
Initial Experience With Laparoscopic Ipsilateral Ureteroureterostomy in Infants and Children for Duplication Anomalies of the Urinary Tract

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Purpose: We report the feasibility of laparoscopic ipsilateral ureteroureterostomy for duplication anomalies of the urinary tract in infants and children, and the short-term results in 6 patients.

Materials and Methods: Laparoscopic ipsilateral ureteroureterostomy was performed transperitoneally with 3 and 4 ports for unilateral and bilateral cases, respectively. Cystoscopy, retrograde pyelogram and stent placement in the recipient ureter were performed at the beginning of each case. The anastomosis was carried out with running or interrupted 6-zero sutures. An abdominal drain and Foley catheter were left indwelling in all cases. Demographic data, body measurements, type of procedure and indication, laterality, intraoperative and postoperative complications, analgesia requirement, length of hospitalization and outcome were recorded.

Results: Eight laparoscopic ipsilateral ureteroureterostomies were performed in 6 patients (2 males). Mean patient age was 51 months. Diagnoses were bilateral lower pole vesicoureteral reflux (2 patients) and ectopic ureter (4). Mean operative time including cystoscopy was 257 minutes (range 140 to 430) and estimated mean blood loss was 2.7 ml. There were no intraoperative complications. Mean morphine requirement was 0.13 mg/kg. Two cases required acetaminophen only for pain management. All patients were discharged home with no narcotics at a median of 3 days postoperatively (range 1 to 7). There were 2 postoperative febrile urinary tract infections. Followup renal ultrasound demonstrated no significant hydronephrosis of the moieties involved.

Conclusions: In this initial experience laparoscopic ipsilateral ureteroureterostomy was done safely and effectively even in small infants. Postoperative course was uneventful, with negligible blood loss and minimal analgesia requirement, and initial results were comparable to those of open surgery.

Key Words: ureterostomy, ureter, vesico-ureteral reflux, laparoscopy, urinary incontinence

Ipsilateral ureteroureterostomy has been used to treat duplication anomalies of the urinary tract with 1 obstructed system for the last 80 years.¹ In addition, good results have been reported when IJU is applied to treat lower pole reflux.^{2,3} Subsequently, several authors have reported the advantages of IJU as an alternative to partial nephrectomy or double barrel reimplantation in selected cases.^{4,5} In the presence of a complete ureteral duplication with preserved function of a refluxing or obstructing moiety IJU is our approach of choice. Since laparoscopic surgery became our preferred approach for pediatric partial nephrectomy⁶ and pyeloplasty,⁷ it became logical to apply a laparoscopic approach to IJU. Herein we describe the technique and our initial experience with laparoscopic ipsilateral ureteroureterostomy.

MATERIALS AND METHODS

We retrospectively reviewed the charts of patients who underwent LIJU at our institution. Demographic data, body measurements, type of procedure and indication, laterality, intraoperative and postoperative complications, analgesia

requirement, length of hospitalization and outcome were recorded.

In cases of reflux the indication for surgery was reflux confined to the lower moiety on more than 1 voiding cystourethrogram and breakthrough urinary tract infections. We performed LIJU in the presence of a duplication anomaly with upper pole hydronephrosis, no evidence of ureterocele and a functioning upper pole on mercaptoacetyltri-glycine or dimercapto-succinic acid renogram.

In this procedure the child is admitted to the hospital on the day of surgery. All except 1 patient weighed less than 21 kg. The same technique was used in all patients. Under general anesthesia the patients were placed supine and were prepared from the nipples down to have the genitalia included in the operating field. The feet were wrapped with waterproof stockinettes to avoid excessive temperature loss (fig. 1). Cystoscopy, retrograde pyelogram and stent placement in the ureter to be anastomosed were performed initially. Access to the peritoneum was gained using the Bailez technique⁸ with a 5 mm trocar. Two and 3 (3 mm) working ports for unilateral and bilateral LIJU, respectively, were placed in the hypogastrium and the ipsilateral flank of the repair, adjusting the distance according to patient size (above or below the umbilical line for infants or older children, respectively, fig. 1).

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Study received institutional review board approval.

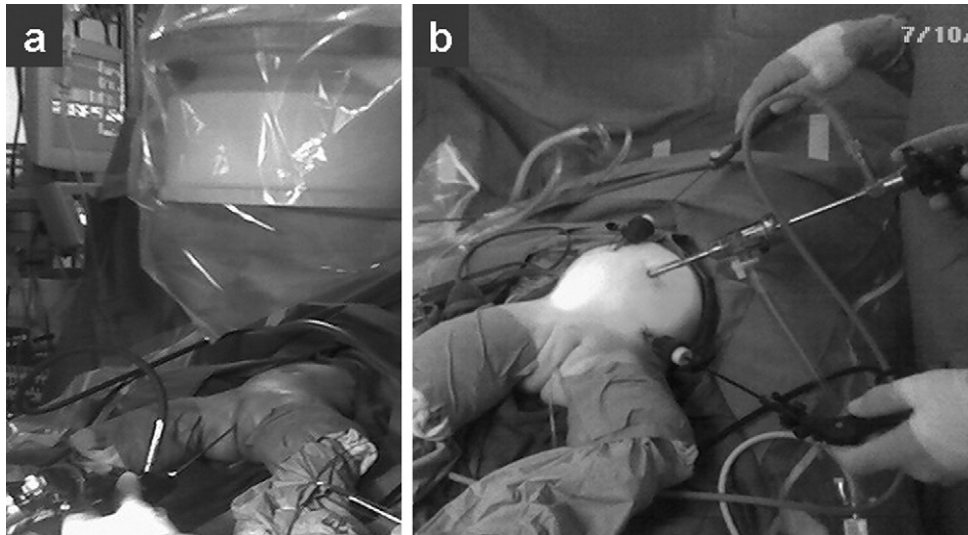


FIG. 1. *a*, patient is prepared from nipples down, with genitalia included in operative field to allow cystoscopy. *b*, port placement in right LIUU in infant with ectopic ureter. Note working port on flank is placed high (above umbilical line).

The recipient ureter was easily identified at the pelvic bream even in cases of equal ureteral size, since it contained the stent. The peritoneum was incised. The donor ureter was dissected free at the level of the crossing of the iliac vessels, divided and ligated distally. The divided end was spatulated on the lateral aspect. The recipient ureter was left in situ and a longitudinal ureterotomy long enough to match the lumen of the donor ureter was performed with single action scissors on its medial aspect. The anastomosis was carried out with running or interrupted 6-zero reabsorbable monofilament sutures. An abdominal drain was left indwelling in all but 1 case.

In 1 patient (a teenager) the procedure was started using the dorsal lithotomy position and the normal ureter was stented cystoscopically. The patient was then placed supine and re-draped, and the laparoscopic procedure was carried out.

The Foley catheter, drain and stent were removed at a median (range) of 1.5 (1 to 2), 2 (1 to 3) and 21 (8 to 35) days, respectively. During the procedure patients were closely monitored and hypercarbia was controlled by the anesthesiologist by adjusting the ventilation rate.

RESULTS

There were 8 LIUUs performed in 6 patients (2 males). Mean patient age was 51 months (range 1 to 190). Diagnoses were bilateral lower pole vesicoureteral reflux (2 patients) and ectopic ureter (4). Mean operative time for unilateral and bilateral cases was 211 minutes (range 140 to 338) and 348 minutes (268 to 430), respectively. Cystoscopy, stent placement and repositioning, if necessary, took a mean of 45 minutes (range 21 to 73), and were recorded as part of the surgical procedure. Blood loss was estimated at a mean of 2.7 ml (range 1 to 5). There were no intraoperative complications.

The end tidal CO₂ typically remained at approximately 40 mm Hg or less. In 1 patient it reached 50 mm Hg briefly without clinical consequences.

All patients were prescribed 15 mg/kg acetaminophen, 0.5 mg/kg ketorolac and/or 0.1 mg/kg morphine, which they

could receive at intervals of 2 to 6 hours with the criteria described previously.⁶ Two patients needed acetaminophen only for pain control, 1 needed 2 doses of ketorolac and 3 received a mean of 2.5 narcotic doses. All patients were discharged home with no narcotics at a median of 3 days (range 1 to 7).

Postoperative course was uneventful in all patients except for a 15-year-old female who had pyelonephritis and needed intravenous antibiotic therapy, prolonging the hospital stay. Another patient needed rehospitalization to treat a febrile urinary tract infection. At the time of stent removal 4 patients underwent assessment of the anastomoses via retrograde pyelogram, which showed patency and no leak (fig. 2). At a mean followup of 10.7 months (range 5 to 16) all patients were clinically well with subjectively perfect cosmetic results. Followup renal ultrasounds were performed at 1, 3 and 9 months postoperatively, and revealed decreasing or no significant hydronephrosis of the moieties involved (fig. 2).

DISCUSSION

Ipsilateral ureteroureterostomy is a time-honored technique to treat duplication anomalies of the urinary tract in which only 1 ureter is abnormal and there is function in the abnormal moiety. Two recent series in which IUU was performed with an open technique demonstrated good long-term results and a low complication rate, comparable to that of open double barrel ureteral reimplantation.^{5,9} In a study by Choi and Oh 18 IUUs were performed in a group of 63 patients with lower pole reflux, ureteral ectopia and ureterocele.⁴ The relatively high reoperation rate reported was, as expected, mostly in patients with ureterocele, and was similar to the reoperation rate after partial nephrectomy. The series of Lashley et al includes 100 IUUs in 94 patients operated on during a 23-year period, with a success rate of 94%.⁵

The question of whether the anastomosis should be done high or low has also been a matter of debate. Choi and Oh explore the kidney to decide whether to do a partial nephrectomy or an anastomosis.⁴ Therefore, they do most of their

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