

INJURIES TO THE KIDNEY

Renal injuries are the most common injuries of the urinary system. It occurs in up to 10% of abdominal trauma.

The kidney is well protected by:

heavy lumbar muscles,

vertebral bodies,

ribs,

and the viscera anteriorly.

Etiology

- Blunt trauma directly to the abdomen, flank, or back. (80–85% of all renal injuries).
- Trauma may result from motor vehicle accidents, fights, falls, and contact sports.
- Vehicle collisions at high speed may result in major renal trauma.
- Gunshot and knife wounds cause most penetrating injuries to the kidney; any such wound in the flank area should be regarded as a cause of renal injury until proved otherwise.

Pathology & Classification

Grade 1 (the most common)—Renal contusion or bruising of the renal parenchyma. Hematoma is subcapsular and nonexpanding.

Grade 2—Renal parenchymal laceration <1cm into the renal cortex. Perirenal hematoma is usually small nonexpanding.

Grade 3—Renal parenchymal laceration extending through the cortex >1cm and into the renal medulla.

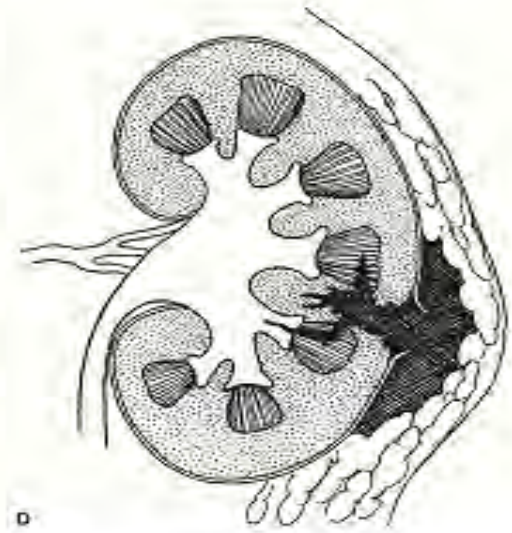
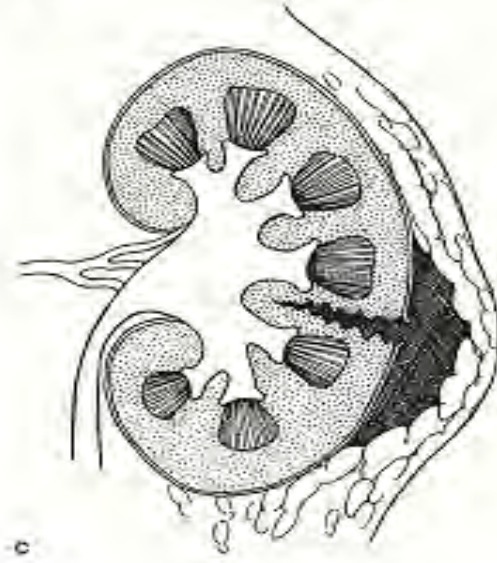
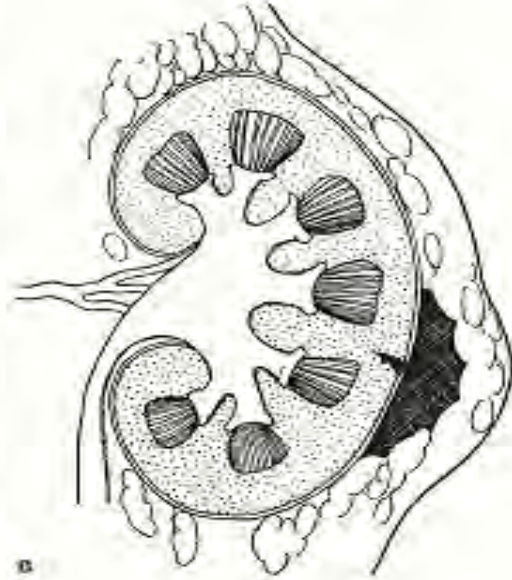
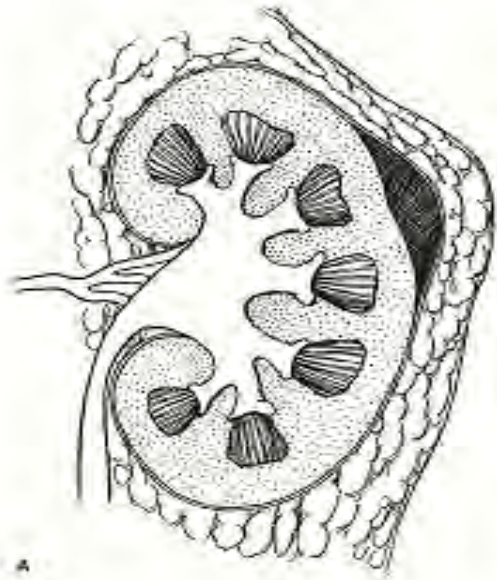
Grade 4:

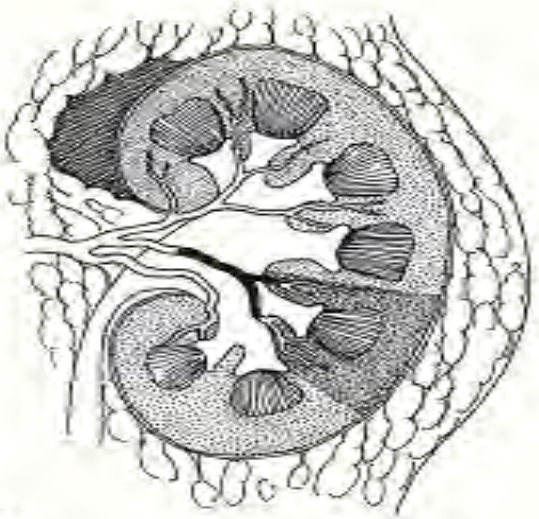
- laceration through the paranchyma into the urinary collecting system.
- Renal pelvis, collecting system laceration and/or complete ureteral pelvic distruption.
- Segmental vein or artery injury.

Grade 5:

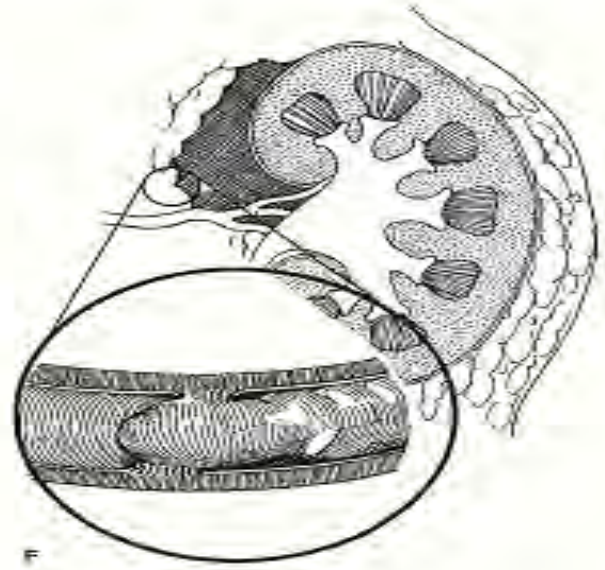
- Main renal artery or vein laceration or avulsion.
- Main artery or vein thrombosis.

- **Old 1995 criteria**
- **Grade 4**—(Renal parenchymal laceration extending into the renal collecting system; also, main renal artery or vein injury with contained hemorrhage.)
- **Grade 5**—Multiple parenchymal lacerations (shattered kid), renal pedicle avulsion, or both; main renal vein or artery injury from penetrating trauma.
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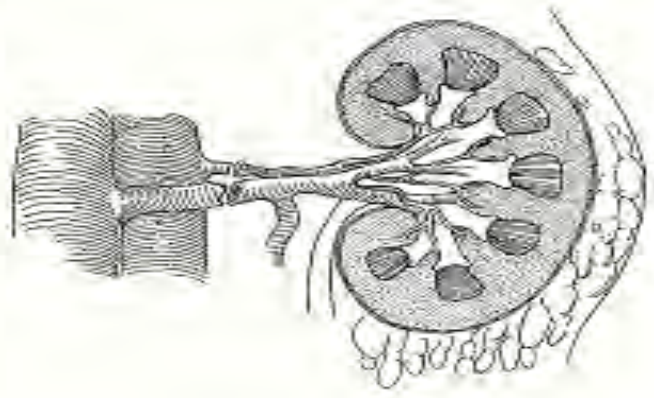
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A. SYMPTOMS

1. There is usually visible evidence of abdominal trauma.
2. Pain may be localized to one flank area or over the abdomen.
3. Associated injuries such as ruptured abdominal viscera or pelvic fractures also cause acute abdominal pain and may obscure the presence of renal injury.
4. Hematuria: the best indicators of urinary system injury.
Microscopic h. or frank h. with hypotension.
The severity of h. and the degree of renal injury do not consistently correlated.
5. Retroperitoneal bleeding may cause abdominal distention, ileus, and nausea and vomiting.(meteorism)

B. SIGNS

Initially, shock or signs of a large loss of blood from heavy retroperitoneal bleeding may be noted.

Ecchymosis in the flank or upper quadrants of the abdomen is often noted.

Lower rib fractures are frequently found.

Diffuse abdominal tenderness may be found on palpation; an “acute abdomen” usually indicates free blood in the peritoneal cavity.

A palpable mass may represent a large retroperitoneal hematoma or perhaps urinary extravasation.

The abdomen may be distended and bowel sounds absent.

C. LABORATORY FINDINGS

Microscopic or gross hematuria is usually present.

The hematocrit may be normal initially, but a drop may be found when serial studies are done.

Imaging studies

Abdominal contrast-enhanced CT scan, is the gold standard of genitourinary imaging in renal trauma staging.

This noninvasive technique clearly defines parenchymal lacerations and urinary extravasation, shows the extent of the retroperitoneal hematoma, identifies nonviable tissue, and outlines injuries to surrounding organs such as the pancreas, spleen, liver, and bowel .

Historically intravenous pyelogram was the most common modality used .)

Ultrasonography of little use initially in the evaluation of renal injuries.

Arteriography defines major arterial and parenchymal injuries .



Treatment

A. EMERGENCY MEASURES

The objectives of early management are prompt treatment of shock and hemorrhage, complete resuscitation, and evaluation of associated injuries.

1. exclude life threatening conditions .
2. I.V line should be established.
3. Blood should be crossed matched.
4. Analgesia.
5. Vital signs charting.
6. Antibiotics.
7. The patient should stay in bed about a week after haematuria.

Nonoperative Management:

Nonop. Management has become the standered care in hemodynamically stable, well staged grade I-III renal inj. Regardless of mechanism.

98% of blunt inj healed well when conservatively managed even in the setting of urinary extravasation and nonviable tissue. Even grade IV injuries can be managed without renal operation if carefully staged and selected.

Penetrating trauma from stab wounds or gunshots can be managed nonoperatively in stable patients.(contrary to the passed experience).

Patients with high grade III-V selected for conservative M. should be closely observed:

1. Serial hematocrit reading.
2. Strict bedrest until hematuria resolved.
3. Delayed bleeding(25%) : Angiography and selective embolization of bleeding vessels can obviate surgical intervention.

Absolute indication for surg.M.

1. Hemodynamic instability with shock.
2. Expanding / pulsatile renal hematoma.
3. Suspected renal pedicle avulsion .
4. p.U.J disruption.(pelviureteric junction)

Interventional radiology

provides the most important advance in renal trauma management.

Angiography with selective embolization is a reasonable alternative to laparotomy provided that there is no other indication for immediate open surgery.

Haemodynamically stable patients with grade 3 injuries or higher should be considered for formal angiography followed by embolization if active bleeding is noticed.

Complications

A. EARLY COMPLICATIONS

Hemorrhage.

Urinary extravasation (urinoma) .

A perinephric abscess.

B. LATE COMPLICATIONS

Hypertension,

hydronephrosis,

arteriovenous fistula,

calculus formation,

pyelonephritis

. Heavy late bleeding may occur 1–4 weeks after injury.

INJURIES TO THE URETER

Etiology

Ureteral injury is rare but may occur, usually during the:

1. course of a difficult pelvic surgical procedure.
2. Endoscopic basket manipulation of ureteral calculi may result in injury
3. as a result of stab or gunshot wounds
4. Rapid deceleration accidents may avulse the ureter from the renal pelvis.

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Injury recognized at time of operation:

U-V continuity should be restored unless the patient's condition is poor percutaneous nephrostomy should be done.

Injury not recognized at time of operation:

Unilateral injury:

1.No symptoms: secure ligation of the ureter may lead to silent atrophy of the kidney which may identified later.

2.Loin pain and fever, possibly with pyonephrosis occur with infection of obstructed system

IVU show a nonfunctioning kidney

Percutaneous nephrostomy to relieve obstruction.

3. A urinary fistula develops through the abdominal or vaginal wound.

IVU or contrast enhanced CT shows urinary extravasation with or without obstruction.

Ureteric reimplantation.

Bilateral obstruction:

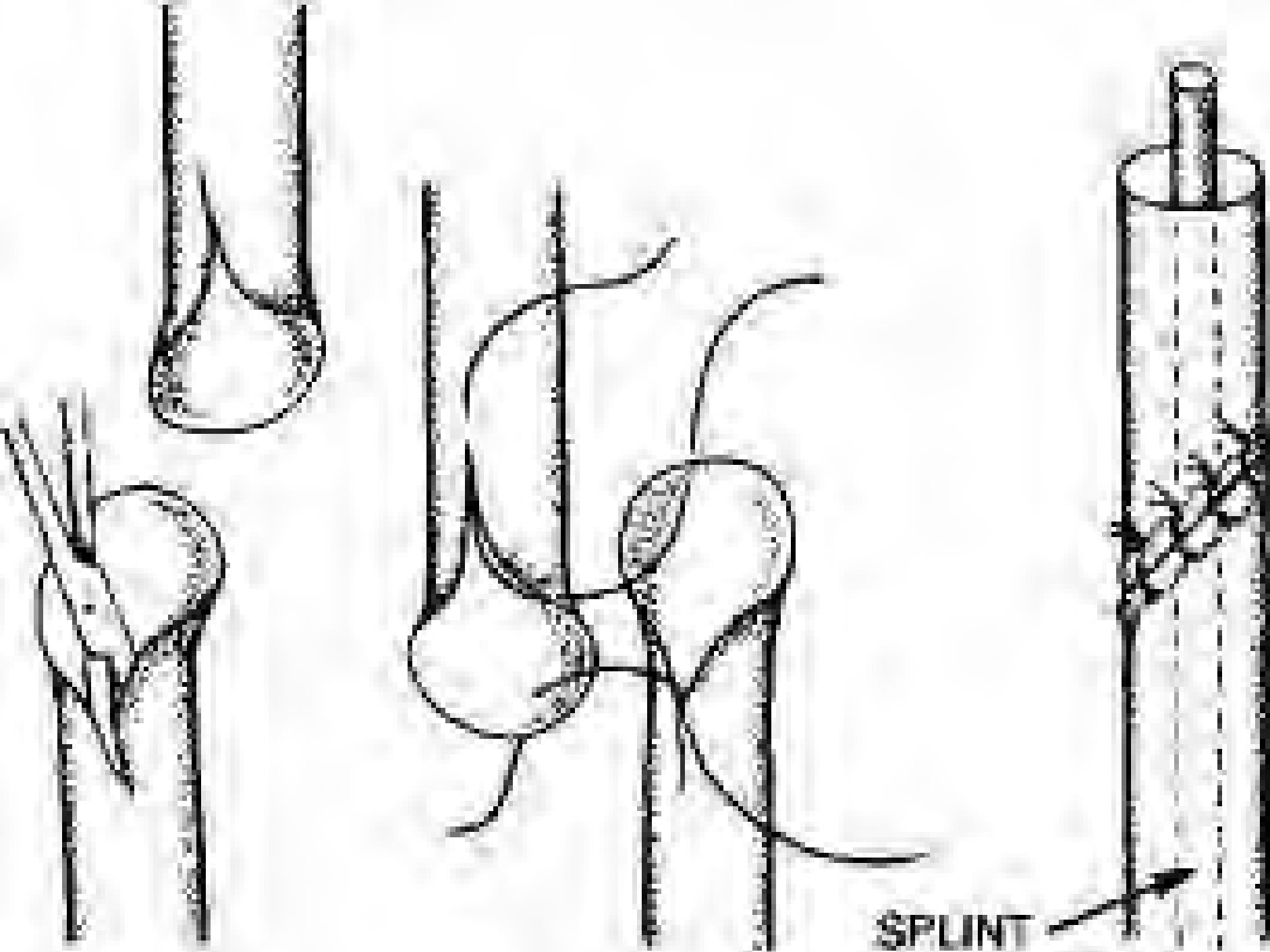
Ligation of both ureters lead to anuria.

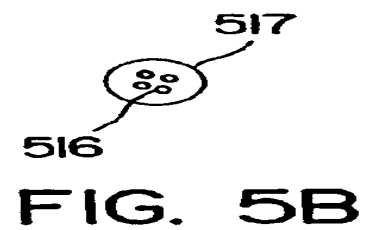
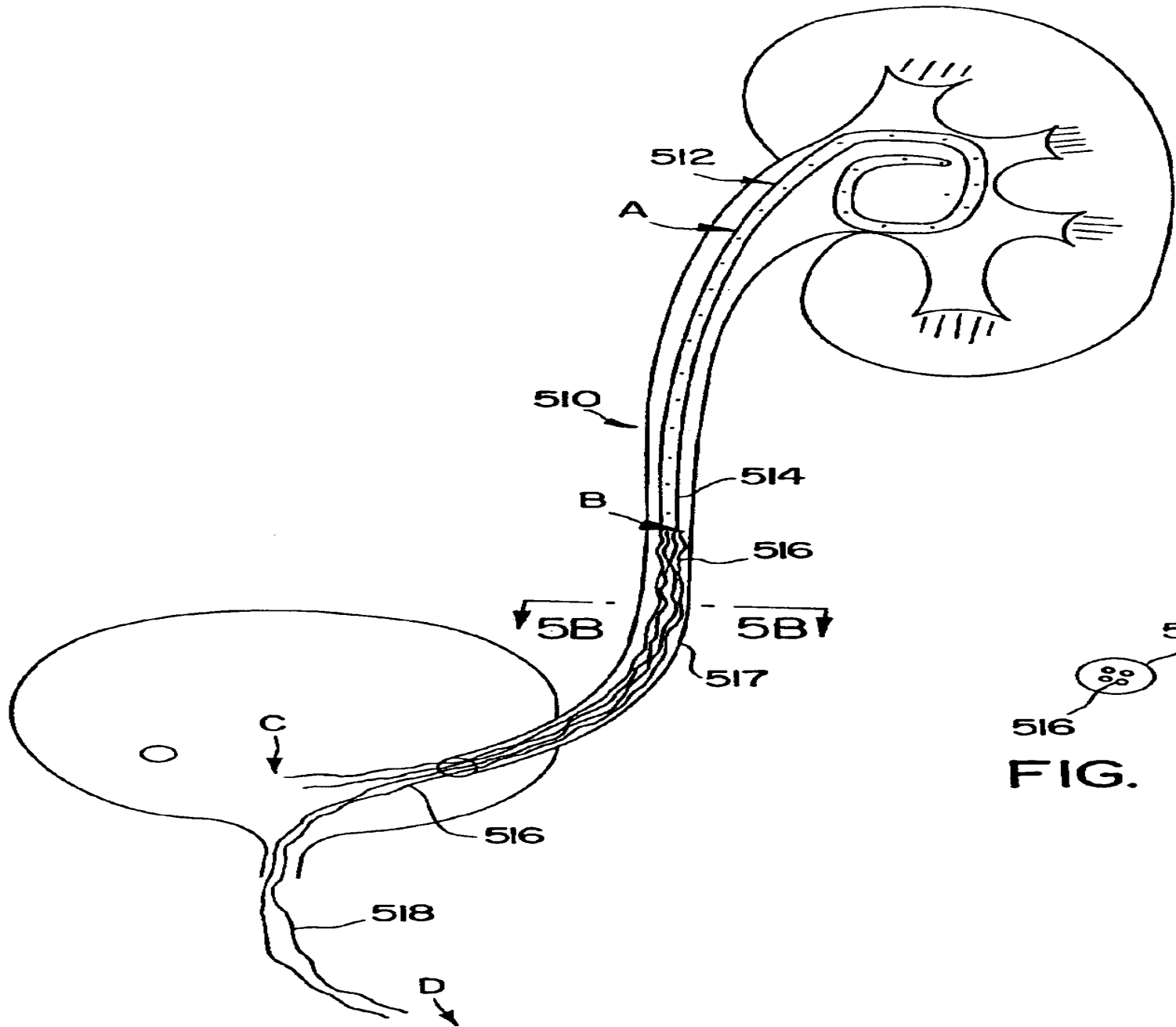
Ureteric catheter will not pass.

Relief of obstruction by nephrostomy or immediate surgery is essential.

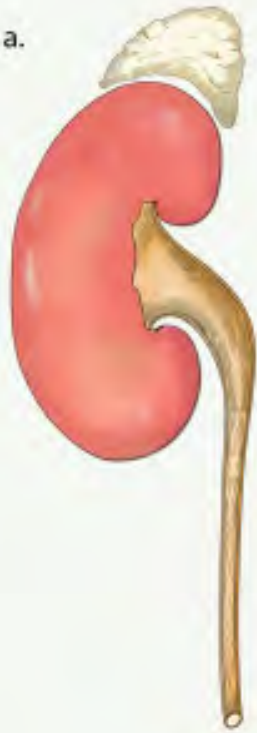
Repair of the injured ureter:

1. endoscopic insertion of double pigtail (double J) ureteric stent passing the partial obstruction.
2. spatulated tension free anastomosis over a pigtail catheter.
3. Lower ureteric injury : ureteric reimplantation.
Boari flap operation.
4. Transureteroureterostomy.
5. replacement of the damaged ureter by a segment of ileum.
6. autotransplantation.

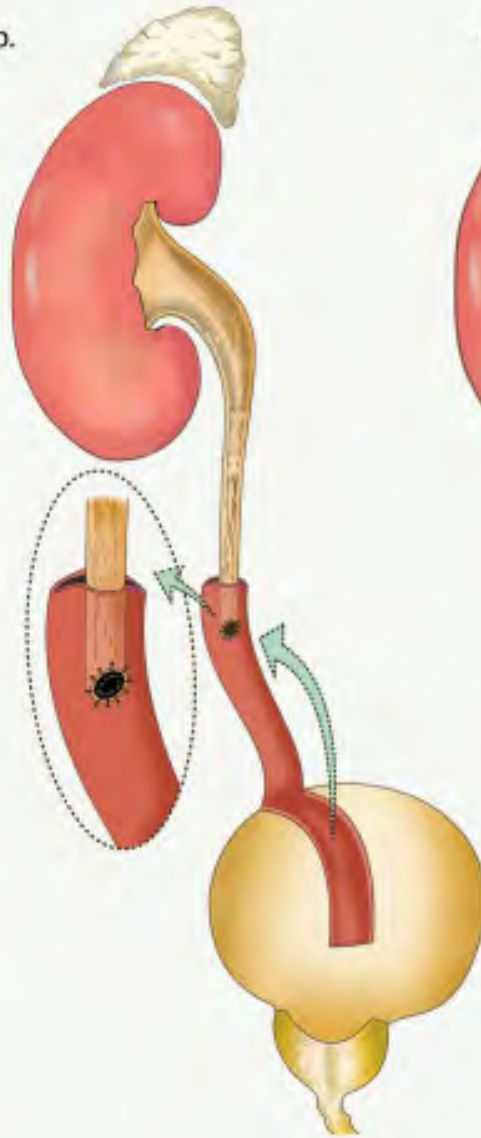




a.



b.



c.

