# Short-term Complications After Pyeloplasty in Children With Lower Urinary Tract Anomalies

**Rafal Chrzan, Wojciech Panek, Caroline F. Kuijper, Peter Dik, Aart J. Klijn, Keetje L. de Mooij, and Tom P. de Jong**

**OBJECTIVE** To investigate whether children with lower urinary tract (LUT) anomalies are at greater risk for postoperative complications after laparoscopic pyeloplasty stented with a double-J catheter (JJC).

**MATERIALS AND METHODS** Prospectively collected data of laparoscopic pyeloplasty (LP) performed between 2006 and 2015 were analyzed. Inclusion criteria are (1) toilet-trained child and (2) unilateral dismembered pyeloplasty stented with a JJC done by the same surgeon. Our pyeloplasty protocol includes cystoscopy and retrograde pyelography. JJC is left in for 3weeks. Asymptomatic patients with infravesical LUT anomalies (a-LUTA) and those with history of LUT symptoms (LUTS) were identified. Any short-term complication was classified according to Clavien-Dindo. Fisher's exact test was used for statistical analysis.

**RESULTS** Fifty-four children (mean 9.8 years) were included. Ten of 54 patients had LUTS. In 4 of those 10, anatomical infravesical anomaly was found during cystoscopy. Accidental urethral anomaly was found in 11 patients (a-LUTA). The control group (CG) consisted of 33 patients. Postoperative hospital stay ranged from 1 to 8 days (mean 2 days). Overall complication rate was 8 of 54 (14%). Grade 1 complications occurred in 3 patients in the CG. Five patients had grade 3 complications (2 needed replacement of bladder catheter, and 3 had diversion of the upper tract). Those problems occurred in 1 of 10 patients with LUTS and 3 of 11 patients with a-LUTA compared to 1 of 33 in the CG. This difference was statistically significant ($P < .05$).

**CONCLUSION** Careful history should be taken in toilet-trained children before pyeloplasty. If any infravesical abnormality is discovered, internal diversion should probably be avoided. Special attention must be paid to bladder function in the postoperative period. UROLOGY ■■: ■■–■■, 2016. © 2016 Elsevier Inc.

Ureteropelvic junction (UPJ) obstruction is one of the most common obstructive uropathies in children.[1] The gold standard treatment for this congenital anomaly is dismembered pyeloplasty, which has a success rate of approximately 95%.[2,3] Open and minimally invasive techniques are comparable in terms of results.[4,5] There is ongoing discussion regarding the method and duration of stenting of the anastomosis after surgery. Double-J catheter (JJC) or percutaneous nephroureterostomy tube is widely used for this purpose.[6-8] When a JJC is retained postoperatively, there is a possible risk of urinary back flow from the bladder to the upper urinary tract, with dilatation of the renal collecting system in cases of elevated bladder pressure.

Infravesical anatomical or functional obstruction can lead to increased intravesical pressure and deterioration of the upper urinary tract.[9-11] A catheter, which is a foreign body in the urinary bladder, can provoke bladder overactivity and thus cause pressure elevation inside the urinary tract. Both situations can result in dilation of the upper tract and urinary leakage through the anastomosis after pyeloplasty.

The aim of this study was to investigate whether children with lower urinary tract (LUT) anomalies are at greater risk for postoperative complications after pyeloplasty stented with a JJC.

## MATERIALS AND METHODS

Open and laparoscopic techniques are used to treat UPJ obstruction in our department. A dismembered pyeloplasty is performed in the majority of cases. Open technique is used in children under 15 kg (approximately 3 years of age), and in those patients an external multipurpose drain is left in the kidney and

**Financial Disclosure:** *The authors declare that they have no relevant financial interests.*

*From the Department of Pediatric Urology, University Children's Hospital AMC/EKZ, Amsterdam, The Netherlands; the Department of Pediatric Urology, UMC/WKZ, Utrecht, The Netherlands; and the Department of Urology, 4th Military Hospital, Wroclaw, Poland*

*Address correspondence to: Rafal Chrzan, M.D., PhD., Department of Pediatric Urology, University Children's Hospital AMC/EKZ, Meibergdreef 9, Amsterdam 1105 AZ, The Netherlands. E-mail: r.chrzan@amc.nl*

*Submitted: May 9, 2016, accepted (with revisions): August 1, 2016*



http://dx.doi.org/10.1016/j.urology.2016.08.058
0090-4295

proximal ureter after surgery. In children above 15 kg, laparoscopic pyeloplasty (LP) stented by a JJC is preferred. Regardless of the technique, our pyeloplasty protocol includes cystoscopy and retrograde pyelography at the start of the procedure. A transurethral bladder catheter (catheter a demeure, CAD) is retained after surgery to maintain good drainage and avoid urinary retention; opioids or epidural analgesia are also used during the first 24 hours after the operation. The patient is discharged on the first or second postoperative day depending on the need for parenteral analgesic agents. JJC is removed 3 weeks later in outpatient surgery.

The first LP at our department was done in 2006, and from that time data were collected prospectively. For this study, a retrospective analysis of 84 LPs done between November 2006 and June 2015 was performed. The inclusion criteria were as follows: (1) a toilet-trained child, (2) unilateral dismembered LP, (3) the same operating pediatric urologist, and (4) postoperative temporary diversion by a JJC.

All toilet-trained children with hydronephrosis were routinely asked about symptoms relating to LUT function. Patients with a history of LUT symptoms (LUTS) underwent complete diagnostic investigation (bowel and bladder diary, uroflowmetry, and ultrasound of the lower tract) before undergoing pyeloplasty.

For this study, the patients were divided into 3 groups: (1) LUTS—patients with a history of LUTS, (2) a-LUTA—asymptomatic patients with infravesical LUT anomalies found during cystoscopy, and (3) CG—control group. The anatomical abnormalities were meatal stenosis and Cob's collar or posterior urethral valves (PUVs) in boys or abnormal meatus with anterior deflected stream in girls.

Any abnormal event that occurred within 4 weeks after surgery was classified according to Clavien-Dindo. Fisher's exact test was used for statistical analysis.

## RESULTS

Fifty-four children (mean 9.8 years) met the criteria. Postoperative hospital stay ranged from 1 to 8 days (mean 2 days). Characteristics are depicted in Table 1. The overall complication rate was 8 of 54. Ten patients (18%) had a history of LUTS (low or high voiding frequency, urge, urinary incontinence, or urinary tract infections). An anatomical abnormality was found during cystoscopy in 4 patients (40%). Meatotomy at 6 o'clock was done in 3 females and posterior urethral valve ablation in 1 male. In 25% of patients (11 of 44) without a history of LUTS, infravesical anomalies were accidentally found (a-LUTA group): meatal anomaly in 1 female, syringocele in 2 males and PUV in 8 males. Meatotomy was performed in the girl, the roof of the syringocele was incised in 2 boys, and ablation of the valves was done in 6 patients. In the remaining 2 male patients, valve incision was not primarily done. There were 8 patients with PUV in the a-LUTA group. No signs of infravesical obstruction on ultrasound were found in any of these 8 males: there was no megaureter or thickening of the bladder wall. None of them had postvoid residual. In 1 child, voiding cystourethrography was done because of history of pyelonephritis. The CG consisted of the 33 remaining patients (no LUTS or anatomical anomalies).

**Table 1.** Patients' characteristics and incidence of grade 3 complications

| | LUTS | a-LUTA | Control Group |
|---|---|---|---|
| Total | 10 | 11 | 33 |
| Age (mean years) | 7.6 | 8.5 | 10.9 |
| Female : Male | 7:3 | 1:10 | 10:23 |
| Hospital stay (mean days) | 2.4 | 1.9 | 2.1 |
| Type of grade 3 complication | | | |
| CAD | | 1 male | 1 female |
| Diversion | 1 female | 2 males | |
| Percent with grade 3 complications | 10 | 27 | 3 |

a-LUTA, asymptomatic patients with infravesical LUT anomalies; CAD, catheter a demeure; LUTS, lower urinary tract symptoms.

Grade 1 complications occurred in 3 patients in the CG (2 males and 1 female). All of them experienced abdominal pain that required additional analgesic agents. Five patients needed medical intervention in the short term (grade 3 complication). Two patients needed replacement of CAD. One of them (female, CG) had abdominal pain and difficulties with bladder emptying after removal of the CAD. Those symptoms disappeared after 2 days of additional bladder drainage using CAD. One patient (male, a-LUTA) was readmitted on the third day with lower abdominal pain and malaise. Those symptoms disappeared within 2 days after bladder drainage (CAD). In 3 patients, diversion of the upper tract under general anesthesia was needed. One patient (male, a-LUTA, PUV found during cystoscopy but not primarily incised) was readmitted on the sixth postoperative day due to flank pain and painful bladder contractions. Those complaints did not resolve with transurethral CAD and anticholinergics. Cystoscopy was done, the JJC was removed, and valve ablation took place on the ninth day. On the following day, a percutaneous nephrostomy drain (PN) was inserted due to pain and gross dilatation of the collecting system. Endoscopic inspection of the UPJ was performed 2 weeks later, and edematous tissue was excised. After this, the PN was removed and the patient recovered (no revision of the UPJ was needed). Another patient (male, a-LUTA, PUV found during cystoscopy but primarily not incised) was readmitted on the ninth day due to abdominal pain and dilatation of the collecting system. The JJC was left in situ and a PN was introduced under general anesthesia. Two weeks later, PUV incision was done and the JJC was removed. The PN was clamped and he had no complaints. One patient (female, LUTS, no anatomical anomaly of the LUT) got a PN and peritoneal drain on the second day after LP because of excessive intraperitoneal fluid, abdominal pain, and mild renal pelvis dilation. Two weeks later, the JJC was changed and the PN was removed. That JJC was then removed 6 weeks later without any further intervention. Grade 3 complications were significantly more common in the LUTS and a-LUTA groups compared to the control group ($P = .04$).