Robot-Assisted Laparoscopic Pyeloplasty with Stone Removal in an Ectopic Pelvic Kidney

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ABSTRACT

Ectopic pelvic kidneys with ureteropelvic junction obstruction and stones present a treatment challenge for the minimally invasive surgeon. A pure laparoscopic approach is less invasive than an open approach but is technically difficult with longer operative time. The use of the da Vinci robotic interface has the potential to refine the laparoscopic technique and improve outcomes. Here, we present successful management using the robotic technique of one such case of concomitant pyeloplasty and pyelolithotomy.

Key Words: Robotic, Laparoscopy, Ectopic kidney, Pyeloplasty.

INTRODUCTION

Ectopic kidney is a common congenital urological abnormality and is frequently associated with ureteropelvic junction (UPJ) obstruction and stones. Treatment options for a case with concomitant stone and UPJ obstruction are limited, including open or laparoscopic pyeloplasty along with stone removal. The laparoscopic technique may be technically difficult and more time consuming. We report our experience in managing a case of ectopic pelvic kidney with UPJO and stone by robot-assisted laparoscopic pyeloplasty and stone removal. To our knowledge, this seems to be the first such reported case.

CASE REPORT

A 55-year-old man with diabetes mellitus, hypertension, and hypothyroidism presented with vague pain in the flanks and suprapubic region along with raised serum creatinine (2.3mg%) and blood urea (82mg%) levels. An abdominal ultrasound showed an ectopic pelvic left kidney lying near the urinary bladder with severe hydronephrosis and a mobile calculus of 13mm in the renal pelvis. The right kidney also had small calculi in the upper and lower calyces. Noncontrast abdominal CT confirmed the same findings (**Figure 1**). A renal scan revealed a split renal function of 19% on the left side with delayed clearance. The overall glomerular filtration rate (GFR) was 35mL/min. The extended metabolic workup for stones was normal.

Left retrograde pyelography (RGP) demonstrated a normal ureter with narrowing at UPJ, gross hydronephrosis, and a secondary calculus in the renal pelvis. Retrograde insertion of the JJ stent was not possible during RGP. Overall, 5 ports were placed including 3 robotic ports as shown in **Figure 2**. Patient positioning was changed to a steep Trendelenburg, and the robot was docked. The hydronephrotic renal pelvis was dissected, and a longitudinal incision was made over it. A JJ stent was placed in an antegrade fashion, and Fenger's pyeloplasty was performed using 4′0 polyglactin suture. A stone was retrieved in a homemade pouch through the 12-mm port site. The overall operating room time was 94 minutes, while the surgeon's console time was 56 minutes. Postoperative

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DOI: 10.4293/108680810X12674612015102

Figure 1. Noncontrast computed tomographic scans showing ectopic (pelvic) left kidney with ureteropelvic junction obstruction and a smooth rounded secondary calculus (arrow) in the renal pelvis.

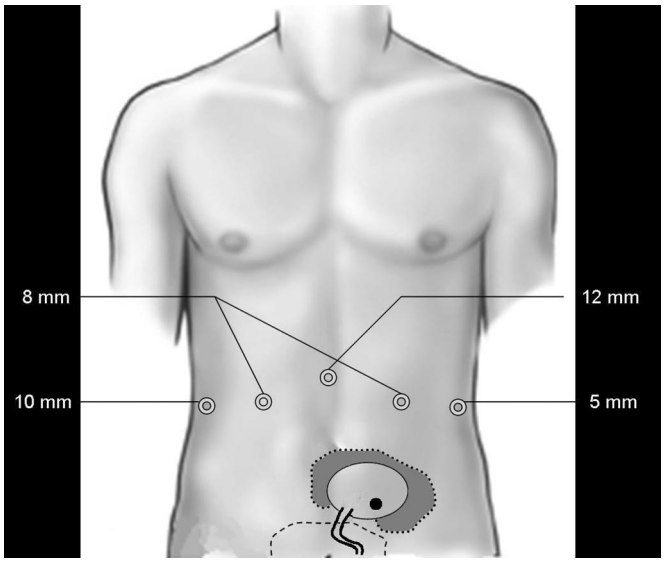

Figure 2. Port position for robotic pyeloplasty with pyelolithotomy in a pelvic kidney with ureteropelvic junction obstruction and a secondary stone.

recovery was uneventful, and the drain was removed on the second postoperative day. The patient was discharged on the third day, and the stent was kept for 4 weeks. At 6-month follow-up, the patient had serum creatinine of 1.9mg% and is symptom free with a left-sided split renal function of 24% and normal clearance on both sides.

DISCUSSION

The incidence of pelvic kidney has been approximated at between 1 in 2200 and 1 in 3000.[1] Reportedly, 56% of ectopic kidneys have hydronephrosis, of which 70% are related to UPJ obstruction. This may be related to malrotation and an anteriorly placed pelvis, which may lead to impaired drainage of urine from a high insertion of the ureter or an anomalous vasculature that partially blocks one of the major calyces or the upper ureter. The hydronephrotic pelvic kidney presents special treatment challenges, because[1] unlike lumbar kidney, the posterior approach is precluded by the sacrum[2]; the presence of viscera, aberrant vessels, and nerves if approached from the anterior aspect; and[3] poor outcomes with endoscopic approaches, because of the high insertion of ureter and anomalous vessels.[2–4]

Traditionally, such anomalies are treated with the open technique. In 2004, Bove et al[5] reported 3 cases of laparoscopic pyeloplasty in pelvic kidneys with UPJ obstruction. The laparoscopic approach provided good surgical exposure, and operative times were comparable to those of laparoscopic pyeloplasty in anatomically normal kidneys. They also reported that laparoscopic pyelolithotomy can be performed concomitant with pyeloplasty. However, the requirement of complex intracorporeal reconstruction has limited widespread application of laparoscopic pyeloplasty.[6–8] The robotic interface improves the limits of tissue dissection, intracorporeal reconstruction, suturing, and stone extraction during laparoscopy, thereby having the potential to improve the outcomes and flattening the learning curve. Though several reports are now available for the robotic approach to simultaneous pyeloplasty and pyelolithotomy,[9–11] its use for the ectopic kidney has not been reported, to our knowledge.

With our success and experience in robotics for various urological indications, we used the robotic technique in this case to good effect. The port position was carefully selected so as to make a trapezoid with the kidney at one corner and the robotic ports at the other 3 corners. The sigmoid colon reflection was not required, because the kidney was lying just above the bladder. Stone removal was perceivably easy, facilitated by the maneuverability of the robotic instruments. Since the renal pelvis was not very dilated, and the ureter had low insertion with no crossing vessel, a nondismembered technique was selected for pyeloplasty in this case. However, classical dismembered pyeloplasty has been used extensively with excellent and repeatable results in most hands and should be considered as the first choice for most patients with a large pelvis or an associated crossing vessel.[12] The use of the robot is helpful in the sense that it facilitates the surgical steps by allowing the surgeon to recapitulate the open procedure. Simultaneously, unlike the open proce-

dure, it also provides benefits of minimally invasive surgery with the potential for reduced postoperative pain, perioperative morbidity, and early return to work. Although the follow-up is not long, the interim early (6 month) functional outcome in our case has been good and demands a thorough study to compare it with the open or pure laparoscopic approach. Definitive conclusions about the advantages to be gained with the use of the da Vinci system can only be made after such studies with a larger number of cases. As we have shown, with the availability of robotic technology, the indications for minimally invasive surgery for pyeloplasty may safely be expanded to include difficult cases, such as ectopic position and concomitant stones.

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