Original Article

Is open pyeloplasty still the first choice of operation for ureteropelvic junction obstruction in children?

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Ureteropelvic junction obstruction, Open-dismembered pyeloplasty

Abbreviations:
UPJO = Ureteropelvic junction obstruction, OP = Open-dismembered pyeloplasty, HN = hydronephrosis, EBL = estimated blood loss

Abstract

Objective: To show the results of the treatment of childhood ureteropelvic junction obstruction (UPJO) in Ramathibodi Hospital in order to identify the best current treatment for patients with this condition.

Material and Method: We retrospectively reviewed the medical records of 28 children submitted to open-dismembered pyeloplasty (OP) between May 2006 and Sep 2015. Patient demographic characteristics, pre and postoperative degree of hydronephrosis (HN) based on the measurement of the antero-posterior (AP) diameter of the renal pelvis, success rate assessed by a change in the degree of HN or renal function and symptom relief, operative time, length of hospital stay, estimated blood loss (EBL), size (length) or site of surgical wound, and complication rate were recorded. A successful outcome was defined according to postoperative radiological improvements in HN by ultrasound, renal function by diuretic renal scintigraphy and without clinical symptoms.

Result: A total of 31 pyeloplasties in 28 patients were identified. The mean operative time was 115 ($\pm$12.12) minutes and the mean EBL was 5.83($\pm$1.91) ml. The mean hospital stay was 5.5 ($\pm$0.63) days. Postoperative ultrasound examination showed a diminished grade of HN and decreased AP diameter of the renal pelvis. The overall success rate was 93.5%.

Conclusion: Our results confirm that OP is within an acceptable range with a short learning curve. We conclude that OP is still the gold standard for the surgical treatment of childhood UPJO in this era. Other aspects, such as surgical costs and patient satisfaction, require further assessment.

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Introduction

Ureteropelvic Junction Obstruction (UPJO) is one of the most common congenital abnormalities of the urinary tract with a reported incidence of 5:100,000 annually[1]. Although the majority of cases of hydronephrosis (HN) diagnosed prenatally eventually resolve, a significant number of UPJO cases remain and thus require urologic evaluation[2].

The gold standard for treating UPJO is considered to be open-dismembered pyeloplasty (OP)[3], which has been shown to have high success rates (80-97.5%) in several studies[4]. However, with the widespread use of minimal invasive surgeries in the past two decades, endoscopic procedures for the treatment of UPJO, such as endopyelotomy and percutaneous pyelolysis, were introduced by Wickam Kellet[5], Badlani and Smith[6], and Inglis and Tolley[7] between 1980 and 1990. Success rates in patients with primary UPJO treatment with endoscopic procedures were between 62-70%[8,9]. Laparoscopic pyeloplasty was first performed by Schussler[10] in 1993, and robotic assisted laparoscopic pyeloplasty was performed by Sung in 1999[11]. The success rate of laparoscopic pyeloplasty was between 95.9-97.2%[12,13].

The aim of this review is to show the results of the treatment of childhood UPJO in Ramathibodi Hospital in order to identify the best current treatment for patients with this condition.

Material and Method

We retrospectively reviewed the medical records of 28 children submitted to OP whose medical data met our requirements between May 2006 and September 2015. Only patients with an age under 15 years old with UPJO were included in the study. Children with other associated KUB anomalies and incomplete records were excluded from this study. The indications for pyeloplasty were UPJO, with either increasing HN, progressive worsening of split renal function (split renal function <40% or a worsening of >10 percentage points) in the diuretic renal scintigraphy (DTPA or MAG3) or symptoms (recurrent urinary tract infections or flank pain). The pyeloplasty technique used was dismembered pyeloplasty. The JJ stent was removed using a cystoscope at a mean of 4 weeks after surgery. In follow-up, renal ultrasounds were performed consecutively 1, 3, 6, 12, and 24 months after surgery to evaluate the grade of renal HN and anteroposterior (AP) diameter of the renal pelvis. If the follow-up ultrasound image showed either persistent or increased HN, diuretic renal scintigraphy was used to identify whether the patients had obstructive uropathy. Patient demographic characteristics, pre and postoperative degree of HN based on the measurement of the AP diameter of the pelvis, success rate assessed by a change in the degree of HN or renal function and symptom relief, operative time, length of hospital stay, estimated blood loss, size (length) or site of surgical wound and the complication rate were recorded. A successful outcome was defined according to postoperative radiological improvements in HN by ultrasound, renal function by diuretic renal scintigraphy and without clinical symptoms.

Result

A total of 31 pyeloplasties in 28 patients were identified. Patient characteristics are summarized in Table 1. The mean operative time was 115 ($\pm$12.12) minutes and the mean EBL was 5.83 ($\pm$1.91) ml. The mean hospital stay was 5.5 ($\pm$0.63) days. Postoperative ultrasound examination showed a diminished grade of HN and a decreased AP diameter of the renal pelvis. Operation details and outcomes are summarized in Table 2 and Figure 1. Only 1 patient experienced stricture of the anastomosis after the OP. One patient who had a persistent moderate to severe degree of HN while the JJ stent was indwelled had the same renal function and t1/2 compared with prior to the operation; thus, the JJ stent was removed and the patient was followed-up. One patient had a decreased degree of HN after follow-up with ultrasound. However, this patient developed smaller kidney size after follow-up for 4 years. The overall success rate was 93.5%. The drain in 2 patients could not be removed because

of accidentally fixing it with the suture; these patients required reoperation for exploratory laparotomy with drain removal.

Discussion

For many decades UPJO was treated using the open pyeloplasty technique, which remains the standard treatment. The advantages of this operation include excellent exposure of the UPJ, familiar anatomy for essentially all urologists, the ability to tailor the renal pelvis as needed, and the performance of a watertight anastomosis. The main changes offered to minimize the invasiveness of open surgery include the reduction of bleeding during surgery, smaller surgical scars, less pain following surgery, and a faster return to normal activity. Indeed, pediatric urologists are able to correct this benign disease through a small flank incision with a low percentage of complications and a short in-hospital stay. The impact of OP in the adult population is probably different, with cosmetic results particularly relevant for young women. Concerning the preferable approach for performing pyeloplasty in pediatric patients with UPJO, a meta-analysis of comparative studies demonstrated overlapping results between laparoscopic or robot-assisted and open pyeloplasty in terms of success rates, complication rates and hospitalization. The only advantage in favor of minimally invasive pyeloplasty remains a shorter operative time than OP in adults, but not in children[14].

For the different approaches, almost all the outcomes could be influenced by the experience of the surgeons. To attempt a real equal comparison, the entire operation should be performed by 1 specified surgeon in order to adjust for the potential effects of the learning curve. But in most of the studies included, pyeloplasty was not performed by the same experienced surgeon from the same surgical team. This may have created biased results to a certain degree.

Indeed, pure laparoscopic and particular robotic approaches can be more technically complex in younger and smaller pediatric patients. Moreover, available data seems to demonstrate no significant benefit to infants and children in preschool and grade school from a laparoscopic or robotic approach over an open procedure performed through a small skin incision[15]. In addition, to minimize adverse events difficult to justify for a benign disease, these younger patients should not be treated during the learning curve period. Pediatric surgeons less exposed to laparoscopic or robotic procedures should adopt a specific training program. This is the only sure method for making laparoscopic or robot-assisted pyeloplasty safe and efficient, achieving comparable results with open surgery in children[16].

Our study reveals that a number of patients required more time for the HN to resolve than other patients. Some patients from our study had an improved degree of obstructive uropathy identified by reducing t1/2 and improving differential renal function despite persistent HN. Some patients experienced worsening renal function in spite of the decreased degree of HN; all of these patients may have had renal dysplasia before the surgery.

In Thailand, the length of hospital stay among the different types of operations, such as OP, laparoscopic pyeloplasty, and endopyelotomy, may not be different because of the culture of Thai patients who require complete recovery before hospital discharge. Furthermore, surgical costs also remain an important consideration for patients in developing countries like Thailand.

However, the present study has several limitations: First, this was a retrospective study which analyzed only a small population of patients. Some of the patients had incomplete data for analysis. Further studies should be randomized controlled trials in order to compare the different types of surgery for the correction of UPJO.

The gold standard for treating UPJO is considered to be OP. However, with widespread minimally invasive surgeries, endoscopic procedures for the treatment of UPJO, such as endopyelotomy and percutaneous pyelolysis, were performed with acceptable success rates. Laparoscopic pyeloplasty and robotic assisted

laparoscopic pyeloplasty were also performed by many urologists with high success rates. However, We found that the OP technique is still the gold standard for the surgical treatment of childhood UPJO in this era.

Conclusion

Our results confirm that OP is within an acceptable range with a short learning curve. We conclude that OP is still the gold standard for the surgical treatment of childhood UPJO in this era. Other aspects, such as surgical costs and patient satisfaction, should be assessed further.

Conflict of interest

The authors declare no conflict of interest.

References

1. Tripp BM, Homsy YL. Neonatal hydronephosis-the controversy and the management. Pediatr Nephrol 1995;9:503-505.
2. Onen A, Jayanthi VR, Koff SA. Long-term follow-up of prenatally detected severe bilateral newborn hydronephrosis initially managed nonoperatively. J Urol 2002;168:1118-1120.
3. Anderson JC, Hynes W. Retrocaval ureter; a case diagnosed pre-operatively and treated successfully by a plastic operation. Br J Urol 1949;21:209-214.
4. Mei H, Pu J, Yang C, Zhang H, Zheng L, Tong Q. Laparoscopic versus open pyeloplasty for ureteropelvic junction obstruction in children: a systematic review and meta-analysis. J Endourol 2001;25:727-736.
5. Wickam JEA, Kellet MJ. Percutaneous pyelolysis. EurUrol 1983;9:122-124.
6. Badlani G, Eshghi M, Smith AD. Percutaneous surgery for ureteropelvic junction obstruction (endopyelotomy): Technique and early results. J Urol 1986;35:26-28.
7. Inglis JA, Tolley DA. Ureteroscopicpyelolysis for pelvic ureteric junction obstruction. Br J Urol 1986;58:250-252.
8. Knudsen BE, Cook AJ, Watterson JD, Beiko DT, Nott L, Razvi H, et al. Percutaneous antegrade endopyelotomy: Long term results from one institution. Urology 2004;63:230-234.
9. Motola JA, Badlani GH, Smith AD. Results of 212 consecutive endopyelotomies: An 8-years followup. J Urol 1993;149:453-456.
10. chuessler WW, Grune MT, Tecuanhuey LV, Preminger GM. Laparoscopic dismembered pyeloplasty. J Urol 1993;150:1795-1799.
11. Sung GT, Gill IS, Hsu TH. Robotic-assisted laparoscopic pyeloplasty: A pilot study. Urology 1999;53:1099-1103.