Laparoscopic management of recurrent ureteropelvic junction obstruction following pyeloplasty

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INTRODUCTION

The gold standard treatment for managing ureteropelvic junction obstruction (UPJO) has been dismembered Anderson Hyne’s 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...
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 polygalctin 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.
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%. 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. It is an option when there is a minimal narrowing with cross adhesions, but not for completely failed repair.

| 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                                | -       |

Table 2: Comparison of outcome between laparoscopic repair of recurrent PUJO and primary UPJO

Redo open pyeloplasty has been suggested as the first method of choice by several authors. Pyeloplasty for recurrent UPJO poses many challenges to the operating surgeon. Factors that undermine the success of redo pyeloplasty are dense peripelvic fibrosis and persistent lower pole crossing vessel.
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%. 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%).

Laparoscopic redo pyeloplasty is becoming a viable alternative to open redo pyeloplasty. 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. 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. Similarly Shadpour et al. also reported laparoscopic redo pyeloplasty using flap technique in 8 patients out of total 11 patients. 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. Lindgren et al. reported robotic assisted laparoscopic redo pyeloplasty for 16 recurrent UPJO with an objective success rate of 88%. 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 peri pelvic 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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**REFERENCES**

1. Schuessler WW, Grune MT, Tecuanhuey LV, Preminger GM. Laparoscopic dismembered pyeloplasty. J Urol 1993;150:1795-9.
2. Braga LH, Lorenzo AJ, Skeldon S, Dave S, Bagli DJ, Khoury AE, et al. Failed pyeloplasty in children: Comparative analysis of retrograde endopyelotomy versus redo pyeloplasty. J Urol 2007;178:2571-5.
3. Veenboer PW, Chrzan R, Dik P, Klijn AJ, de Jong TP. Secondary endoscopic pyelotomy in children with failed pyeloplasty. Urology 2011;77:1450-4.
4. Jabbour ME, Goldfischer ER, Klima WJ, Stravodimos KG, Smith AD. Endopyelotomy after failed pyeloplasty: The long-term results. J Urol 1998;160:690-2.
5. Preminger GM, Clayman RV, Nakada SY, Babayan RK, Albala DM, Fuchs GJ, et al. A multicenter clinical trial investigating the use of a fluoroscopically controlled cutting balloon catheter for the management of ureteral and ureteropelvic junction obstruction. J Urol 1997;157:1625-9.
6. Doraiswamy NV. Retrograde ureteroplasty using balloon dilatation in children with pelviureteric obstruction. J Pediatr Surg 1994;29:937-40.
7. Wilkinson AG, Azmy A. Balloon dilatation of the pelviureteric junction in children: early experience and pitfalls. Pediatr Radiol 1996;26:882-6.
8. Rohrmann D, Snyder HM 3rd, Duckett JW Jr, Canning DA, Zderic SA. The operative management of recurrent ureteropelvic junction obstruction. J Urol 1997;158:1257-9.
9. Thomas JC, DeMarco RT, Donovan JM, Adams MC, Pope JC 4th, Brock JW 3rd. Management of the failed pyeloplasty: a contemporary review. J Urol 2005;174:2363-6.
10. Lim DJ, Walker RD 3rd. Management of the failed pyeloplasty. J Urol 1996;156:739-40.
11. Piaggio LA, Noh PH, González R. Reoperative laparoscopic pyeloplasty in children: Comparison with open surgery. J Urol 2007;177:1878-82.
12. Basiri A, Behjati S, Zand S, Moghaddam SM. Laparoscopic pyeloplasty in secondary ureteropelvic junction obstruction after failed open surgery. J Endourol 2007;21:1045-51.
13. Shadpour P, Haghighi R, Maghsoudi R, Etemedian M. Laparoscopic redo pyeloplasty after failed open surgery. Urol J 2011;8:31-7.
14. Sundaram CP, Grubb RL 3rd, Rehman J, Yan Y, Chen C, Landman J, et al. Laparoscopic pyeloplasty for secondary ureteropelvic junction obstruction. J Urol 2003;169:2037-40.
15. Levin BM, Herrell SD. Salvage laparoscopic pyeloplasty in the worst case scenario: After both failed open repair and endoscopic salvage. J Endourol 2006;20:808-12.
16. Hemal AK, Mishra S, Mukharjee S, Suryavanshi M. Robot assisted laparoscopic pyeloplasty in patients of ureteropelvic junction obstruction with previously failed open surgical repair. Int J Urol 2008;15:744-6.
17. Lindgren BW, Hagerty J, Meyer T, Cheng EY. Robot-assisted laparoscopic reoperative repair for failed pyeloplasty in children: A safe and highly effective treatment option. J Urol 2012;188:932-7.

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