# The Laparoscopic Pyeloplasty
## Is There a Role in the Age of Robotics?

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**KEYWORDS**

• Minimally invasive surgery • Laparoscopy • Pediatrics • Robotic surgery • Da Vinci surgery
• Ureteropelvic junction obstruction

**KEY POINTS**

- Ureteropelvic junction (UPJ) obstruction is a common anomaly, and presents clinically in all pediatric age groups.
- The past 3 decades have witnessed an evolution in the surgical correction of UPJ obstruction on several fronts, with open surgical techniques yielding way to endoscopic, laparoscopic, and robotic-assisted approaches.
- Robotic-assisted surgery has several advantages in complex laparoscopic reconstructive procedures such as pyeloplasty.
- Comparative studies of laparoscopic and robot-assisted repairs have demonstrated similar success rates.
- Laparoscopic pyeloplasty is here to stay because of its advantages of safety, efficacy, decreased morbidity, reduced hospital stay, and, perhaps most importantly, cost-effectiveness.

## INTRODUCTION

Ureteropelvic junction (UPJ) obstruction is a common anomaly, and presents clinically in all pediatric age groups (**Figs. 1** and **2**). There tends to be a clustering in the neonatal period because of the detection of antenatal hydronephrosis, and again later in life because of symptomatic occurrence. Today most cases are identified and diagnosed in the perinatal period.[1]

The past 3 decades have witnessed an evolution in the surgical correction of UPJ obstruction on several fronts, with open surgical techniques yielding way to endoscopic, laparoscopic, and robotic-assisted approaches. Among the various open surgical techniques, the Anderson-Hynes pyeloplasty has become the most commonly used open surgical procedure for the repair of UPJ.[2] The principal reasons for the universal acceptance of the Anderson-Hynes dismembered pyeloplasty have been (1) broad applicability, including preservation of lower pole or crossing vessels, (2) excision of the pathologic UPJ with appropriate repositioning, and (3) successful reduction pyeloplasty. This operation is generally easy to perform and can be accomplished by several surgical approaches, including anterior subcostal, flank, and posterior lumbotomy.[2] Recent advances in equipment and surgical techniques have made minimally invasive surgery (MIS) a well-tolerated and efficient option in the management of UPJ obstruction.

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**Fig. 1.** Intravenous urogram showing right ureteropelvic junction (UPJ) obstruction in a 2-month-old child.

## LAPAROSCOPIC PYELOPLASTY

### *History*

Laparoscopic pyeloplasty was first reported in the adult population in 1993 by Kavoussi and Peters[3] and Schuessler and colleagues.[4] Tan[5] reported the first pediatric series of transperitoneal laparoscopic dismembered pyeloplasty in 18 children aged 3 months to 15 years. Yeung and colleagues[6] described their initial experience with laparoscopic retroperitoneal dismembered pyeloplasty in 13 children, 1 of whom required open conversion. El Ghoneimi and colleagues[7] reported their experience of 50 retroperitoneal laparoscopic pyeloplasties in children aged 22 months to 15 years. Similarly, Reddy and colleagues[8] performed laparoscopic pyeloplasties in 16 children, 5 months to 11 years old. During the early 2000s many such small series reported the feasibility of laparoscopic pyeloplasty in children.

**Fig. 2.** Magnetic resonance urogram showing bilateral UPJ obstruction in an infant.

### *Technique*

#### *Transperitoneal access*

An enema is administered the night before surgery to ensure that the colon is empty. Intraoperative antibiotics are administered to minimize the risk of infection. Patients are catheterized before surgery and the catheter left on free drainage during the operation. Patients are positioned in the lateral position and secured by placing a sand bag to support the back. Patients are further stabilized by strapping the iliac crest to the operating table with an adhesive bandage. Patients are placed as close as possible to the edge of the operating table. The first port is created by open laparoscopy using a blunt Hasson cannula through the umbilical skin crease. A purse-string suture is secured tightly around the Hasson trocar. The abdomen is insufflated with $CO_2$ to 10 to 12 mm Hg. A single 5-mm instrument port and a single 3-mm instrument port are required. Correct placement of these ports is critical to the ease of performing the anastomosis. Occasionally an extra 5-mm port is placed for retraction purposes. The peritoneum overlying the exposed kidney is incised just lateral to and above the colonic flexure. The loose adventitia around the kidney is detached from the renal capsule. Once the correct plane is identified, the renal capsule is traced into the renal sinus until the renal pelvis is identified. The renal pelvis is further dissected free from the medial side. The UPJ and proximal ureter are identified (**Fig. 3**A). The adventitia around the proximal ureter and UPJ is cleared. The ureter is dismembered with a small cuff of renal pelvis, leaving a 1.5- to 2.0-cm pyelotomy to reanastomose to the ureter (see **Fig. 3**C). The lateral wall of the ureter is opened longitudinally and spatulated (see **Fig. 3**D) for about 1.5 to 2.0 cm along its lateral margin. The UPJ and proximal ureter attached at this point to the spatulated ureter are then excised. The ureteropelvic anastomosis is performed with an 18-cm 6-0 polyglactin suture on a three-eighths round-bodied needle. The first suture is placed at the apex of the spatulated ureter from outside in, then driven through the most dependent part of the pyelotomy. The posterior