

Laparoscopic management of recurrent ureteropelvic junction obstruction following pyeloplasty

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Abstract

Objective: The aim was to analyze the operative, postoperative and functional outcome of laparoscopic management of previously failed pyeloplasty and to compare operative and postoperative outcome with laparoscopic pyeloplasty for primary ureteropelvic junction obstruction (UPJO).

Materials and Methods: All patients who underwent laparoscopic management for previously failed dismembered pyeloplasty were analyzed in this study. Detailed clinical and imaging evaluation was performed. Transperitoneal approach was followed to repair the recurrent UPJO. Operative, postoperative, and follow-up functional details were recorded. Operative and postoperative outcomes of laparoscopic redo pyeloplasty were compared with that of laparoscopic primary pyeloplasty.

Results: A total of 16 patients were managed with laparoscopic approach for previously failed pyeloplasty. Primary surgical approach for dismembered pyeloplasty was open in 11, laparoscopy in four patients and robotic assisted in one patient. Fifteen were treated with redo pyeloplasty and one with ureterocalicostomy. Mean operative time was 191.25 ± 24.99 min, mean duration of hospital stay was 3.2 ± 0.45 days and mean follow-up duration was 29.9 ± 18.5 months with success rate of 93.3%. Operative time was significantly prolonged with redo pyeloplasty group compared with primary pyeloplasty group (191.25 ± 24.99 vs. 145 ± 22.89 , $P = 0.0001$).

Conclusion: Laparoscopic redo pyeloplasty is a viable option with a satisfactory outcome and less morbidity.

Key Words: Laparoscopy, pyeloplasty, ureteropelvic junction

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INTRODUCTION

The gold standard treatment for managing ureteropelvic junction obstruction (UPJO) has been dismembered Anderson Hynes pyeloplasty over decades. After 1st report of laparoscopic pyeloplasty by Schuessler in 1993, laparoscopic approach has been widely accepted.^[1] In recent times, robotic assisted

approach is becoming popular. Irrespective of the approach the success rate of dismembered pyeloplasty for UPJO is >90%. However, managing a recurrent UPJO following pyeloplasty is a challenging scenario. In view of variable success rate of endopyelotomy, there is a reemergence in interest about redo pyeloplasty. There are only few reports of pure laparoscopic management of failed pyeloplasty in the literature. We present our experience with the laparoscopic management of previously failed pyeloplasty and outcome compared to primary pyeloplasty.

MATERIALS AND METHODS

All patients who underwent laparoscopic management of previously failed pyeloplasty at our center were included in this retrospective study. Patient's data and previous surgery details

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were collected. All patients underwent detailed evaluation in the form of computed tomography/magnetic resonance/intravenous urography, [Figures 1 and 2] diethylenetriamine pentaacetic acid (DTPA) renogram and retrograde pyelography. Patients with salvageable renal units underwent laparoscopic redo Pyeloplasty. All patients were operated by single surgeon George P Abraham. The operative and postoperative details were collected. Patients were followed up at regular interval with clinical assessment, ultrasonography and DTPA renogram. Failure is defined as persistence or recurrence of symptoms and obstructive drainage pattern in DTPA renogram. A comparative analysis was performed between patients who underwent laparoscopic redo pyeloplasty and recent 75 patients who underwent laparoscopic pyeloplasty for primary UPJO for operative and postoperative outcome. Statistical analysis was performed using SAS version 9.2 software (SAS institute, NC, USA). $P < 0.05$ is considered to be statistically significant.

Operative technique

The transperitoneal laparoscopic approach was utilized in all cases in the lateral decubitus. Pneumoperitoneum was achieved using open access. Standard four ports technique was followed. 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 [Figure 3]. Normal ureter was identified, and dissection was carried out proximally towards renal pelvis. The lower pole crossing vessel was carefully dissected and preserved when found [Figure 4]. Ureter was disconnected distal to fibrotic segment and adequately spatulated on the lateral aspect. Grossly distended renal pelvis identified, and pyelotomy was performed. The most dependent part of the pelvis was anastomosed to apex of the spatulated ureter. Ureteropelvic anastomosis was completed with interrupted stitches using 4-0 polygalactin sutures over the double J stent [Figure 5]. Redundant pelvis was excised, followed by closure of the pelvis using continuous absorbable suture. In the presence of crossing vessel, ureteropelvic anastomosis was performed anterior to crossing vessel. The drain was placed, and port closure performed. The perurethral foley catheter was retained for 2 days. The double J stent was removed after 6 weeks.

RESULTS

Totally 16 patients presented with recurrent UPJO at our center were managed with the laparoscopic approach. Demographic profile has been shown in Table 1. Time to failure of the original repair ranged from 3 to 30 months. In 12 patients primary surgery was performed at other centers before they were referred to our center. Four patients were primarily treated with laparoscopic pyeloplasty for UPJO. Four patients had undergone > 1 procedure before redo pyeloplasty.

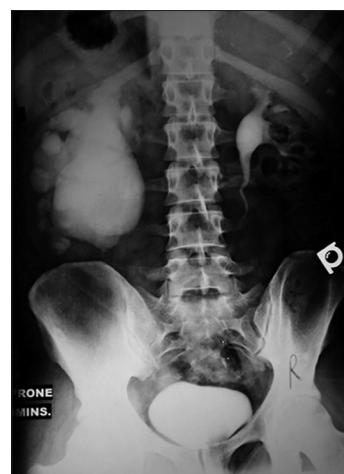


Figure 1: Intravenous urography showing gross right hydronephrosis following a failed open pyeloplasty



Figure 2: Magnetic resonance urography showing gross hydronephrosis following failed robotic assisted pyeloplasty

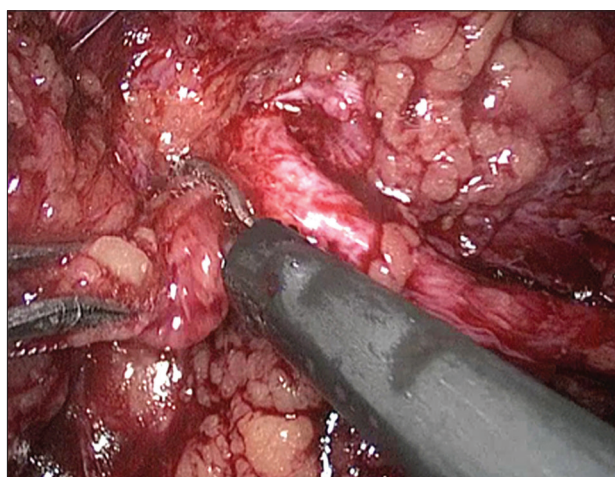


Figure 3: Operative picture showing dense peripelvic fibrosis

In 15 patients laparoscopic redo dismembered pyeloplasty was performed, and one patient underwent laparoscopic ureterocalicostomy. Operative and postoperative profile has

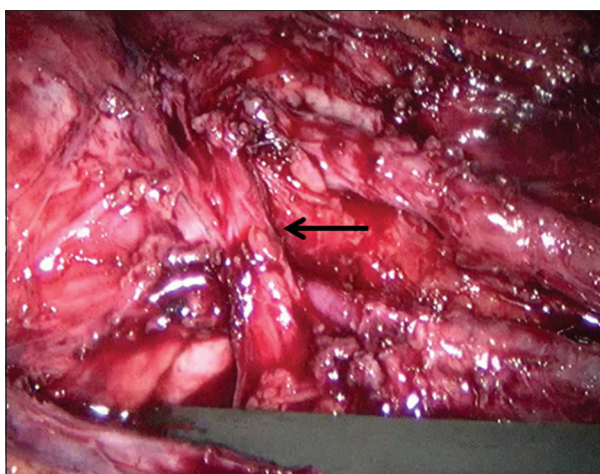


Figure 4: Operative picture showing missed lower pole crossing vessel

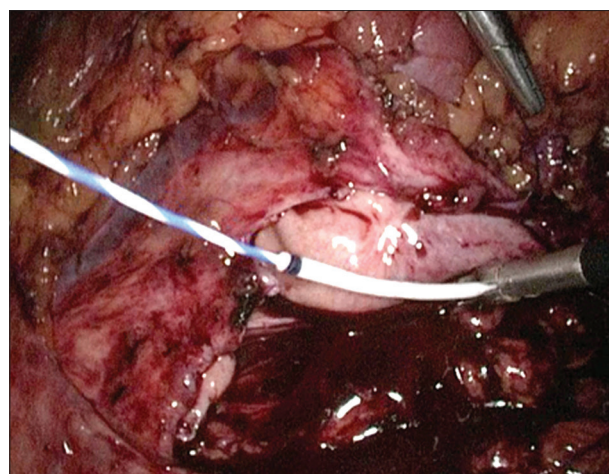


Figure 5: Ureteropelvic anastomosis over double J stent

been depicted in Table 2. Three patients had lower pole crossing vessel, for which transposition was performed. The success rate of laparoscopic redo pyeloplasty was 93.3%. In one patient, the affected renal unit developed restenosis at 6 months following a secondary repair. Remaining patients were asymptomatic until last follow-up and there was an objective evidence of relieved obstruction. The operative time was significantly prolonged in patients who underwent laparoscopic repair for recurrent UPJO compared to in patients who underwent primary pyeloplasty [Table 3].

DISCUSSION

The success of pyeloplasty depends on various factors, and certain principles should be followed to obtain good results. Precautions should be taken to preserve the vascularity of the upper ureter and pelvis, anastomosis should be tension free and watertight and crossing vessel should be identified and transposed. Causes for recurrent UPJO are urinary extravasation which leads to peripelvic fibrosis, ischemic injury to the ureter, persistent lower pole crossing vessel. The current options for managing recurrent UPJO with the salvageable renal unit are endopyelotomy, balloon dilatation, redo pyeloplasty and ureterocalicostomy. Before the laparoscopic approach became the viable option, endopyelotomy was widely used for managing the recurrent UPJO. However, the success rate of endopyelotomy for secondary UPJO varies from 39% to 87.5%.^[2-5] Our experience with endopyelotomy is very sparse, we performed endopyelotomy in two patients with secondary UPJO. However, in both patients endopyelotomy failed to relieve obstruction. Role of balloon dilatation has not been established clearly. Balloon dilatation for secondary UPJO carries a success rate of 66%. However, this rate is based on reported series with small numbers of patients.^[6,7] It is an option when there is a minimal narrowing with cross adhesions, but not for completely failed repair.

Table 1: Demographic profile

Variable	Number
Total number of patients	16
Mean age (years)	16.03±11.53
Male:female	9:7
Laterality	Left: 10, right: 6
Surgical approaches of previous pyeloplasty	Open: 11, laparoscopic: 4, robotic assisted: 1
Current laparoscopic approach	Redo pyeloplasty: 15, ureterocalicostomy: 1
Mean preoperative GFR (mL/min)	29.49±6.08
Time to failure of original repairs (months)	3-30

GFR: Glomerular filtration rate

Table 2: Operative and postoperative profile

Variable, mean (SD)	Number
Operation duration (min)	191.25±24.99
Crossing vessel	3
Time for drain removal (h)	46.7±13.01
Hospital stay (days)	3.2±0.45
Duration of follow-up (months)	29.9±18.5
Success rate %	93.3

SD: Standard deviation

Table 3: Comparison of outcome between laparoscopic repair of recurrent PUJO and primary UPJO

Variable	Redo pyeloplasty (n=15)	Pyeloplasty for primary UPJO (n=75)	P value
Age (years)	16.03±11.53	26.09±12.3	0.0035
Preoperative GFR (ml/min)	29.49±6.08	36.83±6.76	0.0001
Operative time (h)	191.25±24.99	145±22.89	0.0001
Hospital stay (days)	3.2±0.45	3.3±0.54	NS
Follow-up duration (months)	29.9±18.5	33.5±17.95	NS
Success rate %	93.3	100	-

PUJO: Pelviureteric junction obstruction, UPJO: Ureteropelvic junction obstruction, GFR: Glomerular filtration rate, NS: Not significant

Redo open pyeloplasty has been suggested as the first method of choice by several authors.^[8-10] Pyeloplasty for recurrent UPJO poses many challenges to the operating surgeon. Factors that undermine the successful redo pyeloplasty are dense peripelvic

fibrosis, long segment stricture and compromised vascularity of the upper ureter. Redo pyeloplasty for previously failed pyeloplasty is more challenging than for previously failed endopyelotomy. Redo pyeloplasty provides excellent results, with reported success rates of 77.8-100%. Thomas *et al.* reported excellent results with open redo pyeloplasty for previously failed pyeloplasty in seven patients with success rate of 100%.^[9] Braga *et al.* compared endopyelotomy and open redo pyeloplasty for recurrent PUJO in children. They found that redo pyeloplasty was associated with superior outcomes compared with endopyelotomy (success rate 100% vs. 39%).^[2]

Laparoscopic redo pyeloplasty is becoming a viable alternative to open redo pyeloplasty.^[11-15] Piaggio *et al.* had reported equal success rate with laparoscopic and open redo pyeloplasty in the retrospective study analyzing outcome of redo pyeloplasty in 11 children. They also noted that hospital stay and postoperative complications were less in the laparoscopic redo pyeloplasty group.^[11] Basiri *et al.* had reported 18 cases of laparoscopic redo pyeloplasty using different techniques with success rate of 77.8%. They performed flap pyeloplasty in 10 patients and dismembered pyeloplasty in 6 patients.^[12] Similarly Shadpour *et al.* also reported laparoscopic redo pyeloplasty using flap technique in 8 patients out of total 11 patients.^[13] We believe that in recurrent UPJO creating a vertical flap is extremely challenging, and fibrosed segment is not completely excluded during repair. We prefer to perform dismembered pyeloplasty after excising the entire fibrosed segment allowing for anastomosis of healthy ends. If tension free anastomosis is not possible, we perform complete renal unit mobilization to bring it down. Sundaram *et al.* reported 83% success rate with laparoscopic redo pyeloplasty in 36 patients. However, only three patients had previously failed the pyeloplasty. In our cohort, all patients were previously treated with dismembered pyeloplasty, 4 patients with the laparoscopic approach and one patient with the robotic-assisted approach.

Robotic-assisted laparoscopic redo pyeloplasty is gaining momentum in recent times. Hemal *et al.* reported 10 cases of robotic assisted pyeloplasty for recurrent UPJO as a primary modality of treatment with a 100% success rate.^[16] Lindgren *et al.* reported robotic assisted laparoscopic redo pyeloplasty for 16 recurrent UPJO with an objective success rate of 88%.^[17] The dissection and anastomosis would be easy with robotic assistance. However, the major disadvantage of robotics is the cost factor. We have operated four cases using 3D camera which provides depth perception thereby making dissection and suturing easy, precise and cost-effective.

Ureterocalicostomy is considered to salvage the renal unit when there are dense scar and predominantly intrarenal pelvis. We performed ureterocalicostomy in one patient with

dense peripelvic fibrosis who had a failed robotic assisted laparoscopic dismembered pyeloplasty. In our study, we found that redo pyeloplasty is associated with increased operative time compared to pyeloplasty for primary UPJO. This may be attributed to extra time required to release peripelvic and periureteric fibrosis and mobilize renal unit in order to obtain tension free anastomosis. However, there was no difference between two groups regarding hospital stay. To the best of our knowledge, this is the first study comparing outcomes laparoscopic redo pyeloplasty and primary pyeloplasty.

CONCLUSION

Laparoscopic redo pyeloplasty is a viable alternative to open redo pyeloplasty with satisfactory results with less morbidity profile. The outcome is superior to endourological procedures. The operative time is prolonged compared to pyeloplasty for primary UPJO. This procedure should be attempted by a urologist with considerable experience in laparoscopic reconstructive procedures to get optimal results.

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