

Laparoscopic correction of vesicoureteral reflux using the Lich–Gregoir technique: initial experience

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KEY WORDS

vesicoureteral reflux ▶ laparoscopic procedure ▶ Lich-Gregoir technique

ABSTRACT

Introduction. Vesicoureteral reflux (VUR) is a common symptom of various functional and morphological abnormalities. When appropriate conservative and endoscopic treatments are employed, surgical management is recommended in a progressively less frequent pattern. Failure of such treatment modalities may be an indication for surgical treatment. The methods that are used can be divided into those that require incision of the abdominal integuments to access the bladder and ureter and those that are performed using videoscopic techniques.

Among therapeutic modalities used in VUR treatment, there is an extravescicular VUR repair using the method developed by Lich and Gregoir. The authors would like to present this technique based on three surgical correction cases and their results.

Material and methods. The above-mentioned transperitoneal technique was performed on three girls aged 7–10 years with grade III vesicoureteral reflux because the previously employed conservative and endoscopic treatment failed to achieve VUR correction. Under general anesthesia, cystoscopy was performed preoperatively to evaluate bladder abnormalities, such as periureteral diverticula, and to place a 4.8 Fr. or double "J" ureteral splint. Four ports were used to perform the operations. The average surgical time was 180 minutes.

Results. The surgery and postoperative course were uneventful. Seven days postoperatively, the patients were discharged. Voiding cystography performed 3–4 months after surgery demonstrated the absence of reflux.

Conclusions. In the preliminary assessment, extravescicular laparoscopic procedures can be performed without any intra- or postoperative complications. The presented results point to the effectiveness of the method.

reconstructive procedures, such as orchiopexy, nephrectomy, resection of the upper moiety of a duplex kidney, pyeloplasty, and reconstruction of the vagina. Vesicoureteral reflux (VUR) is a common clinical problem especially among children with recurrent urinary tract infections. Failure of conservative and endoscopic treatment modalities may be an indication for surgical treatment. The employed methods can be divided into those that require incision of abdominal integuments to access the bladder and ureter and those that are performed using videoscopic techniques. Originally, laparoscopic techniques for correcting VUR were developed in pigs, but are now used in humans [1–3]. The original clinical results were presented in the early nineties [4, 5, 6]. Nevertheless, even papers published after the year 2000 present reports describing small groups of surgical pediatric patients [7, 8]. Of the videoscopic techniques, great popularity is enjoyed by the surgical technique based on the method developed by Lich–Gregoir [9, 10]. Reports indicate high effectiveness of the method, comparable to that of open ureteral reimplantation [7, 11]. In view of the advantages of the laparoscopic approach, including a quicker recovery, shorter hospital stay, lower degree of pain, and better cosmetic results, the authors have attempted to introduce the above technique for VUR treatment in children. Now we report our initial experience and the procedures and results for laparoscopic correction of VUR in three cases using the Lich–Gregoir technique.

MATERIAL AND METHODS

The children had been referred to our department for febrile urinary tract infections and grade III vesico-ureteral reflux. Three female children, aged 7, 9, and 10 years, continued to manifest persistent VUR stage III after conservative treatment using anti-inflammatory and anticholinergic agents as well as alpha-1 blockers and two subureteric injections of cross-linked hyaluronic acid (Deflux, Vurdex). The decision was made to surgically correct the defect employing the extravescicular laparoscopic technique in the manner of the Lich–Gregoir method.

The first step is to prepare the patient for standard cystoscopy and a typical drape is used. Routine cystoscopy is performed to access the location of the ureteral orifices. The bladder is also assessed for other anomalies that would exclude extravescicular correction, such as ureteroceles, paraureteral diverticula, or ectopic ureters. Subsequently, a double "J" or ureteral catheter 4–5 Fr. is inserted. During laparoscopy, it facilitates the identification of the distal ureter in the pelvis. After cystoscopy, a bladder catheter of suitable size is inserted for hydrodistension and drainage during the procedure and in the postoperative period.

The patient is then placed in the supine and Trendelenburg position. The lower limbs are slightly abducted and small rolls are placed under each knee. The abdomen, pelvis and perineum are re-prepared and draped in a manner allowing perineal access. A 5-mm incision is then made in the inferior umbilical fold using the Hasson technique, a 5 or 10 trocar is placed, and pneumoperitoneum is created by CO₂ insufflation up to 12–14 mm Hg. A 5 or 10 mm laparoscope is then used to inspect the pelvic anatomy. In the Pfan-

INTRODUCTION

In pediatric urology, minimally invasive surgery is becoming increasingly more popular and is employed more and more often. Initially, minimally invasive surgery was used predominantly as a diagnostic tool. At present, a considerable number of operations are performed using the videoscopic technique. Recently, an increase has been noted in the number of reports on laparoscopic,



Fig. 1. Sites marked for umbilical and three working ports.



Fig. 2. Right ureter elevated on Babcock forceps.



Fig. 3. Detrusor muscle incised down to bladder mucosa.

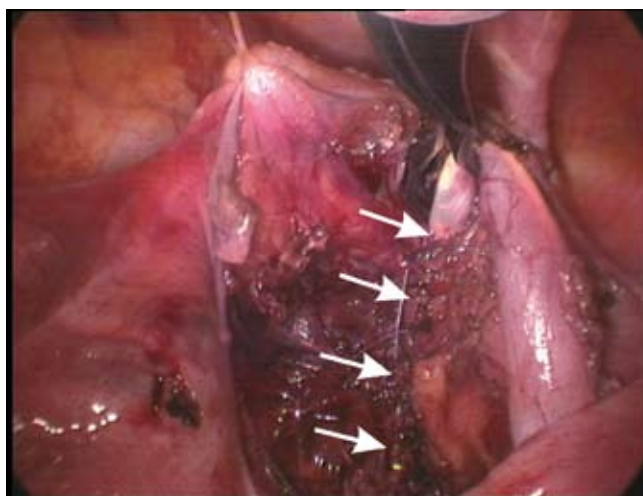


Fig. 4. View of completed right ureteral reimplantation.

nenstil line, the three working "Step" trocar ports are positioned under visual control: one in the middle and two laterally in the midclavicular line (Fig. 1). The port placed midline is 10 mm and the next one is 5 mm. Pneumoperitoneum pressure is then reduced to 8-10 mm Hg and the operation table is tilted head down to move the intestines out of the laparoscopic field. The operator stands on the side opposite to the ureter being operated on.

In our female patients, the distal segment of the ureter was situated between the broad ligament and the bladder base. The overlying peritoneum is incised and blunt dissection is performed. Subsequently, 10 mm Babcock forceps are used to capture and elevate the distal ureter (Fig. 2). The periureteral connective tissue is bluntly dissected away, especially around the UVJ. After bladder distension, the detrusor incision line is determined and marked by electrocautery along the posterior bladder wall. A percutaneous traction suture is placed just beyond the cephalad end of the detrusor incision line. This anchoring suture loop can be controlled externally to achieve the desired tension and elevation of the detrusor tunnel. Then, the bladder is partially filled with water and the detrusor muscle is incised using cautery and scissors without puncturing the bladder mucosa (Fig. 3). The tunnel extends from the UVJ cephalad in the direction of the traction suture. The length of the tunnel is about 4-5 cm. Inferiorly, the dissection proceeds around the ureter onto the lateral and medial aspects of the UVJ in the shape of an inverted "Y". Subsequently,

the ureter is placed in the new tunnel and the detrusor muscle is attached with interrupted absorbable sutures and intracorporeal knot tying. The first suture is placed over the ureter at the UVJ. Subsequent sutures are placed at approximately 5-7 mm intervals. We have to pay attention so that the last suture does not compress the ureteral neohiatus (Fig. 4). After closing the detrusor tunnel, the percutaneous anchoring suture is removed. Then the bladder is partially emptied and the position and direction of the ureter is checked. The peritoneum over the ureter is closed by simple sutures. Hemostasis can be assessed during desufflation of the peritoneum. Subsequently, the working ports are removed under visual control and the fascia is closed with a single absorbable suture. Finally, the umbilical fascial opening is closed using a 3-0 or 2-0 absorbable suture. The skin incision is closed with a subcuticular absorbable suture.

RESULTS

The operative time ranged from 120 to 180 minutes. We did not experience any blood loss and no transfusions were necessary. There was no conversion to open surgery. No intraoperative complications occurred. The mean hospital stay was 7 days (range 6-8). Postoperative pain was controlled for an average period of one to three days after the procedure. Postoperatively, all the patients were afebrile with intravenous cephalosporin administra-

tion. The bladder and ureteral catheter were retained for 5–6 days and removed 12 hours prior to the time of discharge from the hospital.

Cystography was performed 3–4 months after the procedure. Reflux had resolved in all three of the patients. Follow-up ranged from 6 to 9 months. All the patients were infection-free without antibiotics at the last follow-up.

DISCUSSION

The first clinical laparoscopic Lich-Gregoir anti-reflux procedures were described by Erlich and Janetschek [5, 6]. Okamura and Cartwright reported endoscopic trigonoplasty in 1995 and 1996, respectively. These procedures were done by creation of pneumovesicum, inserting a cystoscope through the urethra and placing two trocars in the lower abdomen directly into the bladder. This method was based on the same principles as for the open variant previously described by Gil-Vernet [12, 13]. The long-term success of this method was 47–74% [13, 14]. Gill, and more recently Yeung described a videoscopic cross-trigonal Cohen ureterocystoneostomy [14, 15]. In this technique, three ports are placed through the abdominal wall into the bladder.

The Lich-Gregoir anti-reflux open operation, which evolved in the 1960s, is the most popular of the extravesicular procedures and is frequently used in Europe, but has not gained wide acceptance among American urologists [16, 17]. The requirement to perform dissection in the retroperitoneal space in search of the ureter discouraged the use of this method. The postoperative morbidity of this method is low and the success rate is high. The bladder is not opened, the ureter is not transected, and there is no need to create a new UVJ. A wide dissection of the retrovesicular space may be the cause of destruction of pelvic plexus bundles, which leads to bladder dysfunction. Careful dissection close to the ureter avoids inadvertent injury to the pelvic plexus [18]. This ritual has proven to be well suited for the new, minimally invasive laparoscopic technique. The potential risk posed by open surgery can be significantly reduced by this method.

The first clinical experience with a small number of patients was presented in two reports in 1994 and 1995 [5, 6]. The first large group of children operated with this technique was presented by Lakshmanan and Fung in 2000, with emphasis on the key technical modification and a successful outcome [11]. The results are comparable to the open technique. In Polish reports, we found only one case of an adult patient who underwent a simple laparoscopic ureterovesical anastomosis following the resection of a stenosis at the distal part of the ureter without an anti-reflux mechanism [19].

Our preliminary short-term results are very good. We have had no intraoperative or postoperative complications and the patients returned to full physical activity in about 7 days. Reflux resolution was achieved in all three girls. We hope that long-term results in a larger series will be comparable to those obtained by open surgery, but without the disadvantages of the latter.

CONCLUSIONS

Laparoscopic surgery gives the patients the advantage of a faster recovery, decreases demand for analgesia, and allows for shorter hospitalization and earlier return to normal activity as well as the additional benefit of a better cosmetic result. This technique seems to be much less invasive than other modes of VUR repair because the bladder remains intact and the range of preparation is small. The disadvantages of this technique are the procedure time and the skills required for intracorporeal sewing and knot tying.

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