

Laparoscopic vs Open Pyeloplasty

Ahmed Nihad Abtar

Specialist in Urology, Director, Rania General Hospital, Rania, Sulaimaniyah, Iraq

ABSTRACT

This review article compares open *versus* laparoscopic management of pelviureteric junction obstruction (PUJO). Untreated PUJO will cause hydronephrosis and gradual renal impairment. Using PubMed, Google, Journal of Minimal Access Surgery (JMAS), Medscape, European Urology Journal and SpringerLink internet search engines, I reviewed several articles that have tried to find out which way is better. Most of the articles I reviewed showed that laparoscopic pyeloplasty (LP) is as good as open pyeloplasty (OP) and has additional advantages. The parameters that were evaluated included operative time, the use of pain killers (analgesic), period of hospitalization and complications.

Conclusion: Most of the studies agreed on that LP had less morbidity and less hospital stay than OP, but the main disadvantage was the longer operative time.

Keywords: Laparoscopic pyeloplasty, Management of PUJ obstruction, Laparoscopic PUJ surgery.

INTRODUCTION

Many procedures have been described for the management of Pelviureteric Junction Obstruction (PUJO) including open, laparoscopic and endourological approaches. The first reconstructive procedure was performed by Trendelenburg in 1886 and in 1891, Kuster performed the first successful dismembered pyeloplasty.¹ The first laparoscopic pyeloplasty (LP) was described by Schuessler et al² in 1993. Many procedures exist for correction of PUJ obstruction, but surgical management of PUJ obstruction has recently been improved by the introduction of minimally invasive surgical techniques as alternative to standard open surgery in an effort to reduce the morbidity of the treatment. Initially, minimally invasive approaches included antegrade and retrograde endoscopic endopyelotomy, but there is increasing evidence that laparoscopic dismembered pyeloplasty is becoming the preferred option for treatment of PUJO and it can be performed by transperitoneal, retroperitoneal or hand-assisted techniques, having a success rate of more than 95%.^{3,4} These outcomes are better than other minimally invasive approaches to PUJO, including retrograde and antegrade endopyelotomy or balloon dilation.⁵ Patients suffering from PUJO present with a wide range of symptoms. Only a small percentage present with pain severe enough to necessitate insertion of ureteric stent until the definitive surgery is prepared.⁶

MATERIALS AND METHODS

A search for literatures and articles was performed using Google search engine, SpringerLink, eMedicine, WebMD and PubMed. The following search terms were used: Laparoscopic *versus* open pyeloplasty, pyeloplast repair, advanced management of PUJ obstruction, robotic pyeloplasty. Multiple articles were found. Selection criteria included those articles comparing open

versus laparoscopic (or robotic) techniques, actual application of the methods.

DISCUSSION

LP has developed worldwide as the first minimally invasive option to match the success rates of open pyeloplasty while achieving the added goals of low morbidity, short hospital stay and convalescence. The success rate of Piyush Singhanian et al⁷ was 86.66% with a median follow-up period of 10.6 months which compares favorably with other series. The operative time decreased with increasing surgeon's experience and standardization of the operative steps. LP allows the surgeon to perform the operative steps similar to those in open pyeloplasties, such as dissection, transection and suturing. However, it is a difficult procedure that requires careful ureteral dissection and considerable proficiency in the intracorporeal suturing.⁸ Standardization of a surgeon's steps and introduction of additional techniques specific for laparoscopic surgery can help to overcome the difficulties and enhance the performance. Toward this end, we placed a transcuteaneous suture in the medial edge of the redundant renal pelvis just below the renal vein. We found this step very useful in the transection and suturing as it tends to open up the pelvis and acts as a stay suture holding the anterior and the posterior walls of the pelvis apart. We also tried taking a stay suture on the ureter in our initial cases, but it caused entanglement of the sutures and so to avoid confusion this step was omitted in the subsequent cases. Crossing vessels were observed in 7 out of 15 (46.7%) patients. The contribution of crossing vessels to the functional obstruction of the PUJ is an area of controversy. There is a higher incidence of crossing vessels as detected by color Doppler ultrasonography, in relation to kidneys with known PUJO (79%) than in kidneys with no PUJO (35%).⁹ Crossing vessels are common in adult kidneys (50 to 80%) with PUJO

than in pediatric kidneys with PUJO (30%) and absent in prenatally detected PUJO.¹⁰ Thus, there may be a time-dependent relation between the development of adult PUJO and the presence of crossing vessel. The identification of crossing vessels tends to be higher in laparoscopic than in open surgery.¹¹ The explanation for this difference may lie in the minimal mobilization of the kidney needed during the laparoscopic procedure to access the PUJ, in contrast to the open pyeloplasty in which the entire kidney needs to be mobilized and rotated medially to expose the pelviureteric segment.¹¹ Van Cangh et al showed the negative association between the presence of crossing vessel and the success rate of endopyelotomy.¹² Crossing vessels are an important consideration in managing PUJO even though the relative contribution of crossing vessels to the pathophysiology of the individual PUJO will probably always be difficult to quantify as there are subtle differences in vessel size, distance from and relation to the PUJ, degree of hydronephrosis, level of kidney function and the presence of periureteric and perivascular bands and adhesions. Incidence of crossing vessels reported in retroperitoneal series is lower than those reported in most transperitoneal studies. And a retroperitoneal surgeon is less likely to transpose the anterior crossing vessel arguing that the ureter is lying naturally and anatomically as the most posterior structure in the retroperitoneum as evidenced in the series of Eden CG et al. Still, there is no apparent difference in the success rate of transperitoneal or retroperitoneal LP. Precise plastic repair of the PUJ is most important for the success rate of pyeloplasty with the crossing vessel either transposed or translocated cephalad from the PUJ area, as per the individual case.¹³ The necessity for reduction of the renal pelvis might be controversial. We do not reduce the pelvis when it is small and has active peristalsis. However, in a large pelvis with poor movement, we actively consider reduction, particularly when the reduction is necessary to give the PUJ, a funnel-like shape. All patients in our series had primary PUJ obstruction. LP has been used even in patients in whom previous endoscopic and/or open pyeloplasty had failed. Sundaram CP et al¹⁴ reported an overall success rate of 94% in a series of 36 patients with secondary PUJO. Siqueria et al¹⁵ also reported success in eight out of nine patients. Jarrett¹⁶ reported 17 laparoscopic pyeloplasties with secondary PUJO with a success rate of 88%. Notable point recorded in these studies was the longer mean operative time. Soulie et al¹⁷ and Lachkar et al¹⁸ report that any previous retroperitoneoscopic procedure makes a new retroperitoneoscopic pyeloplasty unlikely. So, a transperitoneal approach is preferred for such cases over the retroperitoneal approach. We used transperitoneal approach in all our patients. This approach offers more working space and a better field of view which is important for a reconstructive surgery. However, several disadvantages have been reported for this approach. For access to the retroperitoneum, the colon has to be mobilized and separated from the Gerota's fascia. In addition, the renal

pelvis is not completely exposed as the renal artery and vein cross ventrally. In Rasweiler's experience,¹⁹ this approach is also more invasive as reflected by the higher postoperative morbidity rates relative to the retroperitoneoscopic nephrectomy. However, we did not experience any technical difficulty or increased morbidity in the postoperative period in our series of transperitoneal pyeloplasty. Fourteen out of 15 patients did not suffer from ileus or distention of abdomen and we started oral sips from the evening of the surgery which was tolerated well by all patients. One out of 15 patients developed urinary peritonitis due to leak from the anterior suture line of the ureteropelvic anastomosis and required open exploration. Others have reported shorter operative times¹⁷ but higher complication rates²⁰ for the retroperitoneoscopic approach. The success rates seem to be better with transperitoneal pyeloplasty (97 to 99%) than with the retroperitoneoscopic approach (87 to 98%).⁸ Long-term outcomes need to be assessed because in rare cases PUJ obstruction can recur a year or more postoperatively. Several investigators recommend assessment of outcome by at least 1-year follow-up with diuretic renal scan or IVP.⁸ Jarrett et al¹⁶ reported the results of 100 laparoscopic pyeloplasties with a mean clinical and radiographic follow-up of 2.7 and 2.2 years respectively. The overall success rate was 96% and no late failure (after 1 year) was observed. We intend to follow all our patients for a period of 1 year after surgery with IVP and DTPA renal scan. At the present time, eight patients are under follow-up and seven patients have completed the 1 year follow-up and there was only one failure.

CONCLUSION

LP is a safe and effective minimally invasive treatment option that duplicates the principles and techniques of definitive open surgical repair. The success rates associated with LP are comparable to those of the gold standard, open pyeloplasty. LP is associated with significant reductions in overall morbidity, including less discomfort, shorter hospital stay, lower complication rate, and shorter time to convalescence and is cosmetically superior to the open pyeloplasty. Varied surgical anatomy associated with PUJ like the crossing vessels and high insertion of the ureter in the pelvis can be successfully repaired with LP which have been shown to compromise the results of other endourological procedures. The disadvantage includes the longer operative duration as compared to open pyeloplasty, steep learning curve and requires technical expertise. With the steady increase in worldwide laparoscopic experience and education, LP is indeed emerging as the new gold standard of care for symptomatic PUJ obstruction.

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