A Comparative Study of Outcome of Pyeloplasty in Stented and Non-Stented Children with Puj Obstruction

Ashok Kumar Laddha¹, Eeshansh Khare², Brijesh Kumar Lahoti²* and Raj Kumar Mathur¹

¹Department of Paediatric Surgery, Mahatma Gandhi Memorial Medical College, Indore, India
²Department of Surgery, M.G.M Medical College and M.Y.H Hospital, Indore, India

*Corresponding author: Brijesh Kumar Lahoti, Department of Surgery, M.G.M Medical College and M.Y.H Hospital, Indore, India, Tel: 9407365590; Fax: 9669104717; E-mail: eeshanshkhare29@gmail.com

Received Date: Mar 01, 2018; Accepted Date: Apr 02, 2018; Published Date: Apr 07, 2018

Copyright: ©2018 Lahoti BK, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Introduction: It is a matter of debate whether to use a stent (double J) or not during pyeloplasty in patients of puj obstruction. This study was conducted to assess which technique- stented or non-stented is better for paediatric patients with puj obstruction.

Materials and method: 45 paediatric patients aged 0-12 years were included in this prospective comparative simple randomized sample study during the period of june 2015 to august 2017 in paediatric surgery division of department of surgery in M.Y. Hospital, Indore.

The M:F ratio was 2:1. All patients except one underwent open A-H Dismembered Pyeloplasty.

The parameters used for comparison were:-

• Renal parenchymal diameter
• Renal pelvis AP diameter
• GFR (by DTPA scan)
• Rate of complications.

Minimum follow up period was 3 months.

Result: Stented children had significant improvement in renal parenchymal diameter (i.e. increase) and GFR (of affected kidney) after pyeloplasty whereas non-stented children too had improvement in renal parenchymal diameter and GFR (affected kidney) but was not significant. The percentage of post-operative complications were more in non-stented group as compared to stented group.

Conclusion: In all paediatric cases with pujo undergoing A-H pyeloplasty, a double J stent should be placed.

Keywords: PUJO; A-H pyeloplasty; Double J stent; Renal parenchymal diameter; Renal pelvis AP diameter; GFR

Introduction

PUJ obstruction is a common urological anomaly in children leading to renal damage. A-H Dismembered pyeloplasty is the gold standard surgical procedure for PUJ obstruction, but there is a debate regarding use of double J stent during pyeloplasty in such patients. Based on the outcome parameters like renal parenchymal diameter, renal pelvis AP diameter, GFR (DTPA scan) and post-operative complications, our study aims to assess which type of pyeloplasty stented or non-stented is better on the basis of outcomes after pyeloplasty.

Materials and Methods

This study was approved by Ethical committee (With reference number EC/MGM/FEB-17/15) and it was a part of post graduate dissertation in M.Y. Hospital, Indore.

Sample size: 45 children with PUJ obstruction which were diagnosed on the opd basis during June 2015-August 2017.

Inclusion criteria: All pediatric patient (age upto 12 y) with urogenital anomalies coming to paediatric surgery, all operated cases of pyeloplasty in paediatric surgery, patient with written consent.

Exclusion criteria: Patient with no or irregular follow up, patient without written consent, patient died during study due to other cause, age above 12 y.

Indications of surgery: Symptomatic patients of PUJ obstruction

Investigations: USG whole abdomen with KUB (renal parenchymal thickness, renal pelvis AP diameter)
DTPA scan

IVP (in non-affordable patients)

Complete blood count and Renal function test.

On the basis of clinical symptoms and investigations described above patients were diagnosed as case of PUJ obstruction.

A team of three surgeons operated all the patients.

**Duration of study:** 2015 to 2017

**Type of study:** Prospective randomized study.

45 patients were randomized into 2 groups: stented (35) and non-stented (10) (tables 1-5) after taking consent from guardians after explaining the advantages and disadvantages of both stenting as well as non-stenting and the results of both the methods in the previous studies. So there was difference in the sample for both the groups.

<table>
<thead>
<tr>
<th>Chief Complaints</th>
<th>No. Of patients (n=45)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbar pain</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Flank mass</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Incidental (on usg)</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>UTI</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Others (stones, hematuria, etc)</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Fever</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>10</td>
<td>22</td>
</tr>
</tbody>
</table>

**Table 1:** Chief complaints of patients

**Statistical method:** Chi-square test.

DTPA scan was done in 15 patients (12 in stented group and 3 in non-stented group).

The mean age, weight and height was calculated.

All patients were followed up after 3 months with USG and 15 patients had DTPA scan done. Patients in both the groups were then compared on the basis of renal parenchymal diameter and renal pelvis AP diameter and GFR (DTPA scan) after surgery.

**Stent, foley’s and perinephric drain**

All patients were catheterized with foley’s catheter of 8 Fr and 10 Fr depending on the age. Foley’s catheter removed after 48 h of surgery. Double J stent was placed intraoperatively and removed 21 days postoperatively; and perinephric drain was removed when collection was minimal.

**Observations and Results**

After following parameters were compared in both stented and non-stented group:

- renal parenchymal diameter
- renal pelvis AP diameter
- GFR after DTPA scan (affected kidney)
- Rate of complications.

**Table 2:** The mean values of renal parenchymal diameter, APPD and GFR in both stented and non-stented group, before surgeries were comparable as the P-value was insignificant.

The mean values of renal parenchymal diameter, APPD and GFR in both stented and non-stented group, after surgery were also comparable (P-value insignificant)

<table>
<thead>
<tr>
<th></th>
<th>Stented group (n=35)</th>
<th>Non-stented group (n=10)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age at surgery</td>
<td>3.3 years</td>
<td>4.5 years</td>
<td>0.229 (insignificant)</td>
</tr>
<tr>
<td>Mean Height at surgery (cm)</td>
<td>81.4</td>
<td>87.4 cm</td>
<td>0.303 (insignificant)</td>
</tr>
<tr>
<td>Mean Weight at surgery (kg)</td>
<td>10.95</td>
<td>12.54</td>
<td>0.300 (insignificant)</td>
</tr>
<tr>
<td>Gender (Male: Female)</td>
<td>3:1</td>
<td>4:1</td>
<td>-</td>
</tr>
<tr>
<td>Mean s-Creatinine at surgery (mg/dl)</td>
<td>0.62</td>
<td>0.64</td>
<td>0.044 (significant)</td>
</tr>
<tr>
<td>Mean APPD at surgery (mm)</td>
<td>12.89</td>
<td>14</td>
<td>0.084 (insignificant)</td>
</tr>
<tr>
<td>Mean (GFR) before surgery (ml/min)</td>
<td>35.6</td>
<td>35.3</td>
<td>0.449 (insignificant)</td>
</tr>
<tr>
<td>Mean Parenchymal Diameter (mm)</td>
<td>11.17</td>
<td>11.35</td>
<td>0.403 (insignificant)</td>
</tr>
</tbody>
</table>

**Table 3:** There was a significant improvement renal parenchymal diameter and GFR in stented group after Pyeloplasty (P-value Significant).

<table>
<thead>
<tr>
<th></th>
<th>Stented group (n=35)</th>
<th>Non-stented group (n=10)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean s-Creatinine after surgery (mg/dl)</td>
<td>0.58</td>
<td>0.59</td>
<td>0.302 (insignificant)</td>
</tr>
<tr>
<td>Mean APPD after surgery (mm)</td>
<td>12.37</td>
<td>13.76</td>
<td>0.052 (insignificant)</td>
</tr>
<tr>
<td>Mean (GFR) after surgery (ml/min)</td>
<td>39</td>
<td>41</td>
<td>0.116 (insignificant)</td>
</tr>
</tbody>
</table>
Following are the raw data and tables:

<table>
<thead>
<tr>
<th>Mean Parenchymal Diameter (mm)</th>
<th>Pre-surgery</th>
<th>Post-surgery</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.37</td>
<td>11.46</td>
<td>0.456 (insignificant)</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4: Post surgery parameters**

There was also improvement in renal parenchymal diameter in non-stented group but P-value less significant, may be due to less no. of patients in this group. The % of complications was more in non-stented group (table 5)

**Table 5: Comparison between pre-surgery and post-surgery parameters in stented group**

<table>
<thead>
<tr>
<th>S.no</th>
<th>Parameters</th>
<th>Pre-surgery</th>
<th>Post-surgery</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Serum Creatinine</td>
<td>0.62</td>
<td>0.58</td>
<td>0.010 (significant)</td>
</tr>
<tr>
<td>2</td>
<td>Mean APPD</td>
<td>12.89</td>
<td>12.37</td>
<td>0.083 (insignificant)</td>
</tr>
<tr>
<td>3</td>
<td>Mean GFR</td>
<td>35.6</td>
<td>39</td>
<td>0.007 (significant)</td>
</tr>
<tr>
<td>4</td>
<td>Mean Renal Parenchymal Diameter</td>
<td>11.17</td>
<td>11.37</td>
<td>0.020 (significant)</td>
</tr>
</tbody>
</table>

**Table 6: Comparison between pre-surgery and post-surgery parameters in non-stented group**

In our study the preoperative data regarding age, sex, side distribution, presentation, degree of hydronephrosis, and GFR (after DTPA Scan) were almost similar in both groups, with no significant difference (tables 2-4). This was related to the simple randomization (every third patient was non-stented) in the assignment of patients to any of the groups. In our study no patient was discovered antenatally on usg compared with other studies however in other pioneer studies the percentage was 53.9 in Elmalki et al. [19] study, 52% in Liss et al. [3] study, 40% in Hussain and Frank's [13] study, 47% in Özdemir and Artikan's [26] study, and 70% in Wooland Farnsworth's [7] study. This fact needs attention and more awareness in our community; however, we are now increasingly being antenatally consulted for fetuses with hydronephrosis. Although the operative time was longer by a few minutes in the stented than in the nonstented group, the difference was not significant. A similar finding was reported by Elmalki et al. [19] and our study (table 2). The duration of hospitalization has become an increasingly important issue in hospitals that have limited resources and lot of patient load [4,8,10,13,22]. In our study, the duration of hospitalization was nearly same in both groups i.e. mean length of stay (LOS) (table 2). We discharged the stented patients after 3-5 days after removal of perinephric drain and recalled them for removal of the stents after 21 days, similarly we kept the nonstented patients in hospital until the perinephric drain was dry and was removed. Some authors reported similar results with a shorter hospital stay in the stented group [7,19–22]. Elmalki et al. [19] also explained this difference on the basis of keeping patients with PUL (urinoma) in patient. In contrast, some authors stated that the non-stented group had a shorter hospital stay than the stented group [8,13,15,16,27–30]. Most of these series explained the longer hospital stay of the stented

**Discussion**

Numerous studies have investigated whether stents are needed during pediatric pyeloplasty, but the question remains unanswered and the decision remains controversial and largely surgeon dependent. Even among proponents of urinary diversion, the optimal method remains unclear [1-7]. However, the original report by Anderson and Hynes [7-12] described a stent less procedure; currently, one can find reports supporting no stents [13-16], externalized stents (percutaneous catheter) [4,17,18], and internalized (JJ) stents [19-21]. This plethora of studies proves all methods to be safe and effective, but conflicting summaries of the results have not proved any single method as superior [22]. Through our comparative study on pyeloplasty we tried to answer the optimal method whether to do a stented or non-stented pyeloplasty in puj obstruction in paediatric patients.

In comparison to study by Elbatarny et al. our study on 45 patients with puj obstruction, 35 patients in stented group and 10 patients in non-stented group with mean age of 3 years with 32 patients having left PUJO and 11 having right PUJO and 2 having b/l PUJO. The mean preoperative GFR and Renal pelvis AP diameter (hydronephrosis) and renal parenchymal thickness was nearly same in both groups (table 2). The mean operative duration in both groups was not significant. Postoperatively there was improvement in hydronephrosis and GFR in both stented and non-stented group but statistically not significant (tables 3 and 4). The complication rates were more in non-stented group than stented group (table 5). So according to our study the outcomes of pyeloplasty in terms of renal pelvis diameter, parenchymal thickness, length of stay are same in both groups but as per complication rate, a stent should be placed in case of puj obstruction.

The supposed advantages of stenting are maintaining alignment of the anastomosis, decreasing urinary extravasation, bypassing the transient obstruction due to edema at the anastomosis site, preventing subsequent stenosis [4-7,23]. However, stents may cause infection, stricture due to pressure of a stent over the anastomosis, injury to the anastomosis or renal tissue, bleeding, dislodgement, fragmentation or migration, calculus formation, and may prolong the hospital stay. In addition, internal stents need a second hospital admission and a general anaesthetic for removal [8-11,13,19,23-25]. Non-stenting allows early mobilization and freedom from draining tubes [16].

In contrary to study by Muhammad Siddique et al. according to which open Anderson Hynes's Pyeloplasty is the gold standard for puj obstruction, but stents are not necessary to be placed during pyeloplasty, our study (tables 3-6) on the basis of rate of complication in both stented and non-stented groups suggests a JJ stent to be placed in each case of puj obstruction Anderson Hynes's pyeloplasty remaining the gold standard.
group on the basis of an increase in the incidence of UTI during the early postoperative period. However in our study the length of stay for both stented and non-stented patients were nearly the same (3 days) (table 2). Hence, the stented group needs parenteral antibiotics for longer periods. However, Sarin et al. [29] explained that, in their clinical practice, where they were dealing with not so literate section of the society, outpatient management of drainage tubes was virtually impossible. Liss et al. [23] discharged 81% of their non-stented patients on postoperative day 1, with an average hospital stay of 1.3 days and assured that PUL (urinoma) was not a cause for in patient stay. They thought that home care of drains was possible and accepted with some peridrain inflammation. Most of the patients in our study were from rural area and were poor economically, so we kept the patients in ward until perinephric drain was removed. So, in contrary to Liss et al. [3] we discharged the non-stented patients only after perinephric drain and Foley’s catheter was removed.

The incidence of postoperative complications in both groups was comparable, with no significant difference (table 5). We also had two cases in the non-stented group who suffered from a UTI despite antibiotic prophylaxis whether this was related to the stent or not cannot be judged from only four cases.

It was suggested that earlier removal of stents may reduce the risk for infection [19]. The rate of infections increased with stent use and in patients who have PUL (urinoma) [3,8,22,31,32], Ozdemir and Arikan [26] had no UTI in their stented patients where they used antibiotic prophylaxis until the stents were removed. In the literature, PUL is more common in the non-stented repairs [7,8,13,19,22]. In accordance with Arda et al. [14] in our study, there was no statistically significant difference regarding urine leakage through the Penrose drain/Perinehric drain in the stented and non-stented groups (tables 5 and 7). The rate of PUL was 14% in Liss et al. [3] study; The rate of urinoma formation in our study is 2.85% in stented group and 10% in non-stented group. Castagnetti et al. had 5% rate of stent dislodgement, which were all treated by stent removal with exceptional need for additional procedures. In our study there was no stent dislodgement. Smith et al. [22] found also that there is no significant difference between the complications of the stented and non-stented repairs our study too have similar results (table 5); In our study out of the 35 stented repairs, complications developed in five (14.28%). Of the 10 non-stented repairs, complications developed in 5 (50%) [22]. In similar view to study of Bayne et al. [28]. Our study found no significant difference (table 5) in the complication rate between the stented and non-stented patients. The results of our study on complications of pyeloplasty matches the analysis by Elmalik et al. [19] which concluded that complications related to surgical repair were significantly higher in the non-stented group, whereas stented patients suffered only stent-related complications, namely UTI and stent migration. The success rate of open A–H dismembered pyeloplasty varies from 94 to 100% in different series [3,7,13,16,19,22,26,33,34]. Our success rate in both groups was nearly 100%. Some studies reported an increased rate of secondary procedures, including redo pyeloplasty and insertion of nephrostomy or JJ tubes, in non-stented pyeloplasty [3,7,22,23]. Liss et al. [3] stated that they cannot be certain that failure was related to non-stenting and wondered whether stenting would have prevented this complication. The outcome of repair regarding improvement of hydronephrosis and GFR was comparable in both groups (tables 3 and 4). There was significant improvement in both parameters as detected by postoperative USG and DTPA, with no significant difference between both groups.

<table>
<thead>
<tr>
<th>Complications</th>
<th>Stented % (out of total complications)</th>
<th>Non-stented % (out of total complications)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever (ur)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Urinoma formation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Wound infection</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Restenosis</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

P-Value=0.722 (Insignificant)

Table 7: Comparison of complications in stented and non-stented group

This is consistent with many other reports comparing the two techniques of pyeloplasty [13,19]. Some surgeons followed the patients only with USG and performed an isotope scan only if USG showed worsening hydronephrosis or if patients develop symptoms of obstruction [3,22,23]. In our study Isotope scan was performed if patient’s guardian were affordable or USG findings were inconclusive. The improvement in hydronephrosis observed in USG was noted from on postoperative day 1, with an average hospital stay of 1.3 days and assured that PUL (urinoma) was not a cause for in patient stay. They thought that home care of drains was possible and accepted with some peridrain inflammation. Most of the patients in our study were from rural area and were poor economically, so we kept the patients in ward until perinephric drain was removed. So, in contrary to Liss et al. [3] we discharged the non-stented patients only after perinephric drain and Foley’s catheter was removed.

The incidence of postoperative complications in both groups was comparable, with no significant difference (table 5). We also had two cases in the non-stented group who suffered from a UTI despite antibiotic prophylaxis whether this was related to the stent or not cannot be judged from only four cases.

It was suggested that earlier removal of stents may reduce the risk for infection [19]. The rate of infections increased with stent use and in patients who have PUL (urinoma) [3,8,22,31,32], Ozdemir and Arikan [26] had no UTI in their stented patients where they used antibiotic prophylaxis until the stents were removed. In the literature, PUL is more common in the non-stented repairs [7,8,13,19,22]. In accordance with Arda et al. [14] in our study, there was no statistically significant difference regarding urine leakage through the Penrose drain/Perinehric drain in the stented and non-stented groups (tables 5 and 7). The rate of PUL was 14% in Liss et al. [3] study; The rate of urinoma formation in our study is 2.85% in stented group and 10% in non-stented group. Castagnetti et al. had 5% rate of stent dislodgement, which were all treated by stent removal with exceptional need for additional procedures. In our study there was no stent dislodgement. Smith et al. [22] found also that there is no significant difference between the complications of the stented and non-stented repairs our study too have similar results (table 5); In our study out of the 35 stented repairs, complications developed in five (14.28%). Of the 10 non-stented repairs, complications developed in 5 (50%) [22]. In similar view to study of Bayne et al. [28]. Our study found no significant difference (table 5) in the complication rate between the stented and non-stented patients. The results of our study on complications of pyeloplasty matches the analysis by Elmalik et al. [19] which concluded that complications related to surgical repair were significantly higher in the non-stented group, whereas stented patients suffered only stent-related complications, namely UTI and stent migration. The success rate of open A–H dismembered pyeloplasty varies from 94 to 100% in different series [3,7,13,16,19,22,26,33,34]. Our success rate in both groups was nearly 100%. Some studies reported an increased rate of secondary procedures, including redo pyeloplasty and insertion of nephrostomy or JJ tubes, in non-stented pyeloplasty [3,7,22,23]. Liss et al. [3] stated that they cannot be certain that failure was related to non-stenting and wondered whether stenting would have prevented this complication. The outcome of repair regarding improvement of hydronephrosis and GFR was comparable in both groups (tables 3 and 4). There was significant improvement in both parameters as detected by postoperative USG and DTPA, with no significant difference between both groups.

<table>
<thead>
<tr>
<th>Complications</th>
<th>Stented % (out of total complications)</th>
<th>Non-stented % (out of total complications)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever (ur)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Urinoma formation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Wound infection</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Restenosis</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

P-Value=0.722 (Insignificant)

Table 7: Comparison of complications in stented and non-stented group

This is consistent with many other reports comparing the two techniques of pyeloplasty [13,19]. Some surgeons followed the patients only with USG and performed an isotope scan only if USG showed worsening hydronephrosis or if patients develop symptoms of obstruction [3,22,23]. In our study Isotope scan was performed if patient’s guardian were affordable or USG findings were inconclusive. The improvement in hydronephrosis observed in USG was noted from 3 months post-operatively. Earlier improvement of hydronephrosis in stented than in nonstented patients was described [19,26,35]. Some authors denied early improvement in hydronephrosis after pyeloplasty and described improvement from 6 months to 1 year [33,36,37]. We followed up patients for a minimum of 3 months. However, some surgeons concluded that follow-up can be discontinued after 3 months. Psooy et al. [38] advised extending the follow-up period to 1 year to avoid repeat referrals. Despite the comparable results of both techniques in our study and in many other studies, the rate and nature of surgery-related complications in the non-stented group as well as the rate of redo procedures, make a stented technique preferable in all patients of puj obstruction.

References