Case Report of Bilateral Ureteric Injury And Its Management

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ABSTRACT

Injury to the ureter is a potentially devastating complication of modern surgery. The ureters are most often injured in gynecologic, colorectal, and vascular pelvic surgery. There is also potential for considerable ureteral injury during endoscopic procedures for ureteric pathology such as tumor or stones. We are presenting this case of bilateral ureteric injury in 50 years old female on account of its rarity and its successful management.

KEY WORDS :- *Ureteric Injury.*

INTRODUCTION

Iatrogenic trauma is the leading cause of ureteric injuries. The single factor adversely affecting the outcome of this rather uncommon injury seems to be delayed diagnosis. The frequency of ureteral injury following gynecologic surgery is approximately 1%, with a higher percentage of injuries occurring during abdominal hysterectomies and partial vaginectomies. Patients who have received pelvic radiation or who have advanced pelvic cancers requiring extensive surgical procedures are more likely to experience a ureteral injury. Laparoscopic procedures also have an equivalent rate of ureteral stricture formation secondary to ureteral injury, ureteral strictures is significantly higher.[1, 2]

Latrogenic ureteral injury during gynecologic surgery may present either intraoperatively or post operatively. In post operative period, ureteric injuries the patient may present with flank pain, prolonged ileus, fever, watery vaginal discharge, or elevated serum creatinine levels. In cases of bilateral ureteral injury, anuria is the first clinical sign.

Iatrogenic ureteric injury is a well-recognised complication of radical hysterectomy occurring in 5–30% of cases [3, 4]. Bilateral injuries are rare, being documented as isolated case reports but do present a considerable reconstructive challenge [5, 6].

In addition to the ureteric injury it must not be forgotten that pelvic surgery such as radical hysterectomy can affect lower urinary tract function, typically by injury to the pelvic nerves, resulting in a proportion of women experiencing long-term bladder dysfunction [7].

The 6 most common mechanisms of operative ureteral injury are as follows:

- Crushing from misapplication of a clamp
- Ligation with a suture
- Transsection (partial or complete)
- Angulation of the ureter with secondary obstruction
- Ischemia from ureteral stripping or electrocoagulation
- Resection of a segment of ureter

Any combination of these injuries may also occur.

Several predisposing factors have been identified in iatrogenic urologic injuries. These factors include uterus size larger than 12 weeks' gestation, ovarian cysts 4 cm or larger, endometriosis, pelvic inflammatory disease, prior intra-abdominal operation, radiation therapy, advanced state of malignancy, and anatomical anomalies of the urinary tract. Ureteral injuries can either be expected or unexpected, and they may be the result of carelessness or due to a technically challenging procedure.

The pathophysiology of ureteral injury depends on many factors, including the type of injury and when the injury is identified. Numerous consequences may occur after ureteral injury, including spontaneous resolution and healing of the injured ureter, hydronephrosis, ureteral

necrosis with urinary extravasation, ureteral stricture formation, and uraemia.

The relevant anatomy of the ureter is shown in the images below. Note the close proximity of the distal ureter to the uterine vessels. This is the site where injuries most commonly occur during gynecologic procedures. The next most commonly injured area is at the pelvic brim, in the area of the infundibulopelvic ligament.

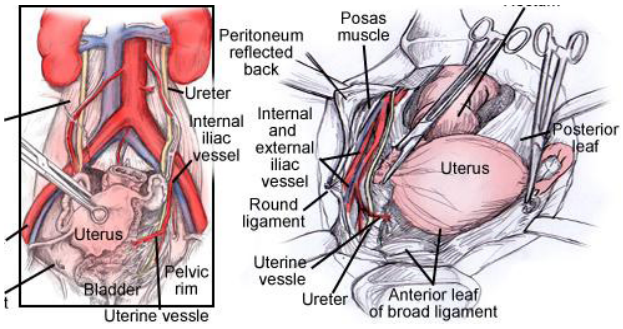

Figure 1
Relevant anatomy of the ureter, illustrating its course from the renal pelvis to the bladder.

In this case patient presented with acute lower abdominal pain after hysterectomy for cervical fibroid with right uretric ligation and left ureteric transaction managed by relieving of right sided obstruction and left sided ureteric reimplantation in bladder.

CASE REPORT

A 50 years old female brought to Casualty of Sassoon General Hospital, Pune with chief compaints of pain in abdomen and anuria since 4 hours before coming to hospital with recent history of gynaecological operation 4hours before at Shirur PHC, Pune for Uterine Fibroid.

On examination-Patient was conscious oriented, has average build and nutrition with severe pallor, pulse was 110/min, BP was 90/60mm of Hg, Spo2 was 98%, CVP was 3cm, on per abdominal examination, soft abdomen with, tenderness, guarding and rigidity in lower abdomen with suprapubic pfannesteil incision scar of around 8cm. PR and PV examination was normal. On x-ray abdomen erect there was no gas under diaphragm, no air fluid levels, on usg there was mild free fluid in abdomen with right sided mild Hydronephrosis with hydroureter, on CT urography, right sided mild hydronephrosis with hydroureter with dye leaking through left ureter in abdominal cavity, uterus was not visualised on CT scan.

MANAGEMENT

We took midline exploratory laparotomy incision under General anaesthesia, above original incision (look like inverted T shaped on closure), minimal serousanguinous collection (approx 100ml) drained, bowel inspected and retracted to expose pelvis, ureters inspected. Right ureter was ligated with uterine artery by cotton tie and left ureter was completely transected flushing the bldder. Right ureter with uterine artery is clamped, tie cut, uterine artery ligated separately, and ureter is removed from tie, on inspection right ureter was normal with no breach in continuity, ureterotomy with DJ stenting done on rt side. On left side, ureteral margins are freshened and bevelled for proper anaestomosis with bladder. We took care that at least 5 cm of ureter is skeletonised so that it can reimplantated on posterior aspect of bladder. DJ stenting done. Patency checked by visualising urine and methylene blue dye in Ureine Bag. Bilteral abdominal drain was kept. Drains removed after post operative day 10, when output was less than 30cc. Foleys kept for 21 days, then CT urography done to check patency of ureters which was normal, Bilateral DJ stents were removed after 6 weeks, as it is estimated that all ureteral healing has occurred by that time.[8]

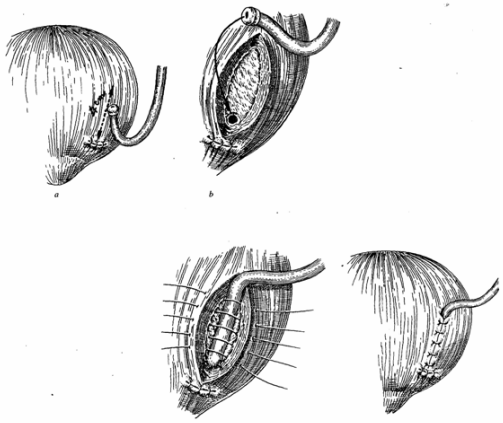

Figure 2
Ureteric Reimplantation into bladder with creating submucosal tunnel.

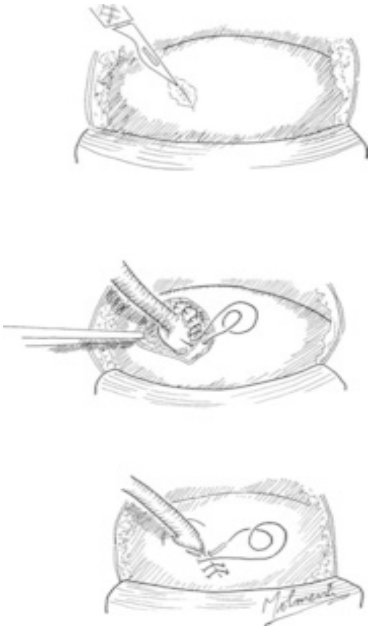

Figure 3
Ureteric reimplantation procedure.

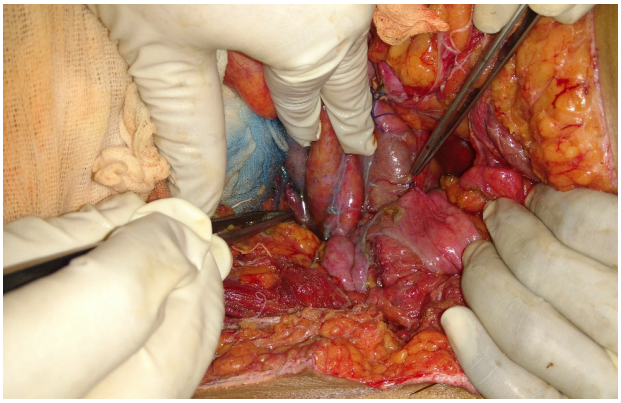

Figure 4
Intraoperative view after right sided ligation and left sided ureteric reimplantation.

DISCUSSION

Intraoperative consultation with a urologist must be obtained when the injury is recognized immediately; these patients are best treated with primary ureteral repair during the same operation.

Distal ureteral injuries are best managed with ureteroneocystostomy with or without a vesico-psoas hitch. Mid-ureteral and proximal ureteral injuries can potentially be managed with ureteroureterostomy. If the distal segment is unsuitable for anastomosis then a number of techniques are available for repair including a Boari tubularized bladder flap, transureteroureterostomy, or renal autotransplantation. In rare cases renal autotransplantation or ureteral substitution with gastrointestinal segments may be warranted to re-establish urinary tract continuity. Laparoscopic and minimally invasive techniques have been employed to remedy iatrogenic ureteral injuries.

A systematic review of 37 studies by Adelman et al found that laparoscopic hysterectomy had an overall urinary tract injury rate of 0.73% and a ureteral injury rate that ranged from 0.2% to 0.4%, depending on procedure type. These investigators concluded that contrary to earlier published findings citing unacceptably high urinary tract injury rates, laparoscopic hysterectomy was a safe procedure in terms of the bladder and ureter.[9]

If the ureteral injury occurred above the pelvic brim, the simplest reconstruction is a ureteroureterostomy, a procedure that is indicated for injuries to short segments of the ureter (ie, <2 cm), in which an anastomosis is performed between the 2 cut edges of the ureter.[10]

If ureteroureterostomy cannot be performed technically and the defect is too proximal in the ureter for ureteroneocystostomy, transureteroureterostomy may be performed.[10]

The literature also demonstrates the long-term efficacy of transureteroureterostomy. Hodges et al reported that, among 100 patients accrued over a 25-year period who had been treated with transureteroureterostomy for various conditions, including ureteral stricture and intraoperative ureteral injury, 77 patients had no complications postoperatively. Of the 23 patients with complications, 5 patients had acute pyelonephritis, 3 patients had tumor blockage at the anastomotic site, 2 patients had IMA syndrome, and 2 patients had subsequent reflux of the normal ureter. In this study, 97% of patients had normal bilateral kidneys after a follow-up period of 1-23 years.[11]

In a 1997 study by Mathews et al, the psoas hitch reimplantation was shown to be a successful technique for reestablishing ureteral continuity after distal ureteral injury. In their study of 20 patients who underwent psoas hitch reimplantation for various conditions, 13 patients had iatrogenic injuries during surgery, and 17 patients (85%) required no further intervention for urologic problems and retained normal renal

function after an average follow-up period of 6 years (range: 1-14 years). The authors conclude that psoas hitch reimplantation is an excellent treatment option for distal ureteral injuries.[12]

In 1975, Konigsberg et al reported on a series of patients; 15 of 21 patients studied had fair or excellent results for an average of 27 months after Boari flap reconstruction. Of the patients who had poor results, 2 patients had previous pelvic radiation, 2 patients had bladder carcinoma that recurred in the flap, and 2 patients had a flap that was not fixed to the psoas muscle. [13] With the benefit of modern indications for the use of Boari flaps, fewer poor results have occurred, although increased risk exists for bladder necrosis, given the dissection needed to create the flap. As a result of this risk and other technical considerations, many urologists opt for the psoas hitch reimplant as their first choice in ureteral reconstruction after a distal ureteral injury.

The rapid adoption of laparoscopic and robotic techniques over the past 2 decades by urologists and other surgical specialists, along with the increased use of ureteroscopy, has increased the risk of ureteral injury, and the need for new preventive techniques.[14, 15] However, in a study of 459 consecutive robotic gynecologic surgery cases, Jones et al reported that conversion to open surgery because of ureteral injury was required in only one case.[16]

Robotic techniques also have the potential for use in repair of ureteral injury. In a review of 43 cases of robot-assisted repair of injuries to the ureter or bladder that occurred during obstetrical and gynecological surgical procedures, Gellhaus et al concluded that robotic repair is associated with good outcomes, appears safe and feasible, and can be used immediately after injury recognition or as a salvage procedure after prior attempted repair.[17]

A review of 208 uterosacral ligament suspension procedures by Barbier et al found that ureteral compromises occurred in six of the 60 patients in whom a vaginal approach was used, but in none of the 148 patients in whom a laparoscopic approach was used.

Conventional management of ureteric injury presenting in the postoperative period has been by open surgery, particularly when faced with ureterovaginal fistula. [18] With more recent developments in endourological techniques and equipment, the use of ureteric stenting as a primary manoeuvre is amassing an increasing volume of supportive evidence. Support for the use of ureteric stents is provided by Selzman and Spirnak, who reviewed the management of ureterovaginal fistulas treated at their institution over 20-year period [19]. Seven patients whose stents were successfully placed and left in situ for a long enough time period to allow fistula closure all showed complete healing. One patient developed a stricture that required further endourological intervention. Giberti et al. also produced excellent early results from the successful stenting of ureteric injuries, however, three of their cases went on to have open reconstruction [20]. The use of ureteroscopy in assisting stent placement has been shown to be successful even in the face of previously failed attempts [21]. In a series of patients with 10 injured ureters, Tsai et al. report the combined use of a ureteroscope and a fluoroscopically guided antegrade snare to place a ureteric stent.[22] In this study, six required no further intervention, and three required balloon dilatation for subsequent stricture formation. In one case (10%) balloon dilation was unsuccessful and open ureteric reimplantation was required.

Numerous consequences may occur after ureteral injury are follows,

1) Spontaneous resolution and healing :- If the injury to the ureter is minor, easily reversible, and noticed immediately, the ureter may heal completely and without consequence. Inadvertent ligation of the ureter is an example of such an injury. If this injury is noticed in a timely fashion, the suture can be cut off the ureter without significant injury.

2) Hydronephrosis :- If complete ligation of the ureter occurs, the urine from the ipsilateral kidney is prevented from draining into the bladder, leading to hydronephrosis and progressive deterioration of ipsilateral renal function. These events may occur with or without symptoms. If the urine in this obstructed system becomes infected, the patient will almost certainly become septic with pyonephrosis.

3) Ureteral necrosis with urinary extravasation :- In complete unrecognized ligation of the ureter, a section of the ureteral wall necroses because of pressure-induced ischemia. The ischemic segment of the ureter eventually weakens, leading to urinary extravasation into the periureteral tissues. If the urinary extravasation drains into the adjacent peritoneum, urinary ascites may develop. If the urinary ascites is infected, peritonitis may ensue. If the peritoneum has remained closed, a urinoma may form in the retroperitoneum.

4)Ureteral stricture :- Ureteral stricture may occur when the adventitial layer of the ureter is stripped or electrocoagulated. When the adventitia, the outer layer of the ureter that contains the ureteral blood supply, is disturbed by either stripping or electrocoagulation, ischemia to a particular segment of ureter may result. Ischemic strictures of the ureter may then develop, leading to obstruction and hydronephrosis of the ipsilateral kidney.

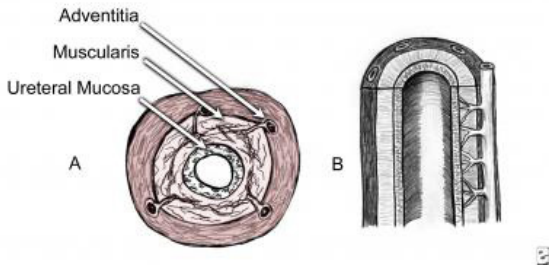

Figure 5

An illustration of the blood supply to the ureter running within the adventitial layer.

5) Uremia :- Uremia results when ureteral injury causes total urinary obstruction. This may result from bilateral ureteral injury or from a unilateral injury occurring in a solitarily functioning kidney. Anuria is the only immediate sign of imminent uremia. These cases require immediate intervention to preserve renal function.

The indications for evaluation of ureteral injury following gynecologic procedures include loin or costovertebral angle tenderness, unexplained fever, persistent abdominal distention, unexplained hematuria, escape of watery fluid through the vagina, appearance of lower abdominal or pelvic mass, and oliguria or elevated serum creatinine levels.

Relative contraindications for immediate operative repair include sepsis, hemodynamic instability, and coagulopathy.

CONCLUSION

Ureteral injury is one of the most serious complications of gynecologic surgery. Less common than injuries to the bladder or rectum, ureteral injuries are far more serious and troublesome and are often associated with significant morbidity, the formation of ureterovaginal fistulas, and the potential loss of kidney function, especially when recognized postoperatively. For these reasons, injuries to the urinary tract, particularly the ureter, are the most common cause for legal action against gynecologic surgeons.

Despite the close anatomical association between the female reproductive organs and the ureter, injury to the ureter is relatively uncommon. Nevertheless, when a ureteral injury does occur, quick recognition of the problem and a working knowledge of its location and treatment are essential in providing patients with optimal medical care. The purpose of this article is to elucidate how and why ureteral injuries occur and to review their surgical management.

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