

Laparoscopically assisted pyeloplasty for ureteropelvic junction obstruction: a transperitoneal versus a retroperitoneal approach

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Objectives To compare the results of a transperitoneal laparoscopic-assisted dismembered pyeloplasty (TLADP) with an extraperitoneal laparoscopic-assisted dismembered pyeloplasty in the management of children with ureteropelvic junction (UPJ) obstruction.

Methods Eighteen children (mean 29 months, range 3 months to 10 years) underwent TLADP. An additional 11 children (mean 3.6 years, range 3 months to 11 years) underwent similar procedures through a retroperitoneal approach (RLADP). We retrospectively compared the operative time, hospital stay, postoperative complications, and follow-up in both the groups.

Results The mean operative time was significantly shorter in the TLADP group (100.6 vs. 119.2 min, $P < 0.05$). The duration of postoperative hospital stay was better in the RLADP group than that in the TLADP group (5.3 vs. 4.2 days) but was not statistically significant. No intraoperative complications occurred in either group, but postoperative urinoma was found in one patient of the TLADP group and persistent postoperative pain was found in one patient of

the RLADP group. The mean follow-up was 5.6 years in TLADP (range 4–9 years) and 26 months in RLADP (range 6 months to 4 years). A significant improvement in renal function was achieved in both the groups. We had to shift to an open technique for two patients of the TLADP group; both were obese children, 4 and 10 years of age.

Conclusion Both TLADP and RLADP have been used successfully in the management of UPJ obstruction in children. We believe that RLADP is more suitable in older and obese children. *Ann Pediatr Surg* 8:29–31 © 2012 Annals of Pediatric Surgery.

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Introduction

We started using intraabdominal laparoscopic-assisted pyeloplasty in children with ureteropelvic junction (UPJ) obstruction in the year 2000, with reasonable success [1], but we have encountered difficulties in delivering the dilated renal pelvis outside the abdominal cavity in children older than 2 years of age, especially in obese ones. In these children, extensive mobilization of the pelvis has to be carried out to bring the pelviureteric junction without tension outside the abdominal cavity. In two of these children, even after extensive mobilization of the pelviureteric junction, we could not deliver the pelvis outside the abdominal cavity and we had to shift to an open technique. The retroperitoneal approach has eliminated the need for extensive mobilization and has proved to be an ideal approach for obese and older children.

Materials and methods

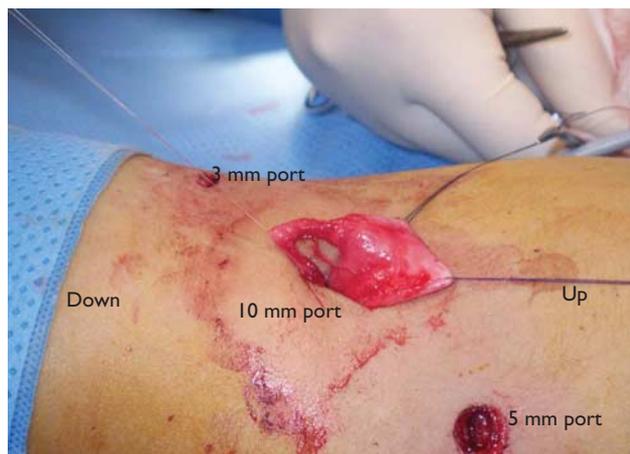
Between January 2000 and March 2009, we have operated on 29 children with gross hydronephrosis secondary to UPJ obstruction. The obstruction was defined as an anteroposterior pelvic diameter of 25 mm or greater and progressively increasing on follow-up ultrasounds, with an obstructive pattern on a MAG-3 nuclear scan (T1/2 more than 20 min) and an impaired split renal function of 40% or less. We used transperitoneal laparoscopic-assisted dismembered pyeloplasty (TLADP) in 18 patients and retroperitoneal laparoscopic-assisted dismembered pyeloplasty (RLADP) in 11 patients. The retroperitoneal group was operated upon during the period between 2005

and 2009. Most of the children in the retroperitoneal group were older than 2 years of age [only two were younger than 2 years of age (6 months and 18 months)]. The majority of the patients in the transperitoneal group were 2 years or younger [only four were older than 2 years of age (3, 4, 6, and 8 years)]. The diagnosis of UPJ obstruction was confirmed on repeated renal ultrasonography and diuretic renogram. The UPJ was bilateral in two patients in the TLADP group.

Operative technique

Our technique for TLADP was reported in 2004 [1]. Similar to the retroperitoneal approach, the technique involves placing the child in a semilateral position. Three trocars (10, 5, and 3 mm) are inserted (Fig. 1). The first trocar, 10 mm at the tip of the 12th rib, is used for the laparoscope and delivering the pelviureteric junction, the second trocar, 5 mm in size, is inserted at the costovertebral angle, and the third trocar, 3 mm in size, is inserted into the top of the iliac crest. The kidney is approached posteriorly and the UPJ is identified. Minimal dissection is used to free the UPJ from the surrounding tissues. A 5 mm camera is introduced through the posterior port and the pelvis is delivered from the 10 mm port without tension. Anderson–Hynes dismembered pyeloplasty is then performed using 7-0 polydioxanone sutures. A pyelostomy transanastomotic stent is inserted and removed on the 10th postoperative day at the outpatient clinic. Perirenal suction drainage inserted through a 10 mm port is left for 3–5 days according to the extent of urine leakage, which

Fig. 1



Depicts the delivered ureteropelvic junction and the three ports.

varies from 40 to 120 per day and progressively decreases over the subsequent days.

Results

A total of 18 children in the TLADP group and 11 children in the RLADP group fulfilled the inclusion criteria. The primary pathology in all patients was primary pelviureteric junction obstruction; we did not encounter any case of obstruction because of aberrant vessels in this study group. The mean operative time was 119.2 min, varying from 105 to 140 min. This is significantly longer than that of the TLADP group (100.6 min, varying from 90 to 120 min, $P < 0.05$), which was because of the time taken to identify and dissect the pelviureteric junction in a narrow retroperitoneal space. The patient was sent home 1 day after the removal of the suction drain (4–6 days). Evaluation after surgery included renal ultrasonography after 3 months and renal scintigraphy (mercaptoacetyltriglycine) after 6 months.

The mean follow-up duration of the TLADP group (range 4–9 years; two patients were lost to follow-up after 2 years) was 5.6 years. The mean follow-up duration of the RLADP was 26 months (range 8 months to 5 years). One child (10 years old) had undergone a nephrectomy. His left renal function was 21% at presentation, with a thin renal cortex. The renal function had not improved postoperatively and he had a complaint of a postoperative dull aching pain in the left loin. A double J stent was inserted into the pelvis per urethra, but the renal function failed to improve and pain persisted. A nephrectomy was conducted after 1 year. Histology showed dysplastic renal changes. The rest of our patients showed significant improvements both on ultrasound and on MAG-3 nuclear scan.

Discussion

Laparoscopic pyeloplasty in children was first described through a transperitoneal approach. Tan reported the first pediatric series of transperitoneal laparoscopic dismembered pyeloplasty in 18 children, age range 3 months to 15 years [2]. More recently, several papers have reported

Table 1 The summary of the differences between the transperitoneal and the extraperitoneal group is listed in this table

	N	Age	Operative time	Conversion	Complications
Transperitoneal	18	3 months–10 years (4 above 2 years)	100.6 (90–120)	2	1
Extraperitoneal	11	3 months–10 years (2 below 1 year)	119.2 (105–140)	0	1

excellent results for laparoscopic intraabdominal, retroperitoneal, or robotic pyeloplasty [3–9] (Table 1).

In 2004, we reported on our experience with transperitoneal laparoscopic-assisted pyeloplasty in children [1]. The procedure was intended to have the advantages of both a laparoscopic and an open technique. However, it was difficult to perform in children older than 2 years of age, especially obese ones. Delivering the pelvis in these situations involved extensive dissection of the pelvis, with the potential of adversely affecting the blood supply. This has prompted us to use a shorter approach that ensures minimal handling of the pelvis. Retroperitoneal laparoscopic-assisted pyeloplasty has proven to be an ideal approach in older children. The procedure can also be used in children younger than 2 years of age, but the space is too limited, and more skillful handling of the instrument is necessary. The use of a robot may overcome such limitations, as the learning curve is quicker and less laparoscopic skills are required [9].

A similar procedure of video-assisted retroperitoneoscopic approach was published by Lima and Ruggeri [10] and more recently by Caione *et al.* [11]. Both techniques appear to be suitable for use in infants and young children, combining the advantages of a minimally invasive laparoscopic approach with the safety and effectiveness of open suturing, with the advantage of being retroperitoneal and requirement of less manipulation of the UPJ.

Placement of a transanastomotic stent [12] has the advantage that the use of general anesthetics can be avoided and the patient need not be readmitted; however, it involves the insertion of a perirenal suction drain and keeping the patient longer in the hospital until the drainage stops.

Until recently, all costs for hospital stay in our institution were covered by the government, and the practice of sending patients home early is yet to be implemented. This explains the longer hospital stay among our patients who underwent minimally invasive pyeloplasty compared with those in the other published series.

Conclusion

Both TLADP and RLADP have been used successfully in the management of UPJ obstruction in children. We believe that RLADP is more suitable in older and obese children.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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