ROBOTIC ASSISTED LAPAROSCOPIC PYELOPLASTY (RALP)
Does The Patients Weight Effect The Surgical Results?

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To date only robotic assisted pyeloplasty is recognized as safe and efficient with an equivalent outcome compared to open or classical laparoscopy.
ROBOTIC PYELOPASTY IN THE PEDIATRIC POPULATION

- UPJ obstruction (UPJO) is the most common congenital ureteral anomaly, occurring in 1 per 20,000 newborns.
- “Gold standard” treatment for UPJO has been the open dismembered pyeloplasty (OP).
- Minimal invasive surgical approaches, such as laparoscopy and, more recently, robot-assisted laparoscopy (RAL), have resulted in reduced morbidity and improved recovery compared to the open surgical approach.
- The RALP cohort demonstrated a shorter length of stay, lower pain medication requirement, a success rate similar to OP or LP.
- Robotic surgeons have recently begun to expand the application of RALP to include younger children and infants.
RALP Technical points

- 8 mm instruments
- Assistant port 5 mm Long trokar
- Stent insertion intracorporeal
- Unstented pyeloplasty/JJ stent 3 Fr
- Monofilament sutures 6/0 (PDS/Maxon)
- Preemptive local anesthesia
- XI platform is preferable in infants
- “Black diamond” needle holder/ microdissector
AIM

• To evaluate our results of Robotic Assisted Laparoscopic Pyeloplasty in infants with UPJO weighing less than 10 kg
METHODS
2016-2017

• Prospective follow up of RALP
• Retrospective evaluation of OP
• Comparison of the following parameters:
  – Total success rate
  – Length of surgery
  – Complications
  – Length of hospital stay
  – Pain score
  – Failure rate
PATIENTS
13: RALP vs 13: OP

- Median age: 8 month (5-11 months)
- Median weight (kg): 7 (5.6-10)
- Renal function: 42.6 ± 6.4 (Mean ± SD)
- Lt hydronephrosis: 9
- Rt hydronephrosis: 4
- SFU: 3.54 ± 0.66
- Intrinsic obstruction:
  • 13 (86.7%) in RALP
  • 14(93.3%) in OP

- Indications are the same for both groups:
  • Deterioration of renal function during observation by 5%
  • SFU Grade of hydronephrosis 3 & 4, initial renal function less than 40% with obstructive curve
RALP
Technical points

- Hasson technique/Veress needle
- Direct port insertion
- 3 Robotic arms/assistant port (5 mm Versus step)
- Combine anesthesia (Caudal MO)
- “Black diamond” needle holder/ microdissector
- Monofilament 6-0 Maxon suture
- Stented Vs Stentless technique
OUTCOME
13 pts vs. 13 pts

RALP Group
- Operating time: 67.8 ± 13.4 min
- Hospitalization period: 1 day (range 1-2 days)
- Stented: 11
- No need in redo surgery
- I-II complications by Clavien-Dindo: 2pts
- Required ureteral re-implantation
  - 2 pts
  - One at the time of RALP

OP Group
- Operating time: 66.5 ± 9.5 min
- Hospitalization period: 2 days (range 2-3 days)
- Pipe Salle nephrostomy: 11
- Redo surgery: 1
- I complications by Clavien-Dindo: 1 pt.
ADVANTAGES OF RALP?

- No difference in FLACC Pain Scale was observed between the 2 groups
- No difference in operating time \( (p=0.76) \)
- Cosmetic issues
CONCLUSIONS

• Our data shows that RALP is safe and effective with similar results in OP series with regards to operating time, hospitalization period, success rate, post operative pain in infants weighing less than 10 kg

• No doubt that larger group of patients and longer follow up are needed in order to get a confidence with this technique
WHO WORE IT BETTER?
### IS IT WORTH?

<table>
<thead>
<tr>
<th>Intervention chosen</th>
<th>5 months old with UPJO</th>
<th>2 years old with UPJO</th>
<th>10 years old with intermittent UPJO and retained renal function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>80% (119)</td>
<td>51% (87)</td>
<td>15% (14)</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>3% (5)</td>
<td>8% (14)</td>
<td>9% (8)</td>
</tr>
<tr>
<td>Robotic</td>
<td>16% (24)</td>
<td>41% (71)</td>
<td>76% (69)</td>
</tr>
<tr>
<td>If open, choice of incision</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dorsal</td>
<td>13% (15)</td>
<td>10% (9)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Flank</td>
<td>69% (83)</td>
<td>69% (62)</td>
<td>58% (7)</td>
</tr>
<tr>
<td>Anterior Subcostal</td>
<td>18% (21)</td>
<td>21% (19)</td>
<td>42% (5)</td>
</tr>
<tr>
<td>If prefer open, why not robotic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No access to robot</td>
<td>6% (11)</td>
<td>15% (20)</td>
<td>17% (14)</td>
</tr>
<tr>
<td>Not trained on robot</td>
<td>16% (29)</td>
<td>25% (35)</td>
<td>30% (24)</td>
</tr>
<tr>
<td>Child is too small</td>
<td>27% (49)</td>
<td>8% (11)</td>
<td>3% (2)</td>
</tr>
<tr>
<td>There would be no benefit to the patient</td>
<td>51% (91)</td>
<td>52% (72)</td>
<td>50% (40)</td>
</tr>
<tr>
<td>Choice of internal/external drainage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antegrade DJ stent</td>
<td>38% (78)</td>
<td>47% (105)</td>
<td>48% (88)</td>
</tr>
<tr>
<td>Retrograde DJ stent</td>
<td>11% (22)</td>
<td>14% (31)</td>
<td>19% (34)</td>
</tr>
<tr>
<td>Kidney internal splint stent catheter</td>
<td>16% (33)</td>
<td>9% (19)</td>
<td>4% (8)</td>
</tr>
<tr>
<td>Nephrostomy tube</td>
<td>3% (7)</td>
<td>2% (4)</td>
<td>1% (2)</td>
</tr>
<tr>
<td>Penrose drain</td>
<td>27% (57)</td>
<td>23% (52)</td>
<td>15% (28)</td>
</tr>
<tr>
<td>None</td>
<td>5% (11)</td>
<td>5% (11)</td>
<td>13% (23)</td>
</tr>
</tbody>
</table>

Jackson J et al, J of Ped Urol, 2017, 13;603
WHAT WE HAVE LEARNED?

Robot Assisted Pyeloplasty in the Infant—Lessons Learned

Alexander Kutilkov, Michael Nguyen, Thomas Guzzo, Daniel Canter and Pasquale Casale®
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Purpose: Robot assisted pyeloplasty is emerging as an effective tool for treatment of ureteropelvic junction obstruction in the pediatric population. However, access needed for the procedure is difficult in the small abdominal cavity of an infant. We present our experience with infant robot assisted pyeloplasty, along with some lessons learned that render this procedure possible in these small patients.

Materials and Methods: Nine children 3 to 8 months old (mean 5.6) underwent transperitoneal robot assisted pyeloplasty for ureteropelvic junction obstruction using the da Vinci® Surgical System. All patients underwent Anderson-Hynes dismembered pyeloplasty without renal pelvis tapering. Outcome measures included operative time, length of hospital stay, and resolution of obstruction by ultrasonography and/or diuretic radionuclide imaging.

Results: All infants successfully underwent robot assisted laparoscopic pyeloplasty without conversion to pure laparoscopy or open procedure. Mean operative time was 122.8 minutes, with a mean console time of 72.1 minutes. Mean hospital stay was 1.4 days. Of the 9 patients 7 (78%) had resolution of or improvement in hydronephrosis, while 2 had no evidence of obstruction based on followup diuretic renography.

Conclusions: Robot assisted pyeloplasty is a safe and effective option in the surgical treatment of infant ureteropelvic junction obstruction. Further long-term studies are needed to confirm the usefulness of robotics in minimally invasive pediatric surgery.

Kutilkov et al J of Urol 176, 2237-2240, 2006
Infant robotic pyeloplasty: Comparison with an open cohort


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Abstract  Objective: To present our experience with infant pyeloplasty, comparing outcomes between robotic-assisted laparoscopic pyeloplasty (RALP) and open pyeloplasty (OP).

Materials and methods: A retrospective review was performed of all children <1 year of age who underwent unilateral dismembered pyeloplasty at a single pediatric institution since January 2007. Patients with standard laparoscopic pyeloplasty were excluded. Patient demographics, intraoperative details, narcotic usage, and complications were reviewed.

Results: A total of 70 infants (51 boys and 19 girls) were identified, with nine RALP and 61 OP performed. Median age was 9.2 months (range, 3.7–11.9 months) for RALP and 4.1 months (range, 1.0–11.6 months) for OP (p = 0.005). Median weight was 8 kg (range, 5.8–10.9 kg) for RALP and 7 kg (range, 4–14 kg) for OP (p = 0.163). Median operative time was 115 min (range, 95–205 min) for RALP and 166 min (range, 79–300 min) for OP (p = 0.028). Median hospital stay was 1 day (range, 1–2 days) for RALP and 3 days (range, 1–7 days) for OP (p < 0.001). Median postoperative narcotic use of morphine equivalent was <0.01 mg/kg/day (range, 0–0.1 mg/kg/day) for RALP and 0.05 mg/kg/day (range, 0–2.2 mg/kg/day) for OP (p < 0.001). Median follow-up was 10 months (range, 7.2–17.8 months) for RALP and 43.6 months (3.4–73.8 months) for OP (p < 0.001). The success rate was 100% for RALP and 98% for OP.

Conclusions: Infant RALP was observed to be feasible and efficacious with shorter operative time, hospital stay, and narcotic utilization than OP.

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Robot-assisted laparoscopic pyeloplasty: Multi-institutional experience in infants.


Abstract

INTRODUCTION: Robot-assisted laparoscopic pyeloplasty (RALP) has been gaining acceptance among pediatric urologists. Over 300 have been described in the literature, but few studies have evaluated the role of RALP in infants alone.

OBJECTIVE: We sought to examine the operative experience and outcomes of RALP in a cohort of infants treated at multiple institutions across the United States. Our primary aim was to describe the safety and efficacy of RALP within this cohort. We recognize the challenges of performing minimally invasive surgery in small patients. In our paper, we address some technical considerations for the infant population.

STUDY DESIGN: This multi-centered observational study collected data on subjects one year of age or less who underwent RALP between April 2006 and July 2012 at five institutions. The primary outcome was resolution of hydronephrosis, and secondary outcomes included surgical time and complications.

RESULTS: A total of 60 patients (62 procedures) underwent RALP by six surgeons during the study period. All surgeons had > 5 years of experience beyond fellowship training. Mean surgical age was 7.3 months (SD ± 1.7 mo), 56 patients (95%) were diagnosed prenatally, and 59 patients (95%) had follow up imaging. Of these patients, 91% showed resolution or improvement of hydronephrosis. Two patients had recurrent obstruction and required additional surgery. Mean surgical time was 3 hours 52 minutes (SD ± 43 minutes). Seven (11%) patients reported intra-operative or immediate post-operative complications.

DISCUSSION: This series found a 91% success rate for reduction or resolution of hydronephrosis, and an 11% complication rate. This is equivalent to modern series comparing open pyeloplasty to pure laparoscopic and robotic-assisted laparoscopic pyeloplasty, which report success rates ranging from 70-96%, and complication rates ranging from 0-24% for open pyeloplasty. We lacked a standardized technique amongst institutions. This was not surprising since there are not established technical benchmarks for this surgery. However, we specified multiple technical considerations for this unique patient population.

CONCLUSION: The advantages of using robot-assistance to perform pyeloplasty in infants remain to be defined. This study cannot make that assessment due to small sample size. Nonetheless, this cohort is the largest robotic pyeloplasty series in infants to date. Seeing an excellent success rate and a low complication rate in this infant cohort is encouraging.

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IS IT WORTH?

• It is feasible
• It is technical demanding
• You have to have previous experience and substantial number of pts.
• You have to evolve
HOW TO GET GOING?

- Familiar with robotic surgery OR staff
- Previous laparoscopic experience
- Case selection
- Desire to study
DO COSMETIC ISSUES JUSTIFY THIS SURGERY?

- The children are growing so the incisions
- Only to fix a problem it is not always enough