in the first patient (Figure 3) and between the major mesenteric vessels in the second patient (Figure 4). A 0.038" guidewire was coiled in the system and the tract was serially dilated with Teflon coaxial fascial dilators to accept a 30F Amplatz sheath, at which point the abdomen was desufflated. A 26F nephroscope was introduced, the guidewire was universalized and all calculi were removed with a

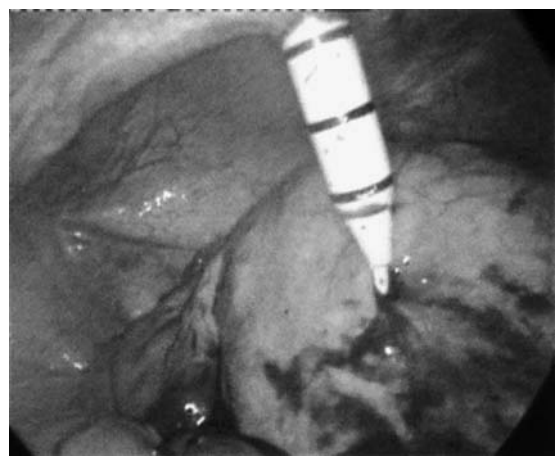


Figure 4. Laparoscopic view of transmesenteric tract in the right iliac kidney.

combination of pneumatic lithotripsy and forceps extraction. A 6F JJ stent and a 24F nephrostomy tube were placed. Pneumoperitoneum was re-established and a 14F drain was placed in the peritoneal cavity close to the kidney through the 5 mm laparoscopic port. Hemostasis was confirmed and the laparoscopic ports were removed. Complete clearance was documented with plain X-ray of the KUB region.

## Results

Complete stone clearance was achieved in both the cases via a single tract in a single session. No complications of note were encountered. Nephrostomy tube was removed on postoperative day 1 in both the cases and intraperitoneal drain was removed on day 2. Both the patients were discharged on day 4. Double J stents were removed after a week. Both patients remain stone free at 6-months follow-up.

## Discussion

Management of nephrolithiasis within an ectopic kidney presents a challenge to the urologist. PCNL, although an accepted treatment modality in anatomically normal kidneys, is still not universally performed for calculi in ectopic kidneys because of fear of injury to abdominal viscera and vessels. Ectopic kidneys require a different and more complicated approach for PCNL.

Eshghi et al. [1] first described a laparoscopic assisted PCNL technique for ectopic kidneys. Percutaneous access was obtained by retrograde nephrostomy in combination with continuous observation and displacement of bowel loops via a laparoscope. Holman et al. [2] reported 15 patients treated with laparoscopic assisted percutaneous transperitoneal nephrolithotomy. With the patient in the Trendelenburg position under laparoscopic control, the bowel was dislodged until the kidney became visible, allowing percutaneous access. All stones were removed successfully with minimal morbidity. Zafar et al. [3] modified the laparoscopic technique to include intracorporeal suturing of the nephrotomy site and ureteral stent placement allowing elimination of a transperitoneal nephrostomy tube. Troxel et al. [4] described

extraperitoneal laparoscopy-assisted percutaneous approach to access the lower-pole calyx of a pelvic kidney for PCNL. Desai et al. [5] performed PCNL in nine patients with ectopic kidneys; however the procedure was performed under ultrasound guidance alone.

The posterior approach, as for kidneys in normal position, has also been described for ectopic kidneys. Monga et al. [6] removed a calcified stent in a pelvic kidney through the prone supra-iliac approach. However, postoperative incomplete femoral neuropathy was observed probably due to direct trauma to dorsal divisions of the lumbar plexus. The authors suggested that anatomically misplaced kidneys require an astute awareness of structures that lie within the path of the percutaneous tract. Patients should be aware of the potential for nerve damage and this possibility should be factored into the risk-benefit evaluation of percutaneous vs. open management of such calculi. Watterson et al [7] described the approach through the greater sciatic foramen under fluoroscopic control after careful review of and correlation with CT to optimize tract placement and avoid injury to any intervening bowel, or anomalous or aberrant vessels. Technically, PCNL through the buttock mimics the standard flank approach. The authors contend that with proper preoperative evaluation, standard techniques and equipment, PCNL can be safely and effectively performed in a pelvic kidney without the need for ancillary modalities.

It is our belief that the posterior approach, either supra-iliac or transforaminal, is only applicable where the pelvicalyceal system (PCS) of the pelvic kidney is not completely overlapped by the sacrum and its alae. In the first patient with the pelvic kidney, the entire PCS was overlying the left ala of the sacrum. This and the potential risk of nerve injury prompted us not to opt for the supra-iliac or transgluteal approach. Although patients with a previous pyelolithotomy may have dense adhesions, this should not be a problem for an experienced laparoscopist.

In the second patient, the potential risk of colonic or large vessel injury prompted us not to opt for the posterior approach, and elect for the anterior transperitoneal laparoscopic-assisted approach. PCNL could have been performed under ultrasound guidance but it could be associated with the risk of injury to an overlying collapsed

bowel loop, which may be missed on sonography. In addition, with ultrasound guidance alone, it is very difficult to safely put in a second tract, should this become necessary. Under laparoscopic vision, transmesenteric puncture and tract dilation avoided the additional procedure of mobilization of the bowel and mesentery, making it a quick and straightforward procedure. However, we recommend, that this approach be reserved only for patients who are slim, so that all mesenteric vessels are clearly seen with the laparoscope. For patients with abundant fat in the mesentery/and or adhesions due to inflammation or prior surgery, it is safer to formally mobilize the bowel and the mesentery off the anterior surface of the kidney prior to puncture.

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