

LONG-TERM EFFECTS OF PYELOPLASTY IN CHILDREN WITH POORLY FUNCTIONING KIDNEYS: A RETROSPECTIVE STUDY.

Jamal Arshad*, Rana Pratap Singh

Department of Urology, Rajendra Institute of Medical Science, Ranchi, Jharkhand, India.

Abstract

Background:

Pediatric pyeloplasty in ureteropelvic junction obstruction (UPJO) is indicated in renal impaired drainage or renal function deterioration. The improvement of renal function after pediatric pyeloplasty is still controversial in poorly functioning kidneys. Past studies on poorly functioning kidneys had a variable SRF specification, and these studies often had a limited number of patients so they did not achieve statistical significance.

Objective:

The objective of this study was to assess the effectiveness and long-term results of pyeloplasty in children with poorly functioning kidneys.

Method:

Patients who underwent pyeloplasty at the Department of Urology, Rajendra Institute of Medical Science, Ranchi for the last twelve years were the subject of a retrospective data study. Postoperative outcome was the parameter under study. Success was measured by either symptom improvement or better drainage on postoperative Tc-99m DTPA renography, which was performed after two months and then yearly after that.

Results:

60 individuals were enrolled in the study, with a mean age of 8.5 years (3 months to 12 years), a male-to-female ratio of 2:1, and poor function on the isotope renogram (31%). The ratio of left to right sides was 1.2:1. All patients had dismembered pyeloplasty procedures. 37 patients (66.8%) underwent laparoscopic pyeloplasty, whereas 23 (33.2%) underwent open surgery. 35 patients had follow-up renograms available; of these, 30 showed improved drainage and no further decline in renal function, while 5 displayed an obstructed pattern; of these, 3 patients had noticeably worsened split function, and the other two underwent a second open pyeloplasty. A mean follow-up of 21.5 months revealed a 91% overall success rate.

Conclusion:

In the pediatric age group, pyeloplasty provides satisfactory intermediate results in kidneys with inadequate function.

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1. Introduction:

The most typical type of obstruction in the upper urinary tract is ureteropelvic junction ob-

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*Corresponding author.

Email address: drajamal@gmail.com (Jamal Arshad)

struction or UPJO. According to reports, it happens between 1:500 and 1:1250 in live newborns [Figure 1;]. Significantly decreased renal drainage or progressive decline in renal function are signs that surgery is necessary. Pain relief and the treatment of diseases brought on by obstruction, such as calculi and infections, are additional grounds for active intervention [2].

Treatment for UPJO in kidneys with poor function is still debatable. Nephrectomy has been suggested by some authors (where split renal function is less than 11%), while renal salvage has been preferred by others [3], but there are few long-term outcomes available. The experience of performing pyeloplasty on pediatric patients with kidneys that were not working properly was discussed in this research.

The objective of this study was to assess the effectiveness and long-term results of pyeloplasty in children with poorly functioning kidneys.

2. Methods:

2.1. Study Design:

This was a retrospective study.

2.2. Setting:

Carried out at the Department of Urology, Rajendra Institute of Medical Science, Ranchi over the last twelve years from March 2010 to February 2022.

2.3. Methodology:

The symptoms of pain, fever, lump in the abdomen, decreased cortical thickness on ultrasound (6 mm), and impaired renal function on isotope renogram were used as the basis for the surgical rationale. The F '0' diuretic renogram was frequently done, and obstruction of drainage was characterised as $t_{12} > 21$ min with a continually rising curve. These patients were broken into two groups based on their split renal function: I (11-31%) and II (11%). All patients underwent dismembered pyeloplasty, with 127 (65%) undergoing laparoscopy and 73 (33.2%) undergoing open surgery. Indications for an open pyeloplasty were

the surgeon's skill and patient affordability. During surgery, a double J stent was inserted antegradely in each patient. Success was determined by either symptom improvement (based on the patient's subjective experience), drainage improvement on postoperative Tc-98m DTPA renography, or improvement in renal function (>11% over baseline) on renal scans performed at 2 and 5 months after surgery, as well as annually after that. Analyses also incorporated the results of the most recent follow-up renal scan.

2.4. Sample Size:

60 pediatric patients were included in the study.

3. Results:

60 individuals were enrolled in the study, with a mean age of 8.5 years (3 months to 14 years), a male-to-female ratio of 2:1, and poor function on the isotope renogram (31%). The ratio of left to right sides was 1.2:1. There were 33 patients in group I and 27 in group II. 37 patients underwent laparoscopic pyeloplasty, with a mean operating duration of 150 minutes (ranging from 77 to 368), a mean blood loss of 65.37 ml (30 to 110), and a mean hospital stay of 5.62 days (2 to 13). In group I, the mean preoperative renal function was 24.6%, while in group II, it was 5.0%.

35 patients had follow-up renograms available; 30 of them showed improved drainage and no additional decline in renal function, while 5 displayed an obstructed pattern. Only ultrasounds were available at the follow-up visit for 3 patients because they wouldn't cooperate with the renal scan, which revealed no worsening in the degree of hydronephrosis and that the patients were symptomatically improved [TABLE 1].

The mean postoperative function increased following pyeloplasty to 38.8% in group I (a mean increase of 14.1%), and to 18% in group II (a mean increase of 13.8%). Of the patients who were still blocked, 3 experienced a severe decline in split function, and the other 2 required a second open pyeloplasty. In the current study, none of the participants experienced any postoperative problems like hypertension. All are regularly monitored to

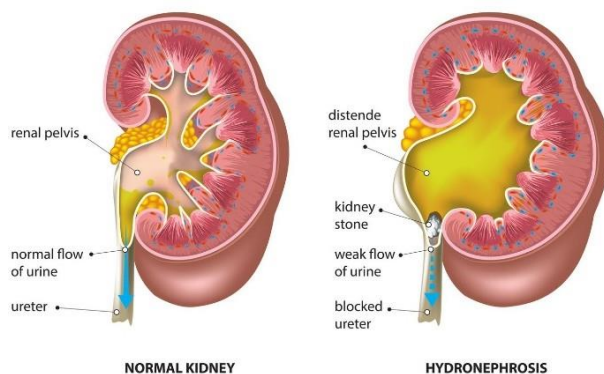


Figure 1: Ureteropelvic junction obstruction

Table 1: Baseline characteristics of patients

Criteria	No. of Patients
Mean age	8.5 years [3 months-12 years]
Male: Female	2:1
Laparoscopic surgery	37
Open surgery	23
Total patient follow up	35
Improved drainage	30
Obstructed pattern	5
Worsened split function	3
Open Plyeoplasty	2
Mean Follow-up	21.5 months

document any such incidence. A mean follow-up of 21.6 months revealed a 91% overall success rate.

4. Discussion:

An impediment to the urine's passage from the renal pelvis to the proximal ureter is known as UPJO. Back pressure within the renal pelvis causes the kidneys to gradually deteriorate and suffer damage. Modern imaging techniques and the widespread use of ultrasonography have accelerated the diagnosis of UPJO. According to the current study, the illness is more common in men and on the left side, and it is regularly seen by both adult and paediatric urologists. 10% to 40% of patients have been observed to have bilateral blockage [4-6].

The natural history of UPJO is incredibly variable; whereas some patients experience grad-

ual or irreparable renal impairment, others remain stable for extended periods or even improve with growth. There is an increase in the single nephron filtration rate as the number of functional nephrons declines. The preservation of homeostasis is aided by this adaptive reaction, known as glomerular hyperfiltration. This demonstrates the kidney's capacity to raise the GFR (glomerular filtration rate). By measuring baseline GFR and enhanced GFR after protein load, Jindal et al. examined this functional reserve in individuals with UPJO. The variation in the two GFR readings represented the renal function reserve. They discovered that children with hydronephrosis still have this reserve, which ultimately aids in the recovery of renal function following surgery [7-9].

The objectives of UPJO care are to increase urine flow, stop additional parenchymal damage, and relieve symptoms. In cases where the renal

function is less than 14-21%, it is typical to give these kidneys a chance to recover function following temporary obstruction alleviation with a percutaneous nephrostomy (PCN). If a renogram reveals UPJO with a 14-41% split function, an operational pyeloplasty is performed. Numerous research arguing for and against the preservation of kidneys with low function can be found in the literature.

Stock et al. investigated the association between divided renal function, renal histology, and post-pyeloplasty outcomes. Patients having a differential function of less than 35% had abnormal renal biopsy results. On subsequent scans, none saw surgical improvement. Biopsies were normal in patients whose preoperative function was higher than 44%. They concluded that there is a high risk of significant histological changes on biopsy and a low probability of postoperative improvement in differential function for UPJO patients with a differential function of less than 35% [10].

In the current study, individuals with substantially compromised split renal function (group I) experienced an average rise of 14.2% above baseline. Similar findings have also been made by Castagnetti et al., who found that individuals with moderately rather than severely reduced preoperative function experienced larger improvements in renal function [11].

Traditional practise called for nephrectomy in renal units with low split function (10%); however, current research has shown that pyeloplasty may be a better option because it improves both drainage and renal performance. Wagner et al. separated 32 patients (mean age 33 months) into three groups (I > 40%, II 10e 40%, and III 10%) to study the long-term effects of pyeloplasty. In patients with less than 10% split function, there was a considerable improvement in split function 12 months following pyeloplasty [12]. Additionally, we noted an average rise in split function of 13.8% in group II patients following pyeloplasty.

In a related trial, all patients with divided renal function of less than 10% underwent PCN. Gupta et al. The split function increased to 29.2% \pm 12.6% in 12 of the 17 kidneys with unilat-

eral UPJO after PCN draining, highlighting the fact that all such kidneys should not be removed without a trial of PCN [13].

In hydronephrotic kidneys with less than 10% split renal function, Aziz et al. also implanted a PCN. After the initial nephrostomy, the renal functional status dramatically improved, preventing the need for pediatric nephrectomy and the potential negative effects of having one kidney [14]. We only performed a PCN on one patient before pyeloplasty. This was due to the parents' request that the kidney be saved, a non-visualized kidney on the renal scan, some discernible parenchyma on ultrasound, and other factors. 23 children were used in Vihma et al.'s study of the effects of pyeloplasty, and each child was monitored with a postoperative renal scan. They noticed that hydronephrotic kidneys with preoperatively decreased glomerular function improved following pyeloplasty. The group of kidneys with significantly impaired preoperative glomerular function showed a greater recovery [15].

For UPJO, laparoscopic pyeloplasty is now the preferred surgery. The same as with open pyeloplasty, the diseased section is removed, and the pelvis is reduced. As a result, the degree of hydronephrosis, the length of the stenotic segment, and the presence of a crossing vessel have no bearing on the success rate. It has a similar success percentage to its open version despite being more technically challenging. Laparoscopic pyeloplasty in pediatric patients has been the subject of several investigations [16, 17].

5. Conclusion:

In the pediatric age group, pyeloplasty provides satisfactory intermediate results in kidneys with poor function, and in most situations, the sacrifice of such kidneys can be avoided.

6. Limitation:

Except in one case, renal units in the current investigation that had a split function of less than 11% were taken up immediately for pyeloplasty. It

is too soon to state that such kidneys may always be taken up for pyeloplasty without PCN because there were so few patients in this category.

7. Recommendation:

Nephrectomy procedures can be performed at a later time if necessary. However, as there aren't any studies including a bigger sample size of patients, this must be done with the full knowledge and agreement of the parents.

8. Conflict Of Interest:

The authors state that they have no conflicts of interest.

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10. References.

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Rana Pratap Singh Assistant Professor, Department of Urology, Rajendra Institute of Medical Science, Ranchi, Jharkhand, India.

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Author biography

Jamal Arshad Associate Professor, Department of Urology, Rajendra Institute of Medical Science, Ranchi, Jharkhand, India.