

Iatrogenic Ureteric Injuries – Our Experience at a Tertiary Care Centre

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Abstract: *The main aim of the study was to review the causes, the clinical presentation, the type of ureteric injuries, the investigative modalities employed and the treatment of iatrogenic ureteric injury, from January 2006 to December 2014 in department of Urology, Sher-I-Kashmir Institute of Medical Sciences (SKIIMS). In this period thirty two patients with thirty three injuries were identified. Gynaecological surgeries accounted for 80.6% of the injuries. Of these, abdominal hysterectomy accounted for 54.6% of total injuries. Right sided injuries (66.3%) were commoner than left sided injuries (30.2%). Of the injuries 79.9% occurred in the lower third, 15.9% in the middle third and 6.1% in the upper third of the ureter, respectively. One of our patients had bilateral ureteric injuries. Preoperative placement of ureteric catheter can help in prompt diagnosis of ureteric injury in patients at high risk for the same. The definitive management for ureteric injuries is surgical intervention.. Only if the patients are not fit for surgery, should percutaneous nephrostomy be done in the interim period.*

Keywords: Post hysterectomy, Ureteric injury, Psoas Hitch, Stenting, Ureterostomy, Ureter, Boari's Flap.

1. Introduction

Ureteral injuries resulted from external trauma are not common. The ureter is finely protected in the retroperitoneum by the psoas muscle, vertebrae and bony pelvis. Damage to the ureter often occurs due to a significant traumatic event that is almost always associated with injury to other abdominal structures. While injuries to the ureter can result from external trauma, iatrogenic causes are more common. Of iatrogenic causes, gynaecological surgery is the most common cause. Definitive management depends on the site of the injury. Upper ureteric injuries can be repaired by either uretero-ureterostomy or release of angulation. Mid ureteric injuries are repaired by uretero-ureterostomy or Boari's flap. Lower ureteric injuries are repaired by Boari's flap or by ureteric re-implantation. DJ stenting is performed at time of surgery and the stent is removed after a period of 4-6 weeks.

2. Material & Methods

We retrospectively evaluated the results of 32 patients (33 injuries) with iatrogenic ureteric injuries treated in our department between January 2006 and December 2014. The study also included the patients who presented in the postoperative period. Variables such as gender, age at the time of injury, etiology of each injury, history, physical examination results, type of surgery performed, radiologic findings and postoperative complications were recorded. The cause, site and the side of injury were also recorded. The patients were put under Surgical intervention. Drains were removed 48-72 hours post operatively. Patients were discharged on 3rd or 4th Post operative day. After 4-6 weeks of the surgery DJ Stent was removed. The patients were followed up over a period of 18 - 26 months (median follow up of 24 months).

3. Results

In our study there were 32 patients with 33 ureteral injuries (one of the patients had bilateral ureteric injuries). The mean age of the patients was 45 years (range 37- 50 yrs). Majority of the patients were females (90.6%). All of our cases were referred to us by the operating surgeons within five days of primary surgery. All cases underwent abdominal ultrasound, however in 20% cases it failed to show any abnormality. In the rest 80% hydronephrosis was detected and 40% showed free fluid in the abdomen. Kidney function test was performed in all cases and only 12.5% needed Dialysis before surgery. CT Urography was performed in all cases (87.5%) in which the Kidney function was normal to identify the site of injury and any urinoma formation. In the 12.5% cases with deranged kidney function Retrograde Pyelography was used to locate the site of injury. After investigations and stabilizing the patients all underwent operative repair within 48 hours in our centre. Gynaecological surgery was the commonest cause for injury (81.9%), followed by Colorectal surgery (12.1%). The right sided ureter was injured in 65.6% cases while only one had bilateral injury. Lower ureter was involved in 78.7% cases. Two cases that underwent Hemicolectomies had injuries located in the upper ureter. Complete transaction of the ureter had occurred in 75.8% cases while the rest 24.2% had partial transaction. All patients underwent site specific repair as shown in Table 3. To locate the exact site of injury intraoperatively we injected Methylene blue dye via a preplaced ureteric catheter after occluding the ureter proximally. The leak of dye was useful to delineate the exact site of injury. Post operatively all patients were put on antibiotics according to the urine culture and sensitivity report. However 12.5% cases developed wound infection, 6.3% developed urinary leak and 6.3% developed urosepsis. There was no death in our cases

however the hospital stay was prolonged in the patient who developed post operative infection.

Table 1: Causes of ureteric injury

Cause of Injury	Surgical Procedure	No Of Injuries (%)
Gynaecological Surgery	Hysterectomy	18 (54.6%)
	LSCS	3 (9.1%)
	Adnexal Mass Surgeries	6 (18.2%)
Colorectal Surgery	Right and Left Hemicolectomies	3 (9.1%)
	Hartman's procedure for Sigmoid volvulus	1 (3.0%)
	Anterior Resection	1 (3.0%)
Abdominal Surgery	Drainage of Appendicular Abscess	1 (3.0%)



Table 2: Characteristics of ureteric injury

Side of injury	No. of cases	%
Right	21	65.6
Left	10	31.3
bilateral	1	3.1
Site of injury	No. of cases	%
upper	2	6
Middle	5	15.2
lower	25	75.8
Type of injury	No. of cases	%
Partial	8	24.2
complete	25	75.8

Table 3: Surgical Procedure used for treatment

Site of Injury	Surgical Treatment	No of Injuries (%)
Upper Ureter	Uretero- ureterostomy with 6Fr DJ stenting	1 (3.0%)
	Release of angulation in the ureter with 5 Fr DJ Stenting	1 (3.0%)
Middle Ureter	Uretero-ureterostomy with 6 Fr DJ Stenting	2 (6.1%)
	Boari's Flap with 6 Fr DJ Stenting	2 (6.1%)
	Releasage of ureteric adhesions with primary repair over a 5 Fr DJ Stent	1 (3.0%)
Lower Ureter	Ureteric Re-implantation	19 (57.6%)
	Boari's Flap with 6 Fr DJ Stenting	4 (12.1%)
	Boari's Flap with Psoas Hitch with 6 Fr DJ Stenting	2 (6.1%)

4. Discussion

The serious complication of pelvic gynaecological surgery and colorectal surgeries can be Iatrogenic ureteric injury and occurs with a frequency of between 0.6% and 1.6 %.[2]. Bilateral injuries are rare accounting for 5 to 15% of all ureteric injuries.[3] When the procedure is performed for malignancy or conditions causing induration and distortion of pelvic anatomy, e.g fibroid uterus or previous pelvic inflammatory disease, this rate is increased [4, 5]. In our cases excessive intraoperative bleeding with difficult haemostasis was the predominant risk factor mainly contributing to the injuries. Even though, in 10 out of the 27 cases the referring gynaecologist described the operation as routine. This is in agreement with the literature where 50 percent of all ureteric injuries had no identifiable predisposing factors. [6]. Preoperative excretory urography or insertion of ureteric stents have been shown to be of limited value for preventing ureteral injuries [7,8] But morbidity associated with this injury can be minimized by prompt recognition and expeditious management. Recent studies have shown that better results and fewer complications are obtained in intra-operative recognition and repair.[9,10] While as injuries that are detected in the post operative period or delayed happen to be more complex and requires more complex repairs as well as multiple procedures and have higher rates of nephrectomy and death.[11,12] In our cases we used retrograde instillation of methylene blue via ureteric catheter to locate the site of ureteric integrity during surgery. We advocate ureteric catheterization prior to surgery in patients at high risk for ureteric injury as the simple instillation of methylene blue via this can help in immediate intraoperative diagnosis and repair of ureteric injury. All the patients in our series, who were referred within 5 days of surgery were fit to undergo reconstruction without any prior dialysis. Patient with bilateral ureteric injury presented with oliguria in the early post operative period. As the intra-operative bleeding was high, the low urine output was misdiagnosed as pre-renal acute renal failure in certain number of cases. Thus it resulted in a delay of several days as the kidneys were challenged with fluids and furosemide. In contrast to this the patients in whom the postoperative low urine output was attributed to obstruction from bilateral ureteric ligation were referred much earlier. Ultrasonography may show the presences of hydronephrosis or fluid collecton in the pelvis or abdomen. Many attributes of ultrasound make it an ideal method for detecting urinary obstruction as it is easily available, quick, relatively inexpensive, portable, and is noninvasive. However 20% of obstructed ureters in our case did not show any hydronephrosis. This is in agreement with the literature where Ultrasonography failed to detect hydronephrosis in 7 of 20 patients (35%) with proven acute obstruction on intravenous urography (IVU) [13]. Thus in some cases ultrasound may not be very effective in diagnosing acute ureteric obstruction. As many patients have renal insufficiency, intravenous urography is unlikely to be effective. Patients with a suspicion bilateral ligation will require cystoscopy and retrograde catheterization and should be referred promptly to an urologist.

The management of ureteric injury actually depends on the patient's condition and the extent and location of the injury. Many investigators have recommended that ureteric obstruction following gynaecological procedures is because of entrapment or ligation of the ureter by a suture, which is eventually absorbed and may be best treated by proximal drainage[14]. This procedure which is supported by several studies [15,16,17] considers that the longitudinal continuity of the ureter is intact and also requires the placement of percutaneous nephrostomy tubes which, in a third world environment is not readily available or affordable. Moreover the period of proximal drainage may be protracted and may however require surgery. Due to the aforementioned reasons a policy of immediate open surgical intervention was adopted. This approach is improved by the use of multidisciplinary team of urologist, anaesthetist and a nephrologist. In patients who are high risk for surgery due to hyperkalaemia or fluid overload, dialysis is performed before surgery to optimize the results. Four cases (12.5 %) in this study received dialysis before reconstruction and all the patients were operated upon within 48 hours of arrival at our facility. Ureteric injury can be prevented by taking all the necessary precautions that includes careful dissection and recognition of potential distortions to normal ureteral anatomy in the presence of pelvic pathology [18]. Most of the injuries in our series occurred at the distal third of the ureter which is consistent with most large series where over 75% of gynaecological ureteric injuries occurred in this location [19]. Care should be taken during dissection of this region particularly at the level of ligation of the uterine artery, ureterosacral and transverse ligament and at the level of ligation of suspensory ligament of the ovary. Good surgical technique during major abdomino-pelvic surgeries can decrease the incidence of iatrogenic ureteric injuries. In the recent years due to the rapid uptake of laparoscopic and robotic techniques in urology, along with increased use of ureteroscopy, the risk of injury to the ureter has increased [20]. Endourological procedures are fast becoming the commonest cause of ureteric injuries. In addition prompt diagnosis and use of appropriate corrective surgical procedures results in a good outcome in more than 90% cases [21].

5. Conclusion

The definitive management for ureteric injuries is surgical intervention. This is dependent on the site of the injury and timely detection. We advocate ureteric catheterization prior to surgery in patients at high risk for ureteric injury even though it may not prevent the ureteric injury, as it does help in immediate diagnosis if methylene blue is instilled in cases with suspected injury. Percutaneous nephrostomy can be done in the interim period in case the patients are not fit for surgery. However, patients should be taken up for early surgical intervention as nephrostomy is cost-prohibitive as in the setting of a third world country.

6. Procedure Related Images and Operative Pictures.

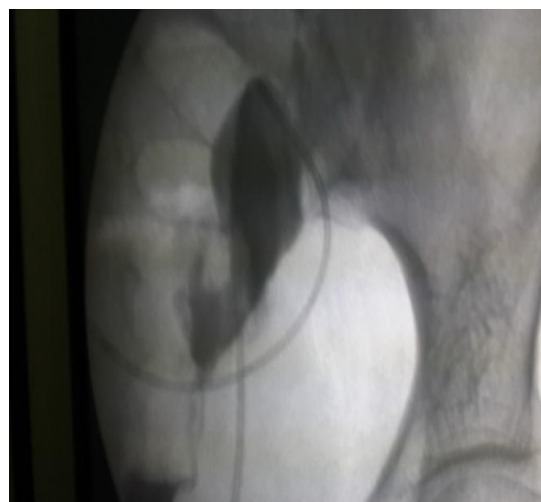


Image 1: RGP showing lower ureteric injury following APR

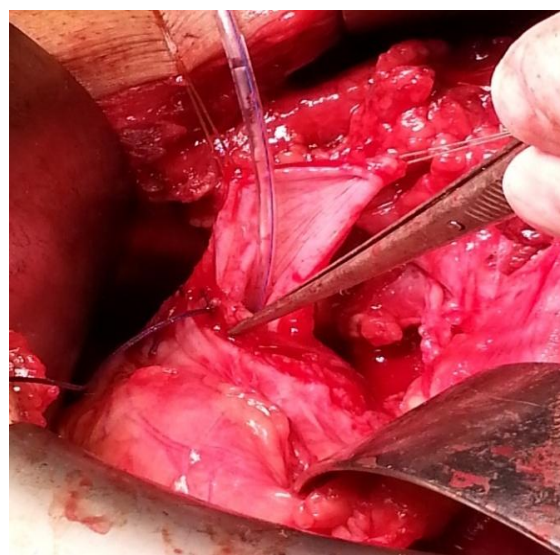


Image 2: Boari flap being raised

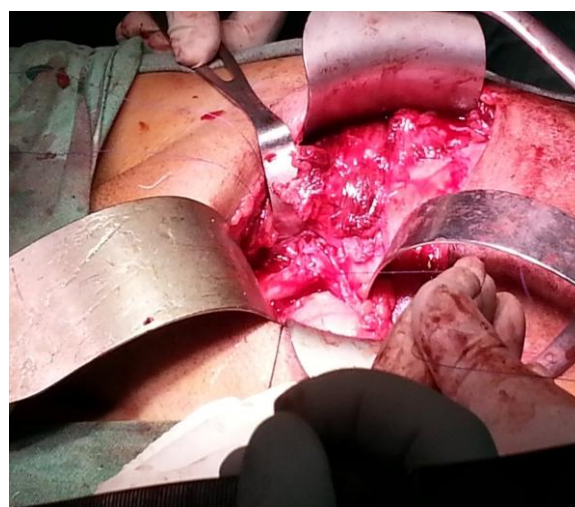


Image 3: Completion of Anastomosis



Image 4: Upper ureteric stricture on PCN

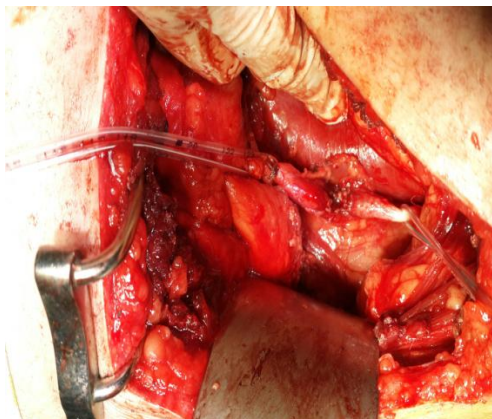


Image 5: Upper Uretric Stricture

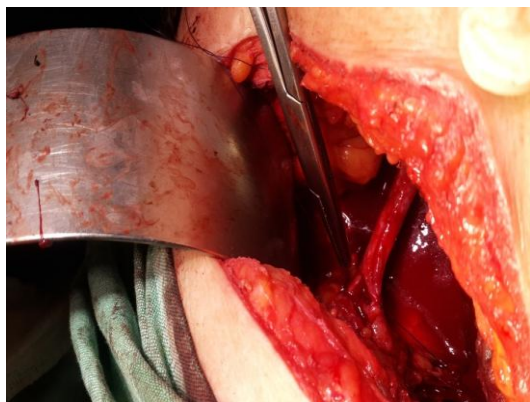


Image 6: Ureteroureterostomy

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