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# Laparoscopic pyeloplasty versus open pyeloplasty for recurrent ureteropelvic junction obstruction in children

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## Summary

### Introduction and objectives

Recurrent ureteropelvic junction obstruction (UPJO) in children is an operative challenge. Minimally invasive endourological treatment options for secondary UPJO have suboptimal success rates; hence, there is a re-emergence of interest about redo pyeloplasty. The present study presented experience with laparoscopic management of previously failed pyeloplasty compared with open redo pyeloplasty in children.

### Study design

Twenty-four children with recurrent UPJO who underwent transperitoneal dismembered laparoscopic pyeloplasty were studied. Operative, postoperative, and follow-up functional details were recorded and compared with those of open pyeloplasty ( $n = 15$ ) carried out for recurrent UPJO by the same surgeon during the same study period.

### Results

Demographic data were comparable in the laparoscopic and open groups, except for a significantly lower GFR in the open group (24.8 vs 38.2 ml/min,  $P = 0.0001$ ). Mean time to failure of the original repair was 20.2 months (23.6 months for redo laparoscopic pyeloplasty, 18.8 months for redo open). The success rate of laparoscopic redo pyeloplasty was 91.7 vs 100% in open redo pyeloplasty. Compared with redo open pyeloplasty, the mean operative time was longer ( $211.4 \pm 32.2$  vs  $148.8 \pm 16.6$ ,  $P = 0.002$ ), estimated blood loss was higher (102 vs 75 ml,  $P = 0.06$ ), while hospital stay

was shorter and pain score was lower in the laparoscopy group ( $P = 0.02$ ) in the laparoscopic group. There were no intraoperative complications, while the postoperative complication rate was similar in the two groups (20.8 vs 20.0%).

### Discussion

Before the laparoscopic approach became a viable option, endopyelotomy was widely used for managing recurrent UPJO. However, the success rate of endopyelotomy for secondary UPJO was approximately 10–25% lower than for open pyeloplasty. Redo pyeloplasty had excellent results, with reported success rates of 77.8–100%. Laparoscopic redo pyeloplasty is becoming a viable alternative to open redo pyeloplasty in many centers with experience in minimally invasive techniques. The present study revealed that redo laparoscopic pyeloplasty appeared to have advantages over redo open surgery, in that it was associated with shorter hospital stay (4 vs 6 days,  $P = 0.046$ ), reduced postoperative pain score ( $P = 0.02$ ), and less need for postoperative analgesia ( $P = 0.001$ ), still with comparable successful outcomes and patient safety. However, the procedure had a longer operative times and more blood loss.

### Conclusion

Laparoscopic pyeloplasty is a viable alternative to open pyeloplasty in children with recurrent UPJO, with shorter hospital stays and less postoperative pain. However, the procedure is technically demanding and should be attempted in high-volume centers by laparoscopists with considerable experience in laparoscopic reconstructive procedures.

**Table**

	Redo laparoscopic pyeloplasty	Redo open pyeloplasty	P-value
Number of patients	24	15	
Mean age, years (range)	13.2 (5–17)	11.8 (2–14)	NS
Previous pyeloplasty (open/laparoscopic)	22/2	14/1	NS
Operative time (minutes)	$211.4 \pm 32.2$	$148.8 \pm 16.6$	0.002
Hospital stay (days)	4 (2–6)	6 (3–8)	0.046
Success rate (%)	91.6%	100%	NS
Complications (%)	20.8	20%	NS

## Introduction

Dismembered Anderson Hynes pyeloplasty has been considered as the gold standard for managing UPJ obstruction (UPJO) over decades [1]. With the widespread adoption of minimally invasive techniques as alternatives to open surgery, laparoscopic pyeloplasty has been widely accepted, with evidence of associated reduced morbidity, better recovery and shorter hospital stays compared with open pyeloplasty [2–4].

More recently, the robotic-assisted approach is gaining momentum with the advantages of ease of meticulous dissection and anastomosis, and reduced operative time [5]. Irrespective of the approach, the success rate of dismembered pyeloplasty for UPJO is >90%.

Managing a secondary UPJO following pyeloplasty is an operative challenge. In spite of the relatively few complications, brief hospitalization and little disability of endourological procedures such as endopyelotomy for treatment of secondary UPJO, these procedures are associated with suboptimal success rates, and hence there is a reemergence of interest in redo pyeloplasty [6,7]. However, there are sparse reports in the literature addressing laparoscopic management of recurrent UPJO in children.

The present study reports experience with the laparoscopic management of previously failed pyeloplasty and outcomes, compared with open redo pyeloplasty in children.

## Materials and methods

From January 2009 to August 2014, twenty-four children who underwent laparoscopic management of previously failed pyeloplasty at the center were included in this retrospective study after approval of the institutional Ethical Care Committee. A comparative analysis was performed between patients who underwent laparoscopic redo pyeloplasty and those who underwent open pyeloplasty for secondary UPJO, by the same surgeon during the same study period, for operative and postoperative outcomes. Patient data and previous surgical details were collected.

A pre-operative diagnosis of recurrent obstruction was confirmed by ultrasonography, computerized tomography and DTPA renogram. Magnetic resonance/intravenous urography, and/or retrograde pyelography were performed whenever indicated to clarify anatomical details.

Failure of initial pyeloplasty was judged by either obstructive symptoms or signs. The decision to perform redo pyeloplasty depended on the presence of symptoms (e.g. recurrent UTI, flank pain), functional loss (deterioration of DRF of >5%), and an aggravated obstruction pattern on renogram.

Patients with salvageable renal units underwent laparoscopic redo pyeloplasty. A single surgeon operated on all patients. Patients' demographics, perioperative, intra-operative and postoperative parameters, like operative time, blood loss, complications, duration of hospital stay, outcome of the procedure and duration of follow-up, were all evaluated.

Patients were followed up at regular intervals with clinical assessments, and ultrasonography at 3 months.

Provided that they were asymptomatic and the ultrasonography showed an improvement in hydronephrosis, a DTPA diuretic renogram was performed at 6 months to determine drainage patterns. Failure was defined as persistence or recurrence of symptoms and obstructive drainage patterns on DTPA renogram.

## Operative technique

Laparoscopic transperitoneal Anderson–Hynes pyeloplasty was carried out in all cases. The patients were placed in the lateral decubitus position. Pneumoperitoneum was achieved using open access. A standard 3–4 3–5 mm ports technique was followed. After exploring the peritoneal cavity, the colon was reflected from the lateral peritoneal attachment to expose the upper ureter and renal pelvis. Peripelvic fibrosis was gently released using blunt and sharp dissection without using electrocautery. The normal ureter was identified distally and dissection was carried out proximally towards the renal pelvis. The lower pole crossing vessel was carefully dissected and preserved when found. The PUJ was usually found as a thick fibrotic area connecting the renal pelvis with the rest of the ureter; at this point, the fibrotic segment was excised and the ureter was spatulated laterally for about 1 cm, while the distended renal pelvis was refashioned, with excision of the redundant part. The most dependent part of the pelvis was anastomosed to the apex of the spatulated ureter using 5-0 polyglactin sutures. Ureteropelvic anastomosis was completed with both continuous and interrupted stitches over the double J stent that was inserted antegradely. Then, the renal pelvis was closed using continuous suture. After ensuring good hemostasis, a tube drain was placed through one of the 5-mm ports then port-site closure was performed.

The open redo pyeloplasty technique follows the same steps as the laparoscopic redo procedure. Patients who underwent laparoscopic or open redo pyeloplasty were treated with intravenous ketorolac injection when patients voiced complaints of severe abdominal pain. A urethral Foleys catheter was retained for 2 days. The double J stent was removed after 6 weeks.

## Statistical analysis

Nominal variables were compared between the two groups using the Chi-squared test or Fisher's exact test. Continuous variables were analyzed using the Mann–Whitney U test. A repeated-measures analysis was also performed.  $P < 0.05$  was considered statistically significant. All calculations were performed with SPSS<sup>®</sup> version 12.0 (SPSS, Chicago, Illinois, USA).

## Results

Demographic data were comparable in the laparoscopic and open groups, except for a significantly lower GFR in open redo pyeloplasty group (24.8 vs 38.2 ml/min,  $P = 0.0001$ ) (Table 1).

A total of 39 children who presented with secondary UPJO were managed with the redo dismembered

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