https://doi.org/10.48047/AFJBS.6.2.2024.4069-4078

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

An Overview about Transperitoneal Approach Laparoscopic Dismembered Pyeloplasty for Ureteropelvic Junction Obstruction Management in Children

Khalid El sayed Ali Shreef , Abd Elrazek Yousef Mohamed, Ahmed Moustafa kamal, Mohamed Ibrahim El sawaf, Hesham mohamed Ali kassem

Pediatric Surgery Department, Faculty of Medicine - Zagazig University, Egypt

Corresponding author: Khalid El sayed Ali Shreef

Email:khsreef2013@gmail.com

Article History

Volume 6, Issue 2, Apr-Aug 2024

Received: 5 August 2024

Accepted: 15 August 2024

Published: 15 August 2024

doi: 10.48047/AFJBS.6.2.2024.4069-4078

Abstract: Ureteropelvic junction obstruction (UPJO) is a significant cause of hydronephrosis, often requiring surgical intervention. Laparoscopic dismembered pyeloplasty (LDP) has emerged as a minimally invasive alternative to open pyeloplasty, offering potential benefits in terms of reduced pain, shorter hospital stay, and improved cosmesis. This abstract focuses on the transperitoneal approach to LDP for UPJO. The transperitoneal approach, while providing excellent visualization of the renal pelvis and ureter, requires careful dissection and meticulous handling to avoid injury to surrounding structures such as the colon, duodenum, and major blood vessels. The procedure typically involves a three- or four-port technique, utilizing a laparoscope and specialized laparoscopic instruments. After mobilization of the kidney, the surgeon meticulously dissects the UPJ, identifying and preserving the vascular supply. Complete dismemberment of the UPJ is crucial for optimal reconstruction. Various techniques exist for pyeloplasty reconstruction, including the spatulation, end-to-end anastomosis, and the extracorporeal techniques. The choice of technique depends on the surgeon's experience and the specific anatomical features of the UPJ obstruction. The anastomosis is typically performed using absorbable sutures, ensuring a tension-free and watertight repair. Intraoperative fluoroscopy can be utilized to confirm the patency of the reconstructed UPJ. Compared to open pyeloplasty, LDP offers several advantages. Patients generally experience less postoperative pain, shorter hospital stays, and faster return to normal activities. The smaller incisions result in improved cosmesis and reduced risk of wound infection. However, LDP also presents unique challenges, requiring specialized surgical skills and equipment. The steep learning curve and potential for increased operative time compared to experienced open surgeons are limitations. Careful patient selection is crucial, considering factors such as body habitus, previous abdominal surgeries, and the complexity of the UPJO. Long-term outcomes of LDP are comparable to open pyeloplasty, demonstrating similar success rates in terms of relieving hydronephrosis and improving renal function. Further research is needed to optimize surgical techniques and identify predictors of long-term success. Overall, LDP, using the transperitoneal approach, represents a valuable minimally invasive option for the management of UPJO, offering significant advantages for appropriately selected patients.

Keywords: *Transperitoneal Approach, Dismembered Pyeloplasty, Ureteropelvic Junction Obstruction, Children*

Introduction.

Ureteropelvic junction obstruction (UPJO) is a common congenital anomaly in children, characterized by an obstruction at the junction of the renal pelvis and ureter, leading to hydronephrosis and potential impairment of renal function. Traditional surgical management involved open pyeloplasty, a procedure associated with significant postoperative pain, longer hospital stays, and substantial scarring. However, the advent of minimally invasive laparoscopic techniques has revolutionized the approach to UPJO repair, with laparoscopic dismembered pyeloplasty (LDP) offering several advantages over the open approach. The transperitoneal approach, in particular, provides excellent visualization of the renal pelvis and ureter, facilitating precise dissection and reconstruction. [1].

The transperitoneal LDP procedure typically involves creating three or four small incisions in the child's abdomen. A laparoscope, equipped with a camera, is inserted into the abdomen, providing a magnified view of the surgical field on a monitor. Specialized laparoscopic instruments are then used to mobilize the kidney, carefully dissecting the surrounding tissues to expose the obstructed UPJ. Maintaining meticulous hemostasis is crucial throughout the procedure to minimize bleeding and ensure optimal visualization. The surgeon then performs a dismembered pyeloplasty, carefully excising the stenotic segment of the UPJ and reconstructing the ureteropelvic junction using a tension-free anastomosis. Various techniques exist for reconstruction, chosen based on the surgeon's experience and the specific anatomical features of the obstruction. [2].

One key advantage of the transperitoneal approach is the excellent exposure it provides. The surgeon can easily visualize the renal vessels, ensuring their preservation during the dissection. This is particularly important in children, where the renal vessels are relatively smaller and more delicate than in adults. The transperitoneal approach also allows for a thorough assessment of the entire renal pelvis and ureter, facilitating the identification and management of any associated anomalies. Furthermore, the use of minimally invasive techniques reduces the risk of complications such as wound infection, incisional hernia, and postoperative ileus, often seen with open surgery. [3].

However, the transperitoneal approach for LDP in children also presents certain challenges. The small size of the pediatric anatomy necessitates the use of specialized instruments and meticulous surgical technique. The surgeon must have extensive experience in pediatric laparoscopic surgery to successfully perform the procedure. The operative time may be longer compared to open surgery, especially in complex cases or those with significant scarring from prior procedures. Furthermore, the learning curve for LDP is steeper than for open pyeloplasty, requiring considerable training and practice to achieve proficiency.

Despite these challenges, the benefits of LDP using the transperitoneal approach often outweigh the risks for appropriately selected children. Studies have demonstrated that LDP leads to comparable or even superior outcomes compared to open pyeloplasty in terms of success rates, renal function preservation, and long-term follow-up. The reduced postoperative pain, shorter hospital stay, and improved cosmesis further enhance the appeal of this minimally invasive technique. Careful patient selection is crucial, considering factors such as the child's age, overall health, and the complexity of the UPJO. [4].

Indications for the procedure are identical to the open approach. Also, the basic surgical steps are identical to open surgery. In adult patients, all types of repairs have been performed laparoscopically: Anderson-Hynes dismembered pyeloplasty, Y-V plasty, Heineke-Miku- licz pyloroplasty, and Davis intubated ureterotomy (Jarrett et al. 2002). There is no reason why this should not be possible in children as well. [1].

A main disadvantage of the minimally invasive ap- proach is the comparatively high operating room time of more than 1.5 h, up to 7 h (Peters et al. 1995; Schier 1998; Tan 1999). Suturing skills are the limiting factor for the operative time and also for the postoperative result, to an extent as in no other pediatric laparoscopic procedure. [2].

Before Induction of General Anesthesia

No special preparations are required. An antibiotic (cephalosporin) may be given if a stent is used. A stent is recommended, especially in the first cases, and can be either a double-J stent or a nephrostomy catheter (Rüsch, 71394 Kernen, Germany. In case the resected ureteropelvic junction (UPJ) can not be exteriorized through a cannula (the technique will be described below).. Complete sets of 3-5 mm instruments are available (Storz, Tuttlingen, Germany). The instruments needed are a hook for incising the peritoneum, forceps and scissors for dissecting the UPJ, and a pair of needle holders for suturing. [3].

Either monofilamentous or braided 5-0 or 6-0 sutures are used. Monofilamentous threads are available. Monofilament threads have a more pronounced "memory"; braided threads will not keep their spatial configuration as well as monofilament ones. Braided threads also tend to stick to neighboring anatomical structures and need to be picked up more often (probably a capillary effect). Therefore colored monofilament threads appear better suited for laparoscopic pyeloplasty. [4].

The laparoscope has a 5 mm diameter and has a side view of 30°. Smaller laparoscopes exist of course, but they make suturing and knotting more difficult. Laparoscopists overcome absent two-dimensionality by using monocular clues such as parallax, color, and shade differences, relative size changes, focusing, and other indirect evidence of spatial relations during endoscopic surgery. These cues do not work well with small-diameter laparoscopes. Thirty-degree laparoscopes are more demanding for the camera operator than 0° laparoscopes. Also the camera operator's position is tiring and so camera operator problems are best overcome with a camera-holding device [4,5].

After Induction of General Anesthesia

The procedure is performed under general anesthesia with intubation. A neutral electrode is placed for high-frequency coagulation. double-J stent is used, the stent is inserted. Later, during laparoscopy. An antibiotic is given (cephalosporin) as long as the stent remains in place. [6].

Positioning of Patient, Crew, and Monitors

The author has tried several patient positions, from a flat supine position to the 90° lateral position. The flat supine position is acceptable for processes at the anterior surface of the kidney. Otherwise it is the least desirable position for pediatric urology. [7].

In contrast, the 90° lateral position is exaggerated. The bowel tends to fall onto the laparoscope when inserted at the umbilicus. Also, Veress needle insertion through the umbilicus is more difficult, i.e., risky, in the 90° lateral position. In the 90° lateral position the procedure takes place "at the ceiling," i.e., the instruments come from below. If the child is positioned at the center of the table, instrument movement may be restricted physically by the table surface. Therefore the child is placed at the margin of the table. Also, patients positioned 90° laterally often have the thighs bent, resulting in subsequent mechanical obstruction of the instruments. The thigh of the patient may restrict the caudal instrument, when the hip joint is bent too much. The thigh of the affected side should therefore be extended. [8,9].

A good compromise is the 30–45° lateral position It allows for safe Veress needle access through the umbilicus and also good visualization. If required, the table may be tilted in order to increase the lateral position. This position is preferable for pyeloplasty. [10].

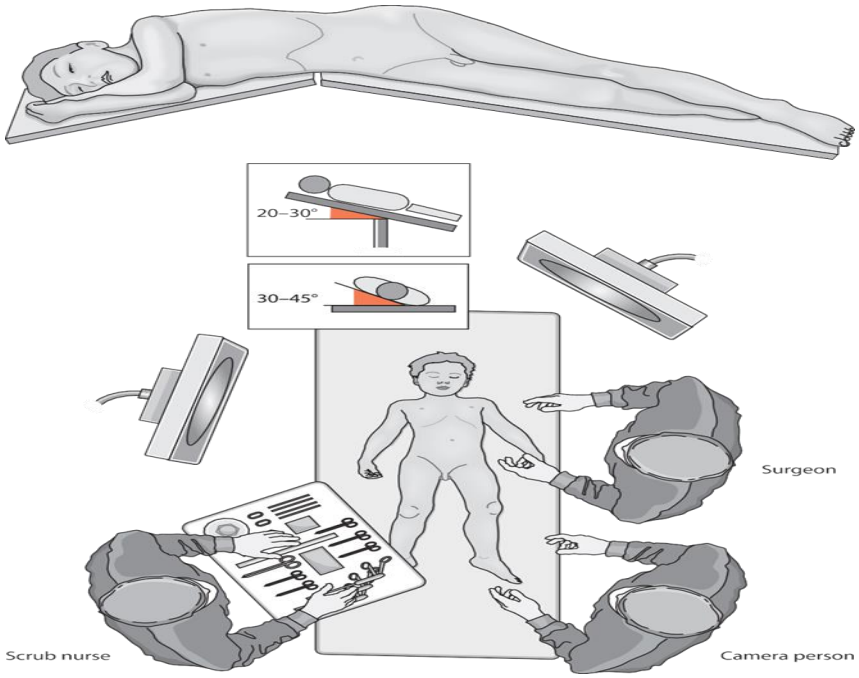

Fig. 1. a The 90° lateral position, b the 30–45° position

The surgeon stands in front of the child with the camera operator to the surgeon's left and the scrub nurse opposite. Two monitors are used; the most important one is opposite to the surgeon. There is no need for special energy applying systems. The peritoneum is opened with regular hook cautery. Except for the stents (at the discretion of the surgeon) and no further equipment is needed. An irrigation/suction device is kept ready in case urine spills upon opening the dilated pelvis. [11].

Technique

Cannulae

When inserting the trocar for the laparoscope at the umbilicus, the kidney is located rather distant, at the level of the lowest ribs. The laparoscope is best inserted *not* at the level of the umbilicus but slightly more cranially It will then arrive right in front of the kidney. This provides better visualization, but results in less favorable cosmesis. [12].

The umbilicus is used for Veress needle insertion. Direct access to the abdominal cavity is most easy at this point as there is the least amount of underlying anatomy. A small transverse semicircular incision is made in a skin fold at the lower margin of the umbilicus. The Veress needle is inserted, flushed with physiologic saline, and used for insufflation of CO_2. If the trocar for the laparoscope is also inserted at the umbilicus, the Veress needle is replaced, by "blind" insertion, by a 5 mm trocar for the laparoscope. For this trocar we prefer the Ethicon model because the trans- lucent cannula can be pulled back as far as possible until it almost falls out. This gives extra distance in a small abdominal cavity. If the laparoscope is not inserted at the umbilicus but more laterally, it is inserted at the lateral margin of the rectus sheath. There are no vessels to be injured here.

Two 2 mm trocars (or 3 mm) are inserted at the lateral margin of the rectus sheath. The trocars are arranged in such a way that the laparoscope is located in the center and, together with the two additional cannulae for the left and right hand, eventually forms a triangle. Ergonometrically the cannulae for the hands are placed so that they might be considered an extension of the forearms. [13].

There is no big difference technically between a pyelo- plasty on the left versus the right side. Still, the left side is slightly easier to be operated upon. [14].

The peritoneum is opened with a hook. If the pelvis is distended, it might be possible to approach it through the mesentery of the colon. Other- wise, the peritoneum is incised laterally to the colon until it falls down by gravity. The pelvis and ureter are exposed as far as necessary Two stay sutures will each hold the cranial pelvis and the ureter These are regular 4-0 sutures (of any material) for "open" surgery with a long needle. The needle is bent open until it almost is straightened, inserted directly through the abdominal wall, grabbed from inside with a needle holder, passed through the wall of the cranial pelvis and exited reversely through the abdominal wall in order to be grabbed from outside and clamped with a forceps. Passing the needle from the outside to the inside is easy. Passing the needle from the inside to the outside is more difficult. Therefore the needle needs to be of the "cutting" variety and it has to be sufficiently long. The site for insertion of the suture is determined by the topographics of the kidney and pelvis. Usually it is at the posterior axillary line and close to the lowest rib. The liver may be lifted up a bit by the stay suture. Similarly, a stay suture is placed at the ureter a few centimeters caudal to the expected anastomosis. These two stay sutures will align the anastomosis and facilitate tissue approximation and suturing. [15].

There are special, long-branched scissors for trimming of the pelvis and spatulation of the ureter. Also, there are new delicate forceps for suturing. They are available as 2 mm or 3 mm "Bab- cocks" (Storz, Tuttlingen, Germany). Most other laparoscopic instruments appear too rough for handling the mucosa while suturing the anastomosis. [16].

The specimen is pushed, in retrograde fashion, "into the face" of the camera operator, into the 5 mm trocar for the laparoscope while the laparoscope is pulled back until the specimen is visible from outside. It is then taken with an instrument within the trocar and removed. [17].

The anastomotic suture material is identical to open surgery, 5-0 or 6-0. Colorless or translucent sutures are difficult to see laparoscopically, especially when blood stained. Colored threads are more comfortable for the laparoscopist's eye, and 5-0 and 6-0 threads have needles to be inserted through commercially available 2 mm trocars or throw abdominal wall. The needles will scratch along the cannula but arrive unharmed intra-abdominally. Needles are removed later through the same trocar. All suturing is completed with intracorporeal knotting [18].

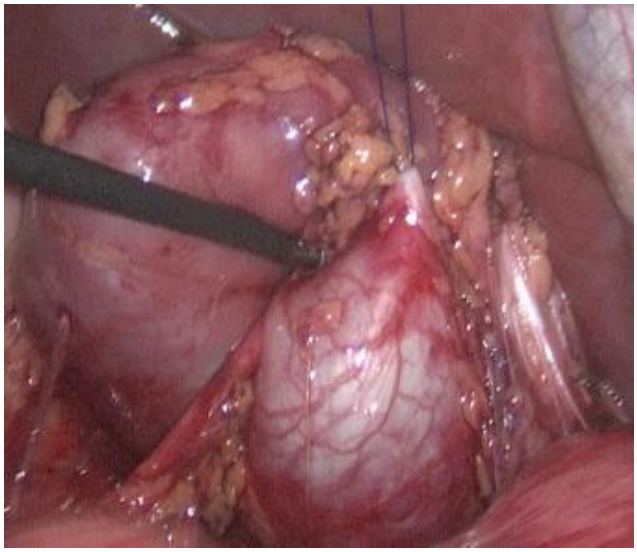

Figure 2 : Opening the peritoneum and exposure of renal pelvis

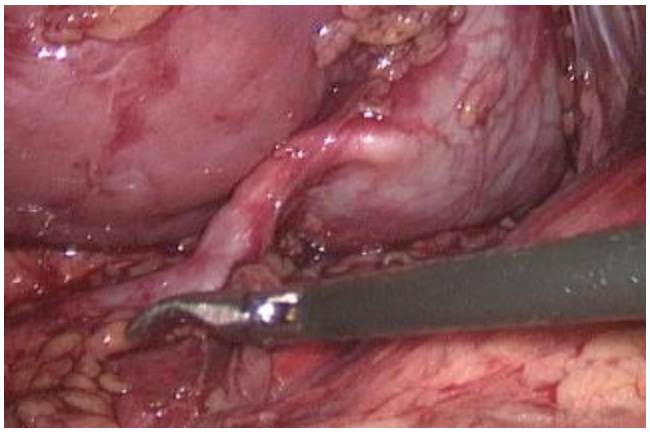

Figure 3: Ureteropelvic junction

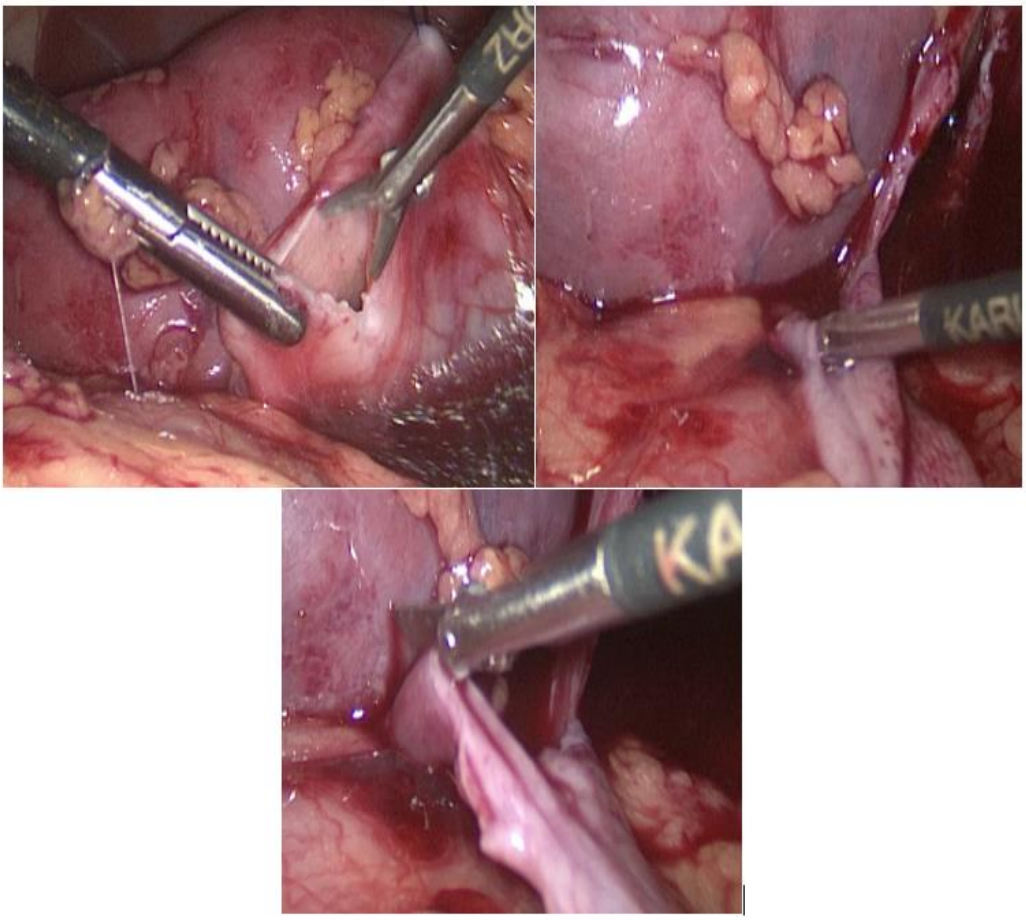

Figure 4 : Resection of the UPJ and trimming of the pelvis and spatulation of ureter

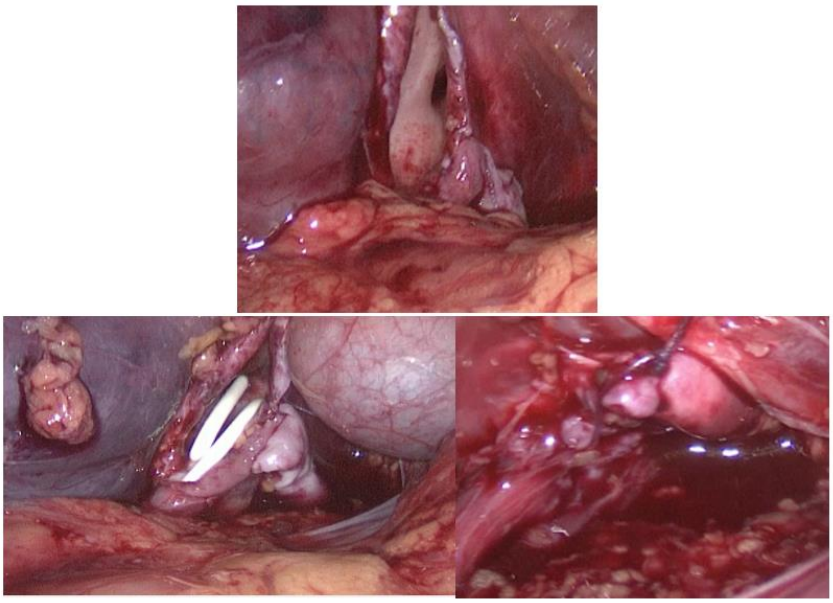

Figure 5: a Suturing the back wall, stent insertion , Suturing the anterior wall

As a safety measure, stents are advisable in the initial cases of a series
After desuffiation, local anesthesia with bupivacaine is applied to all trocar insertion sites. At the 5 mm trocar insertion site the fascia is closed with 4-0 braided slow-absorbable sutures and the skin is closed with interrupted absorbable sutures. Two-millimeter trocar sites are simply covered with a bandage. [19,20].

Postoperative Care
Children are offered regular food as soon as they wish. In our practice, postoperative pain medication is given routinely. Pain perception, however, is different in different societies. With a double-J catheter the children would leave the hospital as soon as they and the parents feel comfortable. This is usually around 3 days postoperatively. The double-J catheter is removed around 42 day post- operatively. Starting with the 8th postoperative day. [21].

Dressings are changed at postoperative day 4. In older children we suggest to refrain from sports for 2–4 weeks. This suggestion is not based on scientific data. [22:24].
In study done by Lopez, et al. [25] LP was feasible in 29 of 32 patients (91%). The procedure could not be completed by laparoscopy in 3 patients; the main reason was difficulty in completing the anastomosis. Only 1 patient with a big redundant renal pelvis underwent a reduction. Stent insertion was successful in all, except 1 patient. An aberrant crossing vessel was found in 12 patients. We held up the aberrant crossing vessel and PUJ with two- or three-point-not absorbable-sutures, without the needed pyeloplasty in 2 of them. The other 10 underwent a LP enabled ureteric transposition. Three patients presented with postoperative complications: pyelonephritis in 2 patients and PUJ leakage in 1 who underwent nephrostomy with a further uneventful course. Mean operative time was 152 minutes (range, 120-270), and average hospital stay was 4.7 days (range, 1-8). In 1 patient, cystoscopy showed that the JJ stent was not in the bladder at the time of removal, and ureteroscopy was used to retrieve it. Mean follow-up was 22 months (range, 2-56). A total of 29 patients (91%) were asymptomatic after removal of the double JJ stent, showing a reduction of the degree of hydronephrosis in all patients, and had also improved PUJ drainage on isotope renography or sonography.

They concluded that LP is effective and safe in children with minimal morbidity and gives excellent short-term results. The feasibility is also excellent in patients younger than 1 year. The transabdominal approach revealed good exposition without disadvantages for the patient. [25].

In study done by S., Pramod, et al. [26] Twenty-six children were included in the study. Mean age of presentation was 6.86±4.13years. Most common presentation was pain abdomen. Left kidney was commonly involved. The mean anteroposterior pelvic dimension (APPD) of involved kidney was 38.96±17.7 mm. 5 children presented with poorly functioning kidney with split renal function less than 10%. In three children PUJO was associated with pelvic calculi. Out of the 26 children simple nephrectomy was required in 4 (15%) children. The remaining 22 children underwent pyeloplasty. Mean duration of stay was 6.19±1.8 days. Post-pyeloplasty diuretic renogram showed improved drainage with improved function. They concluded that PUJO is common cause of urinary obstruction in children. Delay in diagnosis or presentation leads to increased chances of renal damage and loss. Hence it is important to diagnose PUJ obstruction at the earliest and receive prompt treatment. [26].

In study done by demirkol, Mehmet. [26], The mean age of patients was 25.5±17.1 (4–63) years with a male predominance of 56.5%. Of the 23 patients, 22 had primary and one patient had secondary UPJO previously treated with retrograde endo- pyelotomy. The mean operative time, drain stay time, and hospital stay time were 214.8±43.1 (160–310) min, 2.8±1.0 (2–7) days, and 3.5±1.8 (2–9) days, respectively. Although no major operative or post-operative complications were seen in our series, 2 (8.7%) patients had minor operative complications and 4 (17.3%) patients had minor postoperative complications. The mean follow-up period of all patients followed for at least 3 months was 13.9±7.8 (3–34) and the surgical success rate was 95.7%. They concluded that: Due to increased worldwide experience in laparoscopic surgery, the challenge on intracorporeal suturing of LP in initial cases is overcome in a short time. With a high success rate, low post-operative complication rate, and low hospital stay, our initial series results are consistent with high-volume studies in the literature [27].

In study done by Chiancone, et al. [28], 38 consecutive patients who underwent transperitoneal laparoscopic redo-pyeloplasty between January 2007 and January 2015 were included in the analysis. 36 patients were previously treated with dismembered pyeloplasty and 2 patients underwent a retrograde endopyelotomy. All patients were symptomatic and all patients had a T1/2>20 minutes at pre-operative DTPA (diethylene-triamine-pentaacetate) renal scan. All data were collected in a prospectively maintained database and retrospectively analyzed. Intraoperative and postoperative complications have been reported according to the Satava and the Clavien-Dindo system. Treatment success was evaluated by a 12 month-postoperative renal scan. Total success was defined as T1/2≤10 minutes while relative success was defined as T1/2between 10 to 20 minutes. Post-operative hydronephrosis and flank pain were also evaluated. Mean operating time was 103.16±30 minutes. The mean blood loss was 122.37±73.25mL. The mean postoperative hospital stay was 4.47±0.86 days. No intraoperative complications occurred. 6 out of 38 patients (15.8%) experienced postoperative complications. The success rate was 97.4% for flank pain and 97.4% for hydronephrosis. Post-operative renal scan showed radiological failure in one out of 38 (2.6%) patients, relative success in 2 out of 38 (5.3%) patients and total success in 35 out of 38 (92.1%) of patients. They concluded that Laparoscopic redo-pyeloplasty is a feasible procedure for the treatment of recurrent ureteropelvic junction obstruction (UPJO), with a low rate of post-operative complications and a high success rate in high laparoscopic volume centers. [28].

In summary, given sufficient expertise with laparoscopic suturing, laparoscopic pyeloplasty will be as effective as the “open” procedures, with decreased post- operative morbidity [29].

In conclusion, the transperitoneal approach to laparoscopic dismembered pyeloplasty represents a significant advancement in the surgical management of UPJO in children. While requiring specialized skills and meticulous technique, it offers substantial advantages over open surgery, including reduced morbidity,

improved cosmesis, and comparable or superior long-term outcomes. Continued refinement of surgical techniques and ongoing research are vital to further optimize the benefits of this minimally invasive approach and expand its application to a broader range of pediatric UPJO cases.

References

1. Jarrett TW, Chan DY, Charambura TC, et al (2002) Laparoscopic pyeloplasty: the first 100 cases. J Urol 167:1253–1256
2. Peters CA, Schlussel RN, Retik AB (1995) Pediatric laparoscopic dismembered pyeloplasty. J Urol 153:1962–1965
3. Schier F (1998) Laparoscopic Anderson-Hynes pyeloplasty in children. Pediatr Surg Int 13:497–500
4. Tan HL (1999) Laparoscopic Anderson-Hynes dismembered pyeloplasty in children. J Urol 162:1045–1047
5. Tan HL (2001) Laparoscopic Anderson-Hynes dismembered pyeloplasty in children using needlescopic instrumentation. Urol Clin North Am 28:43–51
6. Notley RG, Beaugie JM. The long-term follow-up of Anderson-Hynes pyeloplasty for hydronephrosis. Br J Urol. 1973 Oct;45(5):464-7.
7. Persky L, Krause JR, Boltuch RL. Initial complications and late results in dismembered pyeloplasty. J Urol. 1977 Jul;118(1 Pt 2):162-5.
8. Brooks JD, Kavoussi LR, Preminger GM, Schuessler WW, Moore RG. Comparison of open and endourologic approaches to the obstructed ureteropelvic junction. Urology. 1995 Dec;46(6):791-5.
9. Motola JA, Badlani GH, Smith AD. Results of 212 consecutive endopyelotomies: an 8-year followup. J Urol. 1993 Mar;149(3):453-6.
10. Tan HL, Roberts JP, Grattan-Smith D. Retrograde balloon dilation of ureteropelvic obstructions in infants and children: early results. Urology. 1995 Jul;46(1):89-91.
11. Tan HL, Najmaldin A, Webb DR. Endopyelotomy for pelvi-ureteric junction obstruction in children. Eur Urol. 1993;24(1):84-8.
12. Ahmed S, Crankson S, Sripathi V. Pelviureteric obstruction in children: conventional pyeloplasty is superior to endo-urology. Aust N Z J Surg. 1998 Sep;68(9):641-2.
13. Kavoussi LR, Peters CA. Laparoscopic pyeloplasty. J Urol. 1993 Dec;150(6):1891-4.
14. PubMed
15. Schuessler WW, Grune MT, Tecuanhuey LV, Preminger GM. Laparoscopic dismembered pyeloplasty. J Urol. 1993 Dec;150(6):1795-9.
16. Ben Slama MR, Salomon L, Hoznek A, Cicco A, Saint F, Alame W, Antiphon P, Chopin DK, Abbou CC. Extraperitoneal laparoscopic repair of ureteropelvic junction obstruction: initial experience in 15 cases. Urology. 2000 Jul;56(1):45-8.
17. Schwab CW 2nd, Casale P. Bilateral dismembered laparoscopic pediatric pyeloplasty via a transperitoneal 4-port approach. J Urol. 2005 Sep;174(3):1091-3.
18. Casale P, Grady RW, Joyner BD, Zeltser IS, Figueroa TE, Mitchell ME. Comparison of dismembered and nondismembered laparoscopic pyeloplasty in the pediatric patient. J Endourol. 2004 Nov;18(9):875-8.
19. Tan HL. Laparoscopic Anderson-Hynes dismembered pyeloplasty in children. J Urol. 1999 Sep;162(3 Pt 2):1045-7; discussion 1048.
20. Kutikov A, Resnick M, Casale P. Laparoscopic pyeloplasty in the infant younger than 6 months--is it technically possible?. J Urol. 2006 Apr;175(4):1477-9; discussion 1479.
21. Yeung CK, Tam YH, Sihoe JD, Lee KH, Liu KW. Retroperitoneoscopic dismembered pyeloplasty for pelvi-ureteric junction obstruction in infants and children. BJU Int. 2001 Apr;87(6):509-13.
22. El-Ghoneimi A. Laparoscopic management of hydronephrosis in children. World J Urol. 2004 Dec;22(6):415-7. Epub 2004 Dec 17.
23. Munver R, Sosa RE, del Pizzo JJ. Laparoscopic pyeloplasty: history, evolution, and future. J Endourol. 2004 Oct;18(8):748-55.

24. Bauer JJ, Bishoff JT, Moore RG, Chen RN, Iverson AJ, Kavoussi LR. Laparoscopic versus open pyeloplasty: assessment of objective and subjective outcome. J Urol. 1999 Sep;162(3 Pt 1):692-5.
25. Lopez M, Guye E, Becmeur F, Molinaro F, Moog R, Varlet F. Laparoscopic pyeloplasty for repair of pelviureteric junction obstruction in children. *J Laparoendosc Adv Surg Tech A*. 2009;19 Suppl 1:S91-S93.
26. S., Pramod & Ramji, Ashwath. (2018). Clinical profile and outcome of pelvi-ureteric junction obstruction (PUJO) in children presenting above 1 year. International Surgery Journal. 5. 3066. 10.18203/2349-2902.isj20183724.
27. demirkol, Mehmet. (2021). Laparoscopic pyeloplasty in ureteropelvic junction obstruction: A single-center experience. Laparoscopic Endoscopic Surgical Science. 10.14744/less.2021.58219..
28. Chiancone F, Fedelini M, Pucci L, Meccariello C, Fedelini P. Laparoscopic management of recurrent ureteropelvic junction obstruction following pyeloplasty: a single surgical team experience with 38 cases. Int Braz J Urol. 2017;43(3):512-517.
29. Sharma L, Ahmed N, Bhat M, Khetrapal A, Mathur R, Yadav RG. Laparoscopic Pyeloplasty, Our Experience of Initial Fifty Two Cases. J Urol Surg. 2020 Jun;7(2):125-129. doi:10.4274/jus.galenos.2020.3084.