

CAUSES OF URETERIC INJURES AND OUTCOME OF DIFFERENT SURGICAL PROCEDURES FOR THE REPAIR OF URETER

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ABSTRACT

Background: Iatrogenic ureteric injuries have long been recognized as a potential complication of any abdominal or pelvic surgery. The present descriptive study was conducted at the Department of Urology Services Hospital, Lahore and Sheikh Zayed Medical College Rahim Yar Khan. **Objectives:** The specific objective of the study was to determine causes of ureteric injuries and outcome of various treatment options. **Patients & Methods:** A total of 40 patients included in the study were presented either in the emergency ward or referred from other wards. Detailed History and thorough general and physical examination was done. Routine investigations were done in all cases while ultrasonography, intravenous urography, retrograde urography, antegrade urography and Computed Tomography (CT) scan were done in selected cases. Various procedures for ureteral repair were performed according to the site and extent of injury. Ureteral repair was done over a DJ stent. **Results:** In our study out of 40 patients 33 (82.5%) were female and 7 (17.5%) males. Mean age of patients was 36 years. Maximum number of patients had lower ureteric injuries i.e 29 (72.5%) while 8 (17.5%) had upper ureteric injuries and 3 (7.5%) presented with mid ureteric injuries. 38 (95%) patients presented with iatrogenic injuries and 2 (5%) patients with firearm injury. Abdominal hysterectomy was the main cause in lower ureteric injuries. In case of upper and mid ureteric injuries pyeloplasties and ureteroureterostomy was performed while in case of lower ureteric injuries 27 patients underwent extravesical and intravesical ureteroneocystostomy. Boari flap with psoas hitch was performed in two patients. Patients were followed at fourth week, three months and six months interval. Success rate in upper and mid ureteric injuries were 100% while in case of lower ureteric injuries it was (93.1%). **Conclusion:** Ureteric injury causes a considerable morbidity for the patients. Detail understanding of anatomical relations of ureter and meticulous surgery will prevent iatrogenic injuries. The most common lower ureteric injuries can be best managed with Modified Liche (taguchi) technique.

Key Words: Ureteric injuries, iatrogenic lower ureteric injuries, Ureteric reimplantation

INTRODUCTION

Iatrogenic ureteric injuries have long been recognized as a potential complication of any abdominal or pelvic surgery. The reported incidence ranges from 0.5-30 (%).¹ Injuries sustained during gynaecological procedures represent the bulk of ureteric injuries. The incidence in routine hysterectomy are between 0.5-30%.² The common urological causes of ureteric injuries are renal pelvic surgery, ureteric surgery, vesicovaginal fistula repair, ureteric

stenting and ureterorenoscopy.³ The injuries of upper ureter are often recognized per operatively. In case of lower ureter the injury is usually not recognized per operatively until the patient presents with postoperative pain, fever and urinary fistula. Diagnostic imaging is advocated to identify the site and magnitude of injury to the ureter. Intravenous urography (IVU) is the principle investigation and hydronephrosis and hydroureter are the common urographic manifestations seen in 90% of the cases.⁴ Injuries to the ureter allow several options in management according to the site of injury. The upper and mid ureteric injuries are best managed with Ureteroureterostomy. In case of lower ureteric injuries the ureteric reimplantation is done either intravesically or extra vesically. In the present study the etiological factors causing ureteric injuries and outcome of different treatment options was assessed.

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PATIENTS & METHODS

40 patients of ureteric injuries underwent ureteric repair by different techniques between June 2002 to February 2009 at the Department of Urology, Services Hospital, Lahore and Sheikh Zayed Medical College Rahim Yar Khan. Detail history

about the nature of injury and thorough physical examination was done. Patients with history of renal failure, cardiac failure, hepatic failure and unfit for surgery were excluded from our study. Routine investigations were done in all cases. Ultrasonography, Intravenous Urography (IVU), CT-scan, and antegrade pyleography was done in selected cases. All the patients were operated according to their respective site of injury. Flank, Gibson, phennensteil and lower midline incisions were used to repair the ureter according to their site of injury. Primary repair of the injured part of ureter was done in cases where defect were small and ureteral continuity was intact. End to end anastomosis with Double J (DJ)stent (Fig. I) was done in patient with upper and mid ureteric injuries. The margins were freshened and end spatulated in opposite direction. DJ stents 6F were placed and anastomosis done with vicryl 4/ 0.

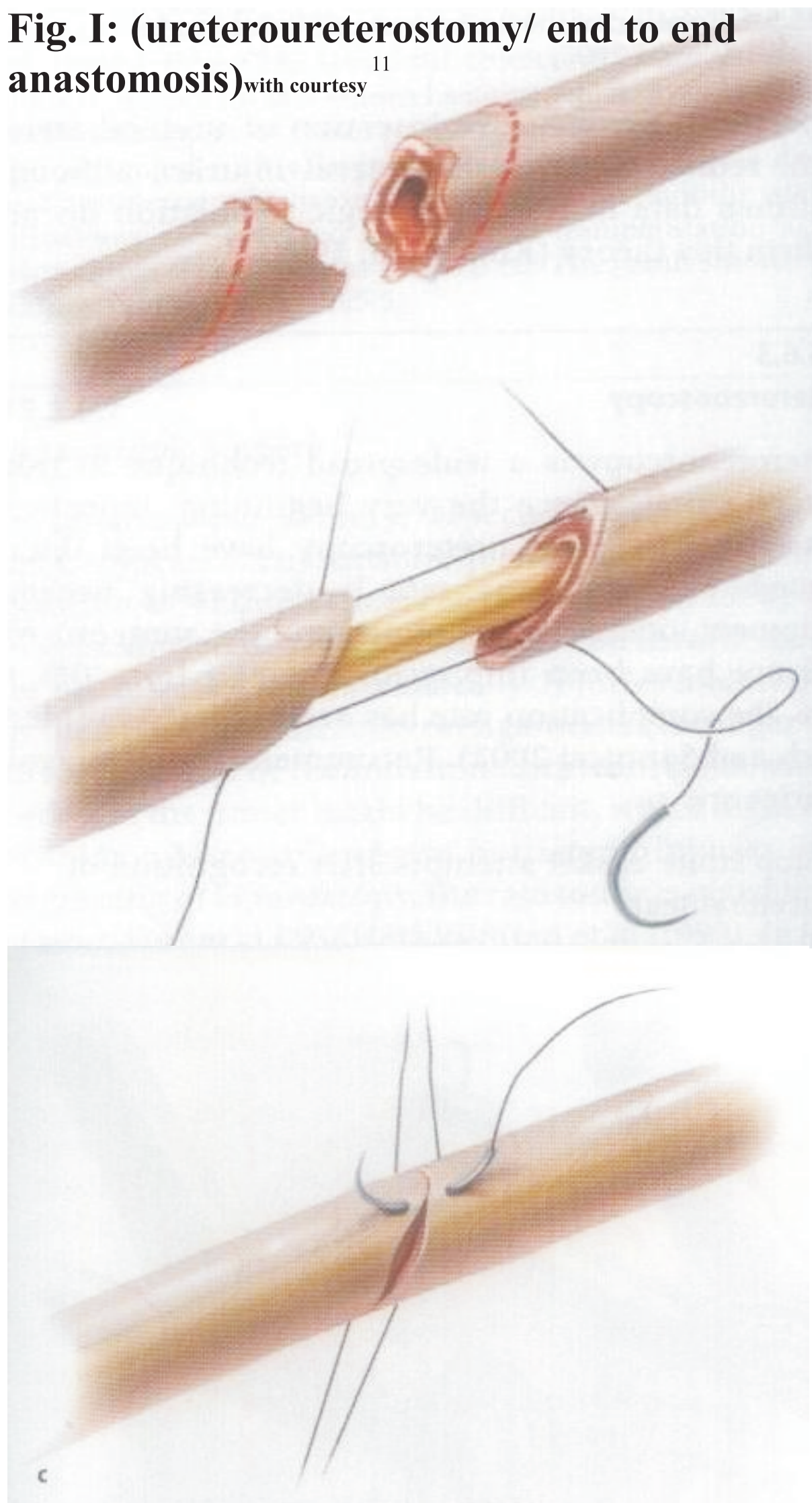


Fig. II: (modified liche/ taguchi technique of lower ureteric reimplantation)

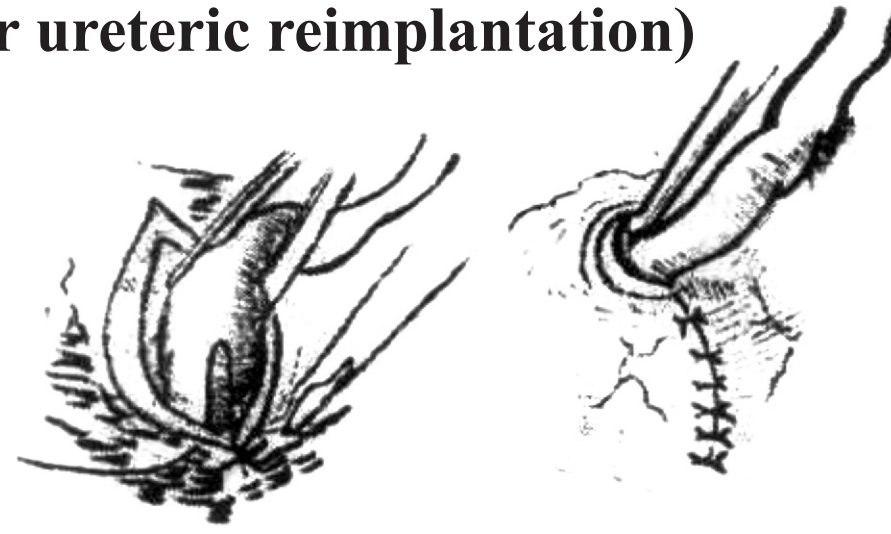
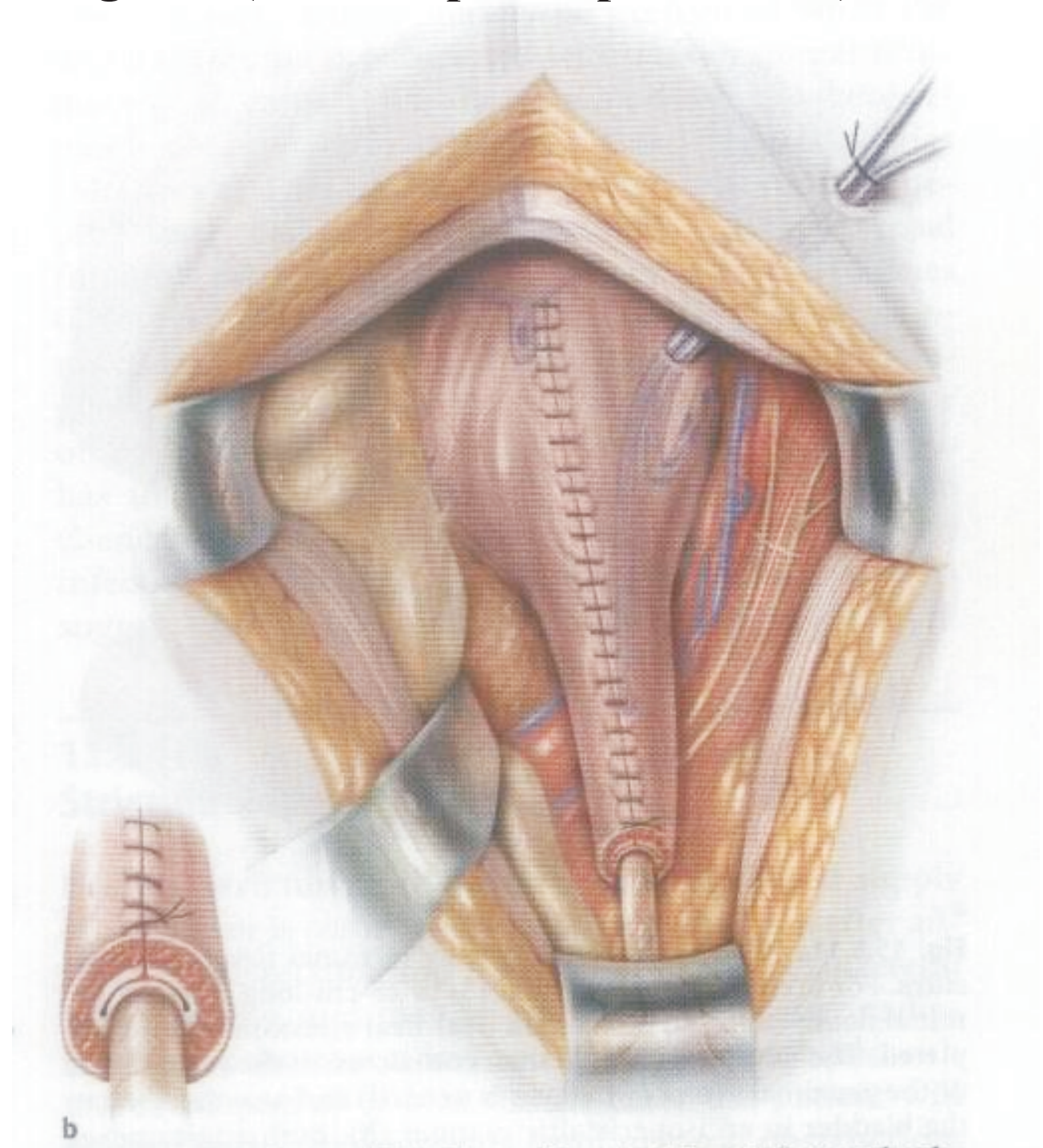


Fig. 2. Closing detrusor over the reimplanted ureter creating a tunnel



Ureteroneocystostomy with Taguchi technique (Fig. II) Boari flap with psoas hitch (Fig.III) and extravesical mucosa to mucosa anastomosis was done in lower ureteric injures. In extra Vesical Taguchi technique a single stitch anchorage and advancement of ureter was done. DJ Stent 6F was placed in all cases. Drains were placed and all the patients were catheterized. In upper and mid ureteric injures foley catheter was removed on 5th post

Fig. III: (Boari flap with psoas hitch) with courtesy 17



operative day while in lower ureteric injuries on 12th postoperative day. Patients were followed at 4th week, 3 months and 6 months interval. Detail history and thorough physical examination was done. Urine complete and ultrasound was done in all cases, while IVU was done in selected cases.

RESULTS

Patients in our study belonged to different age group with mean age 36 ± 9 years (Table I). In our study, 7 (17.5%) of the study subjects were male and 33 (82.5%) female. The mean hospital stay was 6 days. In 38(95%) patients, the cause of injury was iatrogenic. There were 8 (20%) patients with upper ureteric injury, 3 (7.5%) with mid Ureteric injury and 29 (72.5%) with lower ureteric injuries. Out of 29 patients with lower ureteric injuries, in 24 (82.7%) patients the cause was abdominal hysterectomy while, out of total

patients, in 25 (86.2%) the cause of injury was gynaecological.

In 8 (20%) patients with upper ureteric injury the cause was iatrogenic, out of these, in 5 (12.5%) patients the injury occurred due to renal surgery of recurrent stones on already operated kidney. The patients have complete ureteral transection during surgery at pelviureteric junction. End to end anastomosis and pyeloplasty was done over DJ stents. In 3(7.5%) patients with intra renal pelvis and staghorn calculus the injury was partial. Repair of the primary injury was done over a DJ stent.

In case of mid ureteric injuries 2 (5%) patients were diagnosed preoperatively while, undergoing laparotomy with history of firearm injury on abdomen. The ureter left in both cases was completely transected with associated small bowel injuries. The margins of the ureter were bleeding with spillage of urine and haematoma in the retroperitoneum. End to end anastomosis over a DJ stent was performed. In 1 (2.5%) patient with mid ureteric injury there was history of ureterolithotomy followed by persistent leakage through the drain and wound site and ultrasonography showed hydronephrosis and hydroureter and IVU confirmed the findings with extra vasation of contrast. End to end anastomosis over a DJ Stent after refashioning the margins was done.

In 29 (72.5%) patients with lower ureteric injuries 24 (82.7%) patients gave a history of abdominal hysterectomy. Out of these 24 cases, in 4 (16.6%)

Table I: Age of Patients (n=40)

Pt. Age	Number of Pt.	%age
21-30	16	40
31-40	11	27.5
41-50	8	20
51-60	5	12.5

Table II: Site and causes of injury with methods of repair and outcome (n=40)

Site of Injury	Total no of Patients (40)	Cause of Injury	Method of Repair	Outcome
Upper Ureter	8	Iatrogenic during renal surgery (8)	End to end anastomosis and Pyeloplasty (5) Repair of primary defect (3)	100 %
Mid ureter	3	Firearm injury (2) Iatrogenic during ureteric surgery (1)	End to end anastomosis (3)	100 %
Lower ureter	29	Iatrogenic during <ul style="list-style-type: none"> • Abdominal Hysterectomy(24) • Salpingoophorectomy (1) • Ureterolithotomy (3) • Ureterorenoscopy (1) 	<ul style="list-style-type: none"> • Modified Liche Taguchi technique extra vesical ureteric reimplantation (22) • Mucosa to Mucosa extra vesical ureteric reimplantation (5) • Boari-Flap & Psoas- Hitch (2) 	93%

Overall success rate of different surgical procedures 95%

patients the injury was recognized preoperatively. The rest of 20 (83.3%) patients presented with postoperative fever, lion pain followed by leakage of urine pervaginum. Ultrasonography and X-ray intravenous urographny showed varying degree of hydronephrosis and hydroureter in all of these cases. Three (10.3%) patients gave a history of ureterolithotomy followed by leakage of urine through the drain and wound site. One (3.4%) patient gave a history of ectopic pregnancy and right salpingoophrectomy followed by leakage of urine postoperatively. In one (3.4%) patient injury occurred while doing ureterorenoscopy. Ureteric avulsion occurred with lower ureter came out moulded over the tip of uretrorenoscope. In 29 (72.5%) with lower Ureteric injuries 22 (75.8%) patients underwent ureteric reimplantation through extravesical (Taguchi technique) modified liche technique. 5 (17.2%) patients underwent extravesical mucosa to mucosa anastomosis and 2 (6.8%) patients with Ureteric defect > 7 cm underwent Boari Flap with Psoas Hitch. Patients were followed at 4th week, 3 months and 6 months interval, with compliance rate of 100%, 88% and 68%, respectively. Post-operatively, out of 40 patients, 34 (85%) presented with UTI at 4th week. All were treated with appropriate antibiotics. In 2 (6.8%) patients where ureteric reimplantation was done through Modified Liche technique persistant urinary leakage was observed. Patient were re-explored and urinary leakage was observed along the posterior side of the ureteric entry in the bladder. Mucosa to mucosa anastomosis was done over a DJ stent. Both patients recovered uneventfully.

Overall success rate was seen in 38 (95%) patients. Success rate in upper and mid ureteric injuries were 100%, while in case of lower ureteric injuries it was 93.1%. Details of results are summarized in Table (III).

DISCUSSION

Ureteral trauma is rare and due to its anatomical location accounts for only 1% of all urinary tract injuries.^{5,6} The ureter is protected by the dorsal muscle group and the vertebral coloumn posteriorly and by abdominal muscles laterally and anteriorly. Moreover ureter is moveable and flexible. Ureteral injuries may be partial or complete and may be caused by blunt or penetrating

trauma. However iatrogenic ureteral injuries are the most common form of trauma to the ureter.

Blunt and penetrating trauma is rare and occur in 1-4% after external violence.⁷ These injuries are associated with multiple organ injuries in upto 98% of the cases.⁸ In our study, 2 (5%) patients have ureteric injury due firearm, while in both cases there was associated small and large bowel injuries. Most often the ureteral trauma is iatrogenic. It can be caused by open surgery, laparoscopic surgery and endoscopic procedures.

The most common mechanism of operative ureteral injury are crushing from misapplication of a clamp, ligation with a suture, transaction, ureteral stripping or electrocoagulation of ureteral segment.⁹

In one study, of iatrogenic ureteral injuries, 74% were gynaecological, 14% general surgical and 14% were urological. Injury to the lower ureter was the most common site due to its anatomical location.¹⁰ In our study, in 25 (62%) patients the cause of ureteric injury was gynaecological and in 10 (25%) patients the cause was urological. In 29 (72.5%) patients the site of injury was lower ureter. In 38 (95%) patients the cause was iatrogenic in our study.

The most important step towards a successful outcome after ureteral trauma is prompt diagnosis. In case of ureteric injury due to urological surgery the per-operative diagnosis was made.

CT scan and IVU are the most accurate radiographic modality to the diagnosis of ureteral injuries. Extravasation of contrast is a certain sign of ureteric injuries.¹¹ In our study, 25 patients underwent IVU showing varying degree of hydronephrosis hydroureter and extravasation of contrast.

Depending upon the patient condition, the site and the extent of injury appropriate management of the ureteral injury must be selected. Trauma patients with an external trauma, may require prompt operative exploration to manage associated abdominal injuries

In general, the type of reconstructive procedure chosen by the surgeon depends upon on the nature and site of injury. Uretero-ureterostomy so called end to end anastomosis can be used for the repair of ureteral injuries to the upper and mid third of the ureter.¹² For extensive injuries to the pelviureter junction and the proximal ureter pyeloplasty is the treatment of choice.¹³

Iatrogenic ureteric injury is a problem which conforts

the surgeon operating in the pelvic area. Most commonly the ureter is damaged in the ovarian fossa, in the infundibulopelvic ligament and where it courses dorsal to uterine artery. The risk can be minimized by understanding the exact anatomy of the ureter in relation to other pelvic organs.¹⁴ Abdominal hysterectomy is the leading cause of iatrogenic ureteral injuries. The treatment options of these lower ureteric injuries include conservative, endoscopic and open surgical. The success with conservative and endoscopy are not promising.¹⁵ Open surgery is the main stay of treatment. Ureteric reimplantation of lower ureter can be carried out either intra or extravesically. Extravesical ureteric reimplantation was introduced by Liche and later Gregoir and Taguchi.¹⁶ Ureteric reimplantation through Taguchi technique is simple less time consuming. In our study, 22 patients with lower ureteric injuries underwent ureteric reimplantation through Modified Liche Technique with success rate 90.9%. In lower ureteric injuries with defect greater than 7 cm Boari flap is the procedure of choice. Urinary bladder can be hitched to the ipsilateral Psoas muscle to reduce tension on the anastomosis. Mobilization of ureter and tubularization of bladder is a time consuming factor in this procedure.^{17,18}

CONCLUSION

Ureteric injury causes a considerable morbidity for the patients and is a serious health problem. Detail understanding of anatomical relations of ureter and meticulous surgery will prevent iatrogenic injuries, while prompt diagnosis and appropriate surgical treatment will manage most of these injuries. The most common lower ureteric injuries can be best managed with Modified Liche (taguchi) technique.

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