بسم الله الرحمن الرحيم

Urology

- **URETERAL INJURIES**

Rare

Etiology

1. External Trauma

Ureteric injuries after external violence are rare, occurring in less than 4% of cases of penetrating trauma (Gun shot, bullet and shells) and less than 1% of cases of blunt trauma

Those patients often have significant associated other organs injuries and a devastating degree of mortality that approaches one third

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2. Surgical Injury: Difficult pelvic surgery, gynecological, (hysterectomy & CS), or vascular surgery.

3. Endoscopic: ureteroscope, TUR & Dormia basket stone extraction.

4. Hyperextension injury of the spine

- **Types:**
  perforation, division or ligation

<u>Ligation:</u>

1- Asymptomatic resulting in renal atrophy.

2- Ureteric colic or pain post operatively with or without fever of UTI, and tender renal angle.

3- In single kidney: unuria

Ligation of both ureters also result in uremia (obstructive uremia).

- ***<u>Division & perforation:</u>***

Result in urine collection (urinoma) then super added by infection resulting in abscess formation, fever, rigor and abdominal pain.

More commonly ***<u>urine leak</u>*** from the wound or vagina (ureterocutaneous or ureterovaginal fistula) about 10th post operative day.

Staging (Scale) of Ureteric Injury

Grade	Type	Description
I	Hematoma	Contusion or hematoma without devascularization.
II	Laceration	<50% transection
III	Laceration	≥50% transection
IV	Laceration	Complete transection with <2 cm devascularization
V	Laceration	Avulsion with >2 cm devascularization

Clinical presentation

- Hematuria : sometimes
- Delayed presentation of ureteral injuries Fever, leukocytosis, and local peritoneal irritation (Signs of internal abscess formation (infected urinoma)) are the most common signs and symptoms of missed ureteral injury and should always prompt CT scan examination.

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- Post operative colic.
- Post operative urine leak (urinary fistula).
- Post operative uremia.
- Asymptomatic

Diagnosis

A high index of suspicion is required in cases of potential ureteral injury

Laboratory investigations

- GUE : hematuria ?
- **Renal function tests:** normal, and elevated in uremia.
- CBC : leukocytosis

- **Imaging Studies**
- **U/S:** hydronephrosis in ligation and urinoma in division.
- IVU contrast leak in division, hydronephrosis or poor function in ligation.
- CT scan with contrast: diagnostic
- Retrograde pyelography: obstruction in ligation and contrast leak in division.

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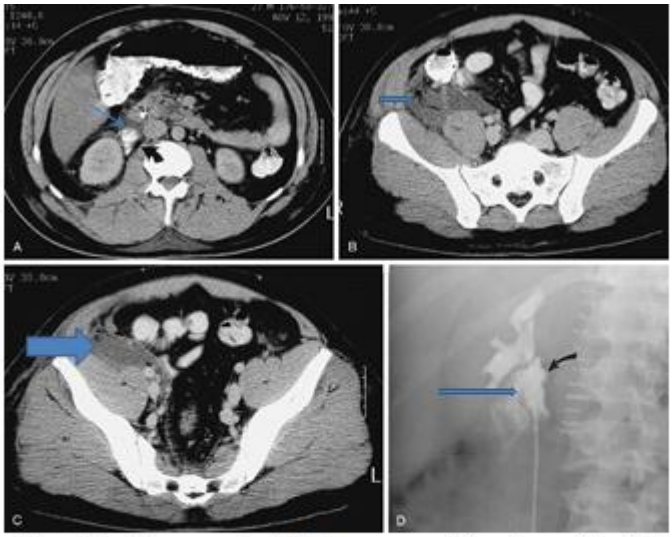
IVU demonstrating extravasation in the upper right ureter consequent to stab wound. Note lack of contrast below the site of injury indicating complete ureteral transection.

Ureteroscopy with a rigid ureteroscope to attempt retrieval of a calculus from the midureter resulted in perforation



Ureteral avulsion: blunt trauma. A, CT shows normal function of both kidneys and an Extrarenal collection of densely opacified urine (arrow). B and C, Water-density fluid extends retroperitoneally along the course of the ureter. No opacification of the distal right ureter is apparent. D, Retrograde urogram confirms avulsion and extravasation at the ureteropelvic junction (arrow)

Management of ureteric injury

Prevention is better than treatment.

Proper identification of the ureter before uterine artery ligation in gynecological operations or pre-operative stenting in pelvic surgeries.

The aim is to regain the continuity of the ureter, preserving renal function and decreasing the morbidity.

Management (***Surgical options)***

- Perforation: ureteric stenting using DJ stent (double J or JJ stent). If it is possible to insert a stent endoscopically past a partial ureteric obstruction, an open repair may be avoidable.
- Ligation: excision of the ischemic segment with end to end anastamosis.
- Division or Transection: refreshment of the ends with end to end anastamosis.

Methods for repairing a damaged ureter

- If there is no loss of length: Spatulation and end-to-end anastomosis without tension
- If there is little loss of length: Mobilise kidney, Psoas hitch of bladder, Boari operation
- If there is marked loss of length: Transureteroureterostomy, Interposition of isolated bowel loop or, mobilised appendix, or Nephrectomy

- **Upper Ureteral Injuries**

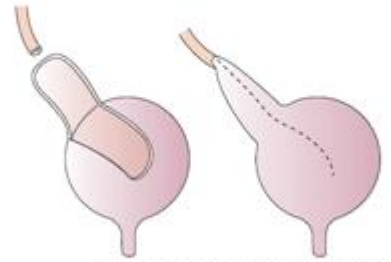
  - Direct Ureteroureterostomy (end to end anastamosis(
  - Transureteroureterostomy. To the other ureter (end to side anastamosis(
  - Autotransplantation
  - Bowel Interposition (ileal transposition): Using the appendix to bridge the defect in the right side

Mid Ureteral Injuries •

- Ureteroureterostomy
- Transureteroureterostomy

- **Lower Ureteral Injuries**
  - Ureteroneocystostomy (ureteric reimplantation) with Psoas Bladder Hitch
  - Boari Flap

Boari operation



Boari operation: a strip of bladder wall is fashioned into a tube to bridge the gap between the cut ureter and the bladder.

Suggested management options for ureteral injuries at different levels.