Section: Pediatric Surgery

Original Research Article

REVISION SURGERY FOR CASES OF PUJO: AN ANALYSIS

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Abstract

Background: As the success of pyeloplasty procedure is high, there is a lack of consensus concerning the indications and outcome of redo pyeloplasty. Hence this study was conducted to analyze the cases, which had revision surgery and to find out the indications for revision surgery and their final outcome. **Materials and Methods:** Retrospective study of cases re-operated for obstruction during the period 2016 to 2023 in a single center was analyzed. The criteria used to label as post-surgical obstruction (stasis) were (i) Acute presentation with DJ stent extrusion in immediate post-operative period with urinary leak. (ii) Recurrence or Late presentation, where there was an initial period of good drainage, but later drainage deteriorated. The investigations, primary surgery details, per-operative findings and final outcome post 2nd surgery were analyzed. **Result:** During the study period of 8 years, 124 cases of pyeloplasty surgeries performed in our centre, out of which eight patients underwent redo surgery for PUJO. The presentation of eight redo surgery cases, 4 cases were having stricture post primary pyeloplasty, 3 cases of post primary vascular hitch procedure for crossing vessel with persistent PUJO and one with missed retrocaval ureter were found to be the reasons for obstruction. Functional and drainage outcome after redo surgery in all these were good. **Conclusion:** Persistent or recurrent PUJO post primary surgery were anlaysed to find out reason for stasis, reason being stricture, missed crossing vessel, and retrocaval ureter. Preoperative investigation with VCUG, IVP and Diuretic renogram would help in diagnosing retrocaval ureter or secondary PUJO due to VUR. The main dilemma is in identifying late or recurrent cases. This is possible only if the patient is kept under systematic and long term follow up.

INTRODUCTION

The gold standard for treating blockage of the ureteropelvic junction (UPJ) has been pyeloplasty. The higher rate of identification of hydronephrosis (HN) as a result of the widespread use of prenatal ultrasonography necessitates paediatric urologists' follow-up.[1] UPJ obstruction accounts for around one-third of HN cases and, if left untreated, can result in severe and irreversible renal impairment.[2] Absence of need for follow-up surgeries or additional surgery is one sign that a pyeloplasty was successful. The rate of secondary surgeries for obstruction may be used as an objective, reportable indicator of failure, even though it underestimates the success of pyeloplasty if one takes undetected silent failures into account.

While both open and minimally invasive pyeloplasties have >92% success rates, there is currently no information available regarding the ideal amount of time for postoperative follow-up.[3] The imaging modality and follow-up frequency vary significantly. There is significant variation in the duration of follow-up and types of imaging among paediatric urologists due to the absence of established recommendations for post-surgical follow-up. A year after surgery, 29% of patients who had pyeloplasty did not get follow-up imaging, according to the national level database. Although the exact cause is unknown, there is a drop in postoperative interval screening with an increase in

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less invasive procedures.[4] Renal function may be preserved if failed pyeloplasty is detected early. The majority of patients who had a failed pyeloplasty were found and given treatment within a year after the first procedure, according to a retrospective research.[5] In light of this, a study was carried out to examine the cases undergoing revision surgery after pyeloplasty and to determine the manner, in which they presented, the causes of any obstruction, the indications for the procedure, and the results.

MATERIALS AND METHODS

Retrospective study was carried out on cases those who underwent pyeloplasty in the Department of Paediatric surgery at Tirunelveli Medical college Hospital, from 2015 to 2023. A total of 124 cases aged < 5 years were for in this study. Subsequently during the follow up, the cases requiring redo pyeloplasty was assessed and documented. All cases were assessed for the history, type of pyeloplasty and indications for the redo pyeloplasty and its outcome. Data was entered in Microsoft excel and analyzed using SPSS version 19. Descriptive statistics like frequency, and percentages were calculated.

RESULTS

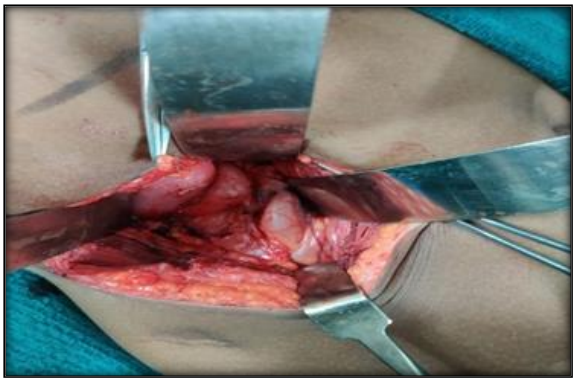

Figure 1

In this study, 39.5%, 33.1% and 27.4 of children were in the age group of < 12 months, 13-36 months and >36 months, respectively with male predominance of 61.3%. On assessing the grading of HN there were 11.3%, 27.4% and 61.3% of cases with mild, moderate and severe HN. Also 12.1% of cases had UTI, pre operatively.

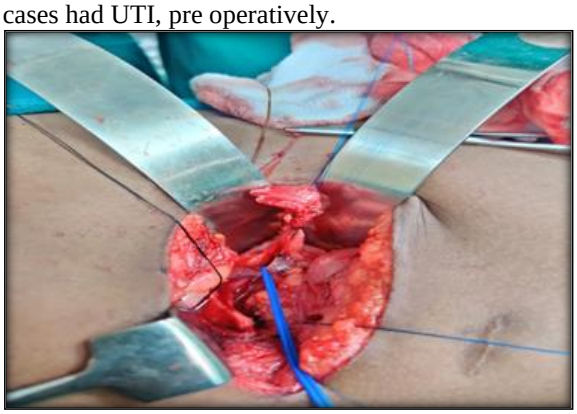

Figure 2

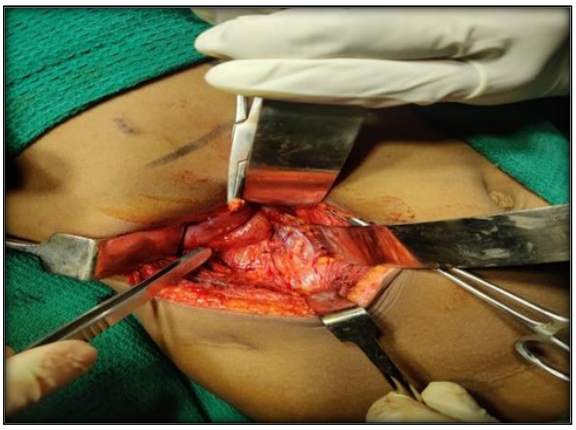

Figure 3

In this study, 91.9% and 8.1% of cases underwent open and laparoscopic pyeloplasty, respectively. Intra operatively 86.3% of cases had stent and post operatively 8.1% of cases had UTI. Also, 34.7% had resolved HN and 37.9%, 20.2% and 7.3% had mild, moderate and severe HN, respectively.

Success rate of primary and redo - pyeloplasty procedures were 93.5% and 100%, respectively.

On assessing the indications for redo-pyeloplasty, 4 cases were having stricture post primary pyeloplasty, 3 cases of post primary vascular hitch procedure for crossing vessel with persistent PUJO and one with missed retrocaval ureter were found to be the reasons for obstruction. Functional and drainage outcome after redo surgery in all these were good.

Table 1: Pre-operative characteristics

Pre op characteristics	Frequency	Percentage
Age (months)		
1-12 months	49	39.5
13-36 months	41	33.1
> 36 months	34	27.4
Gender		
Male	76	61.3
Female	48	38.7
Hydronephrosis		
Mild	14	11.3
Moderate	34	27.4
Severe	76	61.3
H/o Pre op UTI	15	12.1

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Table 2: Intra operative and Post-operative characteristics

Post op Characteristics	Frequency	Percentage
Type of surgery		
Open	114	91.9%
Laparoscopic	10	8.1%
Intra op Stent Placed	107	86.3
H/o post op UTI	10	8.1
Post op Hydronephrosis		
Resolved	43	34.7
Mild	47	37.9
Moderate	25	20.2
Severe	9	7.3

Table 3: Outcome of Primary and secondary procedures

Outcome following surgery	Frequency	Percentage
Primary pyeloplasty		
Success	116	93.5
Failure/ redo Pyeloplasty	08	6.5
Redo pyeloplasty		
Success	08	100
Failure	00	00

Table 4: Indications for redo-pyeloplasty

Indications of redo-pyeloplasty	Frequency	Percentage
Strictures	04	50
Post primary vascular hitch procedure for Crossing vessels	03	37.5
Missed retrocaval ureter	01	12.5
Total	08	100

DISCUSSION

With an emphasis on the presentation and treatment of unsuccessful pyeloplasty in the paediatric population, Thomas JC et al,[6] reviewed their experience with open dismembered pyeloplasty. With an overall success rate of 93.3%, 105 pyeloplasties were carried out on 103 patients ranging in age from 1 to 204 months. The intervals of follow-up were 6–69 months. Males aged 1 to 204 months made up the seven patients who did not respond to treatment; they typically complained of discomfort 3 to 38 months after their first surgery. A subsequent ultrasonography in these individuals indicated deteriorating hydronephrosis, and renography patterns were consistent with blockage. One of the five patients who had initial balloon dilation had success. Furthermore, one of these patients experienced a failed antegrade laser endopyelotomy. Six patients (86%) had open surgery, with three ureterocalicostomies and three reoperative dismembered pyeloplasty procedures. Two patients also had redundant pelvises that resulted in kinking. With ongoing follow-up for three to fifty months, the overall salvage rate was 100%. They came to the conclusion that most patients had great results with dismembered pyeloplasty. While the majority of our series' failures showed up after a year of follow-up, some happened as much as three years after surgery. However in the present study, eight patients had PUJO redo surgery out of the 124 cases of pyeloplasty operations that were conducted in our centre during the course of the eight-year research period. Eight examples of redo surgery were presented; it was determined that the causes of blockage were four cases with strictures following initial pyeloplasty, three cases with post-primary vascular hitch procedures for crossing vessels with persistent PUJO, and one case with a missing retrocaval ureter. Following a second surgery, all of these had good drainage and functional results.

According to Swearingen R et al,[7] out of the 247 laparoscopic pyeloplasties, 68 endopyelotomies, and 305 straightforward laparoscopic nephrectomies that were analysed, 41 were carried out following a prior pyeloplasty and had adequate subsequent care. Nine individuals had laparoscopic nephrectomy procedures. The three secondary laparoscopic procedures involving pyeloplasties went well. Ten (34%) out of the 29 secondary endopyelotomies were successful. Twelve patients had tertiary pyeloplasty, five (26%) had tertiary endopyelotomy, and two (11%) needed nephrectomy out of the 19 failures following secondary endopyelotomy. The success rate of our endopyelotomy was 38% overall, while it was 100% for secondary or tertiary pyeloplasty. For endopyelotomy, the median time to failure was five months. For patients who did not receive intervention, the median follow-up was 40.2 months. They asserted that after a pyeloplasty fails, secondary pyeloplasty is more than twice as successful as endopyelotomy. In order to guarantee early identification of a recurrent obstruction, Bansal UK et al,[8] evaluated the ideal duration of follow-up for patients receiving both open and minimally invasive pyeloplasties. With a follow-up of 26.8 months and a mean age of 51 months, 72% of the 264 patients were male. About 73% continued to follow for three years. There was a recurring blockage in 5.3% of instances. Within three years, 85% of the failures had a successful second

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pyeloplasty after receiving a diagnosis. Within three years of the first operation, six babies (43% of all unsuccessful surgeries) had a recurrence that was identified. Compared to open procedures, patients undergoing minimally invasive procedures had a lower chance of being monitored for over three years. Those with significant preoperative hydronephrosis were monitored for extended periods of time.

Gy GW et al,[9] used a nationwide employer-based insurance database to study the frequency and timing of follow-up treatments following paediatric pyeloplasty cases. 1,976 patients were found, and their mean follow-up was 23.9 months. In total, 226 kids (11.4%) had experienced at least one post-pyeloplasty operation. In 87.2% of patients, the initial procedure was completed within a year, with a mean postoperative interval of 5.9 months. 5.9% of the cases had stents or drains, 1.7% had endoscopic procedures, and 3.1% had pyeloplasties. Stay duration was correlated with having a secondary operation. The HRs for 3 to 5 and 6 days or longer be 1.65 and 3.94, respectively, in comparison to 2 days or less. One in nine patients have at least one follow-up procedure after paediatric pyeloplasty, most of which are completed within the first year. Eleven patients require more comprehensive intervention than the implantation of a single stent or drain, necessitating care plans that typically indicate recurrent or chronic blockage. Compared to other published series, the estimates of pyeloplasty success in the national data set are lower. The method of presentation, the causes of obstruction, the indications for a second pyeloplasty, and the ultimate result of the cases analysed by Sivakumar K et al.[10] There were nine patients with 10 renal units. In three renal units, the presentation was acute, whereas in the remaining seven units, it was late. The structural causes of blockage were identified as reversed anastomosis, fibrous entrapment, pseudo-polyp, pseudo-diverticulum, adynamic segment, and ureterocele. With the exception of one renal unit, all redo pyeloplasty results in good functional and morphological outcomes. They came to the conclusion that there could be structural or functional causes for post-pyeloplasty stasis. Correctly identifying the instances that require a second pyeloplasty is crucial. Finding late or recurring cases are the primary challenge. Only if the patient is maintained under methodical, ongoing follow-up is this feasible.

Piaggio LA et al,[11] evaluated the viability of paediatric repeat laparoscopic pyeloplasty in relation to repeat open pyeloplasty in terms of safety, effectiveness, duration of hospital stay, blood loss, postoperative pain management needs, complications, readmission requirements, and follow-up procedures. Ten patients, or eleven redo pyeloplasties in total, were split into two groups: those having redo open pyeloplasty (4) and laparoscopic pyeloplasty (6). Age, sex, weight, laterality, and the quantity and kind of previous ureteropelvic junction blockage repair procedures were comparable among the groups. Compared to a repeat open pyeloplasty, a repeat laparoscopic pyeloplasty required more surgical time. The two groups had the same success rate of 80%. The group who underwent redo laparoscopic pyeloplasty had fewer problems, a shorter hospital stay, and a tendency towards using less oral and parenteral opioids. A thorough review of the management of paediatric failed pyeloplasty in a big tertiary centre was conducted by Romao RL et al.[12] The overall pyeloplasty failure rate was 5.9%, with 27 out of 455 patients. The failure rates were identical for age, the initial rationale for pyeloplasty, and the surgical method (open versus laparoscopic). Reintervention was indicated for the following conditions: urosepsis (7.5%), discomfort (26%), deteriorating asymptomatic hydronephrosis (59%), and others (7.5%). Reintervention was necessary for 18% of patients, 52% of patients had twice, and 30% of patients needed three. For the first, second, and third reinterventions, the mean time between the initial procedure and the following interventions was 19.3, 24.9, and 27 months, respectively. The following reintervention techniques had varying success rates: ureterocalicostomy (100%), endopyelotomy (50%), redo pyeloplasty (92%), and double J stent insertion (6%). The documented rate of missed crossing vessels was just 7%. After a mean follow-up of 56 months following the initial operation, all patients remained stable and were in good condition. The experience of repeat surgery for persistent obstruction of the ureteropelvic junction was reported by Lim DJ et al.[13] A single surgeon performed 127 pyeloplasties throughout the course of the ten years. In this series of primary pyeloplasty, there were three cases of chronic obstruction of the ureteropelvic junction (97.6% success rate). In the same time frame, a total of 12 patients were referred to us from other locations due to chronic obstruction of the ureteropelvic junction following first pyeloplasty. Using a postoperative stent, eleven patients had repeat pyeloplasty. One of the ten patients who had repeat pyeloplasty eventually had a nephrectomy, and two patients required one during the initial repeat operation. At the time of the initial pyeloplasty, six kids with recurring ureteropelvic junction blockage were less than six months old. They observed excessive urine leakage in two out of the three unsuccessful pyeloplasty cases. Consequently, repeat pyeloplasty was able to satisfactorily resolve blockage in 9 patients (75% of whom had a salvage rate). They asserted that a rare consequence following pyeloplasty is prolonged blockage of the ureteropelvic junction. After pyeloplasty, infants may be more likely to experience ongoing blockage. Extended urination appears to be a sign of ongoing blockage of the ureteropelvic junction. The results of salvage treatments following a failed paediatric pyeloplasty were evaluated by Ceyhan E et al.[14]

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Treatment for occlusion of the recurrent ureteropelvic junction is a challenging process. At the first intervention for a failed pyeloplasty, the mean age of the children was 45.9 months. After the initial intervention, our mean follow-up period was 46.9 months. 48.7% of patients responded well to our initial treatment plans. The statistical difference was not significant in the initial surgeries, despite the fact that redo pyeloplasty was the most successful intervention (83.3%) compared to DJS implantation (45.5%), endopyelotomy (50%) and balloon dilatation (30.8%). Redo pyeloplasty, double-J stent implantation, endopyelotomy, and balloon dilatation had overall success rates of 78.9%, 46.1%, 38.8%, and 29.4%, respectively. The best treatment for children with recurrent ureteropelvic junction blockage is repeat pyeloplasty. The results of follow-up surgical procedures for the treatment of unsuccessful pyeloplasty in children were assessed by Helmy TE et al.[15] The follow-up period (mean 28) varied from 8 to 41 months. 89% of the total salvage was recovered. Sixteen patients had successful secondary reoperative procedures: two patients (11%) had ureterocalyceal anastomosis and fourteen patients (78%) had dismembered pyeloplasty. In two individuals (11%), a nephrectomy was required. There were no postoperative problems. Upon radiological follow-up, all patients displayed stable renal function without any signs of blockage or new complaints. One rare side effect following pyeloplasty is persistent upper limb blockage. Excellent functional outcomes are achieved with a very high success rate in secondary surgeries. Rarely, a nephrectomy is necessary when renal function has seriously declined.

CONCLUSION

Our single-center experience indicates that moderate HN is the primary cause of most paediatric pyeloplasties that fail. Most patients with recurring obstruction have strictures, which are followed by a post-primary vascular hitch operation for a vessel crossing that has a missing retrocaval ureter and persistent PUJO. To answer these crucial problems, guidelines encompassing the optimal postoperative imaging and duration of follow-up are required. Consequently, a prospective, randomised controlled multicenter study is required.

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