

Uretero-Pelvic Junction Obstruction (UPJO) Treatment Using: One-Trocar-Assisted Pyeloplasty (OTAP)

Neil Di Salvo, Eduje Thomas, Tommaso Gargano,
and Mario Lima

Learning Objectives

- To describe the historical process which led to the invention of the technique.
- To describe step by step the technique of One-Trocar-Assisted Pyeloplasty (OTAP).
- To present our experience with the technique, including results and complications.
- To show a video with the OTAP technique.

Among these, the Anderson–Hynes dismembered pyeloplasty is the most adopted, being considered the mainstay in the surgical treatment of UPJO.

Minimally invasive surgery has evolved and has been introduced to reduce postoperative morbidity, length of hospitalization and aesthetic impact. Pyeloplasty can be carried out in a transperitoneal or retroperitoneal manner. The transperitoneal approach provides increased working space and readily identifiable anatomic landmarks, but requires adequate bowel mobilization [1]. The retroperitoneal approach is hampered by limited working space, but has the advantage of direct and rapid access to the ureteropelvic junction (UPJ) and less risk of bowel damage.

Craig Peters reported the first case of paediatric laparoscopic trans-mesenteric pyeloplasty in 1995 [2]; Furthermore, retroperitoneoscopic pyeloplasty, first attempted by C.K. Yeung in 2002, is often performed by paediatric urologists [3, 4].

In 2004, in the conception of a hybrid surgery, Mohammed Amin El Gohary described the first laparoscopic assisted pyeloplasty in children, using three ports to gain access to the UPJ [5]. The procedure entailed mobilization of the colon to expose the pelvis and upper ureter. The UPJ was brought to the flank via a 10 mm port and the procedure was completed as in the open technique. We developed his idea of extracting the UPJ, but we adopted the retroperitoneoscopic

15.1 Introduction

During the past decades, several techniques have been designed to achieve the main goal of surgery in the uretero-pelvic junction obstruction (UPJO): preserving the renal function by allowing unobstructed drainage of the renal pelvis.

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N. Di Salvo · E. Thomas · T. Gargano · M. Lima (✉)
Paediatric Surgery Unit, IRCCS Sant'Orsola University-Hospital, University of Bologna, Bologna, Italy
e-mail: niel.disalvo@aosp.bo.it;
eduje.thomas@studio.unibo.it;
tommaso.gargano2@unibo.it; mario.lima@unibo.it

route, being more direct, instead of the laparoscopic one.

Due to our increasing experience in one trocar video assisted procedures, in 2005 we attempted a new technique, the One Trocar Assisted Pyeloplasty (OTAP) [6]. This technique combines the advantages of a minimally invasive retroperitoneoscopic approach with the high success rate of an open dismembered pyeloplasty. Since its introduction in 2005, OTAP has been adopted in many paediatric surgical units in Italy [7–9].

15.2 Surgical Technique

The patient is placed in lateral decubitus on the non-pathologic side, exposing the pathologic flank. A transurethral catheter is inserted. A 12 mm long incision is made on the prolongation of the 11th to 12th rib (Fig. 15.1). The Gerota fascia and the perirenal fat are reached anteriorly after blunt dissection through the muscles. A 10 mm balloon anchorage trocar is inserted, and we use a 10 mm 0° lens operative telescope with a 5 mm operative channel (Fig. 15.2).

The retroperitoneal working space is created through insufflation of CO₂ (Pressure 8–10 mmHg, Flow 0.5–1 l/min; according to the patient's size and weight) and moving the telescope with an Endo peanut (Covidien, Massachusetts, US); once the lower renal pole is identified, the pelvis and the proximal ureter are anteriorly approached targeting the UPJ (Video



Fig. 15.1 Anatomical landmarks for a small incision

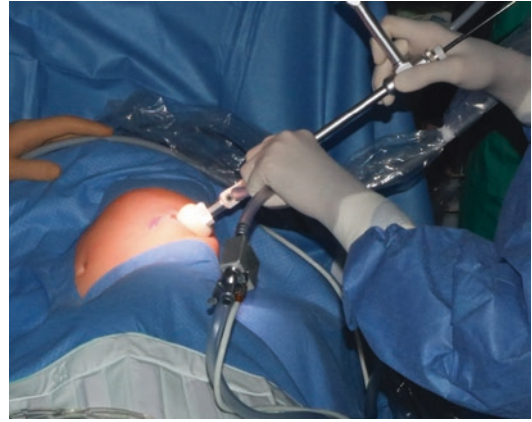


Fig. 15.2 Position of the surgical team during the retroperitoneoscopic phase

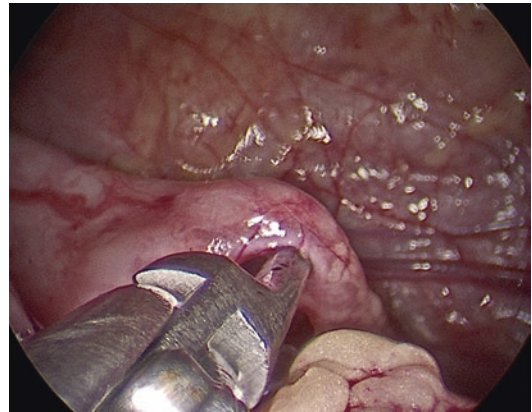


Fig. 15.3 Ureter identification during the retroperitoneoscopic phase. The L dissector, inserted in the operative channel of the operative telescope, can be seen

15.1/Figs. 15.3 and 15.4). Small vessels are coagulated by unipolar cautery. The UPJ is then isolated with an “L” dissector and exteriorized through the lumbar incision, after previously placing a vessel loop for traction purposes (Fig. 15.5). In cases of massive hydronephrosis, the pelvis can be emptied with a needle to facilitate the procedure (Fig. 15.6). A stay suture is first given on the ureter in order to correctly orientate the UPJ thus avoiding twisting of the ureter.

The Anderson–Hynes pyeloplasty is then performed in a traditional manner, using 6–0 or 7–0 PDS running sutures (Fig. 15.7). Before completing the pyeloplasty, an external uretero-pelvic

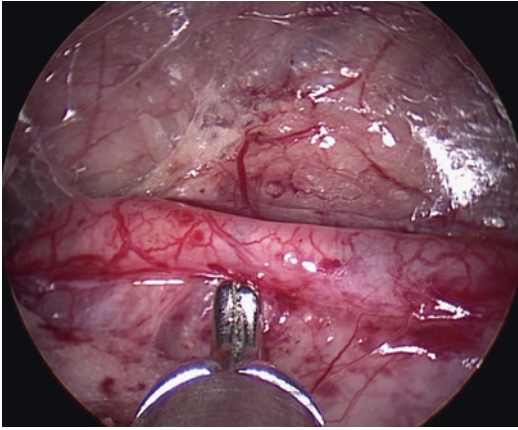


Fig. 15.4 Isolation of the UPJ with the L dissector

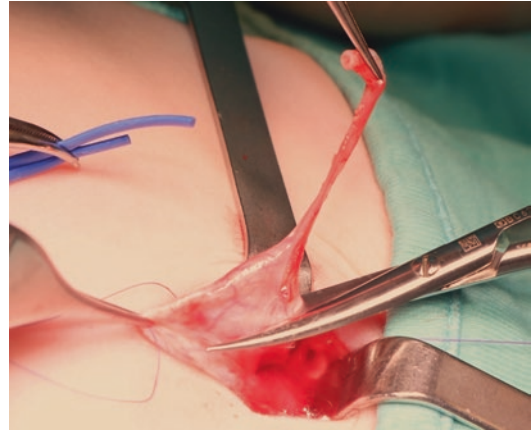


Fig. 15.6 The obstructed UPJ with part of the dilated pelvis and proximal ureter are removed

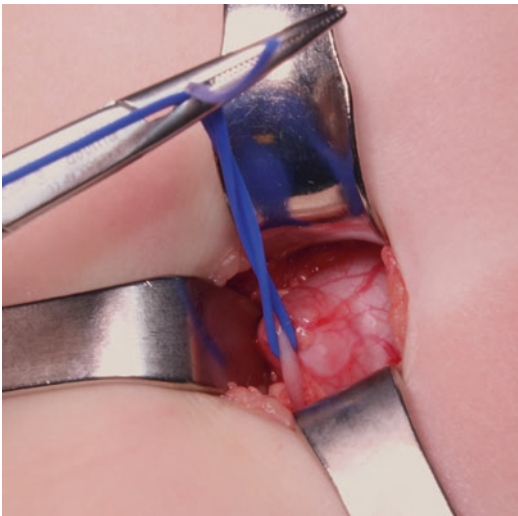


Fig. 15.5 The UPJ is brought out through the lumbar incision using a vessel loop, inserted during the retroperitoneoscopic phase

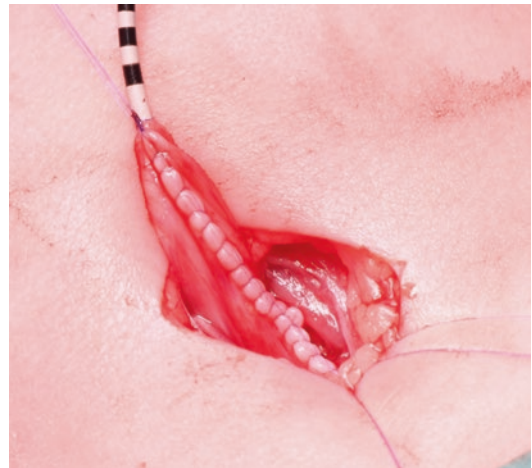


Fig. 15.7 Final aspect of the reconstructed pelvis, with an external ureteropelvic stent emerging from one end of the suture

stent is placed in antegrade manner, emerging from the end of the anastomosis. Alternatively, an internal ureteral stent (double J stent) can be antegradely positioned and cystoscopically removed 3–4 weeks later. The pelvis is repositioned into the renal lodge and the anastomosis can be checked with a retroperitoneoscopic look. In case of extrinsic obstruction due to crossing vessels, these are uncrossed prior to completing the anastomosis. A soft Penrose drain is left in place near the anastomosis and the wound is closed by absorbable sutures.

During the postoperative period, a full course of antibiotics is administered. The transurethral catheter is removed on the first or second postoperative day, whereas the uretero-pelvic stent and Penrose drain are, respectively, kept until the fifth and sixth post-op day. The patient is then discharged.

The feasibility of the technique is hindered only by relative contraindications represented by huge pelvic dilatation, previous retroperitoneal surgery, previous renal trauma and infections (pyonephrosis).

15.3 Complications and Follow-Up

The complication rate is similar to the standard open approach. The principal complication is stenosis of the anastomosis. Fortunately, this is rare and 90–95% of cases are successful. In case of OTAP, recurrence could be due to fibrosis or ureter angles near the anastomosis; it is related to a difficult dissection that can cause tension and ischemia. Another rare complication is urinary leakage from the anastomosis determining a retroperitoneal urinoma (1–3%); however, leakage spontaneously resolves in the majority of cases and reintervention is extremely rare. Conversion to open surgery is necessary if the peritoneum is accidentally open because of the impossibility to create an adequate working chamber in the retroperitoneum.

Follow-up consists of repeated ultrasound at 3, 6, 12 months and then yearly. In our Centre, if pelvic dilation decreases over time and no further deterioration of the kidney echo-structure is seen, renography is not usually required [10]. If dilation does not improve and/or the echotexture worsens and/or symptoms appear, a renogram is performed.

15.4 Case Series

Since 2005, in our institution, the OTAP has been the preferred approach for hydronephrosis in children younger than 2 years of age [11]. Nevertheless, OTAP has also been used in children older than 2 years. In a range period of 15 years, we performed 156 OTAPs. Follow-up was available in 95.7% of all patients. We considered the minimum period of follow-up to be 1 year after surgery to define success. The mean operative time was 133 min and it was not influenced by crossing vessels. The mean hospitalization length was 6.71 days.

Conversion to open repair was required in seven cases (conversion to open surgery rate = 4.5%) with a mean age of 19 months: five accidental peritoneal opening that did not allow

the retroperitoneoscopic phase and two technical difficulties, but these conversions occurred at the very beginning of our experience with OTAP (mostly in the first 8 years of experience with the technique).

Seven patients had complications due to recurrence of UPJ stenosis defined as a post-operative worsening of pelvic dilatation on ultrasound and persistence of impaired urinary flow pattern obstruction on dynamic MAG3 renography at 6 months after surgery (recurrence rate = 4.5%).

Regarding this complication, it is to say that these patients (4/7) mostly belong to the small group in which a stent was not used. This is the reason why we suggest the use of such stents, especially in very young patients.

At the beginning of our experience, we used an internal J-J ureteral stent; afterwards, as mentioned before, we tried not to use ureteral stents in a small series of patients, but this practice was abandoned due to increase in recurrence. At present, we are used to using external pyelo-ureteral stents that can be easily removed during hospitalization, with no sedation.

The postoperative course was characterized by urinary collection around the kidney (urinoma) in three patients (urinary leakage rate = 1.9%). One patient among these had a scarce urinary leakage and he was treated conservatively. In two cases, the urinary collection required a reintervention with the placement of a transanastomotic stent to replace the former one that was accidentally removed.

We have treated very young patients affected by severe forms of hydronephrosis for which an early surgical correction can be of some advantage. As a matter of fact, we demonstrated feasibility, in terms of efficacy and safety, of OTAP in the first 90 days of life in a case series of 23 patients [12].

All parents were satisfied with the aesthetical result.

Thus far, we have attempted a posterior muscle-sparing incision to approach the kidney in one patient, always through the retroperitoneal space (Posterior One Trocar Assisted Pyeloplasty, POTAP) [13].

Take-Home Points

- OTAP is a hybrid technique which combines the advantages of a minimally invasive retroperitoneoscopic approach with the high success rate of an open dismembered pyeloplasty.
- This technique consists of isolating the UPJ, thanks to a retroperitoneoscopic one-trocar approach and exteriorizing the UPJ through the lumbar incision, in order to perform an open dismembered pyeloplasty.
- OTAP is safe and feasible in very young patients.
- Complication and success rates are similar to those of the standard open technique.

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