Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/16691
DOI URL: http://dx.doi.org/10.21474/IJAR01/16691

RESEARCH ARTICLE

LAPAROSCOPIC TRANSPERITONEAL PYELOPLASTY FOR URETEROPELVIC JUNCTION OBSTRUCTION IN PAEDIATRIC POPULATION GROUP

Adil Ahmad*, Zaffer Saleem Khanday, Mufti Mahmood Ahmed, Syed Javaid Qadri, Manzoor Ahamad and Arshid Iqbal Qadri
Postgraduate Department of General Surgery, Government Medical college, Srinagar,India

Manuscript Info

Manuscript History
Received: 15 February 2023
Final Accepted: 19 March 2023
Published: April 2023

Abstract

Background: Ureteropelvic junction obstruction (UPJO) is one of the most prevalent genitourinary abnormalities in children. PUJO is considered as the most common cause of congenital hydronephrosis. Pyeloplasty is the main treatment method for patients with UPJO [5]. An ideal treatment should have the highest success rate and be minimally invasive. There are many techniques for PUJO repair but dismembered Anderson Hynes pyeloplasty remains the gold standard for surgical reconstruction[8]. Laparoscopic Anderson-Hynes pyeloplasty has become the gold standard in many pediatric centers.

Objectives: To assess the safety and efficacy of laparoscopic transperitoneal pyeloplasty in children with PUJ obstruction.

Methods: The study included 30 consecutive cases of congenital unilateral PUJO with SRF <40% managed during the 24-month period from November 2020 to November 2022. All the patients were properly evaluated before proceeding with the procedure.

Results: In our study, the mean age of patients was 6.4 years. Most of the children affected were males (76.7%) and involvement of the left pelvi-ureteric junction. The commonest cause of pelvi-ureteric junction obstruction was an abnormal proximal segment (53.3%) followed by a crossing vessel (20%). The pre-op APPD on ultrasonography was in the range from 21mm to 50mm, with a mean pre-op APPD of 36.26mm. Most of the patients

(83%) had a pre-operative differential renal function in the range of 31-40%(34.8%). The mean operative time was 99.06 mins. Mean post-op APPD was 27.38mm and DRF was 40.72%. 96% of the patients had an indwelling catheter in situ for a period of less than one week. Out of the total of 30 patients anastomotic drain was kept for 6 days in 28 patients (93.34%). The mean hospital stay in days was 7.53 days.

Conclusion: Laparoscopic transperitoneal pyeloplasty is a safe and effective, minimally invasive procedure in pediatric patients, characterized by good surgical efficiency, reduced complications, faster recovery, and satisfactory follow-up results.

Copy Right, IJAR, 2023, All rights reserved.

……...

Introduction:-

Ureteropelvic junction obstruction (UPJO) is one of the most prevalent genitourinary abnormalities in children. PUJO is considered as the most common cause of congenital hydronephrosis. The incidence of congenital hydronephrosis due to UPJO is one in 2000 children, where the ratio of affected boys to girls is 2–3:1. A UPJO occurs more frequently on the left side, and bilateral hydronephrosis occurs in 20–39% of affected patients [1]. The main issue with this obstructive disorder is the progressive deterioration in kidney function, which can lead to renal unit loss. The advent of prenatal ultrasound (US) has brought the diagnosis even earlier before symptoms occur. Thus, treatment has been proposed at younger ages. The optimal time of surgery is based on a number of factors: the hydronephrosis grade, the drainage pattern of diuretic renography, the differential renal function (DRF) deterioration, and obstruction-related symptoms [2]. Ureteropelvic junction obstruction (UPJO) may either have intrinsic or extrinsic cause with the former being the most common etiology. Intrinsic Causes include Ureteral hypoplasia due to the presence of classical “adynamic segment”, High insertion of the ureter into the renal pelvis, and Kinks or valves produced by infoldings of the ureteral mucosa and musculature. Extrinsic Causes create an abrupt angulation and compressing the UPJ, which leads to obstruction of urine flow and progressive hydronephrosis. It includes Significant crossing vessels, ureteral folds that occur at the level of the UPJ, benign lesions such as fibroepithelial polyps, urothelial malignancy, stone disease, and post-inflammatory or post-operative scarring or ischemia.

Pyeloplasty is the main treatment method for patients with UPJO [5]. An ideal treatment should have the highest success rate and be minimally invasive. Open pyeloplasty meets the first criterion but not the second (minimal invasiveness), whereas endourology techniques only guarantee the second one [6]. Minimally invasive techniques, both endoscopic and percutaneous ones, involving the incision of UPJ are performed with low morbidity. However, they are associated with lower success rates than conventional surgery in previous studies. There are many techniques for PUJO repair, but the Dismembered Anderson Hynes pyeloplasty remains the gold standard for surgical reconstruction [3]. Laparoscopic Anderson-Hynes pyeloplasty has become the gold standard in many pediatric centers.

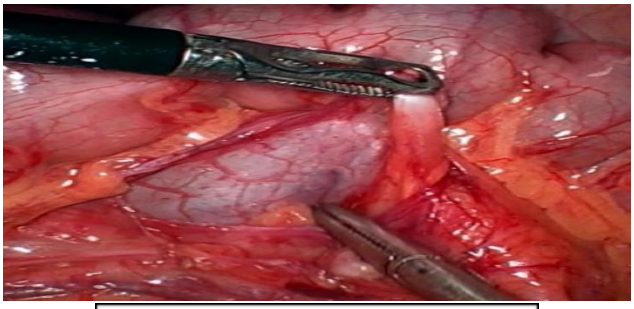
LP for UPJO can be performed through both the transperitoneal and retroperitoneal approaches, and either approach is associated with a high success rate and a low complication rate. The transperitoneal approach has a wider working space that provides a shorter operative time and lower conversion rate, while the retroperitoneal approach has a rapid recovery of intestinal movement and early resumption of oral feeding [4].

Materials And Methods:-

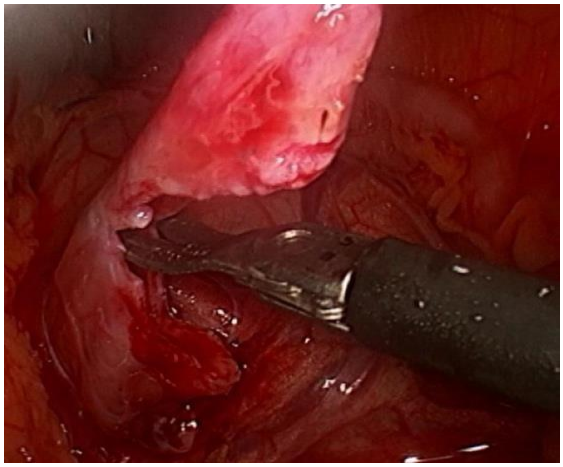
After obtaining the ethical clearance from the Institutional Ethical Committee, the present observational study was conducted in the Postgraduate Department of General Surgery, Government Medical College Srinagar over a

period of two years. The study included 30 consecutive cases of congenital unilateral PUJO with SRF <40% managed during the 24-month period from November 2020 to November 2022.

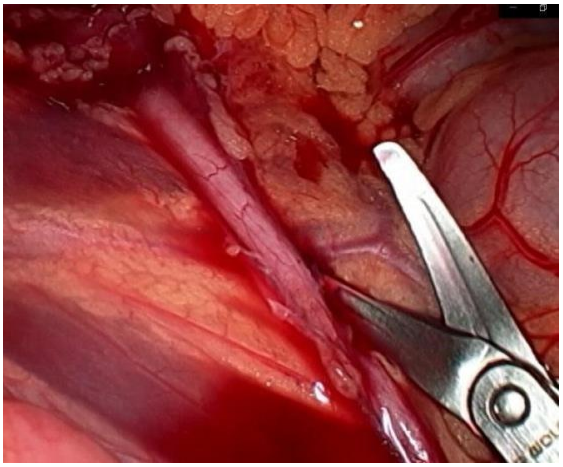
After proper evaluation of the patient the procedure is done under general anesthesia with the patient placed supine on the edge of a table with the affected side slightly elevated by towels to about 30 degrees. The patient is prepared with an exposed surgical field from the costal margin above till mid-thigh below. The surgeon and assistant (cameraman) stand on the normal side while placing the monitor at the affected kidney site. Intraperitoneal access is obtained with the open placement of a 5-mm umbilical port. Two 3- or 5-mm instruments (according to the patient's age) are placed, one of which lies in the mid-epigastrium and the other in the lower abdomen below the umbilicus in the midline. For left-sided procedures, the ureteropelvic junction (UPJ) is accessed via a trans-mesocolic approach. While on the right side, the retro colic approach is preferable because of the short mesentery. The retrocolic is accessed by mobilizing the colon to the level of the hepatic flexure. The renal pelvis is mobilized from the surrounding tissues, anteriorly, medially, and posteriorly. The ureter is carefully dissected free of attachments to avoid affecting its vascularity. Before the renal pelvis is sectioned, a suture (hitch stitches) is placed percutaneously. The stitch is placed through the abdominal wall just below the costal margin and then passed through the upper pole of the renal pelvis passed back through the abdominal wall and secured by a hemostat. Incision of the renal pelvis is done at the dependent point where an anastomosis with the ureter should be placed. Immediate suction of the urine should be done to avoid the potential risk of urinary peritonitis. The ureter is partially incised by a small transverse cut just below the UPJ to open its lumen then spatulated with straight scissors on its lateral aspect till we could have a good caliber of the ureter (that can accommodate the insertion of a closed laparoscopic instrument inside the lumen). The anastomosis begins at the vertex of the spatulated ureter with the most dependent part of the renal pelvis. The posterior aspect of the ureteral-pelvic anastomosis is initiated with two to three interrupted sutures (5/0 vicryl), which can be then completed by running sutures. After completion of the posterior wall, the double J catheter is inserted with the help of a guidewire then the anterior portion of ureteral-pelvic anastomosis is completed in a manner similar to the posterior wall over the double J catheter. We use Double J stent in all children. The redundant pelvis is resected if the pelvis is greatly dilated. Thereafter, the pelvis is closed with running sutures. A suction drain is left as a perinephric drain at the site of the anastomosis that emerged from the lower port site. A bladder catheter is left in place during hospitalization. Oral intake is started as soon as the patient is recovered from anesthesia.



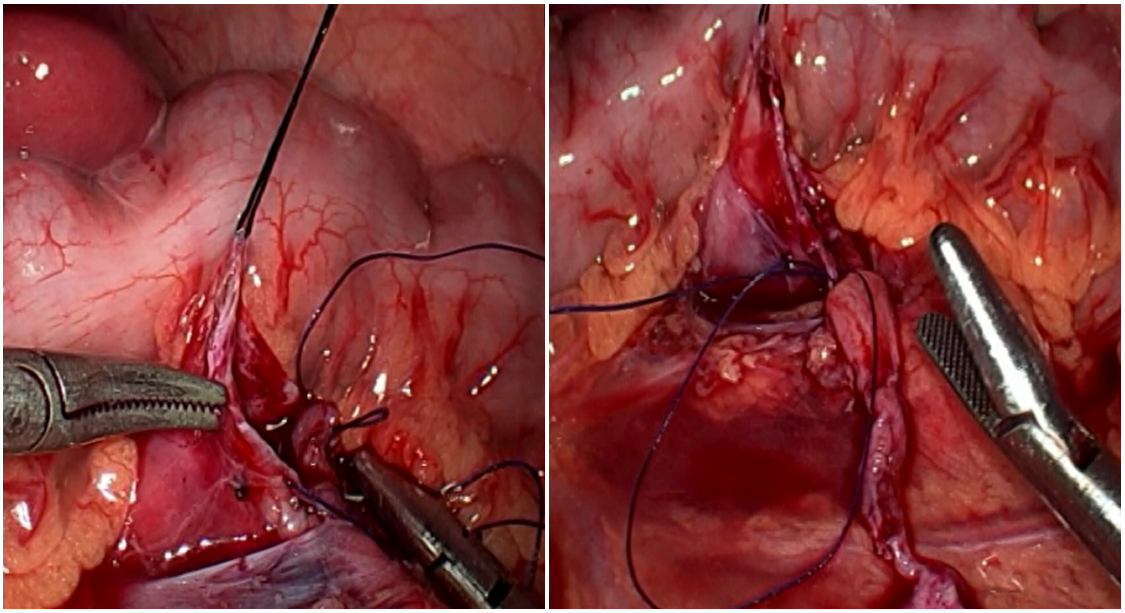
Pelvi-Ureteric junction



Pelvis Reduction



Ureter Spatulation



Anterior wall suturing

Posterior wall suturing

Statistical analysis

Statistical analysis was performed using the statistical package for social sciences (SPSSversion21). Qualitative variables were analyzed using Chi-square Test/Fischer Exact Test while quantitative variables were subjected to unpaired t-test and Mann–Whitney Tests. Data was expressed as mean, standard deviation(SD), and range. Pearson's or Spearman's correlation test were used and a $P< 0.05$ was taken as statistically significant.

Results:-

In our study patients aged between 1-14 years were enrolled, with a mean age of 6.4 years. Most of the children affected were males (76.7%). Most of the patients in our study showed the involvement of the left pelvi-ureteric junction and constituted 60% of the total study group. Subjects included in this study had a pre-op APPD on ultrasonography ranging from 21mm to 50mm, with a mean pre-op APPD of 36.26mm. Most of the patients (83%) had a pre-operative differential renal function in the range of 31-40%. In our study majority of the patients were operated within 1 hour to 2 hours. The mean operative time was 99.06 mins.The commonest cause of pelvi-ureteric junction obstruction in our study was an abnormal proximal segment (53.3%) followed by a crossing vessel (20%). Mean post-op APPD was 27.38mm with a range of 20-37.7mm, and most of the patients (80%) had a renal pelvic diameter in the range of 21-30mm compared to preoperative diameter where most of patients were in the range of 31-40mm. The mean post of DRF was 40.72% with a range of 22-46.12% compared with the mean pre-op DRF of 34.8% with a range of 18.2-39.87%. In our study, 96% of the patients had an indwelling catheter in situ for a period of less than one week. Out of a total of 30 patients anastomotic drain was kept for 6 days in 28 patients (93.34%). The mean hospital stay in days was 7.53 days. Double J stent was kept in situ for a period of 3 weeks in the majority of patients (83%), with a mean of time period 3.3 weeks. The majority of the patients had no intra-op or post-op complications, only 2 patients (6.7%) had an anastomotic leak postoperatively and one patient (3.3%) had a mal-placed stent.

Discussion:-

Laparoscopic pyeloplasty provides a minimally invasive alternative to repair UPJO. The optimal age is one of the concerns for the application of LP in children.The mean age in our study group was 6.06 years with the maximum subject being of the age of 12 years and a minimum of 1.8 years.Various studies which compare laparoscopic pyeloplasty to open pyeloplasty showed that the patients in the open group were younger than those in the LP group. For example, **Valla[5] and Piaggio [6]** reported more young patients (younger than 1 year) in the OP group. The other authors, however, reported the patient ages in the LP group were similar to or even less than those of the OP group.We concluded that age perse is not a limiting factor to perform laparoscopic pyeloplasty if adequate expertise is available. In our study, there were 23.3% females and 76.7% males. Various internationally published studies published data with predominant patients of the male gender. **Cristiane Reis Leonardoet al[7] in** 2020 and **Hany Emad Mohamed et al[8]** in 2022 also reported similar gender distribution, about 26% of female patients.

Bao Q et al[9]in 2022 also reported male predominance in the study group with females constituting only about 14 %. As for as sidedness is concerned there was PUJO on the right side in 40% of patients making left-sided more prevalent. **V.V.S. Chandrasekharam[10] in 2015 also** reported prevalent left-sidedness (76%). The important radiological parameter that we consistently looked at in pre-operative imaging was the APPD of an involved kidney. The mean APPD in our study was around 36mm. **V.V.S.Chandrasekharam[10] in 2015** also reported a mean APPD of about 34mm in his study. **Cristiane Reis Leonardo** et al[7] in 2020 also had a mean APPD of 43mm in his study group.We also did a functional scan preoperatively to evaluate the residual renal function in subjects. The mean pre-operative renal function in our study was 35%. **V.V.S. Chandrasekharam[10] in 2015** also reported mean split renal function of about 22%.

In our study, the mean operative time for laparoscopic pyeloplasty was around 99 minutes. The maximum time taken in our study was 2.5 hours. The average time in our study is consistent with various already published studies. **V.V.S .Chandrasekharam10 in 2015** published his experience of laparoscopic pyeloplasty and reported a mean operative time of 106 minutes. **Cristiane Reis Leonardo** et al[7] in 2020 also published a mean surgical time of 107 minutes (70-180min) from port insertion to port closure in his study patients.

After laparoscopic pyeloplasty, we also evaluated improvement in morphological as well as functional parameters of kidneys vis-a-vis postoperative APPD and postoperative renal function. The mean post-operative APPD in our study was 27mm (compared with 36 mm pre-operatively) and postoperative renal function was 40% (as compared to 35% preoperatively).

V.V.S. Chandrasekharam10 in 2015 published his wide experience of lap-pyeloplasty and reported marked improvement in mean APPD from 34 mm to 10 mm and mean renal function from 22% to 355%. The marked improvement may be due to early intervention as the mean age in V.V.S Chandrasekharam's study was 3.8 years compared to our study where the mean age was 6.06 years.

Cristiane Reis Leonardo et al also reported comparable improvement in APPD in the postoperative period (25 vs 40%). In our study, 2 patients (6.6%) out of 30 patients developed anastomotic leak post-operatively and both were managed conservatively. 1 patient (3.3%) had migrated stent in the postoperative period, which was removed after 3 weeks postoperatively. The mean duration of Stent kept in situ was 3.3 weeks in our study.
Cristiane Reis Leonardo et al also reported stent removal after a mean of 45 days**.**

Conclusion:-

Laparoscopic transperitoneal pyeloplasty is a safe and effective, minimally invasive procedure in pediatric patients with a good intermediate-term success rate, minimal morbidity, and gives excellent long-term results. Direct exposure of the ureteropelvic junction via the mesocolon saves time in children for left-sided PUJ obstruction. It is characterized by good surgical efficiency, reduced complications, faster recovery, and satisfactory follow-up results.

References:-

1. Kletscher BA, Segura JW, Le Roy AJ, Patterson DE (1995) Percutaneous antegrade endopyelotomy: a review of 50 consecutive 50 cases. JUrol153:701–703
2. PsooyK, PikeJG, LeonardMP(2003) Long-term followup of pediatric dismembered pyeloplasty: how long is long enough. JUrol169(5).
3. Baldwin DD, Dunbar JA, Wells N, Mcdougall EM (2003) Single-center comparison of laparoscopic pyeloplasty, Acusize endopyelotomy, and open pyeloplasty. JEndourol17:155–157
4. Wagner S, Greco F, Inferrera A, et al. Laparoscopic dismembered pyeloplasty: technique and results in 105 patients. WorldJUrol.2010;28:615–618.
5. VallaJS, BreaudJ, GriffinSJ,etal. Retroperitoneoscopic vs open dismembered pyeloplasty for ureteropelvic junction obstruction in children. JPediatrUrol2009;5:368–373.
6. Piaggio LA, Franc-Guimond J, Noh PH, et al. Transperitoneal laparoscopic pyeloplasty for primary repair of ureteropelvic junction obstruction in infants and children: Comparison with open surgery. JUrol2007;178:1579–1583.
7. Cristiane Reis Leonardo, Alexandra Muzzi, José Eduardo Távora, Rodrigo Q. Soares, The outcomes of mini-laparoscopic pyeloplasty in children-Brazilian experience; IntBrazJUrol.2020;46:253-9
8. Mohamed, H.E., EL-Asmar, K.M., Hass an, T.A.etal.Feasibility, safety, and effectiveness of laparoscopic transperitoneal pyeloplasty in children: Ain Shams University early experience. AnnPediatrSurg 18, 26(2022).
9. Bao Q, Ma W, Zhang X, Chen S, Luo J, Zhang G, Lao W, Chen Y. Outcome analysis of immediate and delayed laparoscopic pyeloplasty in infants with severe ureteropelvic junction obstruction. FrontPediatr.2022Oct.
10. V.V.S. Chandrasekharam Laparoscopic pyeloplasty in infants: Single surgeon experience, Journal of pediatric urology (2015).