

Overview

Definition and Epidemiology:

Trauma is a physical injury or a wound to living tissue caused by an extrinsic agent.

Sixth leading cause of death worldwide, accounting for 10% of all mortalities. Half of all deaths due to trauma are in people aged 15-45 years being the leading cause of death in this age group. Death from injury is twice as common in males (motor vehicle accidents and interpersonal violence).

Classification of trauma:

According to the basic mechanism of the injury: penetrating or blunt injuries. Blast injury is a complex cause which includes blunt and penetrating trauma and burns. Penetrating trauma, is further classified according to the velocity of the projectile into:

1. High-velocity projectiles. Greater damage due to an expansive cavitation.
2. Medium-velocity projectiles.
3. Low-velocity items.

General management principles:

1. **Initial evaluation:** Imaging, laboratory analysis and specialist surgical input. Tetanus vaccine status should be assessed for penetrating injuries.
2. **Polytrauma managed in major trauma centres leads to improved survival.**
3. **Damage control:** rapid control of haemorrhage and wound contamination --> resuscitation --> definitive surgery in the stabilised patient.
4. **Established prophylaxis measures reduce thrombosis and are recommended.**
5. **Antibiotics:** 1 dose is recommended. Continuing antibiotics depends on injury grade, associated injuries and the need for intervention. Antibiotics should be avoided in lesser trauma.
6. **Urinary catheterisation:** Prolonged catheterisation is required in bladder and urethral injury but not necessary in stable patients with low-grade renal injury. The shortest possible period of catheterisation is advised.

Renal trauma

Epidemiology, aetiology and pathophysiology:

5% of all trauma. Most common in young males. Overall population incidence of 4.9 per 100,000. The prevalence is higher in urban settings.

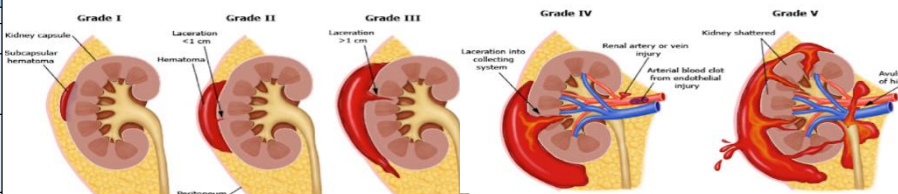
Most injuries can be managed non-operatively with successful organ preservation.

Penetrating injury: direct tissue disruption of the parenchyma, vascular pedicles, or collecting system.

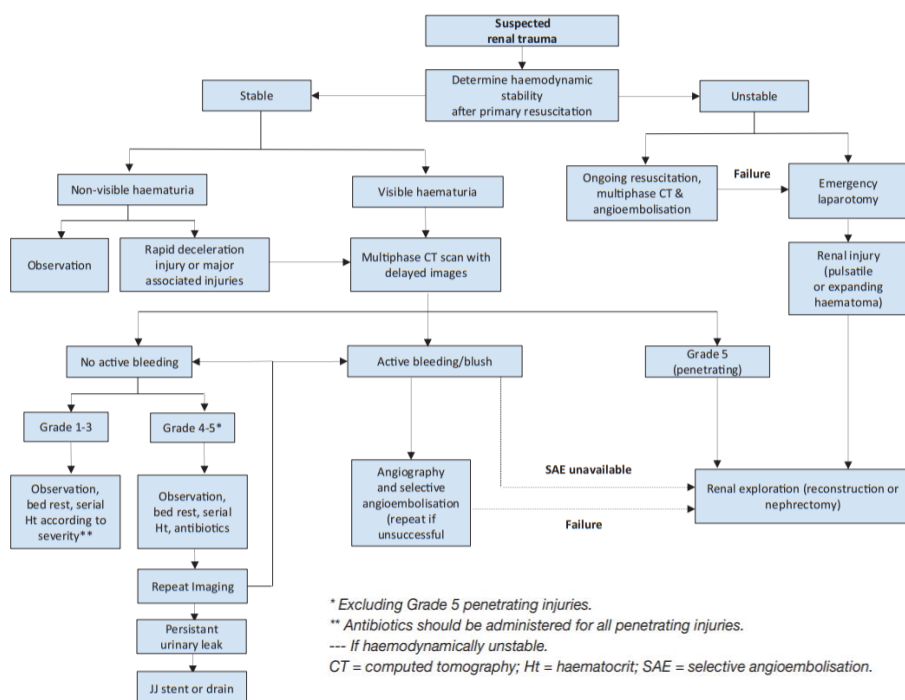
High-velocity bullets or fragments: potential for greatest destruction and associated with multiple organ injuries.

KIDNEY INJURY SCALE (based on AAST 2018 revision). AAST: American Association for the Surgery of Trauma

AAST Grade	Imaging Criteria (CT Findings)
I	Subcapsular hematoma and/or parenchymal contusion without laceration
II	1. Perirenal hematoma confined to Gerota fascia 2. Renal parenchymal laceration ≤1 cm depth without urinary extravasation
III	1. Renal parenchymal laceration >1 cm depth without collecting system rupture or urinary extravasation 2. Any injury in the presence of a kidney vascular injury or active bleeding contained within Gerota fascia
IV	1. Parenchymal laceration extending into urinary collecting system with urinary extravasation 2. Renal pelvis laceration and/or complete ureteropelvic disruption 3. Segmental renal vein or artery injury 4. Active bleeding beyond Gerota fascia into the retroperitoneum or peritoneum 5. Segmental or complete kidney infarction(s) due to vessel thrombosis without active bleeding
V	1. Main renal artery or vein laceration or avulsion of hilum 2. Devascularized kidney with active bleeding 3. Shattered kidney with loss of identifiable parenchymal renal anatomy



Evaluation and management:



* Excluding Grade 5 penetrating injuries.

** Antibiotics should be administered for all penetrating injuries.

--- If haemodynamically unstable.

CT = computed tomography; Ht = haematocrit; SAE = selective angioembolisation.

Summary of evidence	LE
Vital signs on admission give the most reliable indication of the urgency of the situation.	3
Special consideration should be given to patients with a solitary kidney and pre-existing renal disease.	4
Haematuria is a key finding following renal trauma; although, it may not be present in certain situations.	3
A multiphase CT scan is the best method for the diagnosis and staging of renal injuries in haemodynamically stable patients.	3
Haemodynamic stability is the primary criterion for selecting patients for non-operative management.	3
Selective angioembolisation is effective in patients with active bleeding from renal injury, without other indications for immediate abdominal operation.	3
Renal reconstruction should be attempted if haemorrhage is controlled and there is sufficient viable renal parenchyma.	3
Iatrogenic renal injuries are procedure-dependent (1.8-15%); the most common injuries are vascular.	3
Limited literature exists with regard to long-term consequences of renal trauma. Current follow-up includes physical examination, urinalysis, diagnostic imaging, serum creatinine, as well as annual blood pressure monitoring to diagnose renovascular hypertension.	4

Recommendations	Strength rating
Evaluation	
Assess haemodynamic stability upon admission.	Strong
Record past renal surgery, and known pre-existing renal abnormalities (ureteropelvic junction obstruction, solitary kidney, lithiasis).	Strong
Test for haematuria in a patient with suspected renal injury.	Strong
Perform a multiphase computed tomography scan in trauma patients with:	Strong
<ul style="list-style-type: none"> • visible haematuria; • non-visible haematuria and one episode of hypotension; • a history of rapid deceleration injury and/or significant associated injuries; • penetrating trauma; • clinical signs suggesting renal trauma e.g. flank pain, abrasions, fractured ribs, abdominal distension and/or a mass and tenderness. 	
Management	
Manage stable patients with blunt renal trauma non-operatively with close monitoring and re-imaging as required.	Strong
Manage isolated Grade 1-4 stab and low-velocity gunshot wounds in stable patients non-operatively.	Strong
Use selective angioembolisation for active renal bleeding if there are no other indications for immediate surgical exploration.	Strong
Proceed with renal exploration in the presence of:	Strong
<ul style="list-style-type: none"> • persistent haemodynamic instability; • Grade 5 vascular or penetrating injury; • expanding or pulsatile peri-renal haematoma. 	
Attempt renal reconstruction if haemorrhage is controlled and there is sufficient viable renal parenchyma.	Weak
Repeat imaging in high-grade and penetrating injuries and in cases of fever, worsening flank pain, or falling haematocrit.	Strong
Follow-up approximately three months after major renal injury with:	Weak
<ul style="list-style-type: none"> • physical examination; • urinalysis; • individualised radiological investigation including nuclear scintigraphy; • blood pressure measurement; • renal function tests. 	
Measure blood pressure annually to diagnose renovascular hypertension.	Strong