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TRAUMA AND RECONSTRUCTIVE UROLOGY

The retroperitoneal, inguinal approach to distal part of the ureter

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Introduction The inguinal approach to the distal part of the ureter allows the surgeon to perform various types of procedures and is considered to be one of the minimally invasive techniques in pediatric surgery. We aim to describe our initial experience with the surgery of the distal ureter performed through an inguinal mini–incision.

Material and methods Between March 2012 and June 2013, 8 patients were treated using a minimally invasive inguinal technique. The indications for surgical correction were single system primary obstructive megaureter, obstructive megaureter of the upper pole in a duplex kidney and distal ureteral stones. In all patients with single system obstructive megaureter and significant hydronephrosis, ureterocutaneostomy was performed. In one patient with duplex system primary obstructive megaureter and significant hydronephrosis of the upper pole, ureteroureterostomy of the dilated ureter to the normal caliber ureter in the distal part was performed. In the second patient with duplex system primary obstructive megaureter and reduced marker excretion of the upper pole in renal scintigraphy, ureterocutaneostomy was performed. In both cases of distal ureteral stones, deposits were removed by a simple incision.

Results We did not observe any perioperative or postoperative complications. The imaging studies have shown that ureteral dilatation decreased in all but one child in whom the upper pole and the ureter were resected due to lack of function.

Conclusions The inguinal approach allows for the adequate visualization of the distal ureter, creating the conditions for implementation of the various procedures, reduces the risk of retrovesical plexus injury and minimizes visible scars.

Key Words: inguinal approach ‹› obstructed megaureter ‹› minimally invasive procedure ‹› ureterolithiasis ‹› ureterostomy

INTRODUCTION

There are many clinical situations that require an approach to the distal part of the ureter. A typically used Pfannenstiel or an oblique Gibson incision leads to a wide dissection in the retroperitoneal space with the risk of injury to the nerves from the pelvic plexus, supplying the lower part of the ureter and the detrusor muscle [1]. In the symptoms described by the authors of extravesical antireflux procedures, including voiding dysfunction and total urinary retention, up to 20%, are usually temporary and should resolve by 3 months [2 ,3, 4]. The search for minimally invasive techniques with limited dissection around the ureterovesical junction has been prompted by these complications [5–10]. In 2002, Chen first described the technique of minimally invasive surgery through an inguinal canal in the extravesical antireflux procedures [7]. In subsequent years other authors have described the results of the application of the inguinal approach in primary ureteroureterostomy at the perivesical segments in patients with duplex systems, [12] or in primary obstructive megaureter reimplantations [13].

We aim to report our initial experience with surgery of the distal ureter performed via an inguinal approach. We present preoperative indications and outcomes of this procedure.

MATERIAL AND METHODS

The records of all children who underwent a surgery in the Departament of Pediatric Urology of Jagiello-

nian University in Cracow through the inguinal approach were analyzed retrospectively. In the period between March 2012 and June 2013, 8 patients underwent a surgery via the inguinal mini–incision (4 boys, 4 girls). The patients' ages ranged from 1 month to 9 years. Five patients were under the age of six months. The indications for surgical correction were single system primary obstructive megaureter (4 patients), obstructive megaureter of the upper pole in a duplex kidney (2 patients) and distal ureteral stones (2 patients). A skin incision was performed above the inguinal crease, as in hernia surgery (Figure 1). The external oblique aponeurosis was identified and incised. In boys, the spermatic cord was isolated and retracted to the outside. Then, the transversalis fascia was incised allowing entrance into the perivesical space. In the first child, a ureteral catheter was placed for better identification throughout cystoscopy. In all patients with the single system obstructive megaureter and significant hydronephrosis, end–cutaneous ureterocutaneostomy was performed (Figure 2). In one patient with primary obstructive megaureter and significant hydronephrosis of the upper pole, without accompanying vesicoureteral reflux to the lower pole, ureteroureterostomy of the dilated ureter to the normal caliber ureter in the distal part was performed. In the second patient with duplex system primary obstructive megaureter and reduced marker excretion of the upper pole in renal scintigraphy static renography, end–cutaneous ureterocutaneostomy was performed. In both cases of distal ureteral stones, deposits were removed by a simple incision (Table 1). In one of them a double J stent was left for 3 weeks.

Figure 1. *Skin incision for inginal approach.*

Figure 2. *End–cutaneous ureterocytaneastomy.*

Table 1. *Indications and surgical procedures performed via inguinal incision*

Diagnosis	Surgical procedure
Primary obstructive megaureter in a single collecting system (4 patients)	End–cutaneous ureterocutaneostomy
Primary obstructive megaureter with hydronephrosis of the upper pole in duplicated collecting systems (2 patients)	1. Distal part ureteroureterostomy 2. End–cutaneous ureterocutaneostomy
Distal ureterolithiasis (2 patients)	Ureteral incision with stones removal

RESULTS

The follow–up ranges from 1 to 14 months. We did not observe any intraoperative or perioperative complications such as voiding dysfunction. The imaging studies have shown that ureteral dilatation was decreasing in all but one child, in whom the upper pole and the ureter was resected due to lack of function.

DISCUSSION

The pelvic plexus is located about 1.5 cm dorsal and medial to the ureterovesical junction. The bundles from the pelvic plexus run to the distal ureter, bladder trigone and rectum. In females, some branches supply the vagina and uterus. During a wide dissection in the space located distal and dorsal to the ureter there is a high risk of injury to the efferent nerves from pelvic plexus [1]. McAchran stresses the importance of the afferent nerves to the pelvic plexus, which appear in proximity to the obliterated umbilical artery [6].

To avoid these complications, in 2002 Chen and colleagues first described the technique of the inguinal approach in 89 patients with a vesicoureteral re-

flux who underwent modified by Zaontz Lich–Gregoir extravesical ureteral anireflux procedure [7]. In 2004 Chen reported a larger publication comparing the outcomes of the antireflux procedures in three groups of patients with vesicoureteral reflux who underwent: the Cohen tranvesical ureteral reimplantation, the modified by Zaontz Lich–Gregoir extravesical antireflux procedure through a Phannenstiel incision or, modified by Zaontz, a Lich–Gregoir procedure via the new minimally invasive inguinal technique. The indications for surgical corrections were high grade persistent vesicoureteral reflux, recurrent urinary tract infections despite antibiotic prophylaxis or deteriorating renal function in radionuclide renal studies. Patients with duplex system, ectopic ureter, ureterocele or previous bladder surgery were excluded from the study. The success rates were similar among the three groups with a significant shortening in the length of hospital stay. All the patients who underwent minimal invasive surgery were discharged the same day without leaving the catheter in the bladder and they did not need analgesic administration. A similar effectiveness of antireflux procedures performing via the inguinal approach was confirmed by Ashley and Vandersteen (2008) in a group of 57 patients [9], and by Wiygul and Palmer (2011) in a group of 45 patients [10]. Furthermore, Ashley and Vandersteen compared the outcomes of two groups of patients with vesicoureteral reflux who underwent Lich–Gregoir extravesical ureteral procedure via the inguinal incision or dextranomer/hyaluronic acid copolymer injection [11]. In this study, the greater effectiveness of the antireflux procedure than single dextranomer/hyaluronic acid copolymer injection in definitive vesicoureteral reflux resolution three months after surgery was demonstrated.

Prieto described a minimal invasive inguinal technique for the management of ectopic ureters or ureteroceles in the absence of ipsilateral lower pole vesicoureteral reflux [12]. 21 patients underwent lower ureteroureterostomy performed via the inguinal incision Three of them required preliminary ureterocutaneostomy because of purulent discharge, large disproportion in ureter size or inadvertent transaction of the lower pole ureter. Cystoscopy with stent placement was done in 3 patients to identify the lower pole ureter. In the postoperative period Prieto did not use stents or drains. Upper pole hydronephrosis and distal ureteral dilatation had resolved in all cases.

Radojicic reported the outcomes of 21 patients with duplex systems who underwent extravesical reimplantation of only the involved ureter of which 14 were refluxing and 7 were obstructing [13]. Seven patients with obstructing megaureters required temporary ureterocutaneostomy with reimplantation 3–6 months after surgery. A double J stent was used in all patients for 3–4 weeks.

Based on preliminary experiments, we believe that the various types of procedures in the distal part of the ureter performed through an inguinal approach minimize tissue dissection in the retroperitoneal space, reducing the risk of the pelvic plexus injury. Especially beneficial to the patient is the shortening of healing time and the necessity to maintain the urinary catheter in the bladder.

CONCLUSIONS

1. The inguinal approach is sufficient for the adequate visualization of the distal ureter.
2. This approach creates possibilities for removing ureteral stones from the distal ureter.
3. The inguinal approach allows the surgeon to perform ureteroureterostomy or temporary ureterocutaneostomy.
4. Based on the literature, the inguinal approach also creates possibilities for extravesical antireflux procedures.
5. The inguinal approach is considered to be one of the minimally invasive techniques in pediatric surgery, reducing the risk of retrovesical plexus injury.

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