Laparoscopic treatment of vesicoureteral reflux in children

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ABSTRACT

Objective: To report the results of seventeen laparoscopic extravesical reimplantations and to determine their usefulness in the authors’ medical environment.

Methods: From February 2005 to February 2008 seventeen children with primary vesicoureteral reflux underwent laparoscopic extravesical reimplantation. Sixteen of those patients presented with unilateral reflux and one with bilateral reflux. Data collected were age, sex, affected side, vesicoureteral reflux grade, surgery duration, hospital stay, and complications. Control micturition urethrocystogram and excretory urography were carried out at third postoperative month. Data were statistically analyzed with central tendency method.

Results: A total of eighteen laparoscopic Lich–Gregoir reimplantations were performed on nine girls and eight boys with mean age of 8.9 years. Mean surgery duration was 132.5 minutes and there were no cases of urinary retention. One case was converted to open surgery; in another case the colon was scraped but not perforated. There was no obstruction and reflux was corrected in 100% of cases. Mean hospital stay was 3.7 days.

RESUMEN

Objetivo: Informar los resultados de 17 reimplantes extra-vesicales laparoscópicos y determinar su utilidad en nuestro medio.

Métodos: De febrero 2005 a febrero 2008, diecisiete niños con reflújo vesicoureteral primario fueron reimplantados extra-vesicalmente vía laparoscópica, dieciséis pacientes con reflújo unilateral y uno bilateral. Los datos colectados fueron: edad, sexo, lado afectado, grado del RVU, tiempo quirúrgico, estancia hospitalaria y complicaciones; se les realizó uretrocistograma miccional y urografía excretora de control al tercer mes postoperatorio. Los datos se analizaron con método estadístico de tendencia central.

Resultados: Un total de 18 reimplantes tipo Lich–Gregoir vía laparoscópica, edad promedio 8.9 años, nueve mujeres y ocho hombres. Tiempo quirúrgico promedio 132.5 minutos y en ningún caso se presentó retención urinaria. Un paciente se convirtió a cielo abierto y en otro se presentó despulimiento del colon sin perforación. No hubo obstrucción y el reflújo se corrigió en 100% de los casos. La estancia hospitalaria promedio fue de 3.7 días.
**Discussion:** Laparoscopic extravesical reimplantation is a safe and effective procedure for treating vesicoureteral reflux. Results were similar to those of open surgery although there was no repercussion in micturition function.

**Keywords:** Vesicoureteral reflux, laparoscopy, Lich – Gregoir reimplantation, Mexico.

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**INTRODUCTION**

Vesicoureteral reflux (VUR) is one of the most commonly treated urological abnormalities by urological surgeons and pediatricians. Rational treatment of these patients is related to early detection and understanding of disease natural history and pathological mechanisms involved, including those related to bladder dysfunction. When indicated, corrective reflux surgery is safe and effective.1,2

The objective of the operation is to create a functional hydraulic valve at the vesicoureteral junction (VUJ). This is achieved by mobilizing the ureter in order to reimplant it in a better muscular layer. Traditionally, intravesical and extravesical approaches have been used for reimplantation. 2,3 Lich-Gregoir extravesical approach preserves original orientation of ureteral meatus, facilitates its endoscopic manipulation, and avoids opening the entire thickness of the bladder wall, resulting in less bleeding and faster postoperative recovery. 4-6

On the other hand, extravesical reimplantation has been associated with temporal urinary retention, especially in very young male patients with a high degree of reflux or with bilateral pathology. 7,8

In theory the ureterotrigonal unit is not altered with laparoscopic extravesical approach since the bladder is moved very little, obliterated umbilical arteries are spared, and detrusorotomy is limited to each side of the ureter, finally resulting in lower postoperative urinary retention frequency.8-11

**METHODS**

A total of 198 patients were diagnosed with primary vesicoureteral reflux from February 2005 to February 2008. After signing informed consent forms 17 patients were treated with laparoscopic extravesical reimplantation. Nine of the patients were girls (52.95%) and 8 were boys (47.05%). Mean age was 8.9 years with a 4-15 year range. Twelve patients presented with left VUR (66.6%) and 6 with right VUR (33.3%). One of those patients presented with bilateral VUR making a total of 18 reimplantations. According to the international VUR classification, 10 patients presented with grade III reflux (55.5%), 6 with grade IV reflux (33.3%) and 2 with grade V reflux (11.1%) (Figure 1).

The demographic data collected was analyzed with central tendency test.

Four patients had past history of polydimethylsiloxane (Macroplastique®) subureteral application. The first patient had left grade V VUR that went down to grade III after the injection. The second had persistent grade III VUR despite two injections. The third had past history of left open Lich – Gregoir reimplantation and developed persistent grade III contralateral reflux after Macroplastique® application and the fourth patient had right grade IV VUR that went down to grade III after application. In the latter case Psoas – Hitch procedure was added to laparoscopic Lich – Gregoir procedure. Another patient with anorectal deformity and colostomy required adhesion lysis to free the ureter, prolonging surgery duration more time than usual.

The technique was carried out introducing a 5mm transumbilical optical trocar and two 5 mm working ports in right and left inferior quadrant, respectively, at the level of the umbilicus or a bit below it, depending on the age of the patient (Figure 2). After identifying the pelvic portion of the ureter it was indicated by a vessel loop to avoid tweezer manipulation. Deperitonealization was completed up to the vesicoureteral junction and over the bladder wall where the ureteral tract was marked over the detrusor with electrocautery. After filling the bladder, detrusorotomy was completed up to the mucosal herniation, maintaining its integrity and not going further than the lateral walls of the ureteral entrance (Figure 3). Detrusorrhaphy was carried out up to the vesicoureteral junction and over the bladder wall where the ureteral tract was projected, respecting the vas deferens in male patients.

The ureteral tract was marked over the detrusor with electrocautery. After filling the bladder, detrusorotomy was completed up to the mucosal herniation, maintaining its integrity and not going further than the lateral walls of the ureteral entrance (Figure 3). Detrusorrhaphy was carried out with two extracorporeal non-absorbable 2-0 silk or 2-0 polyester sutures (Figure 4). Transecturethral catheter was removed after 24 hours in all patients. Micturition urethrocystogram and excretory urography were carried out 3 months...
after surgery coinciding with prophylactic antibiotic suspension. Clinical follow-up with urinalysis was continued for at least 6 months (Figures 5 and 6).

■ RESULTS

A total of 18 reimplantations in 17 patients diagnosed with VUR were carried out. Mean surgery duration was 132.5 minutes with an 85-180 minute range. Mean hospital stay was 3.7 days with a 3-6 day range. Two patients presented with punctiform perforation of the mucosa that did not require repair since no urine leakage was observed at detrusorrhaphy completion. Transurethral catheter was removed 24 hours after procedure and no patient presented with posterior urinary retention. One patient underwent surgery conversion due to technical difficulties and another due to tear of the sigmoid colon seromuscular layer upon placement of the working port that was repaired with a precautionary suture with no further complications.

Vesicoureteral reflux (VUR) was resolved in all patients and all were asymptomatic at 6-month follow-up with no VUR in micturition urethrocystogram and no evidence of vesicoureteral stenosis in excretory urography.

■ DISCUSSION

Vesicoureteral reflux (VUR) represents one of the most significant risk factors for the development of acute pyelonephritis in infancy.12-15 Surgical correction indications depend on the presence or absence of renal scarring. The presence of renal scars with high and low grades of reflux is indication for early age surgical intervention. In the absence of renal scars it would only be indicated when there was high grade bilateral reflux.16
The extravesical modality has been shown to be a safe and effective method for reimplantation even in bilateral reflux. Limited dissection during ureteral mobilization, sensible use of electrocautery, and sparing of the ureteral hiatus are all factors that help avoid the development of postoperative urinary retention.  

Extravesical laparoscopic reimplantation reported for the first time in an animal model in 1993 did not alter the ureterotrigonal unit since detrusorotomy is limited to lateral walls of the ureter, obliterated umbilical arteries are spared, and the bladder is practically not moved. Extravesical laparoscopic reimplantation compared with reports on open extravesical reimplantation.

Gil-Vernet and Cohen intravesical approaches are other laparoscopic reimplantation alternatives with good rates of 50% and 80% respectively that are very different from those obtained with the same intravesical method, but as open surgery. In contrast, there is a 100% success rate for laparoscopic extravesical VUR treatment in the present series, the same as in other reports with a larger number of patients.

Finally, in those patients with unsuccessful subureteral injection treatment for VUR, dimethylpolysiloxane implant was not a ureteral dissection limitation during laparoscopic extravesical reimplantation.

BIBLIOGRAPHY
