



Trauma and Reconstruction

Laparoscopic Pyeloplasty for Ureteropelvic Junction Obstruction in an Incompletely Duplicated Collecting System in a Patient with a Horseshoe Kidney



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ABSTRACT

We present a case of UPJO associated with an incompletely duplicated collecting system in a horseshoe kidney that was successfully treated by laparoscopic pyeloplasty with concomitant pyelolithotomy. A 53-year-old man had three urological anomalies and urolithiasis. We performed a pyeloplasty and pyelolithotomy using a fully intracorporeal technique. Clinical and radiographic evaluation confirmed complete resolution of the patient's condition. To our knowledge, there have been no reported cases of UPJO in an incompletely duplicated collecting system with a horseshoe kidney in the same patient. We also provide convincing evidence that laparoscopic pyeloplasty is feasible in complex cases of renal anatomic anomalies.

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Introduction

The most common renal anomalies are duplication of the collecting system and horseshoe kidney, with incidence of 0.8% and 0.25%, respectively.¹ The ureteropelvic junction is the most common site of obstruction in the urinary tract, and laparoscopic pyeloplasty is gaining popularity as treatment for ureteropelvic junction obstruction (UPJO). The presence of UPJO with other anatomical anomalies of the kidney is uncommon, and few reports address the treatment of such cases.

We report a case of laparoscopic pyeloplasty in a horseshoe kidney with UPJO of the lower pole in an incompletely duplicated collecting system.

Case report

A 53-year-old male with intermittent left flank pain was diagnosed with left ureteral calculi; however, transurethral lithotripsy (TUL) failed because the calculi could not be accessed. He suffered from dull intermittent left flank pain since 1 year before admission to our hospital.

Despite the presence of outflow obstruction, urinalysis and renal function tests were within the normal range. His initial evaluation included a three-dimensional computed tomography (3DCT) scan, which revealed a horseshoe kidney, incomplete duplication of the left collecting system, and marked hydronephrosis of the left lower pole (Fig. 1A and B). Cystoscopy showed only two normal ureteral orifices in the bladder. Retrograde pyelography confirmed UPJO of the left lower pole in the duplicated system (Fig. 2A). Ureteroscopy revealed that two ureteral branches fused distally, one branch toward the left lower pole was thinner and a flexible ultra slim ureteroscope could not pass through it (Fig. 2B). Thus, the diagnosis was UPJO of the lower pole of an incompletely duplicated left collecting system of a horseshoe kidney. Laparoscopic pyeloplasty was performed after extensive counseling and discussion of the various therapeutic options.

Under general anesthesia, with the patient in a semi-lateral decubitus position, the intraperitoneal space was accessed through a 30-mm skin incision above the umbilical level along the left mid-clavicular line. A 10-mm balloon trocar for a camera port was placed, pneumoperitoneum was obtained, two 5-mm trocars were placed about 8 cm below the xiphoid process at slightly lateral to midline and above the iliac crest on anterior axillary line.

After the line of Toldt was incised, the anterior aspect of the horseshoe kidney was exposed and the lower left renal pole and the incompletely duplicated Y-shaped ureter were identified (Fig. 3A). There were no crossing vessels, and adhesions around the UPJ were

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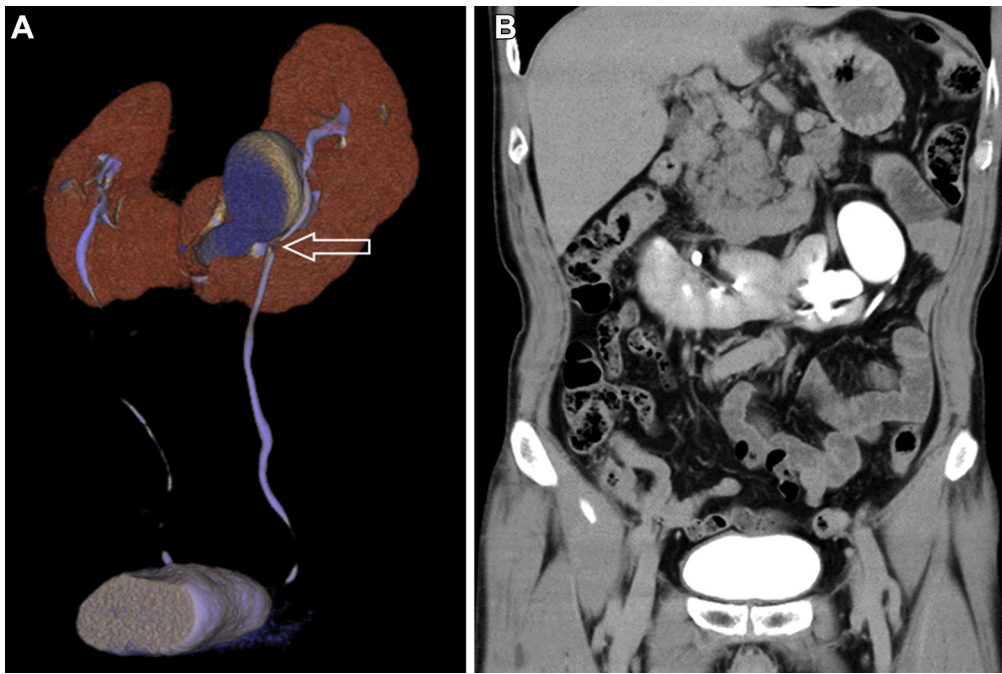


Figure 1. A, B: A three-dimensional computed tomography (3DCT) and CT scan showed a horseshoe kidney, incomplete duplicated ureter, and hydronephrosis of the left lower pole. Two ureteral branches fused here (arrow).

minimal. The ureter was not compressed by the renal parenchyma or isthmus.

We performed a pyelotomy on the lower hydronephrosis with an appropriate length of about 5 mm (Fig. 3B), a flexible ureteroscope was introduced through the 5-mm trocar into the pelvis, and pyelolithotomy was performed (Fig. 3C). Subsequently, after the narrow segment in UPJO was excised, an end-to-side (the open end of lower pelvis and a hole on the side of the healthy left ureter) laparoscopic pyeloureterostomy was performed using a 5-0 absorbable suture material with running suture (Fig. 3D). The total operative time was 269 minutes, and the estimated blood loss was negligible. He recovered well and was discharged on the fifth post-operative day. His ureteral stent was removed after 7 weeks; the hydronephrosis completely disappeared, and he did not experience any left flank pain. A histopathological study of the ureter showed ureteritis with mild fibrosis.

Discussion

Duplicated collecting systems and UPJO are common congenital anomalies of the urinary tract but rarely occur in combination—only in 2%–7% of cases.¹ To the best of our knowledge, there have been no reported cases of UPJO with incomplete ureteral duplication and a horseshoe kidney in the same patient.

Recently, minimally invasive surgery (laparoscopic and robotic pyeloplasty) has replaced open pyeloplasty as the standard of treatment for UPJO. In adults with normal kidneys, the success rate for laparoscopic pyeloplasty ranges from 94% to 98% for the transperitoneal approach.² Few reports have been published on laparoscopic pyeloplasty of UPJO in duplicated collecting systems. Bove et al (2004) have also reported laparoscopic pyeloplasty in 11 patients with various renal or urinary tract abnormalities, five and one

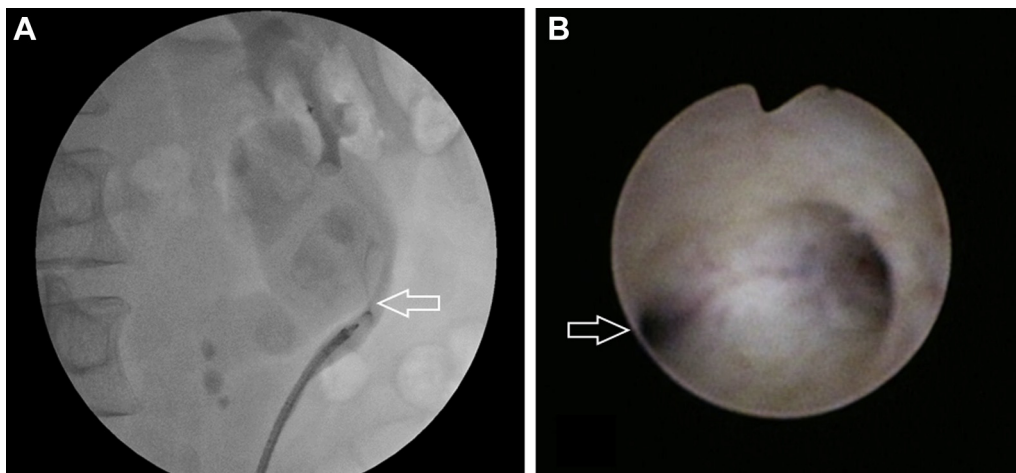


Figure 2. A: Retrograde pyelography showed a jet sign (arrow). B: One branch toward the left lower pole was thinner (arrow).

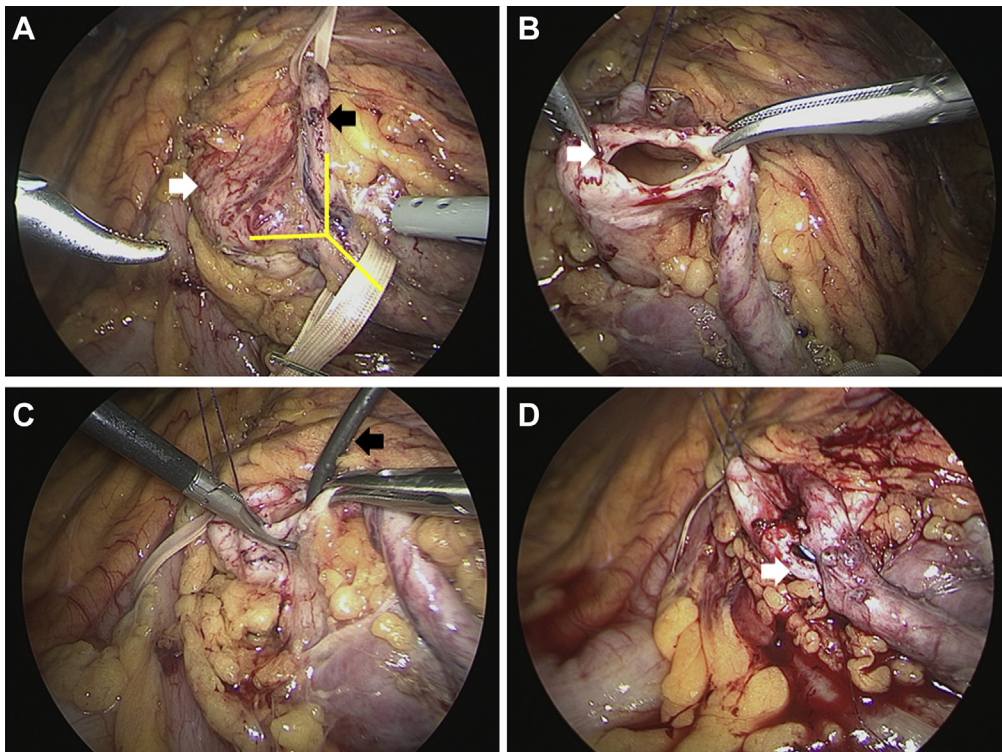


Figure 3. A: The lower left renal pelvis (white arrow), the ureter toward upper pelvis (black arrow) and incompletely duplicated Y-shaped ureter (yellow line) were identified. B: A pyelotomy was performed on the lower hydronephrosis (white arrow). C: A flexible ureteroscope (black arrow) was introduced into the pelvis. D: Laparoscopic pyeloureterostomy was performed, which showed completion of the posterior anastomosis after resection of UPJO (white arrow).

of whom had horseshoe kidneys and a duplicated collecting system, respectively.²

In UPJO in a horseshoe kidney, it is difficult to determine whether the urinary tract obstruction is the cause of the pressure from the horseshoe kidney. Traditionally, if the ureter was compressed as it passes over the anterior surface of the isthmus, isthmectomy may be necessary to maintain the patency of the repaired outflow tract. Nadler and colleagues performed hand-assisted laparoscopic dismembered pyeloplasty and isthmectomy using the harmonic scalpel.³

Shadpour et al (2015) described 15 patients with horseshoe kidney and symptomatic UPJO who underwent laparoscopic management, only one of whom required isthmectomy.⁴ Nishi et al (2013) found no case for isthmectomy in managing five patients with hydronephrosis and horseshoe kidney.⁵ This is in contrast to traditional surgical teaching, where isthmectomy may not be necessarily required to treat horseshoe kidneys with anomalies of the collecting system.

In our experience, concomitant pyelolithotomy could be performed using the laparoscopic approach, allowing for intact stone removal in a single operative session. In order to remove the stone, the use of a flexible fiberoptic ureteroscope during laparoscopic pyeloplasty could also be very technically demanding.

Management of patients with duplicated collecting systems and horseshoe kidney is largely dependent on the symptoms and clinical presentation. Our patient had hydronephrosis in an incompletely duplicated system in a horseshoe kidney when he presented with intermittent flank pain. It is important to preoperatively evaluate the renal vascular anatomy and the relationship between the renal parenchyma and its collecting system. 3DCT angiography and urography may provide information on the anatomy of the complicated collecting system. This imaging

technique has been performed in our case and it helped to demonstrate the anatomical relationship between the horseshoe kidney and duplicated ureter.

In conclusion, the case presented is novel in that it reports the efficacy of laparoscopic pyeloplasty in UPJO of a duplicated system in the presence of horseshoe kidney. A pyeloureterostomy in accordance with dismembered pyeloplasty can enable the removal of the intrinsic obstructive segment and the creation of an anastomosis anterior to the isthmus, even without isthmectomy.

Conflicts of interest

None declared.

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