Is laparoscopic pyeloplasty a comparable option to treat ureteropelvic junction obstruction (UPJO)? a comparative study

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Is laparoscopic pyeloplasty a comparable option to treat Ureteropelvic junction obstruction (UPJO)? A comparative study

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Abstract

Objective: To compare laparoscopic with open pyeloplasty.

Methods: The retrospective study was conducted at Aga Khan University Hospital, Karachi, and comprised records of patients who underwent surgical correction of ureteropelvic junction obstruction between January 2008 and December 2012. Patients with laparoscopic pyeloplasty were placed in group 1 and those with open pyeloplasty in group 2. The groups were compared for operative time, hospital stay, perioperative complications, blood loss, duration of surgery, outcome and follow-up. Data was analysed using SPSS 19.

Results: Of the 73 patients, 29(40%) were in group 1, and 44(60%) in group 2. A crossing vessel could be identified in 25(86.2%) in group 1 and in 33(75%) in group 2. Laparoscopic procedures were associated with a longer mean operating time (p=0.04), median estimated blood loss (p<0.001) and a shorter mean hospital stay (p<0.001). Follow-up mercaptoacetyltriglycine scan was done in 21(74.5%) patients in group 1 and 23(52.2%) in group 2. Only 2(7%) patients in group 1 and 2(4.5%) in group 2 had poor response on mercaptoacetyltriglycine scan. Mean follow-up was 2.71±1.2 months. Postoperative complications were 5(13%) in group 1 and 9(20%) in group 2 (p=0.141).

Conclusion: Laparoscopic pyeloplasty was associated with shorter hospital stay, less pain and less blood loss. The efficacy in term of success rate and perioperative complications of laparoscopic pyeloplasty was comparable to that of open pyeloplasty.

Keywords: Laparoscopy, Hydronephrosis/congenital, Minimally invasive surgical procedures. (JPMA 66:324; 2016)
at the level of obstruction or beyond that and then the
distal end of ureteric catheter was fixed with 16Fr Foley.
Position was changed to semi-lateral with ipsilateral side
up. Anderson-Hynes (AH) dismembered pyeloplasty was
the preferred choice in all but one patient with UPJO. LP
was performed using three ports in all the patients
through transperitoneal approach. Using the Hasson

technique, a 10mm port was placed above the umbilicus,
second port (5mm) was placed at the angle between the
costal margin and the lateral border of the ipsilateral
rectus muscle, and third port (10mm) was placed midway
between the umbilicus and the anterior superior iliac
spine at the level of the umbilicus.

Colon was mobilised medially by identifying and incising
Line of Toldt, and dissection was done to identify the
ureter. Gonadal vessel and psoas were the landmarks for
the identification of ureter. The ureter could be
distinguished from the gonadal vessels by peristalsis and
by the presence of ureteric stent. After identification of
ureter it was traced upwards towards the pelvis. Peripelvic
fat dissection was done to allow for optimal visualization
and enough mobility for a tension free anastomosis with
the ureter (Figure). If the crossing vessel was identified,
then ureter was divided and transposed anteriorly. The
scissors were used to divide the ureter at the ureteropelvic
junction (UPJ). The ureter was then spatulated on its
lateral aspect (facing the medial aspect of the kidney).
Corner sutures were taken first then posterior wall
anastomosis was performed in a running fashion with 4-0
polydioxanone suture. Double J stent was passed
antegrade and anastomosis completed. Further, 10
FrRadivac drain was placed and 10mm port sheath was
closed with vicryl 2-0 and skin with polypropylene 2-0.

For open dismembered pyeloplasty, a standard
retroperitoneal approach through the subcostal incision
was used.

Postoperative management was similar in both groups.
Prophylactic antibiotics (third-generation cephalosporin)
were routinely prescribed. The Foley catheter was
removed 2 days postoperatively. The closed suction drain
was subsequently removed if the drain output was less
than 30ml in 24 hours after Foley catheter removal.
Postoperatively patients were given intravenous (IV)
paracetamol and opioid analgesia. Ultrasonography and
renal scintigraphy were performed 02 months postoperatively. Double J stent was removed after 06
weeks in both groups.

Operative time, intraoperative estimated blood loss,
presenting complaint, preoperative imaging, analgesic
use, postoperative hospital stay, crossing vessel,
complications and success rates based on postoperative
mercaptoacetyltriglycine (MAG3) scan at 6 months were
compared for both groups. The operative time was
recorded from the time of the initial skin incision to the
final skin suture.

Statistical analysis was done using SPSS 19. Continuous
variables were analysed by using student t test or Mann
Whitney test, where applicable, and p<0.05 was taken as
statistically significant.

Results
There were 84 patients identified initially, but 11(13%)
patients were excluded for missing or incomplete data. Of
the 73(87%) patients in the study, LP repair was performed
on 29(40%) and OP on 44(60%)(Table 1).

Crossing vessel was identified in 33(75%) in group 2 and
25(86.2%) in group 1. Mean operative time in group 2 was
153±45 min and 178±60 min in group 1. Mean blood loss
in group 1 was 54±17 ml compared to 110±78 ml in group
2 (p=0.059).

Mean length of stay was 2.7±0.5 days in group 1
compared to 4.5±0.9 days in group 2 (p<0.000).

There were 7(16%) complications in group 2 against 5(17%)
in group 1. Mean follow-up was 2.7±1.2 months (range: 1-
6 months). Postoperative radionuclide scan on follow-up
revealed success in 42(95%) in group 2 compared to i95% (n=42) for OP vs 27(93%) in group 1 (Table-2).

**Discussion**

To our knowledge, this is the first study from our region demonstrating safety and efficacy of laparoscopic approach. The first LP was described in 1993, initially, OP was considered the gold standard with high success rate and acceptable outcome. The advancement in technology led to widespread use of minimally invasive surgical techniques. A reflection of this trend was the development of LP which is now the preferred treatment modality, with advantages of reduced access-related morbidity, improved visualisation, decreased blood loss, less postoperative pain, quicker recovery and better cosmesis. With respect to success rate, LP has provided equivalent results when compared to open surgery.

A crossing vessel is identified as one of the common causes of UPJO irrespective of the choice of surgical approach. In our study the LP group it was the case in had 86.2% patients. The standardised procedure of Anderson-Hynes repair is ideally suitable for crossing vessel.

Existing literature presents contradictory findings with regard to duration of surgical intervention in LP vs OP approach. This maybe a reflection of the learning curve of reconstructive laparoscopy. Some studies showed that LP is a demanding procedure and requires longer duration of time. Conversely, others identified no significant difference in duration of surgery for OP versus LP. Our study revealed that it took on average 25 min more to perform LP, and this difference was statistically significant. This review includes the experience of our first 30 cases and the increased operative time maybe a reflection of our learning curve. Literature also supports this finding as LP is a difficult procedure and demands technical expertise compared to OP. Reduced operative time can be achieved by increasing experience of surgeons and by standardisation of operative steps. On the other hand, the significantly shorter length of hospital stay (2.7 days) required for LP group is an obvious advantage. This finding can be attributed to the fact that patients undergoing LP experience less postoperative pain, and have quicker recovery. Similarly, the reduced blood loss is another advantage of minimally invasive approach and is duplicated in our study. There was a female predominance in our study which is contrary to literature. As LP offers unparalleled cosmetic advantage, this may be a reflection of patient's preference or referral pattern.

Existing literature also supports that LP has lower morbidity compared to OP. In general, the reported overall complication rate of the LP ranges from 4% to 12.7%. In the present study the complication rate LP in group was 17% (n=5). There was no intraoperative complications, but there were 2 cases converted to open surgery due to the technical problems that has been reported in earlier studies as well.

In the current study the main strength was preoperative renal scintigraphy (MAG-3) in the LP group done in 93% (n=27). Preoperative renal scintigraphy is important to identify patients who will benefit most from repair and also helps in comparison during postoperative follow-up. We recommend postoperative radionuclide scan routinely in all patients undergoing LP. As reduction of renal pelvis is not routinely performed during LP, imaging modalities like intravenous pyelogram (IVP) or ultrasonography (USG) may provide erroneous result in this setting.

**Table-2: Postoperative findings.**

<table>
<thead>
<tr>
<th></th>
<th>Open Approach N=44</th>
<th>Laparoscopic Approach N=29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of stay (days)</td>
<td>4.5±0.9</td>
<td>2.7±0.5</td>
</tr>
<tr>
<td>Complications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary Tract Infections</td>
<td>4 9 1 3</td>
<td></td>
</tr>
<tr>
<td>JJ displaced</td>
<td>0 0 1 3</td>
<td></td>
</tr>
<tr>
<td>Perinephric Haematoma</td>
<td>0 0 1 3</td>
<td></td>
</tr>
<tr>
<td>Anastomosis Leak</td>
<td>1 2 1 3</td>
<td></td>
</tr>
<tr>
<td>Recurrent PUJO</td>
<td>1 2 1 3</td>
<td></td>
</tr>
<tr>
<td>Wound Infection</td>
<td>1 2 0 0</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>42 95</td>
<td>27 93</td>
</tr>
<tr>
<td>Recurrence</td>
<td>2 4</td>
<td>2 6</td>
</tr>
</tbody>
</table>

**Figure:** Black arrow renal pelvis and white arrow narrow part of UPJO.
Conversion to OP is a recognised complication of LP.\textsuperscript{8,16,21,22} All patients should be informed about this technical problem. In our series, 3 patients were converted from LP to OP. In all 3 of these cases, the reason was technical difficulty in achieving a tension-free anastomosis.

Despite initial concerns, the success rate of LP is comparable to OP. Previous studies are limited by variable follow-up strategies and definition of success.\textsuperscript{12,20,25} We report a success rate of 93\% in our LP cohort using radionuclide scan as the primary modality for follow-up.

Our study is limited by a few considerations. Firstly, the small sample size of each group did not allow for subgroup analysis. Secondly, the duration of follow-up was short, so the long-term results of LP could not be inferred.

Conclusion

LP had equivalent success rate compared to OP but offered all the advantages of minimally invasive treatment. With shorter hospital stay and better cosmetic results, laparoscopic dismembered pyeloplasty has the potential to replace open surgery and, provided there is availability of expertise, it should be considered the first option for the treatment of ureteropelvic junction obstruction.

References