Laparoscopic End-to-End Reanastomosis on the Distal Ureter

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Abstract
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Introduction
Injury to the ureter occurs in 0.1% to 1.5% of pelvic surgeries (Thomson, 1997; Saidi MH and al, 1996). Frequency is increasing as a result of greater number of complex endoscopic procedures with anatomical distortions being performed. Although it has to be underlined that studies reveal that most ureteral injuries occur during simple routine pelvic surgeries, such as an uncomplicated hysterectomy (Harkki-Siren P, 1998).

It has been recognized that only one third of ureteral injury are detected during surgery. Instead, intraoperative recognition of ureteral injury is of paramount importance so that the damage can be repaired promptly before impairment of the renal function. Thus is necessary for all pelvic surgeons to be skilled in identifying and, if necessary, in dissecting out the entire pelvic ureter. The best way to prevent ureteral injury during laparoscopic surgery is to be certain of its location at all times during the procedure. In difficult pelvic surgery, ureteral dissection almost always requires a retroperitoneal approach.

When there is doubt about the possibility of ureteral injury or when pelvic surgery is difficult, it is recommended to routinely perform cystoscopic examination. Ureteral obstruction or injury is suspected if no Indigo-carmine Dye, Methylen Blue Dye or urine effuses from the ureteral orifice. A 4-5 French sized whistle-tip ureteral catheter can be used to pass up the ureter in a retrograde fashion. It is crucial that urine is observed exiting the catheter and that the entire course of the ureter is observed laparoscopically. If resistance is met or if localization of the catheter is uncertain, a retrograde pyelogram should be performed by injecting contrast dye through the catheter. An x-ray is taken to determine the exact location of the obstruction. It has do be underlined that thermal injury to the ureter may be difficult to recognize intraoperatively.

Regardless of whether the injury is recognized intraoperatively or detected postoperatively, surgery for ureteral reconstruction should adhere to the following recommendations:

- Adequate debridement has to be obtained in presence of an otherwise healthy ureter
- Not too many sutures should be used
- Tension at the anastomotic site has to be avoided
- A complete hemostasis has to be obtained
- Indwelling ureteral catheter has to be inserted as well a retroperitoneal drainage

There are essentially three options for ureteral repair (Walsh PC, et al, 1998):
End-to-end reanastomosis

Ureteroneocystostomy, and

Transureteroureterostomy.

The end-to-end reanastomosis is usually recommended if the site of ureteral injury is above the midpelvis, and the extent of injury is not extensive. Injuries to the distal pelvic ureter are usually managed with other techniques given the technical difficulty and poor results obtained with open ureteroureteral anastomosis (Thompson JD, 1997; Smith AM, 1975). In these cases, continuity of the urinary tract can best be restored by performing a ureteroneocystostomy. To avoid tension on the anastomotic site, the bladder must be mobilized from the back of the pubis. An anterior cystotomy is performed and the ureter is brought through the wall of the bladder by means of a submucosal tunnel. An end-to-side mucosa-to-mucosa anastomosis between the end of the ureter and the side wall of the bladder is performed. A double-J catheter is inserted and a drain is placed retroperitoneally. If adequate mobilization of the bladder is difficult, a bladder hitch can be done by simply displacing the bladder upward and attaching it to the fascia of the iliopsoas muscle. Obviously, the upper segment of the ureter can be further mobilized to reduce the tension on the anastomotic site.

An advantage of laparoscopic ureteral surgery is that an end-to-end ureteral re-anastomosis can be performed, even in cases of injury of the distal ureter between the ureteric canal and the base of the bladder. A technique of laparoscopic ureteroureteral anastomosis in the distal ureter has been developed with good long term results.

**Operative Procedure**

Laparoscopic ports are placed using a five-puncture method. One 10- to 12-m trocar is placed at the umbilicus. Two 5 mm trocars are positioned approximately 8 cm above the pubic bone and lateral to deep epigastric vessels on each side of the abdomen. Two additional 5 mm trocars are placed higher, at the level of the umbilicus, lateral to the rectus muscle and approximately 7 to 8 cm lateral to midline on each side of the abdomen.

Video 1
(Download QuickTime here to view the videos.)
The proximal and distal ends are prepared by excising the damaged area or the lesion with sharp laparoscopic scissors (5 mm curved dissector with monopolar coagulation; Ethicon Endosurgery, Cincinnati, OH). The excision should be done 45 degrees to the length of the ureter.
A 5F whistle-tip ureteral catheter (bard Hospital Division, Murry Hill, N.J.) is introduced through the bladder during cystoscopy.

The catheter is placed in retrograde fashion across the injured area.
The ends of the ureter are approximated over the ureteral catheter with six simple interrupted sutures placed through the full thickness of the ureteral wall at 6, 12, 2, 4, 8, and 10 o’clock positions.
Complete hemostasis is achieved at the site of the anastomosis with microbipolar electrosurgery at 20 W. A Penrose drain is left in place at the anastomosis site. The ureter is reperitonealized with 3-0 polyglactin in a continuous running fashion.

The whistle-tip catheter is replaced with a double-J ureteral stent (Circon Surgitek, Racine, WI). The Penrose drain is removed in 24 hours or later, when minimal or no drainage is noted. The double-J stent is maintained in place for 6 weeks, and an intravenous pyelogram (IVP) is performed to document patency after it has been removed.

Testo Riga

Results

Between June 1993 and May 1998 four laparoscopic end-to-end reanastomosis were performed. Indications were ureteral injury resulting from other laparoscopic procedures or ureteral stricture secondary to endometriosis. All four cases of ureteral anastomosis were carried out with no complications. The postoperative course was uneventful and all the patients were discharged in 1 or 2 days. The long term follow-up shows good results.

Discussion

Nowadays, laparoscopic repair of ureteral injury is a reality (Nezhat C and Nezhat F, 1992). The level of injury or level of resection of the ureter was important in the past and usually prescribed the type of surgical repair to be performed. Injury farther down than the pelvic brim and especially in lower 4 to 5 cm made traditional open reanastomosis difficult and usually resulted in poor results (Walsh PC, 1998; Thompson JD, 1997; Smith AM, 1975). Technical difficulties preclude end-to-end reanastomosis in the distal ureter, but they have been overcome with laparoscopy. The laparoscope allows magnification of the of the injured site with better visualization of the anastomotic area. Moreover, the laparoscopic instruments allow an easier access to area in the deep pelvis that traditional instruments would have difficulties to reach.

It is mandatory that the damaged injured is extensively mobilized to guarantee tension-free anastomosis. To increase the anastomotic area, we prepare the ends in a 45-degree angle. This ensure an easier approximation of the cut edges and provides adequate anastomotic area to minimize problems with stenosis at the site. In fact, no stenosis has been detected in our patients. A good teaming with a colleague urologist is essential.

References:


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