# *Laparoscopic pyeloplasty for ureteropelvic junction obstruction in a horseshoe kidney*

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*With a continued movement toward minimally invasive surgical interventions, the range of applications treated with laparoscopic surgery will continue to grow. Laparoscopy is a preferred method for various reasons, including decreased postoperative pain, shorter inpatient hospital stays, and decreased convalescence. Ureteropelvic junction obstruction (UPJO) has traditionally been treated by open pyeloplasty. In patients with horseshoe kidneys, the blood supply is aberrant, which adds complexity to the procedure. We present the second reported case of a pediatric patient with a horseshoe kidney found to have UPJO who was successfully treated with transperitoneal laparoscopic pyeloplasty.*

**Key Words:** ureteropelvic junction obstruction, laparoscopic pyeloplasty, horseshoe kidney

## Introduction

Since routine antenatal ultrasonography emerged in the mid 80's, many cases of hydronephrosis that would otherwise go undetected are being diagnosed prior to birth. Ureteropelvic junction obstruction (UPJO) is the most common cause of significant antenatal hydronephrosis.[1] UPJO may be due to an intrinsic lesion causing a narrowing of the ureteral lumen, an obstructing (extrinsic) cause such as that due to a crossing blood vessel, or a secondary cause such as vesicoureteral reflux. Additional congenital renal malformations can be seen in patients with UPJO such as the horseshoe kidney. In the pediatric patient, UPJO is usually treated with open pyeloplasty. Peters et al reported a case of UPJO in a pediatric patient treated successfully with laparoscopic pyeloplasty.[2] This was done using a transperitoneal approach and techniques similar to those

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used in laparoscopic pyeloplasty for adults. Laparoscopic techniques have gained wider acceptance in the management of these patients. Kawauchi et al recently described the use of laparoscopic pyeloplasty with concomitant isthmectomy in a pediatric patient with a horseshoe kidney.[3] We present the case of a pediatric patient with hypertension found to have a horseshoe kidney and UPJO who was treated with transperitoneal laparoscopic pyeloplasty.

## Case presentation and management

A 17-year-old male with a history of hypertension was evaluated with a renal ultrasound to detect a possible secondary cause for his elevated blood pressure. His blood pressure was noted to be 133/88 mmHg while on atenolol 25 mg daily. The study revealed a horseshoe kidney with parenchymal thinning and grade III hydronephrosis of the left renal moiety, Figure 1. Diuretic renogram revealed split function of 37% on the left and 63% on the right. There was no significant drainage from the left kidney after administration of furosemide while the right kidney excreted normally. Prior to surgical intervention, a CT urogram was done to further delineate the renal anatomy, Figure 2.

The patient underwent placement of a 6 French indwelling left ureteral stent followed by transperitoneal laparoscopic pyeloplasty utilizing four trocars. The patient was placed in a modified right lateral decubitus position. An infraumbilical 12 mm trocar was placed for the camera, and two 5 mm trocars were placed as working ports. The first was located at the left lateral border of the rectus sheath at the level of the umbilicus,

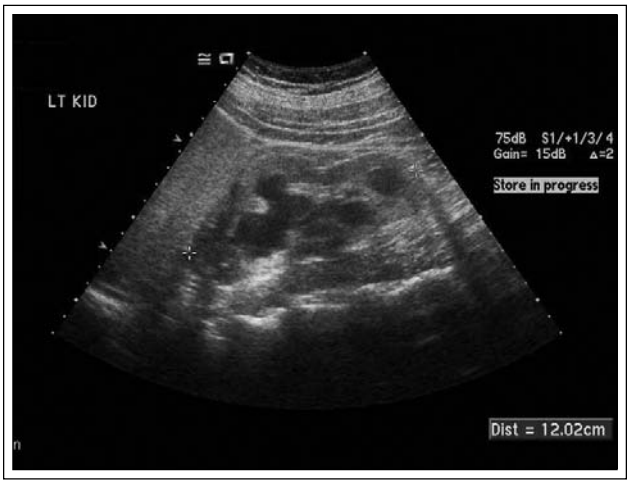


**Figure 1.** Renal ultrasound revealing grade III hydronephrosis and parenchymal thinning of the left kidney.

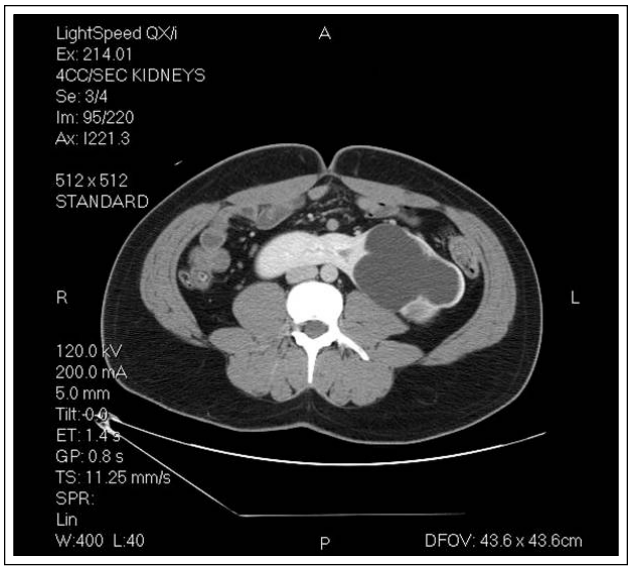


**Figure 2.** CT scan of the abdomen and pelvis with intravenous contrast used to delineate the renal anatomy and relationship to surrounding structures.

while the other was placed in the midline between the xiphoid process and umbilicus. The descending and sigmoid colon were mobilized and reflected medially for retrocolic exposure of the kidney. After mobilizing the colon, an additional fourth port was used for retraction. This was placed in the mid-axillary line 2 cm caudad to the twelfth rib. Due to the configuration of the horseshoe kidney, the fourth port was necessary to displace the adjacent bowel to assist in identification of the ureteropelvic junction. The ureter was identified and traced proximally to the level of the ureteropelvic junction and dilated renal pelvis. An aberrant crossing vessel was identified during the dissection, and after dismembering the ureteropelvic junction, this was transposed anterior to the vessel. The ureter was then spatulated laterally and the anastomosis was made using two sutures of 4-0 Polysorb in a running fashion. No holding sutures were needed to assist with the anastomosis. The isthmus between the kidneys was not divided during the procedure. The operative time was 272 minutes and blood loss was < 10 ml. The patient was discharged on postoperative day one. He had the foley catheter removed prior to discharge and had no other external drain. The ureteral stent was removed 8 weeks after surgery. A repeat diuretic renogram was performed 3 months after surgical repair and revealed an improvement in the function of the previously obstructed left kidney (split function of 56% on the left and 44% on the right). It is possible that the function of the left kidney appeared greater than the right due to

artifact from the horseshoe configuration of the kidney. During 6 months of follow-up since surgery, the patient denies any episodes of abdominal or flank pain, hematuria, or urinary tract infection. His blood pressure has improved to 126/80 mmHg at follow-up, but he continues to take the antihypertensive medication, which was initiated prior to the diagnosis of UPJO.

## Discussion

UPJO is found in approximately 1 in 500 births.[4] Although it is often diagnosed during infancy after a workup for antenatal hydronephrosis, some patients will present later in life. Nausea and vomiting, as well as flank and abdominal pain, are common presenting symptoms. In addition, hypertension has been associated with UPJO, albeit in rare cases. No clear cause-effect relationship has been found, and it is unclear how many of these patients have hypertension from another etiology and concomitant ureteropelvic obstruction.[5] Our patient had UPJO associated with a horseshoe kidney. This anatomic variation adds complexity to surgical repair, as the renal vessels are often aberrant. To our knowledge, this is the second reported case of laparoscopic pyeloplasty in a pediatric patient with a horseshoe kidney.

The original open pyeloplasty was described by Anderson and Hynes over 50 years ago.[6] This repair is still done today, with success rates > 90%.[7] Laparoscopic pyeloplasty was introduced in 1993 by Schuessler et al.[8] Although endoscopic techniques such as endopyelotomy and balloon dilatation are used in some cases of UPJO, only laparoscopic pyeloplasty has had comparable success rates to open surgery.[9,10] After initially gaining acceptance for use in adult patients, the procedure has since been used in children. Several modern series with pediatric patients have shown success rates comparable to open pyeloplasty.[11-13] The spectrum of cases treated with laparoscopic pyeloplasty has expanded to include those with horseshoe kidneys, and there has been a report of using this technique in a pediatric patient.[3]

Our case involved transperitoneal laparoscopic pyeloplasty utilizing four trocars. The fourth port was used for retraction to assist in identification of the ureteropelvic junction. Preoperative placement of a ureteral stent also aided in the procedure. The isthmus between the kidneys was not divided during the procedure, although, this could be performed to allow for ease of dissection. Postoperatively, the patient experienced an improvement in the renal function of the previously obstructed left kidney.

Laparoscopic pyeloplasty is a viable alternative to open surgical repair, even in patients with anatomic variations such as horseshoe kidneys with aberrant vessels. An additional port for retraction is critical to prevent injury to surrounding structures during the dissection and can also assist with the anastomosis. It is currently unclear how the outcome using a laparoscopic approach compares with an open pyeloplasty in this unique subset of patients. In addition, it is possible that the rate of conversion to open pyeloplasty may be greater due to the aberrant anatomy associated with horseshoe kidneys. In our case, laparoscopic pyeloplasty was associated with minimal blood loss, minimal postoperative analgesic requirements, and a short hospital course. □

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