

GENITAL URINARY TRAUMA KIDNEY AND URETER



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RENAL INJURIES ETIOLOGY

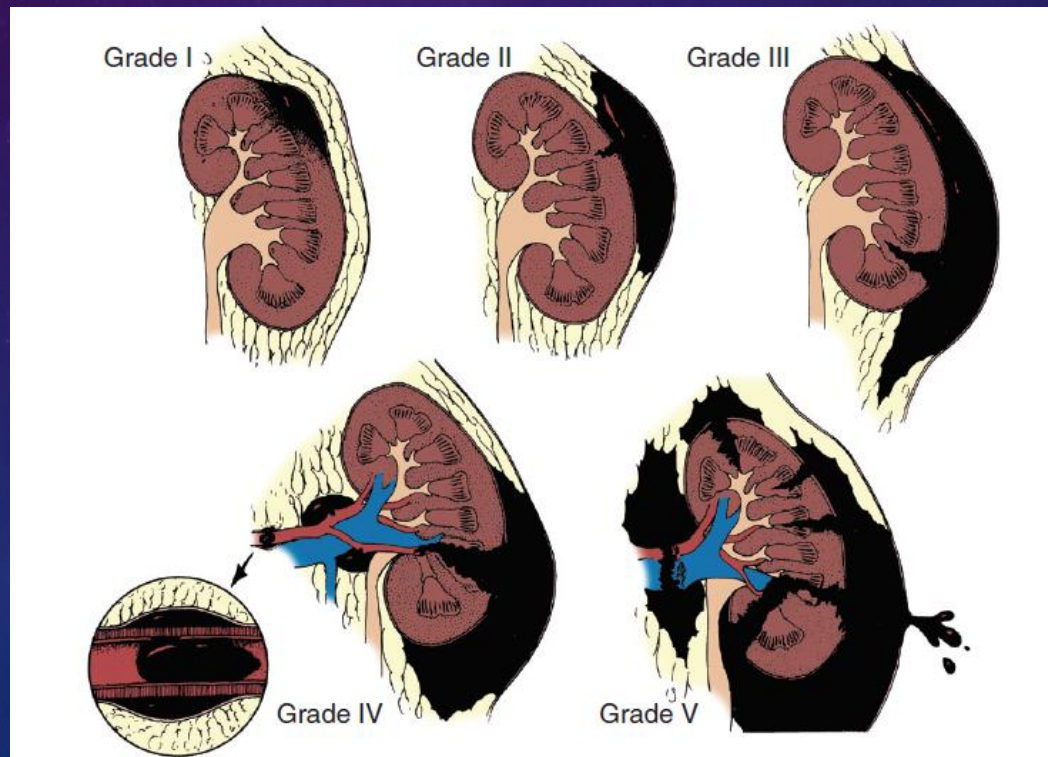
- Up to 10% of abdominal trauma cases
- Blunt renal trauma: Motor vehicle accidents, falls from heights
- Penetrating renal injuries : gunshot and stab wounds

SYMPTOMS AND SIGN

- Hematuria: best indicators of significant urinary system injury include the presence of microscopic or gross hematuria and hypotension (systolic blood pressure <90 mm Hg).
- The degree of hematuria and the severity of the renal injury **do not consistently** correlate.
- No hematuria was in 7% grade IV renal injuries and 36% of renal vascular injuries

CLASSIFICATION

- American Association for the Surgery of Trauma Organ Injury Severity Scale for the Kidney (1989)
- Accurate grading made possible by contrast-enhanced computed tomography (CT),



American Association for the Surgery of Trauma Organ Injury Severity Scale for the Kidney

GRADE*	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

IMAGE FINDINGS

- Findings on CT that raise suspicion for major injury
- (1) medial hematoma, suggesting vascular injury;
- (2) medial urinary extravasation, suggesting renal pelvis or ureteropelvic junction avulsion injury
- (3) lack of contrast enhancement of the parenchyma, suggesting arterial injury.

MANAGEMENT

- **Nonoperative Management**
- Standard of care in hemodynamically stable, in grade I to III renal injuries, regardless of mechanism
- 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**

- Bluntly injured kidneys heal well when managed conservatively, even in the setting of urinary extravasation and nonviable tissue; 98% can be successfully managed without exploration (Broghammer et al, 2007).
- In a series of six hemodynamically stable, grade V blunt injuries, **four (66%)** kidneys demonstrated satisfactory function after conservative treatment (Altman, 2000).

- All patients with high-grade injuries (grades III to V) selected for nonoperative management should be closely hematocrit.
- Strict bed rest is mandatory until gross hematuria resolves.
- Most grades II to IV injuries resolve uneventfully, delayed renal bleeding can occur in up to 25%
- angiography with selective embolization in bleeding persist or delayed bleeding occur

INDICATIONS FOR ANGIOGRAPHY WITH EMBOLIZATION

- Bleeding from a renal segmental artery with or without parenchymal laceration
- Unstable condition with grade III to IV injury,
- arteriovenous fistula or pseudoaneurysm,
- persistent gross hematuria, and/or blood loss exceeding 2 units in 24 hours.

OPERATIVE MANAGEMENT

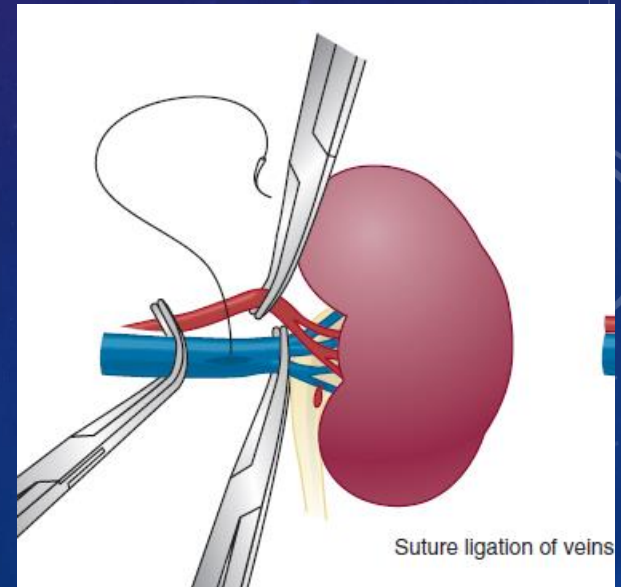
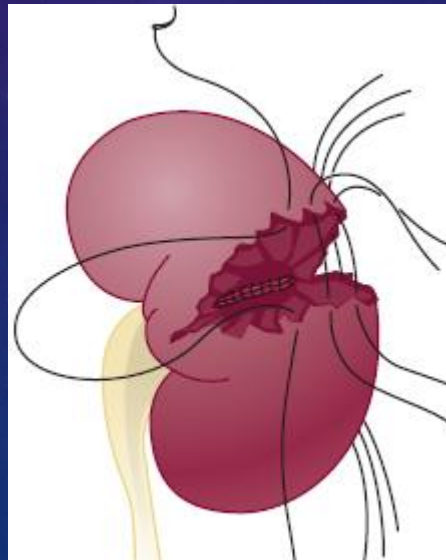
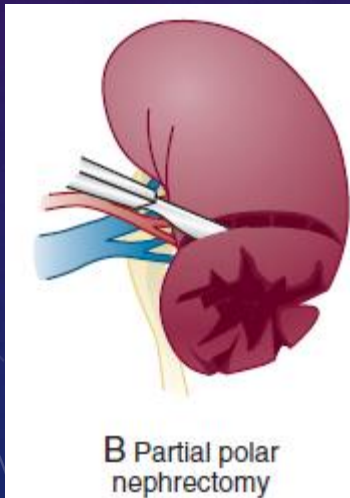
- **Absolute indications include**
- (1) hemodynamic instability with shock;
- (2) expanding/pulsatile renal hematoma (usually indicating renal artery avulsion);
- (3) suspected renal pedicle avulsion
- (4) ureteropelvic junction disruption.

RENAL EXPLORATION

- Best done by a transabdominal approach, which allows complete inspection of intra-abdominal organs and bowel
- Renal bleeding is a major cause of nephrectomy in renal trauma.
- Obtaining early vascular control before opening Gerota fascia can decrease renal loss
 - nephrectomy rate was reduced from 56% to 18%

RENAL RECONSTRUCTION

- Partial nephrectomy
- Renorrhaphy
- Vascular repair



URETERAL INJURIES

Etiology

- **External trauma:** less than 1% of all genitourinary trauma.
- **Iatrogenic:** open surgery, laparoscopy, and endoscopic procedures.

American Association for the Surgery of Trauma
Organ Injury Severity Scale for the Ureter

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

SURGICAL INJURY

- hysterectomy (54%), colorectal surgery (14%), other pelvic procedures like ovarian tumor removal (8%) abdominal vascular surgery (6%)
- Avoidance of ureteral injury is predicated on intimate knowledge of its location

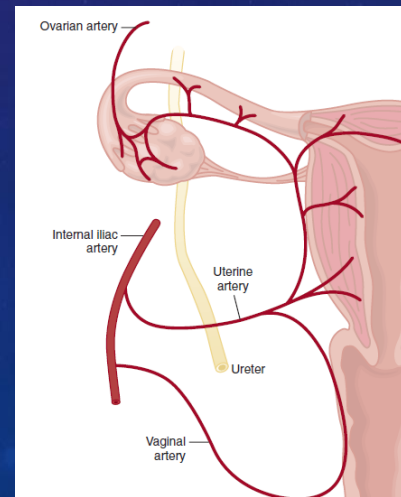


Figure 42-13. Ureteral anatomy showing relationship to fallopian tube and uterine artery.

- Ureteroscopic Injury : perforation rate of 1% to 5% (Schuster et al, 2001), of which 0.2% requires open surgery (Butler et al, 2004) with an additional 5% incidence of delayed stricture occurrence (Schuster et al, 2001).
- Risk factors: longer surgery times, treatment of renal calculi, surgeon inexperience, and previous irradiation

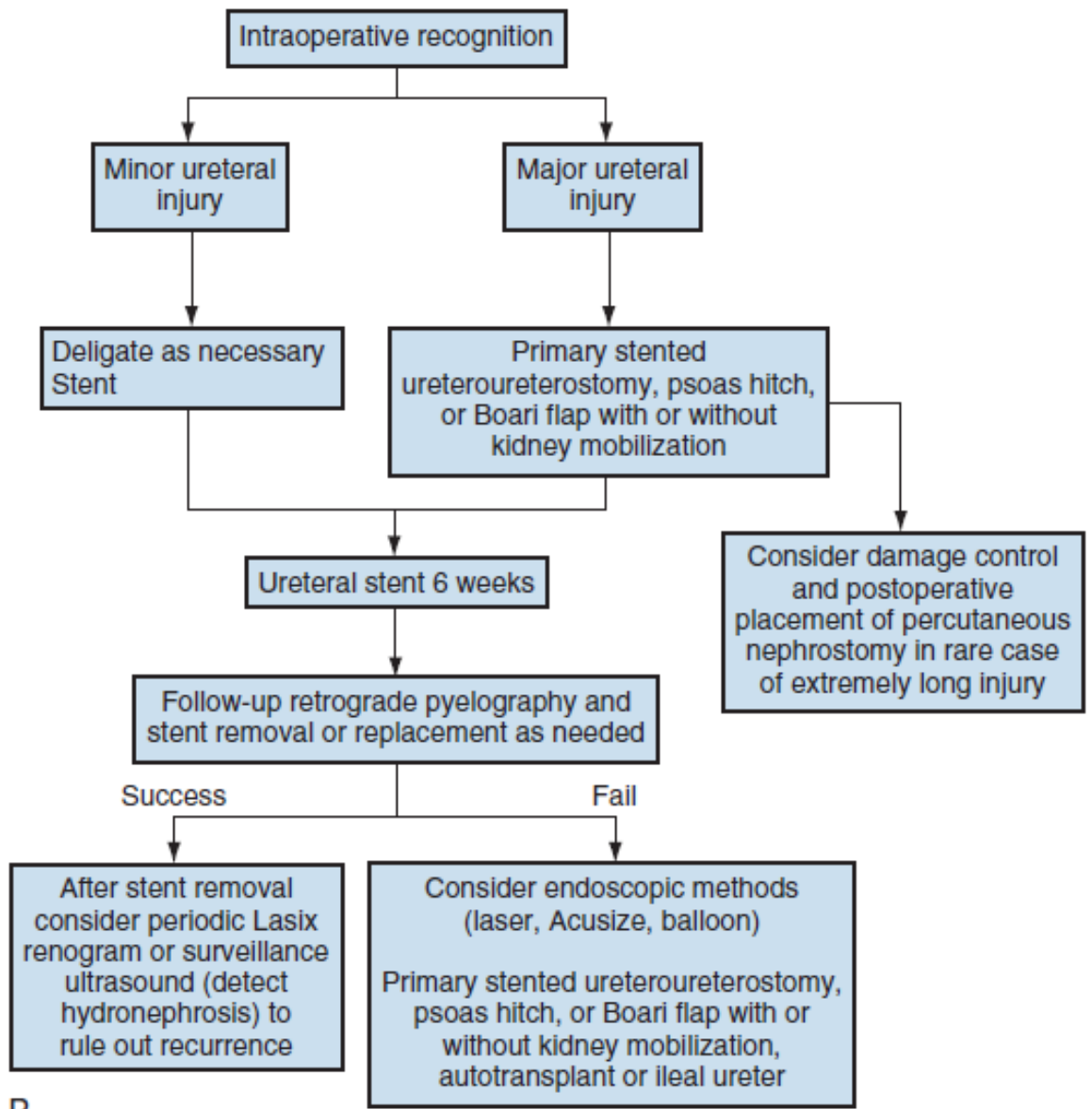
DIAGNOSIS

- Intraoperative recognition : 57% that were identified intraoperatively

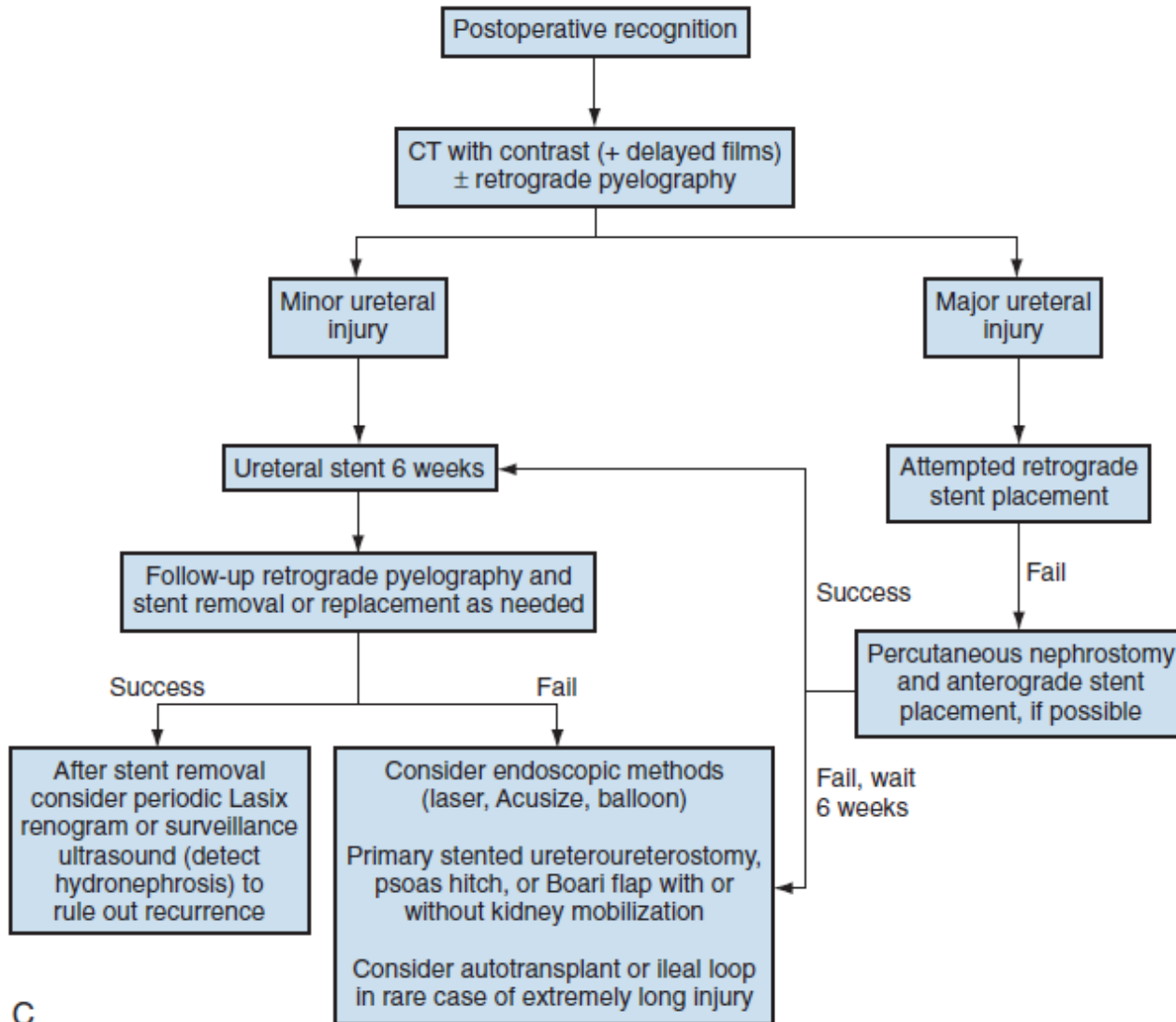
Image study

- Excretory Urography: IVP or CTU
- Retrograde Ureterography: the most sensitive radiographic test for ureteral injury
- Anterograde ureterography: If retrograde stent placement is not possible

- An unrecognized ureteral injury can lead to significant complications including urinoma, abscess, ureteral stricture, urinary fistula, and potential loss of an ipsilateral renal unit.
- Delay recognition: Some authors have cited a triad: fever, leukocytosis, and generalized peritoneal signs as being most diagnostic for missed ureteral injury (Medina et al, 1998).



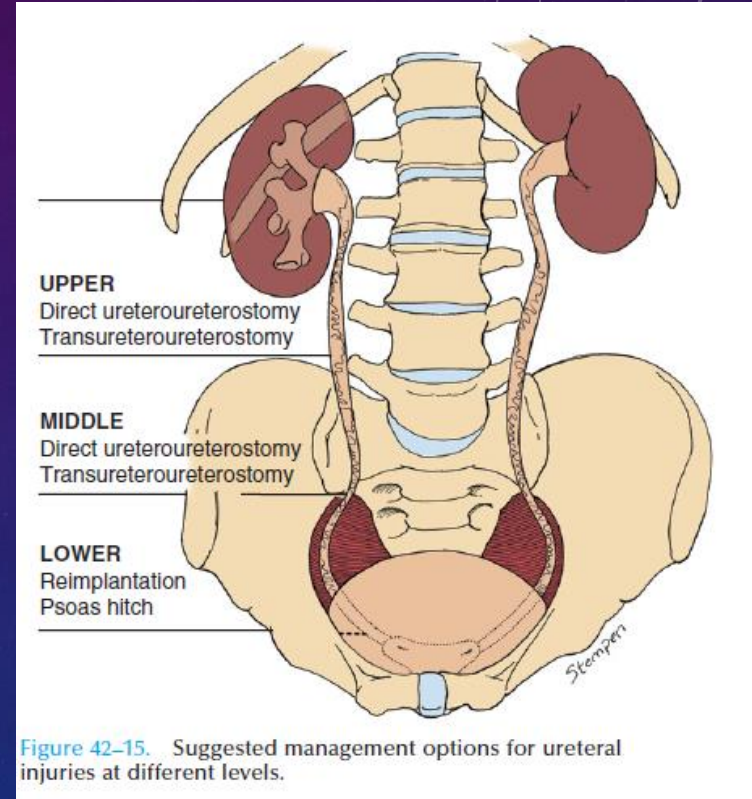
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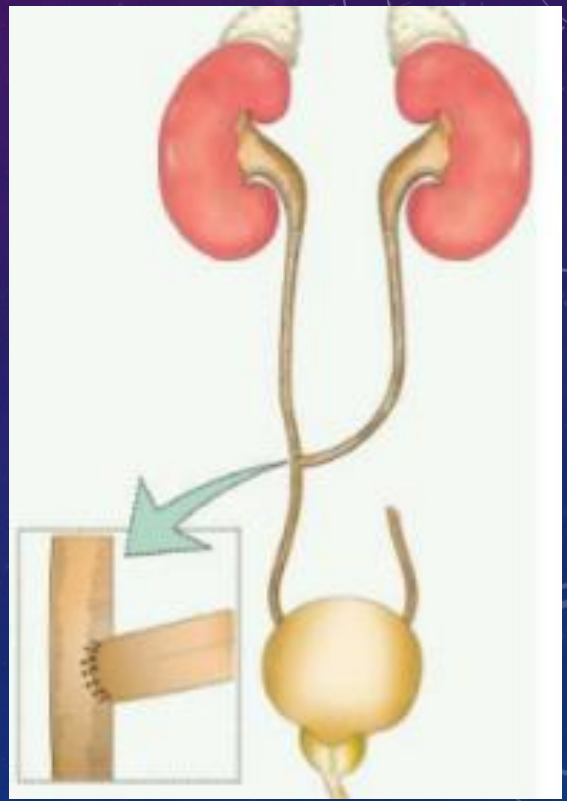
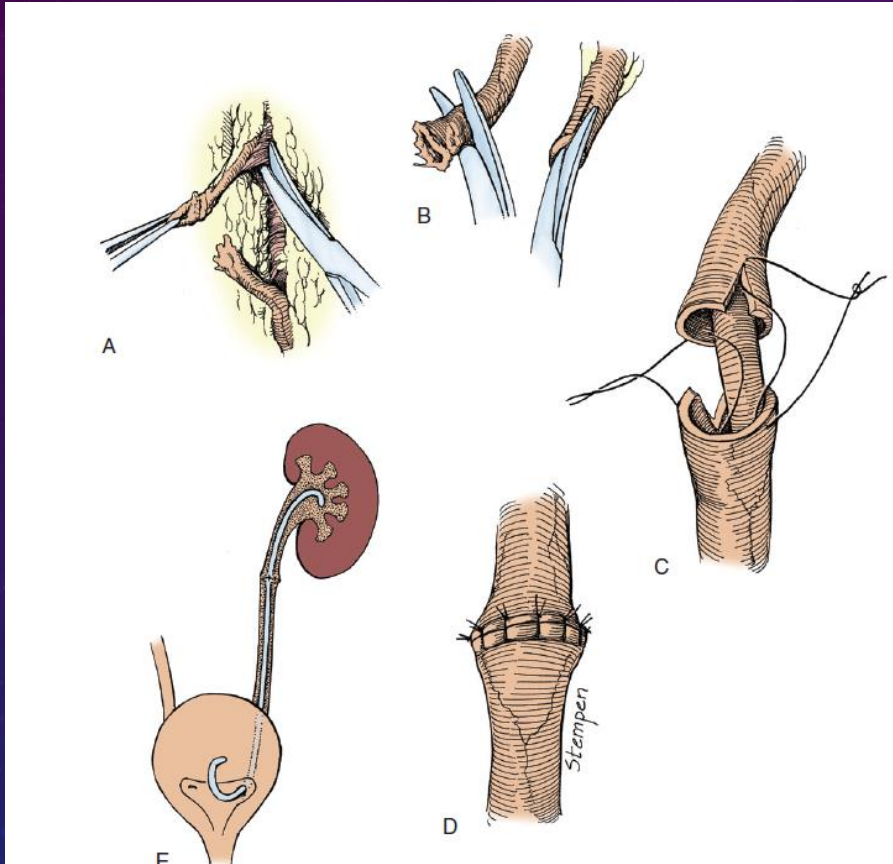


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MANAGEMENT

- Upper Ureteral Injuries
 - *Ureteroureterostomy*
 - *Autotransplantation*
 - *Bowel Interposition:*
- Midureteral Injuries
 - *Ureteroureterostomy*
 - *Transureteroureterostomy*





BOWEL INTERPOSITION

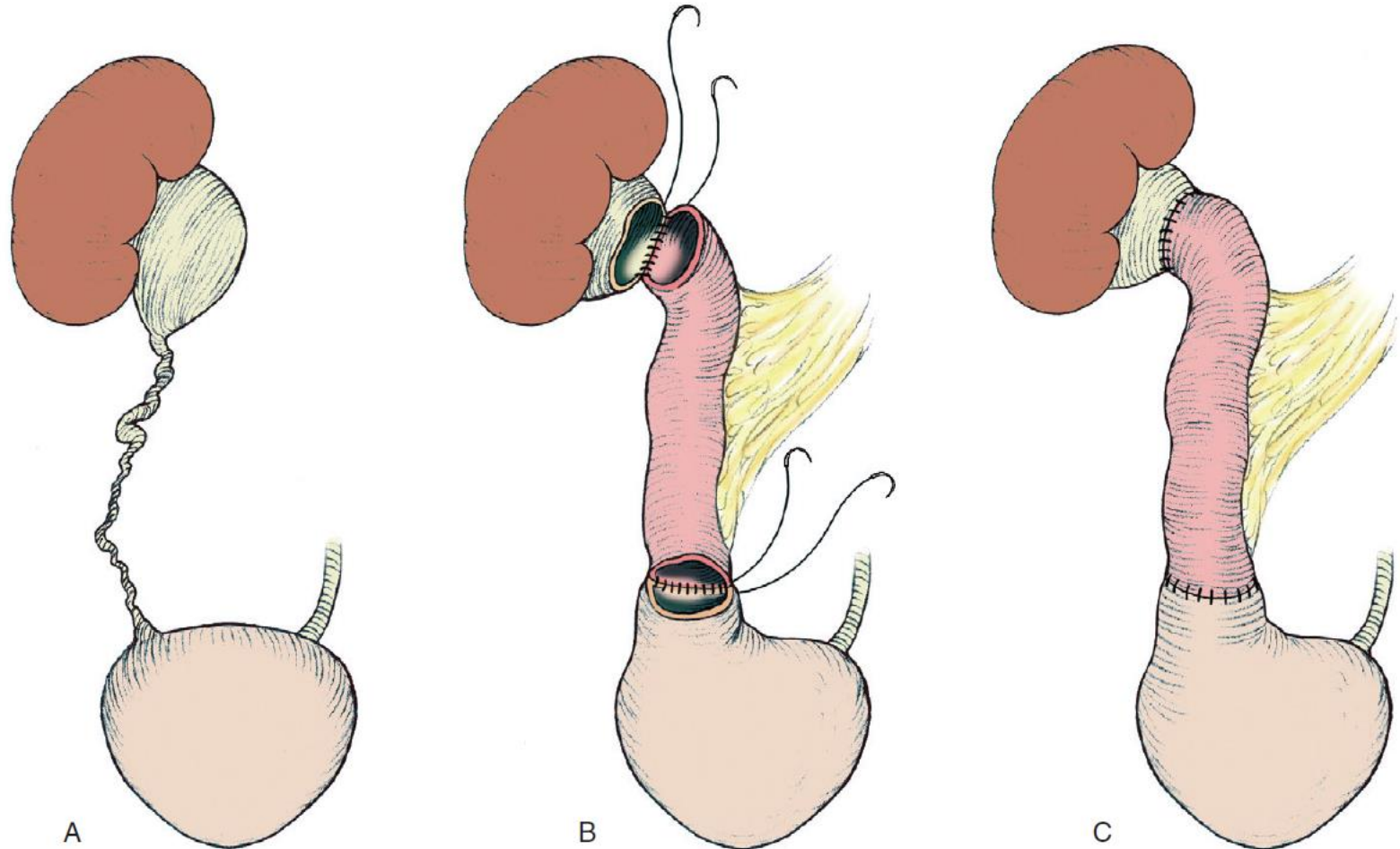
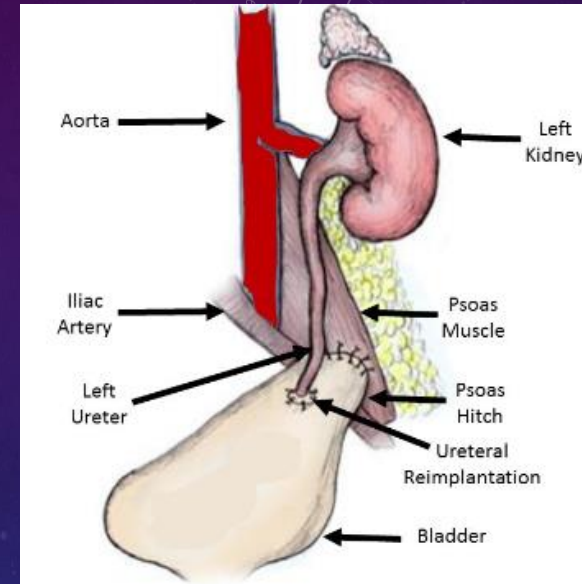
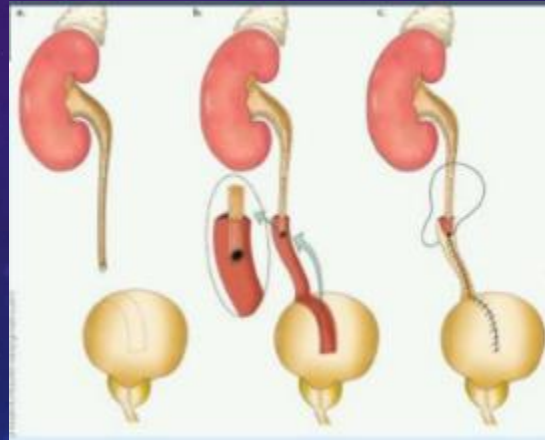


Figure 41-35. A, In ileal ureteral substitution, the affected ureter is first identified and dissected, which is followed by removal of the diseased portion. B, A piece of ileum is brought through the colonic mesentery to bridge the renal pelvis and the bladder. C, Both proximal and distal anastomoses are completed in full-thickness, water-tight, tension-free manner.

- Lower Ureteral Injuries
 - *Ureteroneocystostomy*
 - *Psoas Bladder Hitch.*
 - *Boari Flap.*



- *Minimally Invasive: laparoscopic and robotic*

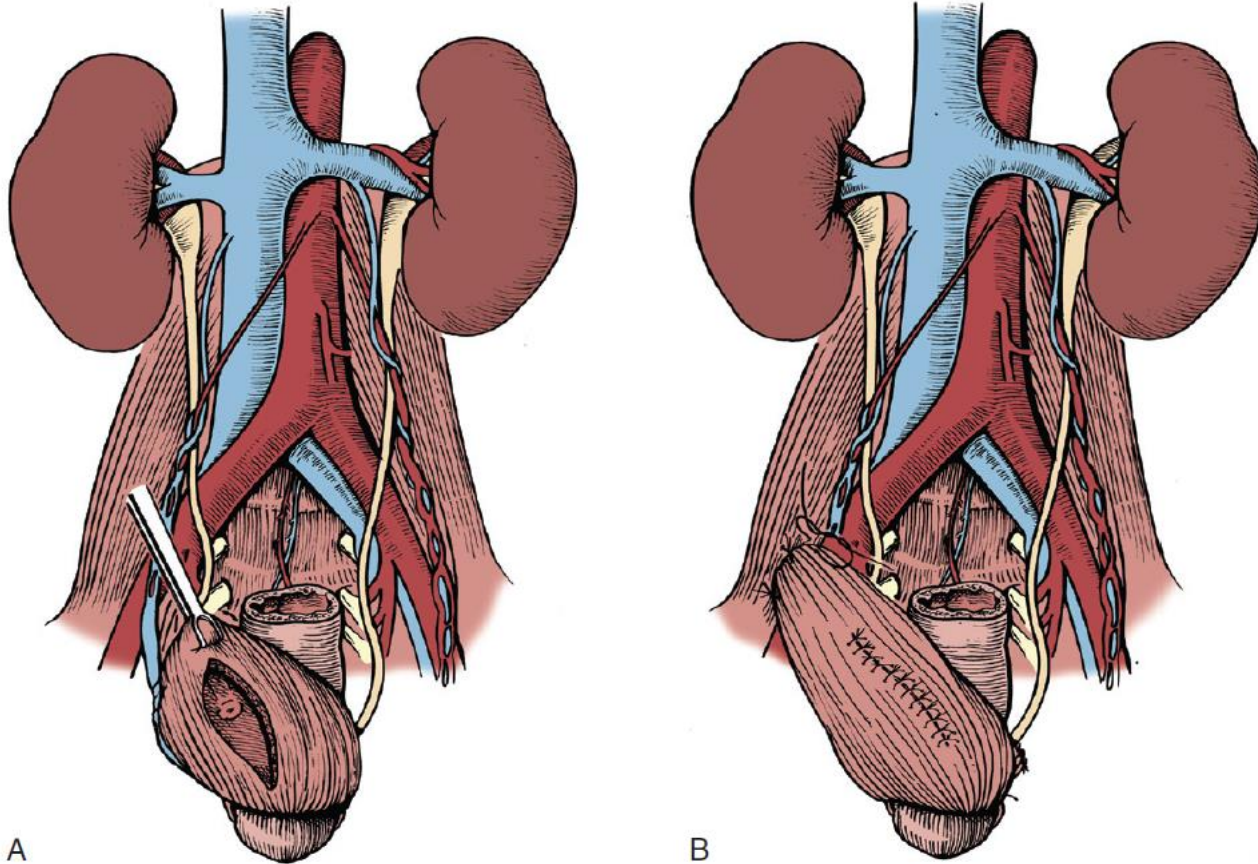


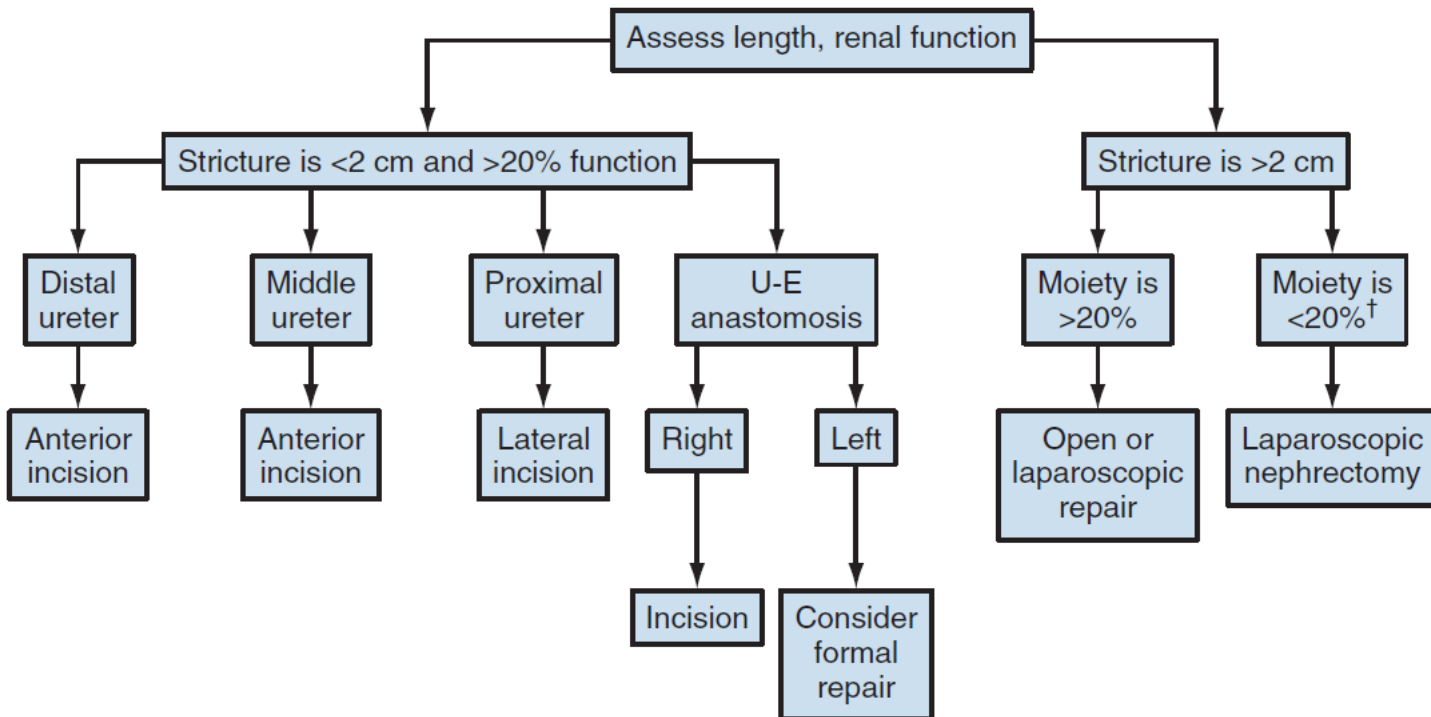
Figure 41-31. A, In psoas hitch, an anterior cystostomy is performed following bladder mobilization. B, The bladder dome is fixed to the ipsilateral psoas tendon, and the ureteral reimplantation is completed in a tension-free manner.

- Distal ureteral stricture may be managed with ureteroneocystostomy with a psoas hitch or Boari flap.
- Boari flap may be used to bridge a 10- to 15-cm ureteral defect.
- Small bladder capacity is a contraindication to such flap creation. Care should be taken to ensure adequate vascular supply to the flap.
- Ileal ureter is useful in the presence of extensive ureteral loss. It is contraindicated in cases of baseline renal insufficiency with a serum creatinine of greater than 2 mg/dL

URETEROSCOPY INJURY

- Avulsion. Ureteral avulsion during ureteroscopy is treated in the same manner as ureteral injuries after open or laparoscopic surgery
- Perforation. Ureteral perforation can be treated by ureteral stenting, usually with no subsequent complications

OPTIMAL THERAPY FOR BENIGN URETERAL STRICTURES*





THANK YOU FOR YOUR ATTENTION