

A Comparative Study of Outcome of Pyeloplasty in Stented and Non Stented Children

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ABSTRACT

Aim: To evaluate which technique of pyeloplasty stented or non-stented is better for management of PUJ obstruction in paediatric patients.

Study design: Randomized controlled trial

Place and duration: Paediatric Surgical Department of Bahawal Victoria Hospital, in collaboration with Pathology Department Quaid e Azam Medical College Bahawalpur, from January 2019 to January 2021.

Methodology: A total of 60 patients who presented with obstruction of primary ureteropelvic junction were enrolled in study. Patients were divided into two groups (30 in each) and treated with stented and non stented pyeloplasty. Parenchymal diameter, GFR and serum creatinine, hospital stay are outcomes and fever, urinoma, restenosis and wound infection are complications. SPSS version 23 was used for data analysis.

Results: The mean S-Creatinine and parenchymal diameter before and after surgery in stented group were not significant. The mean GFR after surgery was greater than before surgery, (p=0.000). Mean APPD and parenchymal diameter before and after surgery in non-stented group was not significant. The mean GFR after surgery was greater than before surgery, (p=0.000).

Conclusion: Pyeloplasty with stents and without stents is equally effective for the treatment of PUJ obstruction. Parenchymal diameter improved in both groups and but statistically not significant, GFR also improved in both groups and significant. Complications are more in non stented group but probability is not significant.

Keywords: PUJO, Pyeloplasty, Double J stent, Renal parenchymal diameter, Renal pelvis AP diameter, GFR.

INTRODUCTION

Obstruction of pelvic ureteric junction (PUJ) is a serious urological anomaly that can lead to permanent renal damage¹. In recent years dismembered pyeloplasty considered as a gold standard surgical management of PUJ obstruction, but use stent during pyeloplasty is controversial. In simple words PUJ is defined as obstruction in urinary flow from renal pelvis to ureter and kidneys². In usual occurrence of PUJ is congenital but in some cases it remains silent much later in life span. Incidence rate of PUJ is well defined in children as compare to adults. In paediatric age PUJ is most common cause of upper urinary tract problems and dilatation. Predominance of PUJ is much higher in male gender and usually affects left kidney double more from right kidney³.

In congenital cases PUJ obstruction may result from physiologic or anatomic defect in upper region of ureter⁴. Narrowing of lumen usually occurs due to incomplete recanalization process which is involved in development of ureter⁵. Histopathology examination shows that development of abnormal longitudinal muscles in place of spiral muscles inhibits the normal peristaltic wave and urinary flow. Some other factors like production of cytokine in urothelium, epidermal growth factor expression, transforming growth factor β , neuropeptide Y and nitric oxide are also involved in occurrence of PUJ obstruction⁶.

During development period ureter becomes solid and then recanalized after some time, that usually happened at the mid of ureter. In case recanalization remains incomplete it may lead to obstruction of PUJ⁷. In bladder differentiation of smooth muscles completes during 7th to 16th weeks of gestation, any shortcoming during this period that inhibits the differentiation of smooth muscles may lead to improper contract and poor peristalsis and PUJ obstruction⁸.

There is no specific time of PUJ obstruction in life in neonates its presentation may be like a palpable mass⁹. In antenatal period ultrasonic findings of hydronephrosis indicate its presence, while in older children it may present in form of flank pain associated with vomiting¹⁰. This study is an effort to justify the advantages of stented and non stented pyeloplasty in children and to compare the complications after pyeloplasty.

METHODOLOGY

This randomized controlled trial was conducted at paediatric surgical department of Bahawal Victoria Hospital, Bahawalpur from January 2019 to December 2020 in two years duration. Study was initiated after ethical approval from hospital ethical committee and written informed consent was obtained from patients after detailed information to patients about study purpose and ensured about their privacy. Sample size was calculated by using Openepi.com online software for sample size calculation. Non probability consecutive sampling technique was used. Diagnosed patients of PUJ obstruction and planned for

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pyeloplasty (stented or non stented) age upto 14 years and both gender were enrolled in study. Patients with multiple congenital anomalies, recurrent PUJ obstruction, deranged renal function tests, single kidney patients, chronic debilitating disease, renal calculi and age above 14 years were excluded from the study. Patients were divided into two groups (group I and II) by lottery method. Patients in group I were operated with stented technique and in group II treated with non stented technique.

Patients renal function tests including serum creatinine and blood urea were performed in pathology department QAMC Bahawalpur, for which 2ml of whole blood was taken from each patient and serum was extracted and analysed on fully automated chemistry analyser AU 640. For blood culture & sensitivity 5ml blood was taken in sterilized culture bottles and processed on semi-automated Bact Alert 3D. Results were noted after 12hrs, 24hrs and 48hrs for any visible growth. Urine microscopy was also done for each patient prior to surgery from Pathology department Quaid-e-Azam Medical College Bahawalpur. GFR was estimated using Schwartz formula
 Creatinine Clearance = $(k \cdot Ht) / \text{serum creatinine}$

Renal ultrasonography and renal isotopic scanning were also performed prior to surgery. Indications of surgery include asymptomatic and symptomatic hydronephrosis, anteroposterior diameter of pelvis above 40mm and deteriorating initial parameters in follow up period. In stented surgery pyeloplasty technique was achieved through subcostal incision and extraperitoneal method under general anaesthesia. Pelvicureteric junction was explored and obstructed portion of ureter was excised. Ureter was spatulated on lateral aspect at distance of 1cm. 5Feeding tube of 5 or 6 numbers was passed to patency of ureter. Anatomises was done using vicryl 6/0 and continuous suturing technique. Posterior layer of ureter was closed along the pelvis and stent was inserted in stented group patients. JJ stent was used and stent was projected with 6 number feeding tube. Drain was inserted in renal pelvis and anterior layer was closed. Foley catheter was inserted in all patients for 24 hours. Standard pain reliving medicine and antibiotic therapy was given till the time of tube in body.

Drain was removed when dry and JJ stent was removed after 2 months under general anaesthesia. Blood samples for renal function tests were obtained before discharge. Patients were discharged after perinephric drain removal and stented patients were discharged after 2 days. Follow up was done at outpatient department. Collected data was entered in SPSS version 23. Mean and SD were calculated for continuous data like age, duration surgery hospital stay.

Frequency and percentages were calculated for categorical data like gender. Test of significance were applied to see association among variables. P value ≤ 0.05 was taken as significant.

RESULTS

Sixty patients were included this study. The patients were randomized into two groups as stented 40(66.7%) and non-stented 20(33.3%). The most common complains of the patients were lumber pain and UTI, 16(26.7%) and 12(20%), respectively (Figure I). The comparison of major complains between stented and non-stented groups was statistically insignificant, (p=0.314) (Table I).

The mean age, height and weight of stented and non-stented group represented in table. I. No significant difference was found in the means of operative duration, foley duration, length of stay and FU duration in stented and non-stented groups. The comparison of S-Creatinine, APPD, GFR and parenchymal diameter at surgery of both groups was also insignificant (Table II).

The mean S-Creatinine, APPD, GFR and parenchymal diameter before and after surgery in stented group represented in table II. The mean GFR after surgery was greater than before surgery, (p=0.000). (Table. III). similarly, the mean S-Creatinine, APPD, GFR and Parenchymal diameter before and after surgery in non-stented group shown in table III. The mean GFR after surgery was greater than before surgery, (p=0.000). (Table. VI).

Figure I: Major Complains of the patients

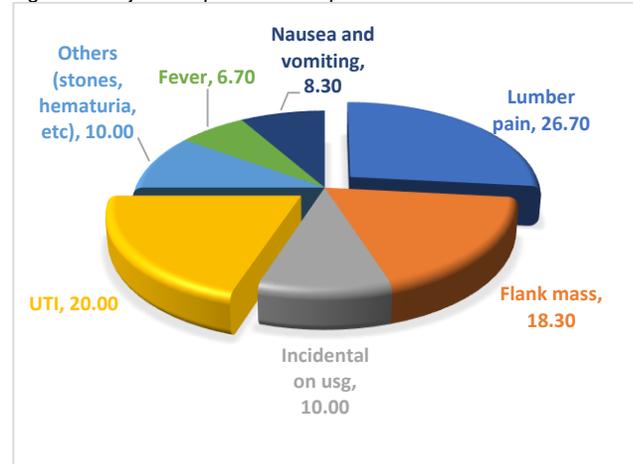


Table. I: Comparison of major complains between stented and non-stented groups

| Complaints | Stented n=40 (66.7%) | Non-stented n=20 (33.3%) | P-value |
|---------------------------------|----------------------|--------------------------|---------|
| Lumber pain | n=10 (25.0%) | n=6 (30.0%) | 0.314 |
| Flank mass | n=5 (12.5%) | n=6 (30.0%) | |
| Incidental on usg | n=4 (10.0%) | n=2 (10.0%) | |
| UTI | n=11 (27.5%) | n=1 (5.0%) | |
| Others (stones, hematuria, etc) | n=5 (12.5%) | n=1 (5.0%) | |
| Fever | n=2 (5.0%) | n=2 (10.0%) | |
| Nausea and vomiting | n=3 (7.5%) | n=2 (10.0%) | |

Table II: Demographic and baseline characteristics of the patients

| Characteristic | Stented n=40 (66.7%) | Non-stented n=20 (33.3%) | P-value |
|-------------------------|----------------------|--------------------------|---------|
| Age (years) | 6.17±2.85 | 5.65±2.15 | 0.472 |
| Height (cm) | 84.95±2.09 | 85.23±1.45 | 0.924 |
| Weight (kg) | 11.35±1.96 | 11.41±2.28 | 0.930 |
| Gender | 32(80.0%) | n=13 (65.0%) | |
| | 8(20.0%) | n=7 (35.0%) | |
| Operative duration | 56.81±3.92 | 56.72±4.75 | 0.931 |
| Foley duration | 2.57±1.01 | 2.11±0.92 | 0.092 |
| Length of stay | 4.62±2.08 | 5.02±2.29 | 0.501 |
| FU duration | 6.01±2.91 | 7.12±3.72 | 0.213 |
| S-Creatinine at surgery | 0.56±0.31 | 0.69±0.29 | 0.130 |
| APPD at surgery | 13.15±2.15 | 12.75±2.59 | 0.529 |
| GFR before surgery | 36.15±4.01 | 35.12±3.32 | 0.317 |
| Parenchymal diameter | 12.15±1.84 | 12.45±2.01 | 0.565 |

Table III: Comparison between after and before surgery parameters of stented group

| Parameter | At surgery | After surgery | P-value |
|----------------------|------------|---------------|---------|
| S-Creatinine | 0.56±0.31 | 0.51±0.09 | 0.233 |
| APPD | 13.15±2.15 | 14.05±2.64 | 0.059 |
| GFR | 36.15±4.01 | 41.62±4.04 | 0.000 |
| Parenchymal diameter | 12.15±1.84 | 12.17±2.15 | 0.958 |

Table VI: Comparison between after and before surgery parameters of non-stented group

| Parameter | At surgery | After surgery | P-value |
|----------------------|------------|---------------|---------|
| S-Creatinine | 0.69±0.29 | 0.51±0.08 | 0.025 |
| APPD | 12.75±2.59 | 13.60±2.65 | 0.400 |
| GFR | 35.12±3.32 | 41.98±3.15 | 0.000 |
| Parenchymal diameter | 12.45±2.01 | 11.69±1.75 | 0.191 |

Table-V: Complications in both groups

| Complication | Stented | Non stented |
|-----------------|----------|-------------|
| Fever | 6 (20%) | 7 (23%) |
| Urinoma | 6 (20%) | 6 (20%) |
| Restenosis | 3 (10%) | 5 (16%) |
| Wound infection | 2 (6.6%) | 3 (10%) |
| P value | | 0.823 |

DISCUSSION

Various studies have been conducted on comparison between stented and non stented pyeloplasty but decision remains controversial and question is still unanswered. Some authors supported non stented technique and some concluded in agreement with stented technique¹¹. This study was conducted to support the optimal method for treatment of PUJ obstruction.

In our study renal outcomes GFR, serum creatinine and parenchymal diameter was improved after pyeloplasty in stented group. Laddha et al¹² conducted a study on comparison of outcomes and complication between stented and non stented patients and reported that pyeloplasty outcomes like GFR, serum creatinine and parenchymal diameter is much improved in stented group as compare to non stented group. Complications like hospital stay FU and foley catheter duration is much lower in stented group.

Anderson and Hynes¹³ supported stent less procedure and described that all stent less techniques like external stent or no stent is favorable for patients as compare to stent insertion. On other hand controversial studies have no single option in support of stents. Le et al¹⁴ completed a study on comparison of outcomes between stents insertion and non stented patients after pyeloplasty and reported no superiority of non stented outcomes over stented outcomes. This study is in agreement with our findings about outcomes and complications of pyeloplasty

after insertion of stent in management of PUJ obstruction in children.

Length of hospital stay is little higher in non stented group when compared in both groups but not significant. Length of hospitalization is much serious issue in hospital regarding availability of beds and other health services. A study by Elmalik et al¹⁵ supported similar studies in which hospitalization was nearly same in stented and non stented patients after pyeloplasty. Patients were discharged at 4-5th day after pyeloplasty when perinephric drain was empty and removed.

Meisheri et al¹⁶ concluded that they are dealing with illiterate and low economic population where management of drain in outpatient conditions not possible and results in more harmful effects. In our study most of patients belongs to rural areas where literacy rate is not enough to understand medical care of patients and cannot manage with complications. Various studies suggested that initial stability until removal perinephric drain should be managed in hospital.

In a controversial study by Liss et al¹⁷ all non stented patients were discharged at day 1 of pyeloplasty. This study claimed that urinoma is not a reason of hospitalization. Average hospital stay of patients in this study was 1.3 days. Authors explained that home care of drain and patient is possible and minor inflammatory response is acceptable.

Risk of infection can be reduced with proper antibiotic therapy and early removal of stent. A study was carried out by Özdemir¹⁸ in 2010 and reported that early start of antibiotic prophylaxis reduced risk of infection significantly. In his study no patient reported with wound infection. Elbatarny et al¹⁹ supported that use of stents in pyeloplasty procedure is not justified with results of this study.

In our study fever is found in most of patients 20% in stented and 23% in non stented group may indicate presence of urinary tract infection. Smith et al²⁰ explained that there is not too much difference in complications among stented and non stented patients. UTI is common complication of this procedure. Complications of stented group were 13% and non stented group 12%.

CONCLUSION

This study concluded that pyeloplasty with stents and without stents is equally effective for the treatment of PUJ obstruction. Parenchymal diameter improved in both groups and but statistically not significant, GFR also improved in both groups and significant. Complications are more in non stented group but probability is not significant.

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