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Introduction

- GU tract injuries are rare
- The kidneys are most commonly injured
- 1/4 of solid organ injuries : renal trauma
- Younger men ; predominant
- Management :increasing emphasis on nonsurgical
 low grade blunt injuries ; standard care
 High grade blunt & penetrating trauma: controversial

Anatomy

Retroperitoneal

The kidneys well protected

Adjacent to T11-L4 vertebrae

Upper poles protected by ribs so lower poles more commonly injured

Right kidney inferior to left & more commonly injured

Kidney mobile , hilum more fixed

Mechanism of injury

- Blunt 65% Penetrating 35%
- Blunt:
 - motor vehicle collisions 63%
 - Falls 14%
 - Sport-related 11%
 - Pedestrian 4%
 - Rapid deceleration
- Penetrating :
 - Firearms 65%
 - Stab wounds

Associated injuries

- Penetrating > blunt
- Blunt trauma : liver & spleen
- Penetrating trauma : along trajectory

Clinical features

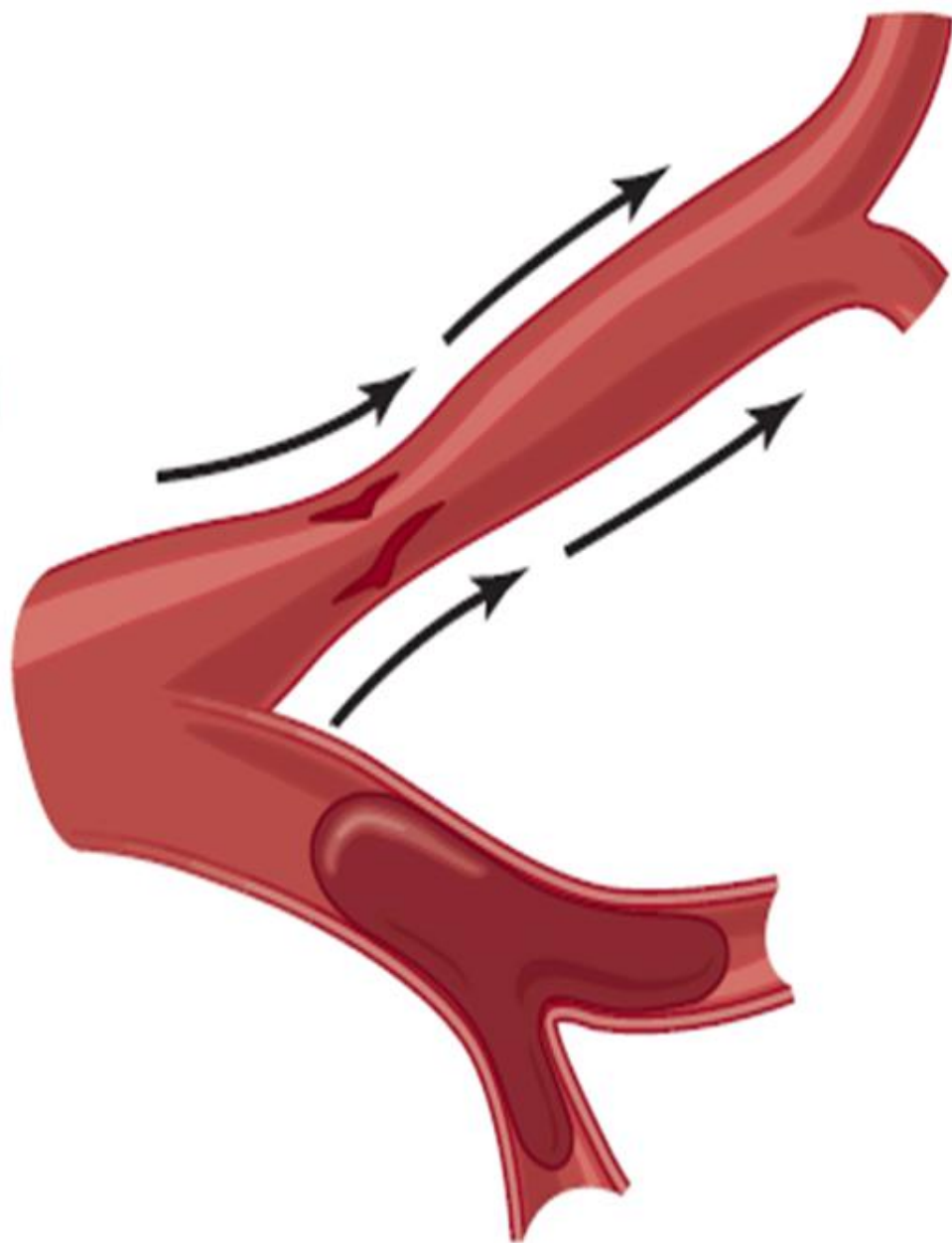
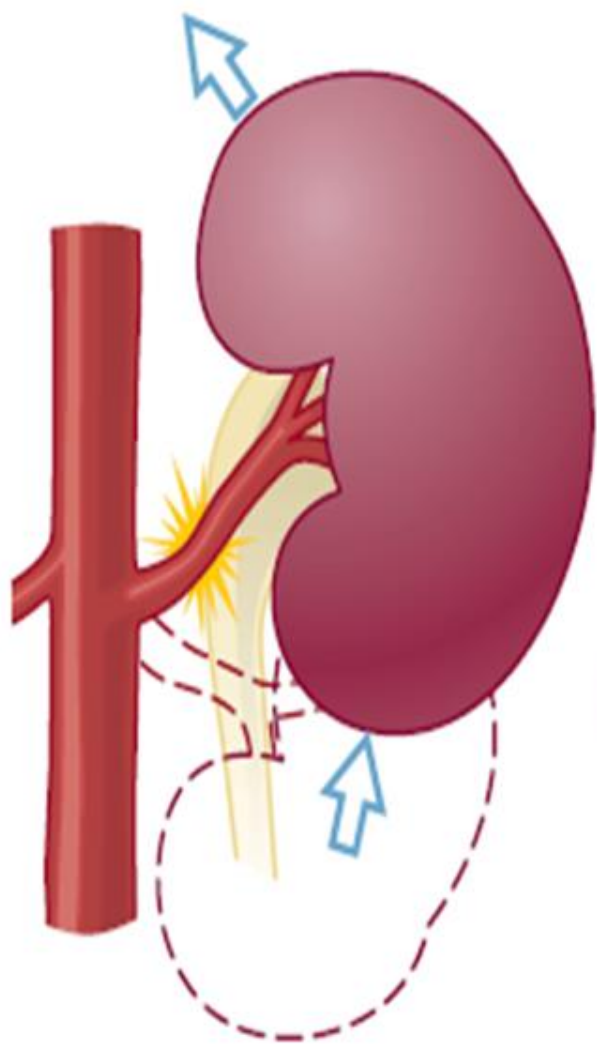
- Suspicion for renal injury:
 - Hematuria
 - Rapid deceleration
 - Direct blow to the flank
 - Penetrating injury in proximity to the kidney
 - Flank tenderness or ecchymosis or displaced lower rib Fx
- Penetrating implements :
 - at ant. Axillary line
 - at pos. axillary line
- Preexisting renal disease

Hematuria

- Microscopic or gross
- Blunt trauma 88%
- Penetrating trauma 56%
- The assessment should be performed early
- The degree of hematuria no predict
- 1/3 of deceleration injuries ; no hematuria
- Creatinine

Indications for imaging

- Gross hematuria
- Acceleration & deceleration
- Microhaematuria + SBP < 90 mmHg
- Microhaematuria in pediatric patients



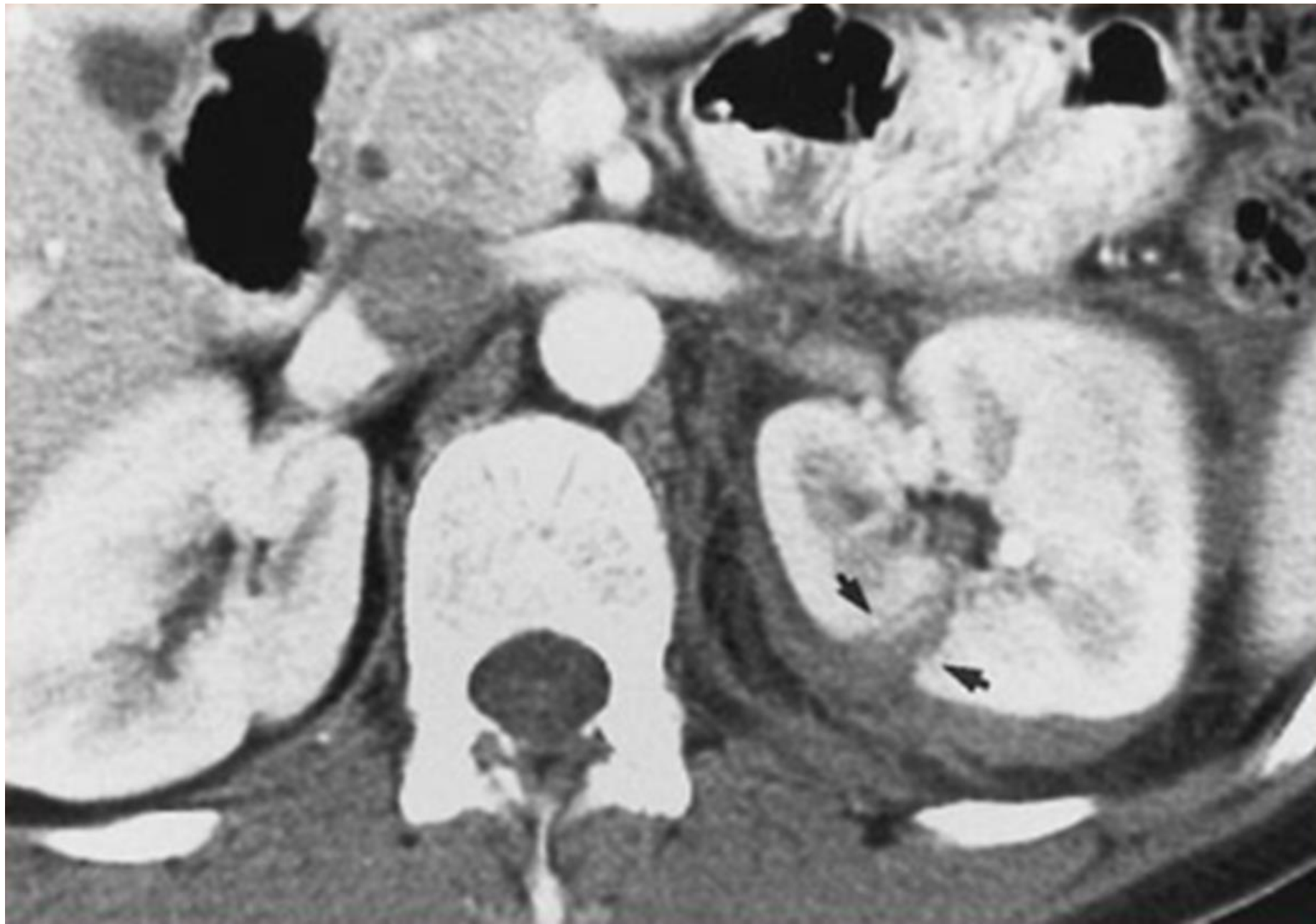
Diagnosis & Approach

- *Hemodynamically instability*
- Operation room :zone 2 hematoma
- Expanding or pulsatile
- one-shot” IVP
- Non expanding zone 2 hematoma
- High suspicion for urine leak

Diagnosis & Approach

- *Hemodynamically stable*
- Contrast –enhanced CT of abdomen + delayed image; CT pyelography ;
- IVP ; CT is not available
- Ultrasonography can be used in children
- Renovascular injury ; angiography or CT angiography





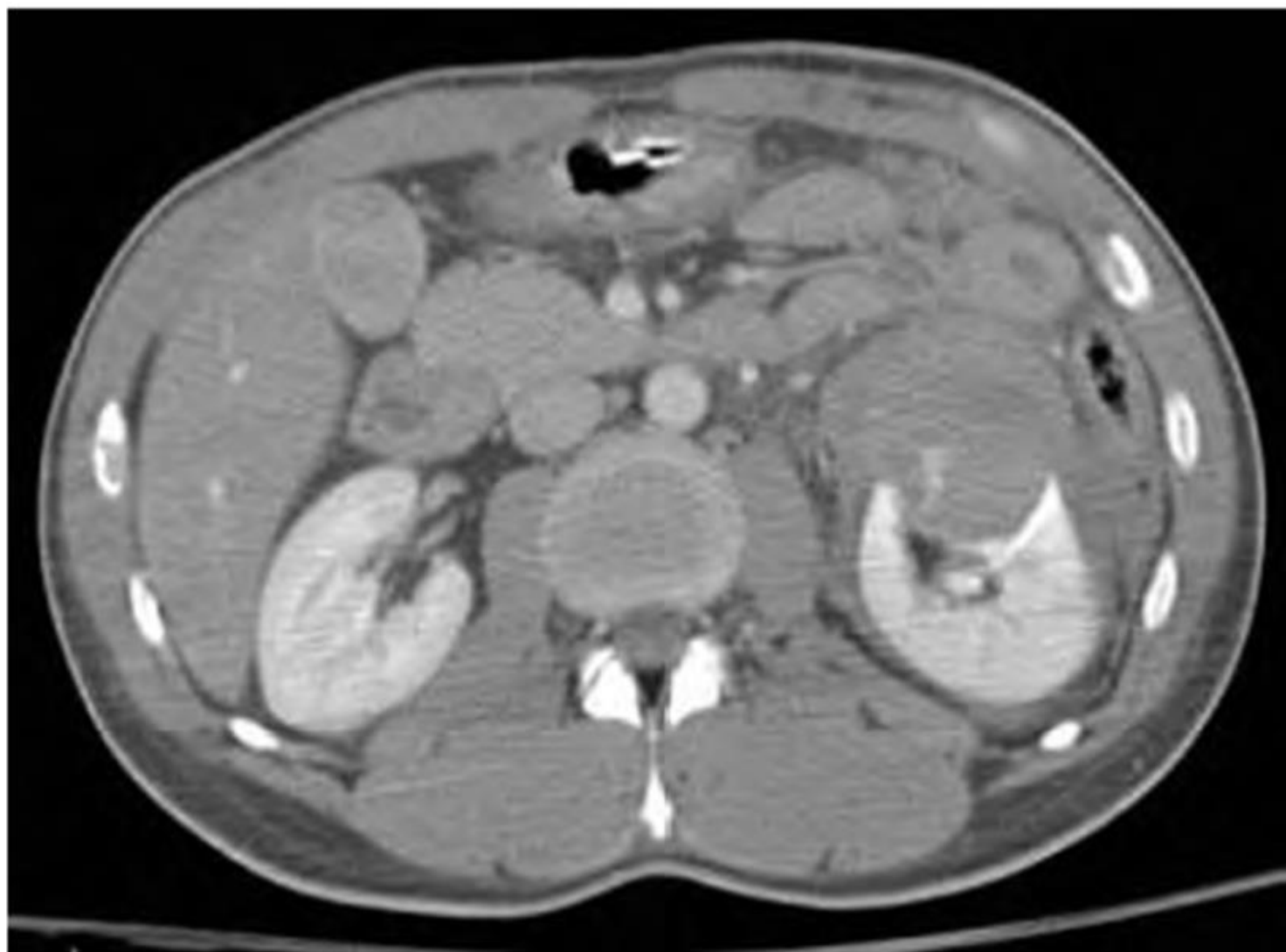


Fig. 90.5. Computed tomography showing left renal fossa hematoma after blunt renal trauma, with bright jet of active extravasation of intravascular contrast indicating brisk active bleeding.





Im:13 +C
[FOV 33.0cm
STNO

R
1
8
5

R





Fig. 90.4. (A) Computed tomography showing right renal artery thrombosis after crush injury. Note poor contrast uptake in right kidney compared with left and diffuse soft tissue injury medial to right kidney in the area of the renal artery. (B) Angiogram showing right renal artery thrombosis after crush injury.

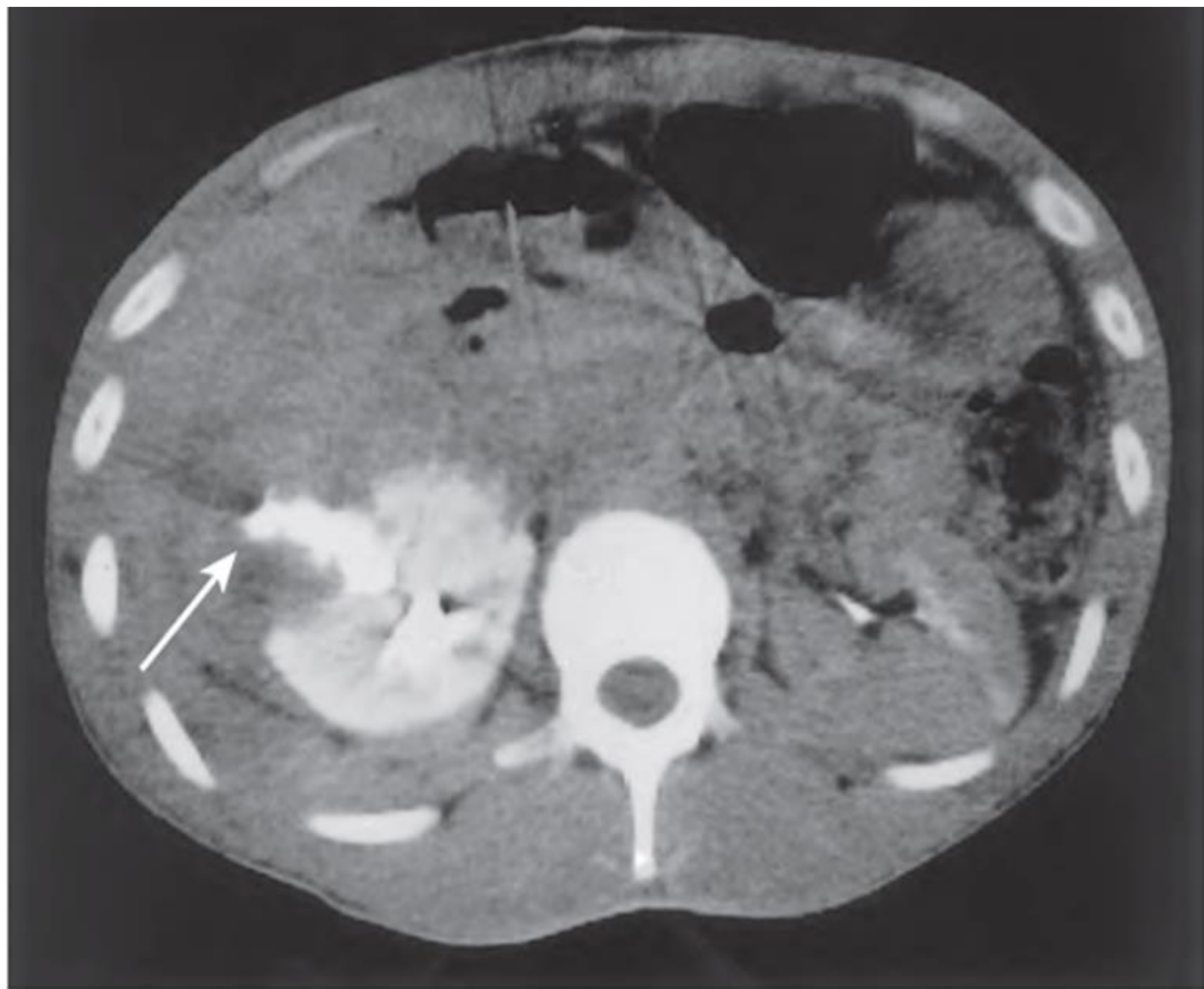
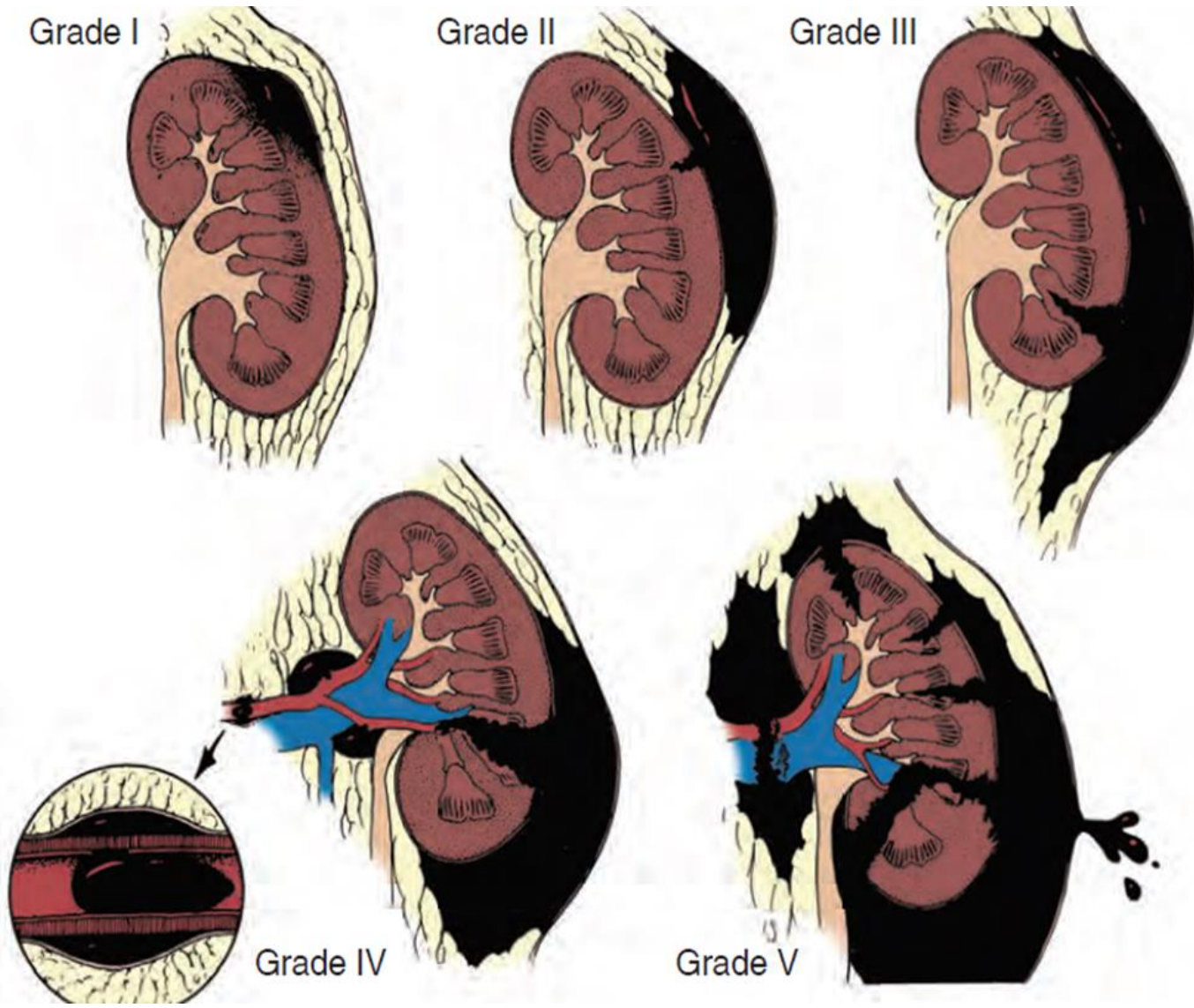


Fig. 90.3. Computed tomography scan of a right renal stab wound (grade IV) (*arrow*), demonstrating extensive urinary extravasation and large retroperitoneal hematoma.

The american association for the surgery of trauma (AAST) grading system

GRADE ^a	TYPE	DESCRIPTION
I	Contusion	Microscopic or gross hematuria, urologic studies normal
	Hematoma	Subcapsular, nonexpanding without parenchymal laceration
II	Hematoma	Nonexpanding perirenal hematoma confined to renal retroperitoneum
	Laceration	<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	Parenchymal laceration extending through renal cortex, medulla, and collecting system
	Vascular	Main renal artery or vein injury with contained hemorrhage
V	Laceration	Completely shattered kidney
	Vascular	Avulsion of renal hilum, devascularizing the kidney

The american association for the surgery of trauma (AAST) grading system



The american association for the surgery of trauma (AAST) grading system

- Grade 1 55%
- Grade 2 18%
- Grade 3 12%
- Grade 4 10%
- Grade 5 5%
- Urine leak 6.1%

Management

- Better renal outcomes when surgery can be avoided
- Conservative & non operative
- Initially hemodynamically stable or those who are stabilized in the OR
- Angioembolization
- Urinary extravasation

Management

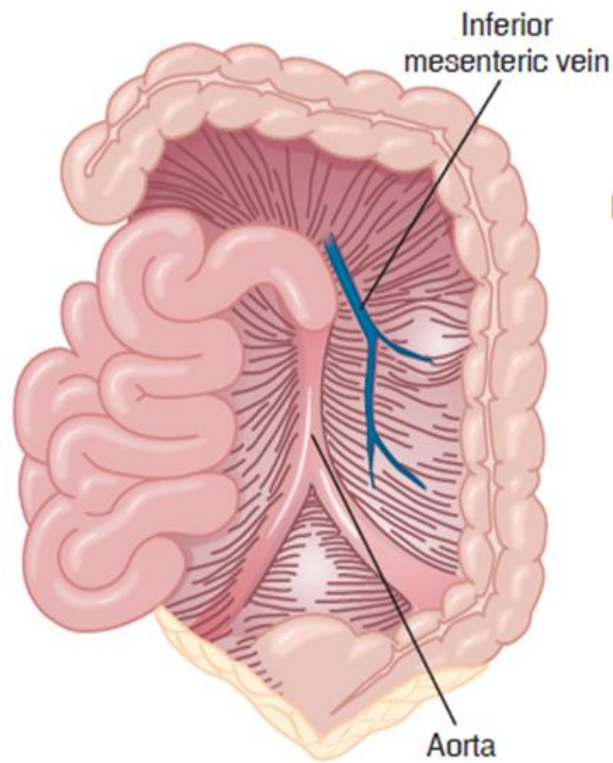
- ICU admit
- CBR
- CBC q 6-8h
- Repeat CT Scan :

grade 4-5 :48-72h

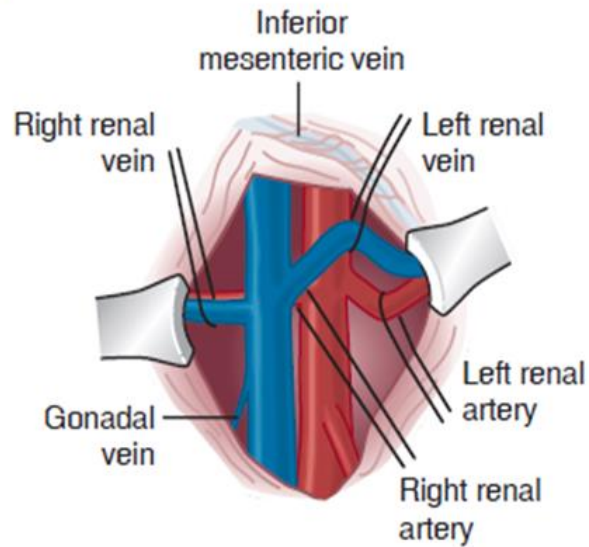
Fever, worsening flank pain
ileus or abdominal distention
persistent blood loss

Surgical techniques

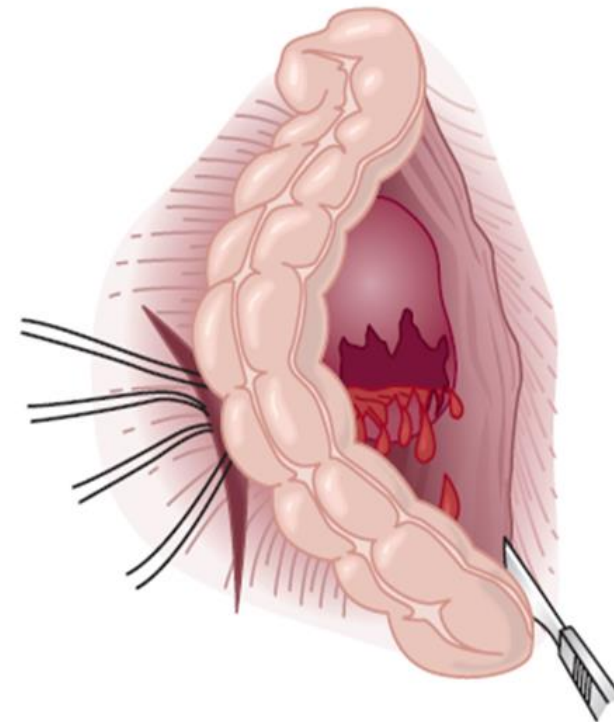
- The goals ; bleeding control
Renal repair
Perirenal drainage
- Concomitant injuries are not a contraindication for NSS
- Gerota fascia & perirenal fascia should be preserved



A

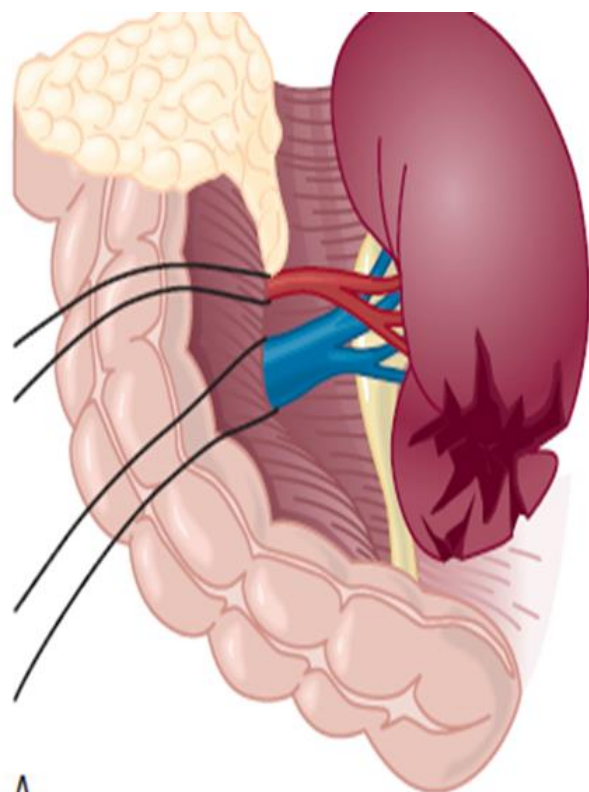


B

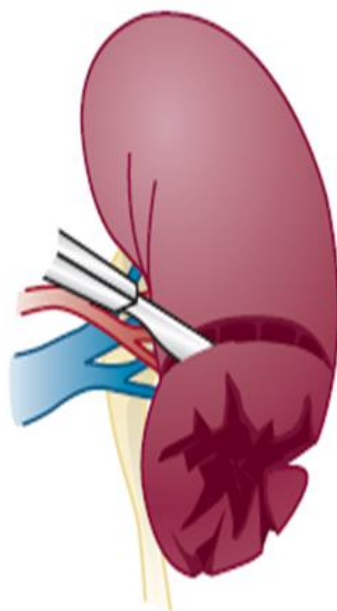


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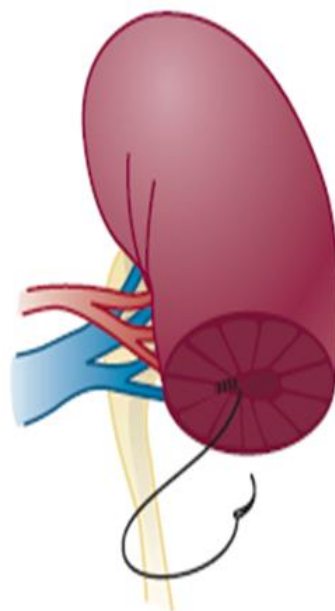
Fig. 90.8. The surgical approach to the renal vessels and kidney. (A) Retroperitoneal incision over the aorta medial to the inferior mesenteric vein. (B) Anatomic relationships of the renal vessels. (C) Retroperitoneal incision lateral to the colon, exposing the kidney.



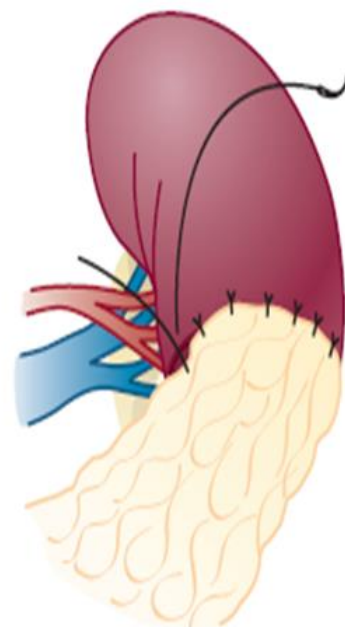
A



B Partial polar
nephrectomy

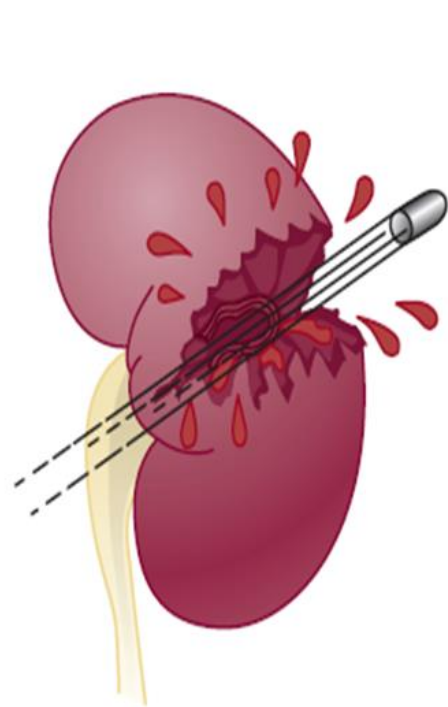


C Collecting system
closure

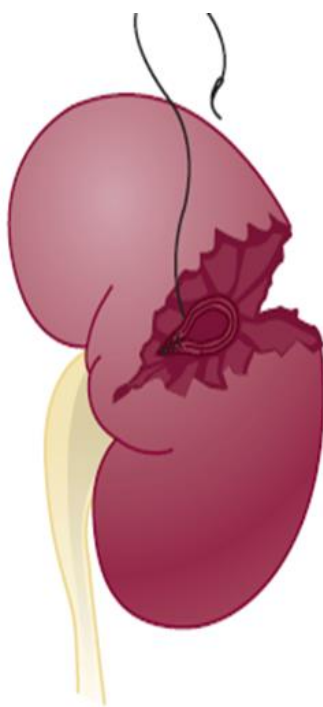


D Omental pedicle
flap

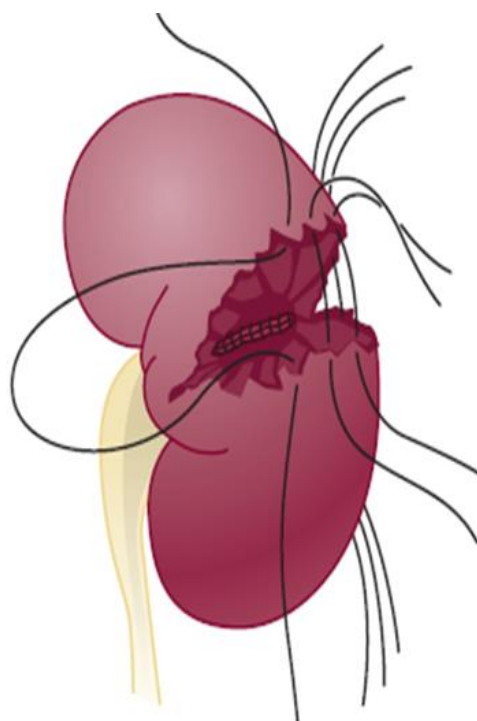
Fig. 90.9. Technique for partial nephrectomy. (A) Total renal exposure. (B) Sharp removal of nonviable tissue. (C) Hemostasis obtained and collecting system closed. (D) Defect covered.



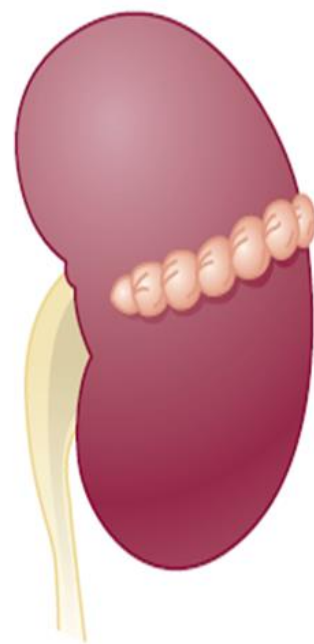
A Deep midrenal laceration into pelvis



B Closure of pelvis
Ligation of vessels



C Defect closure



D Absorbable gelatin
sponge (Gelfoam) bolster

Fig. 90.10. Technique for renorrhaphy. (A) Typical injury in midportion of kidney. (B) Debridement, hemostasis, and collecting system closure. (C) Approximation of parenchymal margins. (D) Sutures tied over gelatin sponge bolster.

Complications

- Urinoma
- Hypertension
- Delayed bleeding

