Ureteroneocystostomy with laparoscopic psoas hitch as treatment for ureterovaginal fistula: a preliminary experience


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Abstract

Background: Numerous approaches have been described for the surgical repair of ureterovaginal fistulas, including the psoas hitch and Boari flap. With the continual refinement of laparoscopic techniques, reconstructive approaches have gone from being practically experimental, to becoming common practice.

Aims: We present herein our preliminary experience in ureteroneocystostomy with laparoscopic psoas hitch in referred patients presenting with ureterovaginal fistula.

Methods: Five cases of ureterovaginal fistula were retrospectively identified that were treated with Lich-Gregoir ureteral reimplantation and psoas hitch within the time frame of September 2010 to July 2012 at our institution. Indication for surgery was: ureterovaginal fistula with or without stricture in the distal third of the ureter.

Results: The 5 patients presented with fistula secondary to hysterectomy for benign disease. Mean age was 37.2 (range: 34-43) years. Percutaneous nephrostomy was placed in 2 patients prior to surgery and double-J catheter placement was achieved in 3 patients. The fistula involved the right ureter in 2 patients and the left ureter in 3. Mean stricture length was 1.9 (range: 1.4-2.2) cm, mean surgery duration was 174 (range: 160-180) min, and estimated blood loss was 130 (range: 50-200) mL.

Discussion: The first laparoscopic ureteral reimplantation was performed in 1994 by Erlich et al. in a pediatric patient. Also in 1994, Reddy and Evans published a report on the first ureteroneocystostomy in the adult population.

Conclusions: Laparoscopic ureteroneocystostomy is a safe procedure with the advantages of minimally invasive surgery: rapid recovery and short convalescence, with similar results to those of open surgery.

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Introduction

Laparoscopic urology covers a wide spectrum of urinary pathology management that extends from experimental techniques to procedures of proved effectiveness.\(^1\)

Ureteral procedures such as pyeloplasty, ureterolithotomy, and ureterostomy are now commonly performed and their effectiveness as minimally invasive techniques has been recognized.\(^2\) Various management options for ureteral strictures are well known; however, length, etiology, and location are the factors that determine the choice of a given technique.\(^3\) These same factors are also the ones taken into account when deciding on the adequate management technique for ureterovaginal fistulas.\(^4\) Ureteral damage is recognized as a complication of pelvic surgery, with a 0.3% to 2% incidence after gynecologic surgery.\(^4\) Approximately 70% of the patients with ureteral damage are identified in the immediate postoperative period, due to total incontinence. A small group representing 5% to 10% of patients are recognized in the late postoperative period due to pain secondary to hydronephrosis.

Open surgery has been the traditional option for managing this pathology. Ureteral reimplantation is regarded as the preferred treatment. Initial endoscopic management (double-J catheterization) should be attempted in all the patients, but even though double-J catheter placement is sometimes successful, it rarely resolves the problem.\(^5\) When this procedure fails and there is hydronephrosis, nephrostomy should be placed in order to salvage the renal unit.

We present herein our preliminary experience in performing ureteroneocystostomy with laparoscopic psoas hitch in referred patients presenting with ureterovaginal fistula.

Methods

Five cases of ureterovaginal fistula were retrospectively identified that were treated laparoscopically with Lich-Gregoir ureteral reimplantation and psoas hitch at our institution. Indication for surgery was ureterovaginal fistula with or without stricture in the distal third of the ureter.

All the procedures were performed by the same surgeon with experience in laparoscopic pelvic surgery.

A retrospective study was conducted that included a total of 5 patients diagnosed with ureterovaginal fistula that were seen within the time frame of September 2010 to July 2012. Four of the patients were referred between one and 7 weeks after hysterectomy. One patient had been diagnosed for 2 years. All of the patients had a history of open hysterectomy secondary to benign disease and had undergone previous unsuccessful endourologic procedures. A percutaneous nephrostomy was placed in 2 of the patients (after failed attempt at placing a double-J catheter) and double-J catheter placement was achieved in 3 of the patients presenting with severe hydronephrosis.
Preoperative evaluation included the studies available at our hospital: urine culture, excretory urography (EU), plain and contrast-enhanced abdominopelvic computed axial tomography (CAT) scan, kidney scintigram, cystogram, cystoscopy, ureteroscopy, retrograde pyelography (RPG), and in 2 cases, antegrade pyelography (AP).

All the fistulas had a partial or complete obliteration of the ureter. The length of the stricture was measured through RPG and the mean length was 1.9 (range: 1.4-2.2) cm (fig. 1).

Technique

Position of the patient and access: prior to the laparoscopic approach in the lithotomy position, diagnostic cystoscopy is carried out. Afterwards, the patient is placed in the supine decubitus forced Trendelenburg position and a Foley catheter is placed with the sterile technique before the procedure. The pneumoperitoneum is created through the Hasson method, and a 10 mm trocar for the 0° lens laparoscope is placed at the level of the umbilicus. Three more 5 mm ports are placed under direct vision, the lateral one at 2-3 cm from the anterior superior iliac crest and the third one at the middle of the imaginary line between the pubic symphysis and the umbilical trocar (fig. 2).

We work with only one assistant positioned at the left side of the patient. After freeing the adhesions in the abdominal cavity (present in all 5 cases), the dissection of the ureter is begun. It is freed from above the intersection of the iliac vessels to its entrance into the bladder. Ureteral dissection must be gentle so that no healthy tissue is devascularized. The ureter is dissected distally up to the point where it is surrounded by scar tissue. At that point it is sectioned and sent to the pathology department to rule out malignancy. The proximal end of the stricture is spatulated. The bladder is totally freed and a completely open space of Retzius is observed. This step provides sufficient bladder mobility; up to now, it has not been necessary to sacrifice any vascular pedicle in order to mobilize the bladder.

Ureteral reconstruction: the parameters evaluated for making the decision of which ureteral reconstruction technique to use are: 1) length of the ureteral stricture and 2) bladder capacity. We performed the psoas hitch and the Lich-Gregoir extravesical ureteroneocystostomy in the 5 cases. Once the bladder is freed, 2 lateral sutures are placed in the bladder dome (seromuscular layer) and the psoas muscle, lateral to the genitofemoral nerve. After resecting the segment of the ureter with the stricture and fibrosis, the distal end of the ureter is spatulated and anastomosed to the bladder with separate sutures using Monocryl® SH 3-0 (fig. 3).

The Lich-Gregoir extravesical reimplantation was the technique employed, first creating a tunnel in the seromuscular layer until the bladder mucosa is exposed. Bladder mucosa-ureteral mucosa sutures are placed and then detrusorrhaphy is carried out as an antireflux technique (fig. 4). A double-J catheter is placed in each of the patients and 150 cc of solution is instilled through a transurethral Foley catheter to check for leakage. The transurethral catheter was left in all the patients for 7-10 days after the operation. The double-J catheter was removed after 6 weeks. A kidney scintigram and/or excretory urogram were carried out 2 months after double-J catheter removal in order to demonstrate permeability. Follow-up was every 6 months for 2 years with kidney ultrasound, kidney scintigram or intravenous urogram, and micturition cystogram.

Results

The 5 patients presented with fistula secondary to hysterectomy carried out due to benign disease. All of them...
had adhesions in the abdominal cavity from the previous surgical procedures. Each of the fistulas had partial or complete obliteration of the ureter. The length of the stricture segment was measured through RPG and the mean length was 1.9 (range: 1.4-2.2) cm.

The preoperative results are shown in table 1. Mean age was 37.2 (range: 34-43) years. Percutaneous nephrostomy was placed in 2 patients prior to surgery (after failed attempt at placing a double-J catheter) (fig. 5); double-J catheter placement was achieved in 3 patients. The fistula involved the right ureter in 2 patients and the left ureter in 3. There were no major complications. The double-J catheter had to be readjusted 24 hours after surgery in one of the patients with the nephrostomy because it had stayed in the percutaneous tract. The intraoperative and immediate postoperative results are shown in table 2. Mean surgery duration was 174 (range: 160-180) minutes, the estimated blood loss was 130 (range: 50-200) mL, and mean hospital stay was 3.2 (range: 3-4) days. Mean follow-up for all the patients has been over 4 months. The drain was removed when output was under 40 cc and the mean time for beginning oral ingestion was 8 hours.

The double-J catheter was removed 6 weeks after surgery. Excretory urogram and/or kidney scintigram have not shown obstruction in the follow-up of all 5 patients carried out every 3 months. Micturition cystogram was initially done every 3 months. Only one patient showed grade II reflux.

Discussion

Fistulas and distal ureteral strictures are frequently caused during pelvic surgery, by complete transection and/or thermal damage and incidental ligature. The non-surgical causes of stricture include radiation, blunt trauma, infection, and retroperitoneal fibrosis. The repair of these lesions can vary, with a wide spectrum of situations in which knowing the length and location of the lesion is essential for treatment. Another factor to be taken into account is periureteral fibrosis. 3,6-7 Ureteral reimplantation in the adult is often performed due to pathologies that involve the distal third of the ureter: trauma, stricture, fistula. 8-11

When the distal segment of the lost ureter is not very long, reimplantation with psoas hitch or Boari flap can be

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Age*</th>
<th>Time of progression**</th>
<th>Length***</th>
<th>BMI****</th>
<th>Cause of hysterectomy</th>
<th>Catheter</th>
<th>Preoperative/ postoperative creatinine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
<td>14</td>
<td>1.4 cm</td>
<td>27.1</td>
<td>Ruptured ectopic pregnancy</td>
<td>Catheter</td>
<td>1.1/1.1</td>
</tr>
<tr>
<td>2</td>
<td>37</td>
<td>12</td>
<td>2 cm</td>
<td>30.9</td>
<td>Ruptured ectopic pregnancy</td>
<td>Nephrostomy</td>
<td>1.4/1.4</td>
</tr>
<tr>
<td>3</td>
<td>37</td>
<td>16</td>
<td>2.1 cm</td>
<td>28.6</td>
<td>Uterine myomatosis</td>
<td>Catheter</td>
<td>0.8/0.9</td>
</tr>
<tr>
<td>4</td>
<td>34</td>
<td>15</td>
<td>1.8 cm</td>
<td>31.2</td>
<td>Uterine myomatosis</td>
<td>Nephrostomy</td>
<td>1.3/0.9</td>
</tr>
<tr>
<td>5</td>
<td>43</td>
<td>2 años</td>
<td>2.2 cm</td>
<td>37.1</td>
<td>Myomatosis</td>
<td>Catheter</td>
<td>1.2/1.2</td>
</tr>
</tbody>
</table>

BMI: body mass index.
* Years. ** Months. *** Centimeters. ****Kg/m²
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performed. 12-14 The first laparoscopic ureteral reimplantation was carried out in 1994 by Erlich et al. in a pediatric patient. 12 Reddy and Evans published a report on the first ureteroneocystostomy in the adult population, also in 1994. 13 It is difficult to evaluate the length of the damaged segment (fibrotic or stenotic) in the acute event. The damage is not self-limited before a few weeks in the majority of cases. This is why we never operate on a patient until at least 10 weeks after hysterectomy.

As is known, laparoscopic surgery has the advantages of less pain, a rapid recovery, and a shorter convalescence. In our circumstance, it is important to mention that the magnified surgical field makes the procedure safer and possibly with better results in relation to open surgery.

The success rate of laparoscopic ureteroneocystostomy is from 92% to 98%. 5,8-14 Laparoscopic reconstructive surgery has the disadvantage of being very demanding and requires a long learning curve. Very few case series conducted in centers have been published, reporting on their experience with this procedure. The principal aim of a reimplantation is to achieve an antireflux anastomosis, with no medium- or long-term obstruction. The success of this procedure has been reported up to 100%. 1 We prefer to always use the psoas hitch technique in all patients to create a tension-free anastomosis; we do not perform much ureteral mobilization, resulting in less risk for devascularization. We did not carry out any Boari flap procedure in the present cases because the ureteral segments in all of them were relatively short (2.1 cm). The curve that the ureter makes upon entering the bladder is not modified with the emptying of the bladder.

An important aspect (as in any other reimplantation) is to conserve the 1:4 ratio, diameter: length of the submucosal tunnel.

In regard to age, the majority of the patients in this report were in the third and fourth decades of life. There is little information available about the effect of these treatments (open or laparoscopic) on the sex life of the patients.

We routinely use the double-J catheter during reimplantation. Some published case series omit double-J catheter placement, employing the criteria used for kidney transplant reimplantation, instead. 5 The spatulation of the ureter, the correct suturing of the bladder mucosa to the ureteral mucosa, and detrusorrhaphy are the cornerstones of the surgical technique. 15-17

Rassweiler et al. compared open and laparoscopic ureteroneocystostomy. 18 Their study compares the laparoscopic psoas hitch or Boari flap technique with the open technique. With the latter technique, 2 patients presented with urinoma. Stricture recurrence typically develops in the first postoperative year. Even though our follow-up period is short, we will carry out a re-evaluation after a longer period of time.

The use of robotic technology for complex urologic surgery has aided in overcoming many of the technical difficulties encountered during laparoscopy. In particular, thanks to three-dimensional vision and the EndoWrist® versatility of movement, intracorporeal suturing is no longer an obstacle for this procedure. Uberoi et al. published an article on the first robotic ureteroneocystostomy with psoas hitch, 19 and Casale et al. have published the largest case series of robotic-assisted extravesical ureteral reimplantation. 20

Conclusions

Ureteral damage occurs in 2% to 10% of routine pelvic operations and goes up to 30% in pelvic surgery carried out due to malignant processes, especially in the open procedures. 4 Laparoscopic ureteroneocystostomy is a safe procedure for the treatment of this pathology. It is reproducible and has the advantages of minimally invasive surgery: rapid recovery, short convalescence, and short hospital stay. Moreover, its results are comparable to those of open surgery.

Conflict of interest

The authors declare that there is no conflict of interest.

Financial disclosure

No financial support was received in relation to this article.

Figure 5 Coronal view of the plain CT urogram. The psoas hitch, double-J catheter, and nephrostomy can be seen.
Table 2  Intra and perioperative characteristics

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Procedure</th>
<th>Sx duration**</th>
<th>Blood loss**</th>
<th>Days of hospital stay</th>
<th>Oral ingestion***</th>
<th>Complications</th>
<th>Results</th>
<th>UCG</th>
<th>Pain Opiates</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Psoas Hitch/ extravesical reimplantation</td>
<td>160</td>
<td>50 cc</td>
<td>3</td>
<td>1</td>
<td>No</td>
<td>Nl</td>
<td>VUR II</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Psoas Hitch/ extravesical reimplantation</td>
<td>175</td>
<td>150 cc</td>
<td>3</td>
<td>1</td>
<td>No</td>
<td>Nl</td>
<td>Nl</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Psoas Hitch/ extravesical reimplantation</td>
<td>175</td>
<td>100 cc</td>
<td>3</td>
<td>1</td>
<td>No</td>
<td>Nl</td>
<td>Nl</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Psoas Hitch/ extravesical reimplantation</td>
<td>180</td>
<td>200 cc</td>
<td>3</td>
<td>1</td>
<td>Double-j catheter readjustment the day after surgery</td>
<td>Nl</td>
<td>Nl</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Psoas Hitch/ extravesical reimplantation</td>
<td>160</td>
<td>150 cc</td>
<td>4</td>
<td>2</td>
<td>No</td>
<td>Nl</td>
<td>Nl</td>
<td>No</td>
</tr>
</tbody>
</table>

* Minutes. ** mL. *** Days.

References

2. Gerspach JM, Schulam PG, Kavoussi L. Laparoscopy as applied to the upper urinary tract. AUA update series 2003;XVI.