

Pediatric laparoscopic dismembered pyeloplasty: technique and results in 25 patients

Pediatric laparoskopik dismember piyeloplasti: Teknik ve 25 hastanın sonuçları

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Abstract

Objective: To evaluate the postoperative and functional results of the laparoscopic dismembered pyeloplasty (LDP).

Materials and methods: Between January 2007 and August 2009, we performed 25 LDP in our clinic. All patients presented with an ureteropelvic junction obstruction and dilatation of renal calyx system with an enlarged renal pelvis. Demographic data, perioperative and postoperative parameters, including operating time, estimated blood loss, complications, length of hospital stay, functional outcome were evaluated.

Results: The mean operative time for LDP was 115 (range 65-230) min and the mean estimated blood loss was negligible in all patients. The mean hospital stay was 4.7 (range 3-11) days. No conversion to open surgery occurred. In the follow-up, we noted success in 92% of the patients.

Conclusion: LDP, if performed by expert surgeons in high-volume centers, presents results that are comparable with open surgery, with lower surgical trauma for the patients.

Key words: Laparoscopic pyeloplasty; pediatric laparoscopy; ureteropelvic junction stenosis.

Özet

Amaç: Bu çalışmanın amacı laparoskopik dismember piyeloplastinin (LDP) postoperatif ve fonksiyonel sonuçlarını değerlendirmektir.

Gereç ve yöntem: Ocak 2007 ve Ağustos 2009 tarihleri arasında kliniğimizde 25 LDP gerçekleştirdik. Tüm hastalarda üreteropelvik bileşke obstrüksiyonu ve renal kaliks sistemin dilatasyonu ile irileşmiş renal pelvis mevcuttu. Demografik veriler; perioperatif parametreler; operasyon süresi, tahmini kan kaybı, komplikasyonlar, hastanede kalış süresi dahil olmak üzere postoperatif parametreler; ve fonksiyonel sonuç değerlendirildi.

Bulgular: LDP için ortalama operasyon süresi 115 (dağılım 65-230) dk olup, ortalama tahmini kan kaybı tüm hastalarda göz ardı edilebilir düzeydeydi. Ortalama hastanede kalış süresi 4.7 (dağılım 3-11) gündü. Açık cerrahiye geçilmedi. İzlemde hastaların %92'sinde başarı kaydedildi.

Sonuç: LDP, tecrübeli cerrahlar tarafından yüksek hasta kapasiteli merkezlerde yapıldığında, hastalar için daha az cerrahi travma ve açık cerrahi ile karşılaştırılabilir sonuçlar sunmaktadır.

Anahtar sözcükler: Laparoskopik piyeloplasti; pediatik laparoskopi; üreteropelvik bileşke stenozu.

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Ureteropelvic junction obstruction (UPJO) is a common urologic problem that has had excellent surgical treatment outcomes since Anderson-Hynes first described the dismembered pyeloplasty technique more than 50 years ago. The open Anderson-Hynes procedure continues to be the gold standard, with an overall success rate of 90%.^[1] Since first described by Schuessler et al. in 1993, laparoscopic pyeloplasty has emerged as a valid technique to correct UPJO, with a

success rate of more than 90%.^[2] Laparoscopic pyeloplasty in children is a demanding surgical procedure. Due to the technical complexity and the doubts regarding long-term success, it is performed only by few centers with adequate expertise in advanced pediatric laparoscopy.^[3-5] In this study, we described our technique and reported our results in 25 pediatric patients who underwent a laparoscopic dismembered pyeloplasty (LDP) for UPJO.

Materials and methods

From January 2007 to August 2009, LDP was performed on 25 pediatric patients by a single surgeon experienced to laparoscopy (MS). The Harran University Faculty of Medicine Institutional Ethics Committee approved the retrospective study protocol and study has been performed in accordance with the ethical standards. All pediatric patients with primary UPJO and with dilated renal pelvis were included. The diagnosis was made and confirmed by ultrasonography, intravenous urography (IVU), and renal scintigraphy in all patients. Patients' demographics (age, gender); perioperative, intraoperative and postoperative parameters like time of surgery, blood loss, complications, duration of hospital stay, outcome of the procedure were all evaluated. Data were expressed as mean and standard deviation.

Surgical technique

Following the induction of general anaesthesia, a nasogastric tube and transurethral catheter were inserted to decompress the stomach and bladder. The patients were secured to the operating table in a full flank position. Transperitoneal approach was used in all patients. A Veress needle was inserted 2 or 3 cm lateral to the umbilicus to establish the pneumoperitoneum using carbon dioxide. With an initial intra-abdominal pressure of 12-15 mmHg, a 5 mm trocar was placed lateral to the umbilicus after removal of

the Veress needle (10 mm trocar was used in few initial cases older than 12 years old). The endoscopic 30° camera is introduced and after inspection of the abdominal cavity three other trocars were inserted under direct vision: the second 5 mm trocar is placed 5 cm lateral to the first one and the transverse line going through the umbilicus. The third trocar is placed just below the costal margin. The last trocar is placed medially to the anterior superior iliac spine. Then, the intra-abdominal pressure was lowered to 10 mmHg and maintained at this level. The peritoneum was incised using electrosurgical scissors and grasping forceps. The peritoneal incision was made along mezocolic line for left side UPJO. After identification of the ureter in the retroperitoneum; the proximal ureter, UPJ and the renal pelvis were completely freed (Fig. 1a). The renal pelvis is dismembered and the redundant portion excised. The technical modification is based on a renal pelvis flap kept undetached from the ureteropelvic junction, and consequently from the ureter, until near completion of the new ureteropelvic anastomosis. This flap is used for ureteral handling (a "no touch" technique) during pyeloplasty and also serves as a very reliable guide for lateral ureteral spatulation, preventing ureteral twisting and subsequent misalignment of the de novo ureteropelvic junction. The ureter was spatulated by extending dismembering incision to the lateral aspect of the ureter (Fig. 1b). The anastomosis was started from the low-

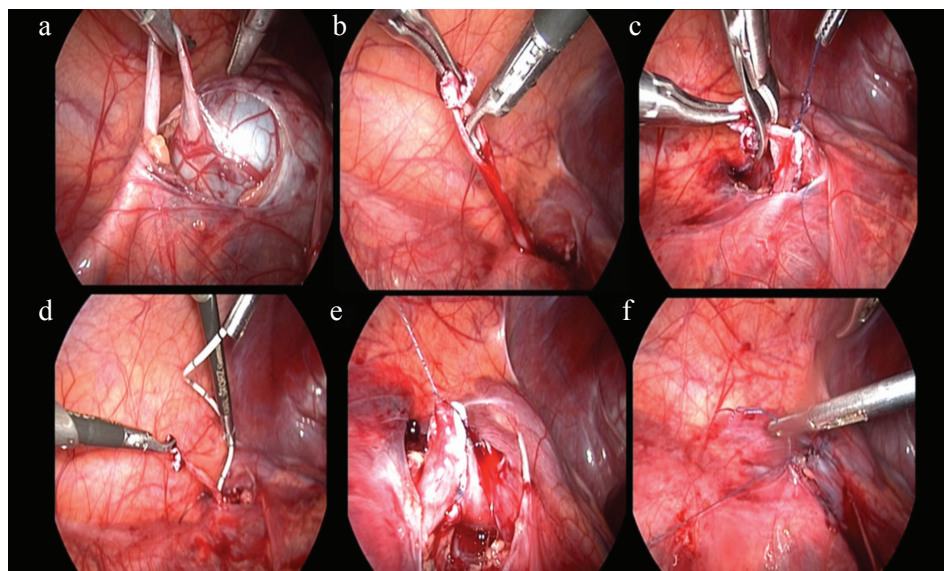


Figure 1 Intraoperative view of laparoscopic dismembered pyeloplasty. The proximal ureter and the renal pelvis were completely mobilized (a); ureter was laterally spatulated (b); anterior wall of anastomosis was completed (c); the stent was replaced in the ureter and pelvis (d); the anastomosis was completed (e); and posterior peritoneum was closed by running 4-0 vicryl sutures (f).

est point of the spatulated ureter to the lowest point of the pelvis using vicryl 4-0 suture. With continuous suturing technique, anterior layer was completed in a watertight fashion (Fig. 1c). If crossing vessels were found, the ureter and the renal pelvis were transposed anteriorly before the anastomosis. A 4.8 Fr double-J stent was inserted in antegrade manner (Fig. 1d) and the anastomosis was completed (Fig. 1e). At the end, posterior peritoneum was closed by running 4-0 vicryl sutures (Fig. 1f) and a 14 Fr suction drain was placed into the pelvic space of abdomen. The trocars were removed under laparoscopic visualization and the fasciae of the trocars' sites were closed with interrupted absorbable sutures. The skin was approximated with subcutaneous absorbable sutures. Foley catheter was removed on the morning of third postoperative day. Prophylactic intravenous antibiotic (third generation cephalosporin) was administered preoperatively and postoperatively until discharge. Children with a postoperative urinary tract infection received full-dose antimicrobial treatment followed by prophylaxis until stent removal.

Follow-up

Double-J stent was removed after 6 weeks. The mean follow-up was 19 (range 6-36) months. Follow-up was done with IVU at 3 months, and with diuretic renal scan at 6 months. Outcome was considered successful if there was complete resolution of flank pain (clinical), adequate renal excretion of contrast on IVU (radiographic), preserved or improved renal function on renal scan, and good drainage curve.

Results

Mean age of the patients was 9.7 (range, 0.5-15) years. Characteristics of patients were presented in Table 1. Of these patients, 15 were male and 10 female. The mean operative time for LDP was 115 (range 65-230) min and the mean estimated blood loss was negligible in all patients. The mean hospital stay was 4.7 (3-11) days. No conversion to open surgery occurred. Crossing vessels as the cause of UPJ obstruction were found in 28% of cases, and injury to the crossing vessels did not occur in any case. Three patients (12%) developed postoperative prolonged abdominal ileus; nevertheless, a surgical revision was not necessary. Prolonged urine drainage was identified in one patient (4%) (Double J stent was

inserted the other orifice intraoperatively). Double J stent was removed by sistoscopically and urine drainage was resolved. Intra and postoperative data were summarized in Table 2. The mean follow-up was 19 (range 6-36) months. During follow-up, all patients underwent IVU at 3 months. Patients underwent diuretic renal scan at 6 months. There were 8% recurrence among the patients that presented after 3 and 7 months of operation. One patient underwent open surgery successfully. Unfortunately, the other patient was lost to follow-up. In the follow-up, we recorded a success rate of 92% among the patients.

Discussion

The ideal treatment for UPJO would be minimally invasive with a low complication and failure rate. Therapy of UPJ stenosis has been significantly influenced by various minimally invasive techniques, including percutaneous and ureteroscopic endopyelotomy, cutting transvesical balloon dilatation as well as laparoscopic pyeloplasty. All of these procedures were introduced with the goal to meet the standard of open dismembered pyeloplasty providing long-term success rates between 93% and

Table 1. Characteristics of patients

| | |
|--------------------------|--------------------|
| Number of patients | 25 |
| Age (years) | 9.7 (0.5-15) years |
| Sex (male/female) | 15/10 |
| Side (right/left) | 8/17 |
| Crossing vessels [n (%)] | 7 (28%) |

Table 2. Summary of intraoperative and postoperative data

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|--|------------------|
| Number of cases | 25 |
| Operative time [mean (range)] | 115 (65-230) min |
| Bowel recovery (mean) | 26±3.6 hours |
| Postoperative hospital stay [mean (range)] | 4.7 (3-11) days |
| Success rate (%) | 92% |
| Recurrence [n (%)] | 2 (8%) |
| Complications [n (%)] | |
| Wound infection | 0 (0%) |
| UPJ leakage | 1 (4%) |
| Hematuria | 2 (8%) |
| Urinary infection | 1 (4%) |
| Displaced catheter | 1 (4%) |
| Prolonged abdominal pain | 3 (12%) |

97%, with a lower surgical trauma for the patients.^[2] Laparoscopic pyeloplasty is a minimally invasive alternative in the treatment of UPJ obstruction and was developed in the early 1990s and after an initial period of development, actually it can duplicate the high success rates achieved with open pyeloplasty, if performed by expert surgeons in centers with high laparoscopic expertise.^[6,7]

Although it is an established reconstructive procedure in adults,^[8] laparoscopic pyeloplasty in children is still in its infancy. Due to the difficulty of intracorporeal suturing and the lack of space within the intraperitoneal cavity in children, the procedure is difficult to learn and time consuming.^[9] After an initial experience, it was even suggested that the laparoscopic approach not be performed in children younger than 6 months of age.^[10,11] Moreover, handling fine suture material with present day laparoscopic instruments is still cumbersome. As originally described by Lee et al.^[12] exteriorizing the anastomosis in LDP helps to overcome these obstacles. The technique is similar to the exteriorization of bowel used in gastrointestinal anastomosis during small bowel resection.^[13] In children, the abdominal wall being thin and pliable, the dilated pelvis can be easily brought out. Unlike when exteriorizing the UPJ through the laparoscopic port or the umbilicus,^[12] much less mobilization is needed for bringing it out through the flank. Duration of surgery is much less than for contemporary series of pediatric laparoscopic pyeloplasty.^[2,14] Since this procedure does not involve intracorporeal suturing, the learning curve is definitely much shorter than for a complete laparoscopic pyeloplasty. The success rates after LDP are 73-100% in literature.^[15] At the beginning of the development of laparoscopic pyeloplasty, Türk et al.^[6] reported a success rate in 97.7% of the patients, a value that perfectly reflects the results obtained after open surgery, with an incidence of complications of 2%. In 2006, Eden^[16] published a review about the results associated with the minimal invasive treatment of UPJO. In the laparoscopic series, he reported no significant differences between the retroperitoneal and transperitoneal approach, noting that with transperitoneal technique there is the advantage to have a better visualization of anatomy and greater workspace to suture. Moreover, he pointed out that in contrast with the 3-11% transfusion rate following endourologic UPJO incision, transfusion following laparoscopic pyeloplasty is rare. In our study,

25 patients underwent a LDP for UPJO. The mean operation time of 115 min is in accordance with literature.^[15] In our LDP series suturing was done with a 4-0 absorbable suture, but 5-0 or 6-0 suture can be used depending on the size of the patient. Currently, sutures larger than 6-0 are recommended for small children and infants.^[17] The stitch was placed through the anterior abdominal wall in our LDP technique, because of this reason we needed stronger suture and bigger needle. In our experience bigger needle manipulation and control is easier than small one. In our series we did not see any complication with preferred suture and needle. The mean estimated blood loss was negligible in all patients and no conversion to open surgery occurred. The mean follow-up was 19 months. Postoperative evaluation included clinical history, excretory urography (3 months postoperatively) and ultrasonography. In 92% of patients, a complete success was registered.

In conclusion, LDP has consistently achieved success rates comparable to those of open pyeloplasty. The reduced patient morbidity and length of stay offer considerable advantages over open procedures, and LDP should be first-line treatment for UPJO by experienced laparoscopic surgeons. Our institution has a success rate comparable to that of other centers that have published results.

Conflict of interest

No conflict of interest was declared by the authors.

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