

## RENAL INJURIES

### Objectives

1. to understand the mechanism of genitourinary injury.
2. to know the presentation and complications of the injury.
3. to understand the management of the injuries.

The kidneys are the most commonly injured genitourinary organs from external trauma.

Ten percent of all trauma cases involve the genitourinary tract.

### Causes

1. **Blunt trauma:** Blunt trauma is much more common than penetrating trauma. Most cases of blunt trauma are treated conservatively. Common blunt injuries result often from road traffic accidents, falls, assaults and sporting injuries. Five to 10% are major injuries.
2. **Penetrating trauma:** Common penetrating injuries are knife or gunshot wounds. Most penetrating injuries require renal exploration and up to 70% are major injuries.

### Investigations:

**Contrast-enhanced CT is the gold standard for genitourinary**

**imaging in renal trauma.** It will accurately assess the extent of the injury, showing laceration, extravasation, surrounding hemorrhage and vessel injury.

It also shows non-renal injuries and effectively stages renal pedicle injuries. Arterial occlusion is manifest as rim enhancement of the normal renal contour.

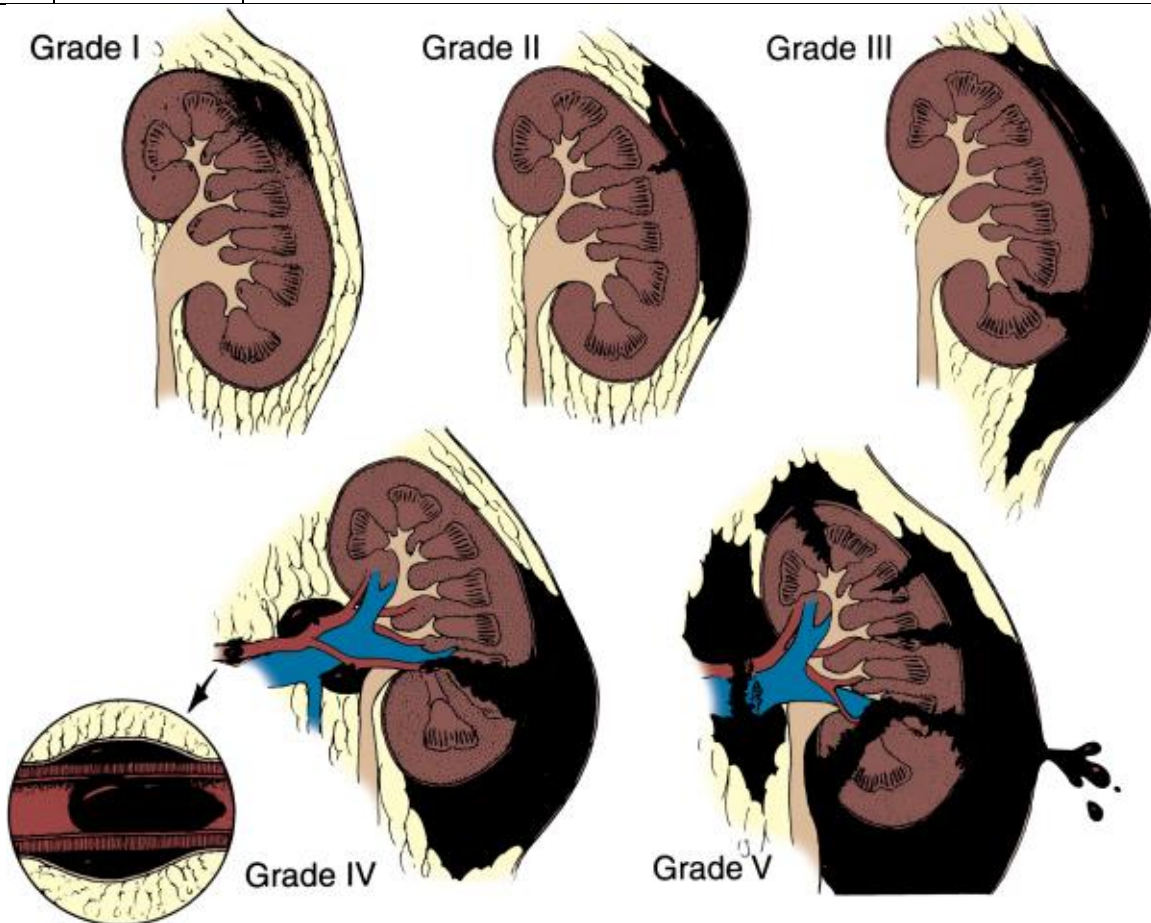
In some patients with an immediate laparotomy and renal trauma encountered unexpectedly during laparotomy, then an on-table intravenous urogram (one shot IVP) is required. If significant extravasation, non-function, poor opacification or caliceal distortion is found then renal exploration is indicated.

### The indications of imaging:

1. All penetrating trauma with a likelihood of renal injury (abdomen, flank, or low chest entry/exit wound) who are hemodynamically stable enough to have a CT (instead of going right to the operating room or angiography suite)
2. All blunt trauma with significant acceleration/deceleration mechanism of injury, specifically rapid deceleration as would occur in a high-speed motor vehicle accident or a fall from heights
3. All blunt trauma with gross hematuria
4. All blunt trauma with microhematuria and hypotension (defined as a systolic pressure of less than 90 mm Hg at any time during evaluation and resuscitation)
5. All pediatric patients with greater than 5 RBCs/HPF

**Classification:****Classified by contrast enhanced Ct scan**

Grade	Type	Description
I	Contusion Hematoma	Microscopic or gross hematuria, urologic studies normal Subcapsular, nonexpanding without parenchymal laceration
II	Hematoma Laceration	Nonexpanding perirenal hematoma confined to renal retroperitoneum <1 cm parenchymal depth of renal cortex without urinary extravasation
III	Laceration	>1 cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation
IV	Laceration Vascular	Parenchymal laceration extending through renal cortex, medulla, and collecting system Vascular Main renal artery or vein injury with contained hemorrhage
V	Laceration Vascular	Completely shattered kidney Avulsion of renal hilum, devascularizing the kidney



**Treatment:****Nonoperative Management**

Significant renal injuries (grades II to V) are found in only 5% of renal trauma cases.

Nonoperative management has become the standard of care in hemodynamically stable, well-staged patients with AAST grade I to III renal injuries, regardless of mechanism. Most experts agree that patients with grade IV and V injuries more often require surgical exploration, but even these high-grade injuries can be managed without renal operation if carefully staged and selected

**Operative Management**

Indications for renal exploration or speedy angioembolization after trauma can be separated into absolute and relative

**Absolute indications include**

- (1) hemodynamic instability with shock,
- (2) expanding/pulsatile renal hematoma (usually indicating renal artery laceration),
- (3) suspected renal vascular pedicle avulsion (grade 5), and
- (4) ureteropelvic junction disruption.

**Relative indications are**

- (1) urinary extravasation with significant renal parenchymal devascularization (older data suggest higher complication rate than average if watched, but these also can be closely observed),
- (2) renal injury together with colon/pancreatic injury (these patients have a higher complication rate if their renal injury is not repaired at the time of colon/ pancreatic injury, but the renal injury may be closely observed after repair of the enteric injury), and
- (3) a delayed diagnosis of arterial injury (which will most likely need delayed nephrectomy).

**URETERAL INJURIES****Cause**

1. **External Trauma:** - Blunt trauma: is very rare result of a hyperextension injury of the spine.  
-Penetrating trauma.
2. **Surgical Injury:** Any abdominopelvic surgery whether gynecologic, obstetric, general surgery, vascular or urologic
  - Surgical trauma during pelvic surgery is the most common cause of ureteric trauma

- Preoperative catheterisation of the ureters makes them easier to protect

### 3. Ureteroscopic injury.

#### Imaging Studies

**Excretory Urography.**

**Computed Tomography.**

**Retrograde Ureterography.**

Retrograde ureterograms, the most sensitive radiographic test for ureteral injury, are used in some centers as a primary diagnostic technique to detect acute ureteral injuries however, we tend to use noninvasive methods such as one-shot IVP and CT scan to make the diagnosis intraoperatively when feasible.

**Antegrade Ureterography.**

#### Treatment:

Injuries discovered during surgery should be repaired  
Immediately

#### Methods of treatment:

##### 1. Upper Ureteral Injuries

Ureteroureterostomy( end to end anastomosis) with or without mobilization of the kidney.

ureterocalycostomy,

Bowel Interposition.

Autotransplantation.

##### 2. Midureteral Injuries

Ureteroureterostomy( end to end anastomosis) with or without mobilization of the kidney.

Transureteroureterostomy.

Bowel Interposition.

##### 3. Lower Ureteral Injuries

Ureteroneocystostomy.

Psoas hitch of bladder

Boari flap operation