

Iatrogenic ureteric injuries

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Summary

Damage to the lower ureters during pelvic surgery is a serious and well-recognised complication. This iatrogenic injury, when undetected intra-operatively, continues to give rise to significant patient morbidity. In 1987, this Department was referred 18 cases of iatrogenic ureteric injuries. 16 patients were from gynaecologic surgery and 2 patients were from general surgery. Only 4 cases (24%) were detected and referred intra-operatively. 13 patients presented post-operatively with various symptoms viz., anuria, loin pain and urinary leak per vagina. Good recovery of urinary function was achieved in all cases after urological intervention, usually by ureteric re-implantation.

Key words: Ureter, injury, iatrogenic, hysterectomy, re-implantation.

INTRODUCTION

Gynaecologic surgery is the commonest cause of ureteric injury. The lower ureter lies in close proximity (1-2 cm) to the cervix and the lateral fornix of the vagina as it curves anteriorly to the bladder, at about 2 cm from the uretero-vesical junction. It is usually here that it is vulnerable to injury, although this is by no means the only site of injury. This report which documents a one-year experience in this department of Urology is followed by a brief review of the subject.

MATERIALS AND METHODS

Records of all cases of ureteric injuries referred to this Department in 1987 were traced from the ward admission books and reviewed retrospectively. Patients associated with metastatic malignancy (4 cases) were excluded.

RESULTS

There were 18 patients, 17 female and 1 male. The average age of the patients was 44 years with an age range of 34 to 67 years. Analysis of the patient characteristics are shown in the following Tables (I to VIII).

Table I
Surgeons who carried out operations causing injury

Gynaecologists	(consultant, of same hospital)	:	12
Gynaecologist	(registrar, of same hospital)	:	1
Gynaecologists	(consultant, of private hospitals)	:	3
General surgeons	(consultant, of same hospital)	:	2
Total number of patients			: 18

Table II
Types of operation causing ureteric injury

Total abdominal hysterectomy	:	14
Vaginal hysterectomy	:	1
Laporotomy for post-D&C bleeding	:	1
Retroperitoneal tumour excision	:	2
Total number of patients	:	18

Table III
Incidence of ureteric injuries at hysterectomy

Ureteric injuries from hysterectomy (General Hospital, K.L.)	:	12
Total number of hysterectomies at same hospital in 1987	:	210
Incidence of ureteric injuries at hysterectomy	:	5.7%

Table IV
Pathology for which operations were performed

Uterine fibroid	:	8
Endometriosis	:	1
“Unremarkable” T.A.H.B.S.O. specimen, no pathology	:	1
Molar pregnancy	:	1
Dysfunctional uterine bleeding	:	3
Uterine prolapse	:	1
Repair of uterine perforation	:	1
Retroperitoneal tumour (leiomyoma, haemangiopericytoma)	:	2
Total number of patients	:	18

Table V
Presentation of ureteric injury

Intra-operative detection	:	4
Continuous urinary leak per vagina,		
early (within 1 week)	:	3
delayed	:	7
Loin pain	:	3
Immediate post-operative anuria (the only patient with bilateral ureteric injury)	:	1
Total number of patients	:	18

Table VI
Waiting time from 1st appearance of symptoms till referral to urologist

Presentation	Waiting Time	No. of Patients
Intra-operative detection	0	4
Immediate post-op anuria	1 day	1
Loin pain	20 days	3
Urinary leak	28 days	10
Total number of patients		18

Table VII
Waiting time from referral to urologist till definitive surgery

Presentation	Waiting Time	No. of Patients
Intra-operative detection	0	4
Immediate post-op anuria	1 day	1
Loin pain	7 days	2
Loin pain, with nephrostomy	7 months	1
Urinary leak	25 days	10
Total number of patients		18

Table VIII
Management of ureteric injury

Primary ureteric re-anastomosis (ipsilateral)	:	3
Re-implantation of ureter,		
intravesical, submucosal, Politano-Leadbetter technique	:	3
intravesical, submucosal, Baori flap	:	1
extravesical, submucosal, Barry (4) technique	:	7
extravesical, submucosal, with psoas hitch	:	3
extravesical, direct	:	1
Total number of patients	:	18

Investigations

The majority of patients referred post-operatively had an IVU (intravenous urogram) and cystoscopy with methylene blue instillation intravesically to rule out an associated vesico-vaginal fistula.^{1,2} Cystoscopy with bilateral retrograde ureterogram under fluoroscopy was done in all cases to confirm ureteric injury and this was the only investigation done for the patient with anuria. In the other 17 patients with unilateral injuries, 7 were of the right and 10 were of the left ureter. All patients with an IVU done had features of obstruction on the affected ureter. However, extravasation on IVU was demonstrated only in 2 of the 10 patients with urinary leak. Indeed about 5% of ureteric injuries may have a normal IVU.^{1,3} Photographs 1 to 5 are some of the radiocontrast studies done for this series of patients.

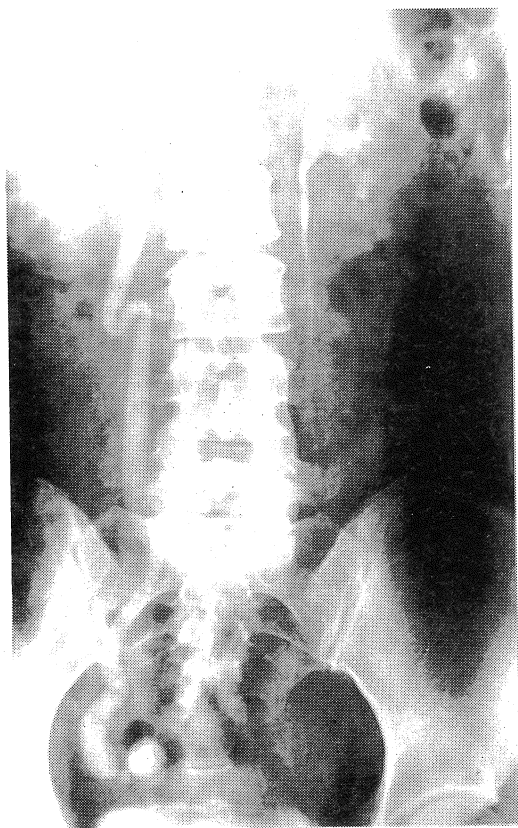


Figure 1:
IVU showing dilatation of the right system above site of ureteric injury in the pelvis. Radiocontrast is seen leaking medially. The left is normal



Fig. 2 Right retrograde ureterogram showing a tight stricture at the site of injury near vesico-ureteric junction but with passage of some radiocontrast up a grossly dilated ureter.

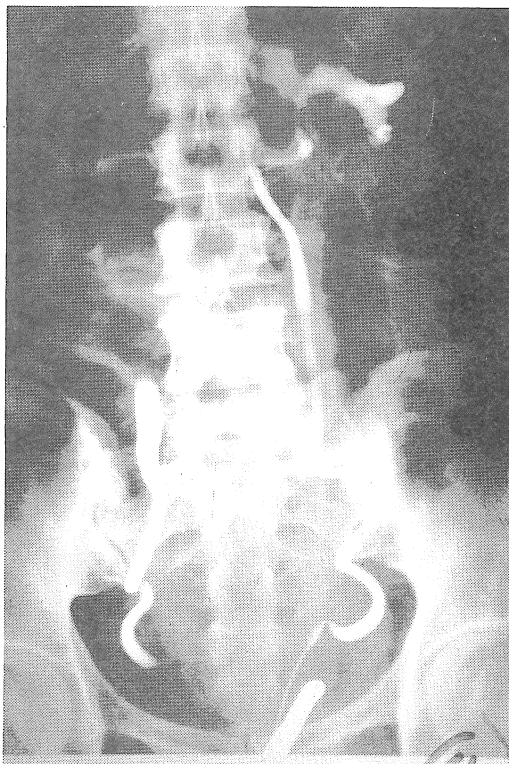


Fig. 3 Bilateral retrograde ureterogram showing almost complete ureteric occlusion which was the cause of immediate postoperative anuria.

Surgical technique:

In 2 cases of intra-operative referral, the ureter was cleanly transected at the pelvic brim. Spatulated end-to-end uretero-ureterostomy was performed with ease over a double-J ureteric stent. No attempt was made to treat any post-operative case with simple stenting except in 1 case where there was a minor leak from an uretero-ureterostomy repair performed by a gynaecologist. The leak stopped after cystoscopic double-J ureteric stenting and the stent was removed after 2 weeks.

Ureteric re-implantation was usually via the previous incision or a lower midline abdominal incision. The peritoneum was opened to help exposure of the ureter as there was often a lot of fibrosis around the site of injury. The ureter was traced from the bifurcation of the iliac vessels downwards and it usually disappeared into a mass of fibrosis. It is difficult to determine the exact nature of the injury, whether it was a transaction, ligation or devascularisation. The bladder was then distended with 200 mls of saline via an urethral catheter. The bladder was then mobilised and the ureter re-implanted with one of the techniques listed in Table VIII. The ureteroneocystostomy was usually not stented. A Penrose drain was used to drain the perivesical space and was usually removed within 48 hours. The bladder was drained for 7 days. Perioperative antibiotics (usually netilmicin, an aminoglycoside) was given for 5 days. The average hospitalisation period was 10 days.

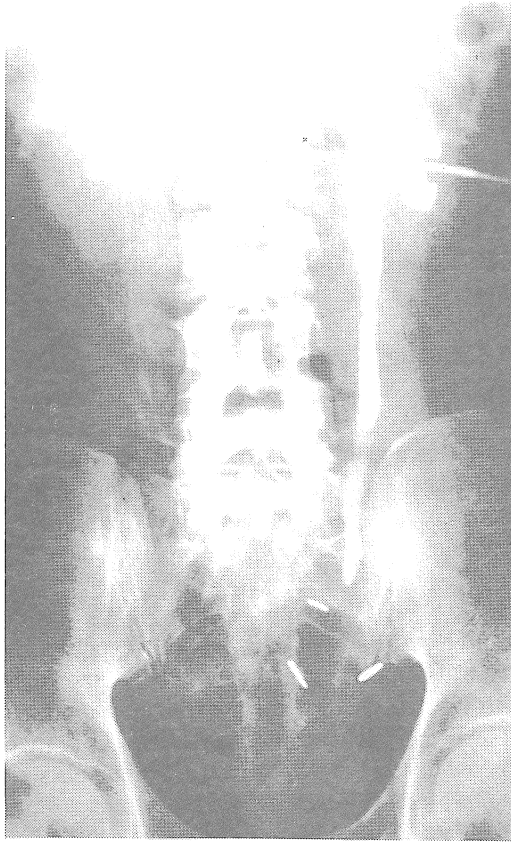


Fig. 4 Left antegrade pyelogram to demonstrate patency of upper ureter as retrograde studies done earlier showed a complete stricture.

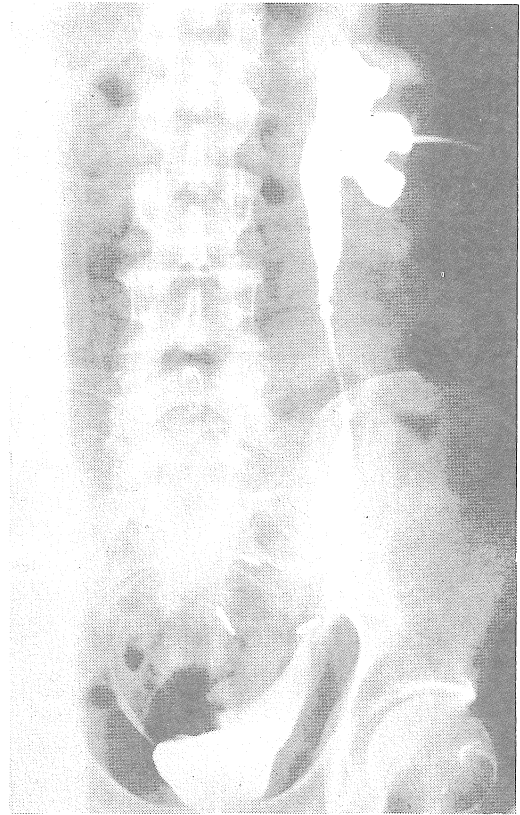


Fig. 5 Same patient as in Photo 4, antegrade pyelogram after ureteric re-implantation with psoas hitch. Free flow of radiocontrast into bladder.

Follow-up:

One patient was completely lost from follow-up upon discharge from the ward. All other 17 patients had been followed up for a mean duration of 16 months with a range of 13 to 21 months. Patients were discharged to the referring doctor at about 1 1/2 years and told to report back only if there are any symptoms. All patients had uneventful post-operative recoveries with 11 cases operated by the first author. All 17 patients had 1 post-operative IVU at 3 to 6 months. One patient had a second IVU at 20 months because of vague pains but the IVU was normal. All 17 patients had functioning kidneys with no obstruction at the site of repair. Residual hydronephrosis persisted in 3 patients who had presented pre-operatively with hydronephrosis (loin pain). As of January 1991, none of the 18 patients had reported any complications.

DISCUSSION

Pelvic surgical procedures account for the majority of iatrogenic ureteric injuries. In 1976, Symmonds reported that 80-90% of ureterovaginal fistulae were secondary to gynaecological operations and 70-75% of these were related to a single operation – total abdominal hysterectomy⁵. The incidence of ureteral fistulae after radical hysterectomy range from 0.9% to 11.4%.⁶ Green had earlier reported 78 ureteral complications in 623 patients (12.5%)⁷. Symmonds, in reviewing various reports, had found

the reported incidence to vary between 0.48 to 2.5% for gynaecologic operations of benign conditions. Zinman⁸ stated that the reported incidence of operative ureteral trauma continued to increase. He felt that this may be attributed in part to the increased numbers and types of surgical procedures being performed. Significant ureteric injuries can also occur from endo-urological and vascular procedures but this was not encountered during the period of this study.

Symmonds further reported that 10 out of 18 ureteral injuries (almost 56%) were "silent" ligations. Silent ureteric injury occurs because of adequate contralateral renal function and silent atrophy of the affected side. Progressive hydronephrosis and renal deterioration can also occur in the relative absence of symptoms. It is commonly assumed that more ureteric injuries occur in the complicated, irradiated case associated with malignancy. In the present series there was no record of any significant operative difficulty in any of the cases; it was often claimed to be a "straightforward" hysterectomy. Indeed one hysterectomy specimen was reported to have no pathology.

Urinary leak is the most common postoperative presentation and this may be early or delayed. Early urinary fistula occurs from direct ureteric transection. In the devascularisation type of injury, urinary leak is delayed for several days or weeks until the ureteric wall breaks down. Ureteric injury may be "silent" only for a period of time and the patient presents later with an abdominal mass (hydronephrotic kidney), sepsis or hypertension.

Obviously, the best time to repair any injury is at the time of the original surgery. However, injuries are often not detected at the time of the operation. There also appears to be undue delay of reparative surgery. Healthy suspicion is important so as not to dismiss post-hysterectomy loin pain or any "colourless fluid" (urine) as vaginal discharge. The delay may also be related to the accessibility of the doctor to the patient. In London, Badenoch reported in 1987 that 46% of the 59 patients were referred after a delay of greater than 6 weeks⁹. The anuric case was treated as an emergency. Those with hydronephrosis were operated as soon as possible. One patient in this series had a nephrostomy for 7 months to allow him to complete adjuvant radiotherapy and chemotherapy. Patients with urinary leak were given incontinence pads while waiting for an early operative date. It has been clearly shown that there is no justification for a delay of 4 – 6 weeks as a deliberate measure to allow any ischaemic tissue to re-vascularise or to be less friable^{9,10}. With early treatment, the patient does not have the prolonged misery of waiting at home with an urinary fistula, a time which is apt to generate bitterness, embarrassment to the surgeon and thoughts of medicolegal action. Most iatrogenic ureteric injuries probably do not amount to medical negligence but this may not be viewed as such by others.¹¹

The most decisive factor influencing the choice of surgical options is the level and length of ureteric injury. Surgical options include ureteric stenting, ipsilateral ureteroureterostomy, transureteroureterostomy¹², ureteric re-implantation with or without psoas hitch¹³ and Boari flap¹⁴ omento-skin-patch ureteroplast,¹⁵ ileal interposition,⁸ renal auto-transplantation¹⁶ and nephrectomy. Nephrectomy is the last resort and when the contralateral kidney has been proven to be normal.

Routine use of preoperative IVU for patients who undergo potentially curative resection of pelvic pathology does not appear to reduce the incidence of urologic complications.¹⁷ However, if urinary tract involvement by pelvic disease is suspected, this should be documented by a preoperative IVU. If a difficult surgical procedure is anticipated, it is wise to have an ureteric catheter in place so that the surgeon can easily identify the ureter if it is injured. However, preoperative stenting does not prevent injury to the ureter.¹⁸ The stent itself may not be easily felt intraoperatively especially if there is adjacent fibrosis or tumour. Therefore, stenting does not preclude the need to identify the ureter. It must not be forgotten that ureteric stenting itself is associated with complications including ureteric damage.

The traditional means of avoiding injury to the ureter is to "stay clear" of it, without actually identifying it. However, it is basic surgical principle that important contiguous structures subjected to possible injury must be dissected and identified eg the recurrent laryngeal nerve in thyroid surgery. The ureter can usually be identified at the pelvic brim as it crosses the iliac vessels and its course can be followed from there. Blind clamping and suturing near the ureter is hazardous. On the other hand to limit the margin of resection (for fear of the ureter) in tumour surgery is a grave error as the postoperative complication will be recurrence of tumour.

CONCLUSION

Ureteric injury during pelvic surgery is a continuing problem. The commonest procedure causing such an injury is abdominal hysterectomy. Such injuries, if not detected intra-operatively, cause significant morbidity to the patient. The best way of avoiding injury to the ureter is to routinely identify the course of the ureter visually throughout the operative field. When the ureter is damaged, it should be repaired as soon as possible and this can be done with excellent results.

Ureteric re-implantation is the reparative procedure most often performed as the injury is usually deep in the pelvis near the bladder.

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