

Radiology Renal System



Objectives:

- Modality used for assessment of the urinary system
 - X-ray
 - us
 - Ct
 - MRI
 - Nuclear
- Normal anatomy
- Common pathologies
 - Kidney
 - Ureter
 - Bladder
 - Urethra

Modalities used:

- **US**

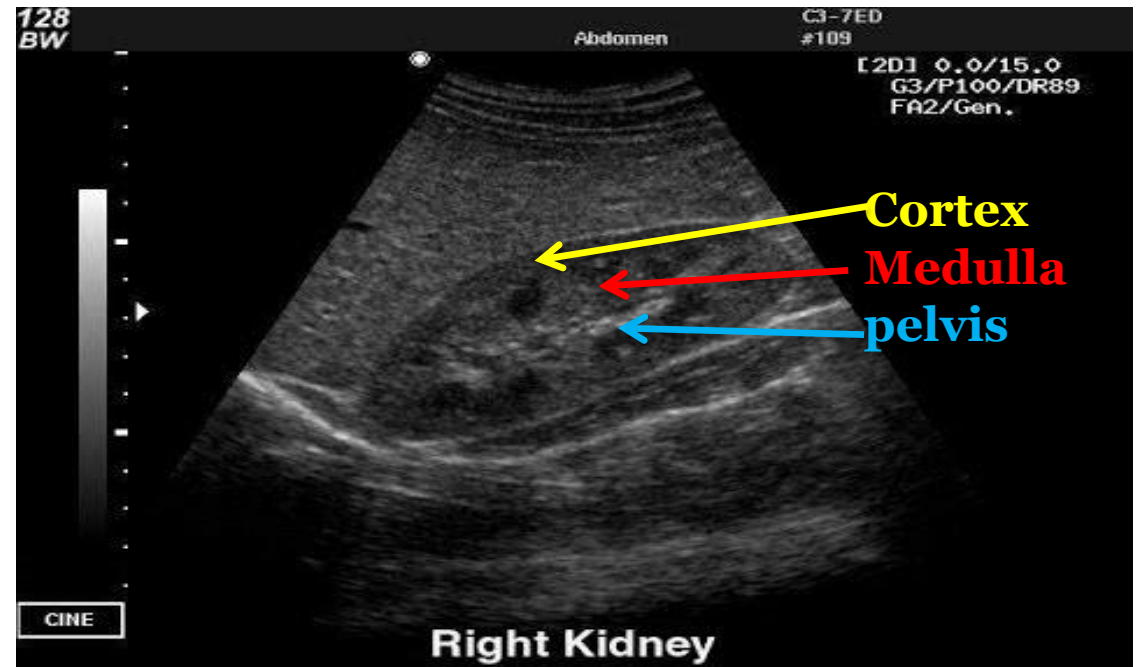
- Pros: (no ionizing radiation , inexpensive , portable)
- Cons :(operator dependent, time consuming)

Image Key:

White = stones and calcification.

Grey = soft tissue.

Black = fluid.



Modalities used

- **X rays**
 - Pros (inexpensive , quick)
 - Cons (ionizing radiation , not definitive)

Image Key:

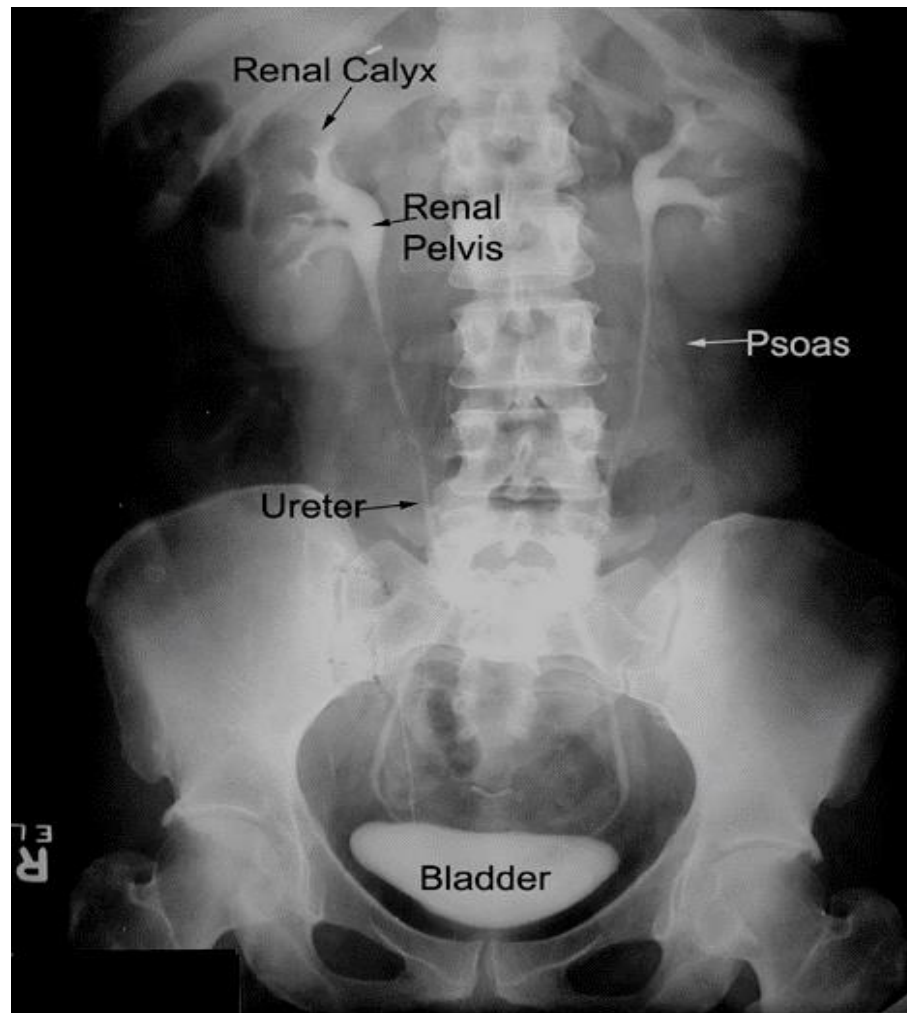
White = bone and calcification.

Grey = soft tissue.

Black = air.



IVP



Modalities used

- **CT**
 - Pros (quick , a lot of information)
 - Cons (ionizing radiation , expensive)

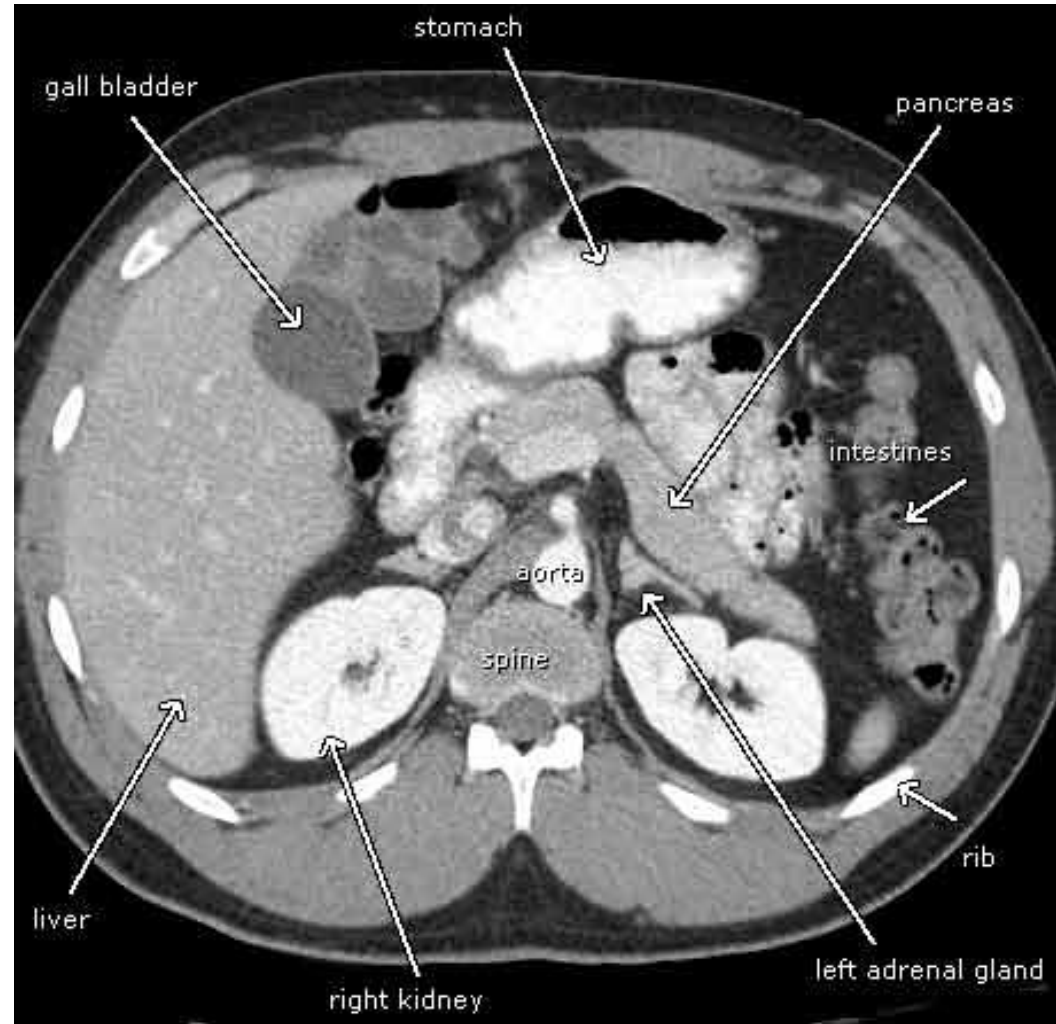
Image key:

White = bones and calcification.

Grey = soft tissue.

Black = air.





Modalities used

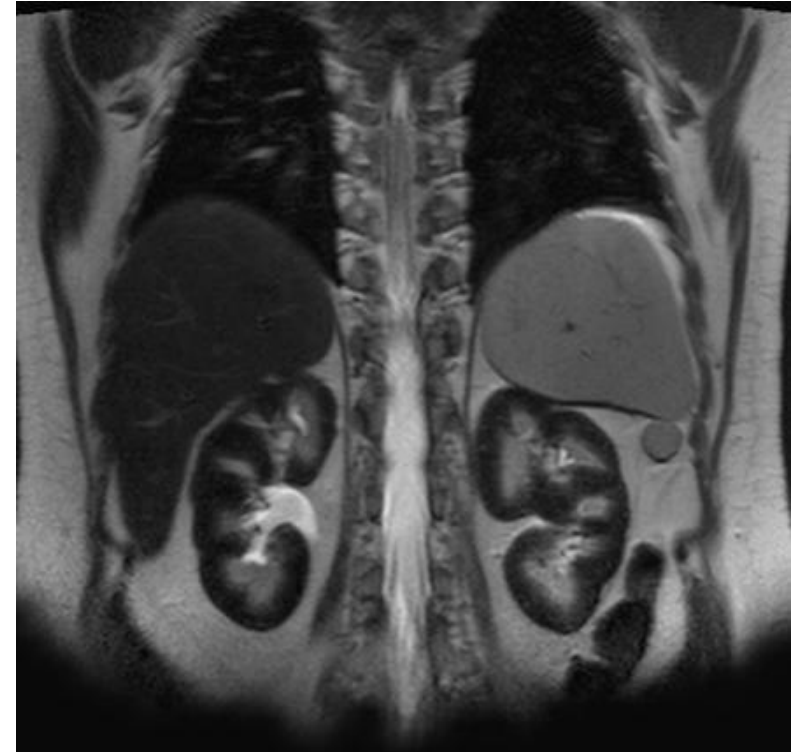
- **MRI**

- Pros (no ionizing radiation , a lot of information)
- Cons (expensive , time consuming)

Image key:

White = high intensity.

Grey to black = low intensity.



Modalities used

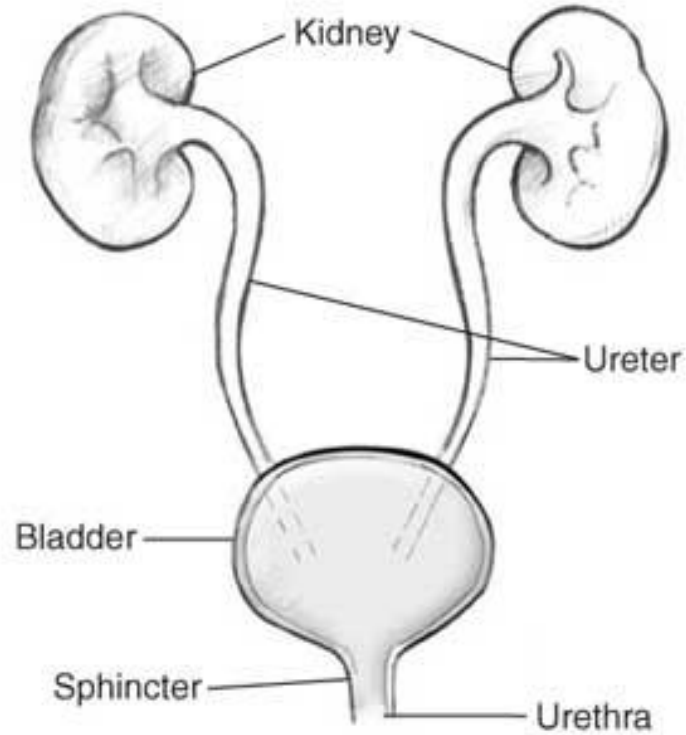
- **Nuclear scans**

- Pros (assess the function)
- Cons (time consuming , radioactive materials)



modality	US	X-ray	CT	MRI	Nuclear
Pros	<ul style="list-style-type: none"> No Ionized radiation. Cheep. Portable. 	<ul style="list-style-type: none"> Cheep. Quick. 	<ul style="list-style-type: none"> Quick. Gives lots of information. 	<ul style="list-style-type: none"> No Ionized radiation. Gives lots of information. 	<ul style="list-style-type: none"> Assess the function.
Cons	<ul style="list-style-type: none"> Operator dependent. Time consuming. 	<ul style="list-style-type: none"> Ionized radiation. Not defective. 	<ul style="list-style-type: none"> Expensive. Ionized radiation. 	<ul style="list-style-type: none"> Expensive. Time consuming. 	<ul style="list-style-type: none"> Time consuming. Radioactive materials.

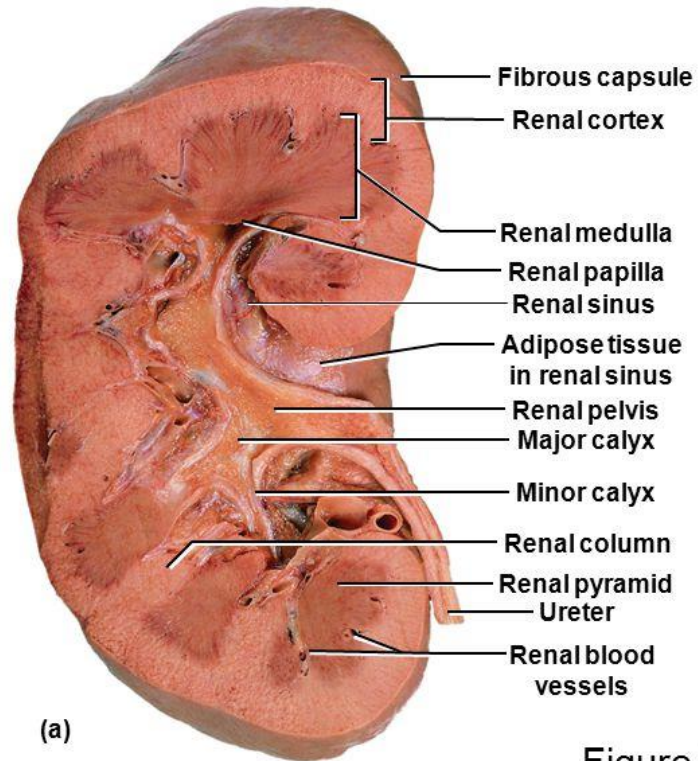
Anatomy of the urinary system



Kidneys:

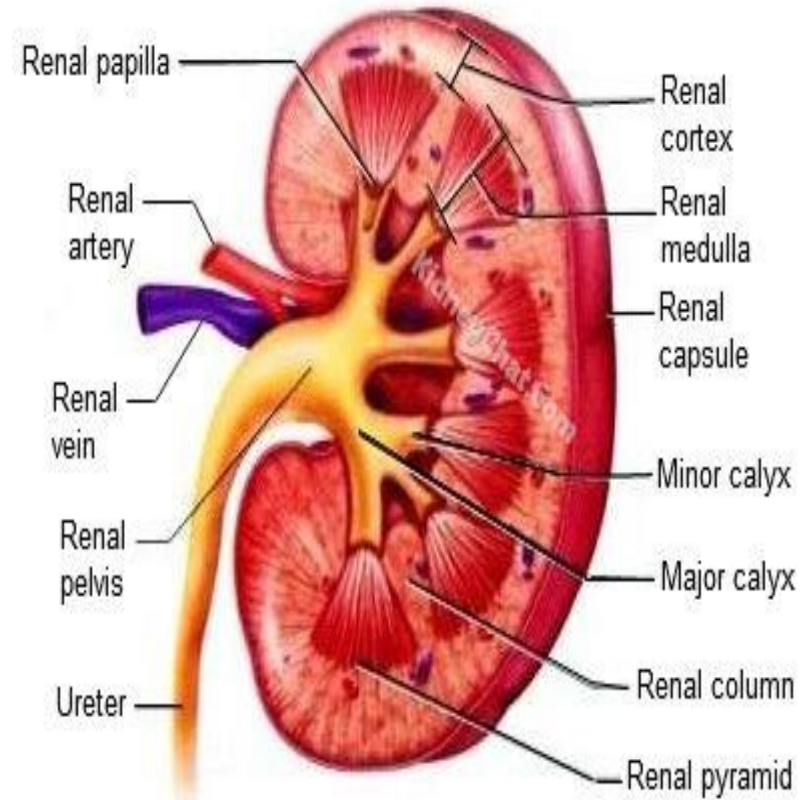
Gross Anatomy of Kidney

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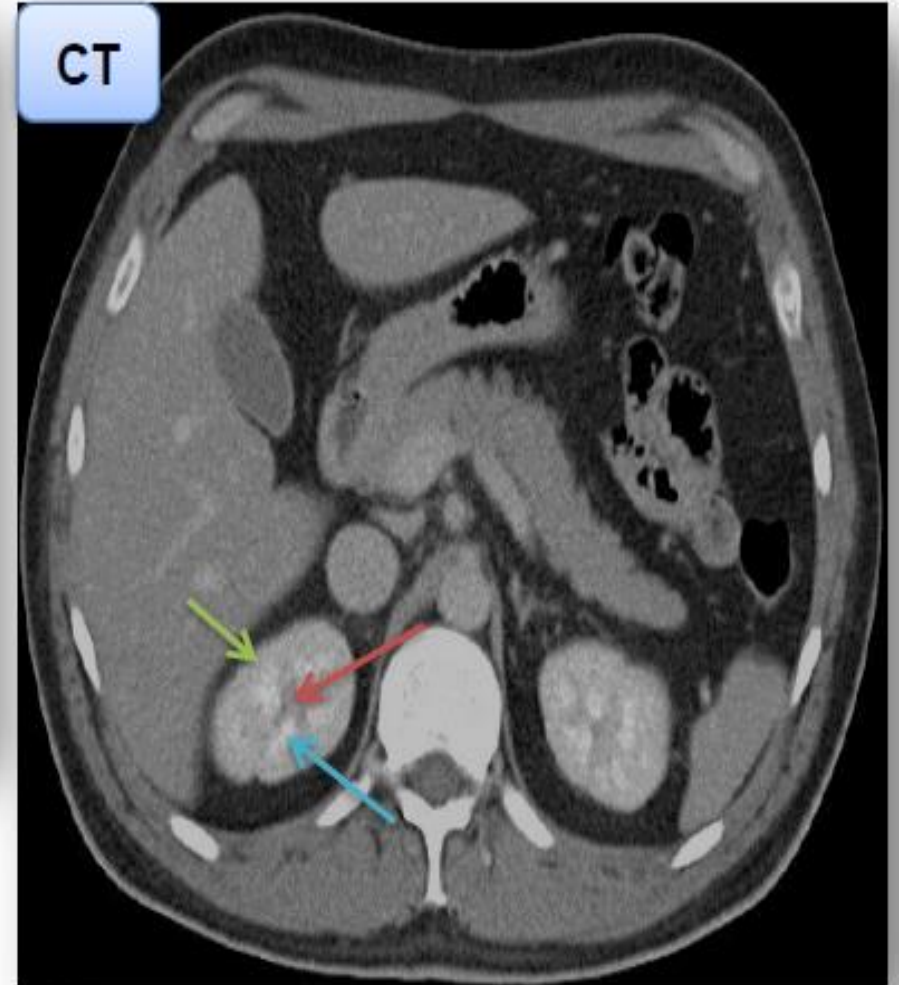
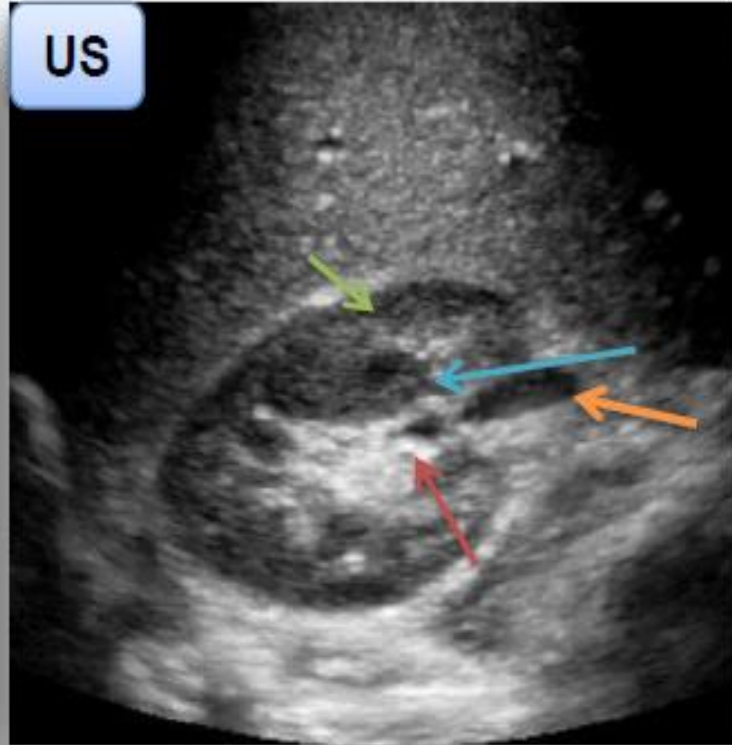
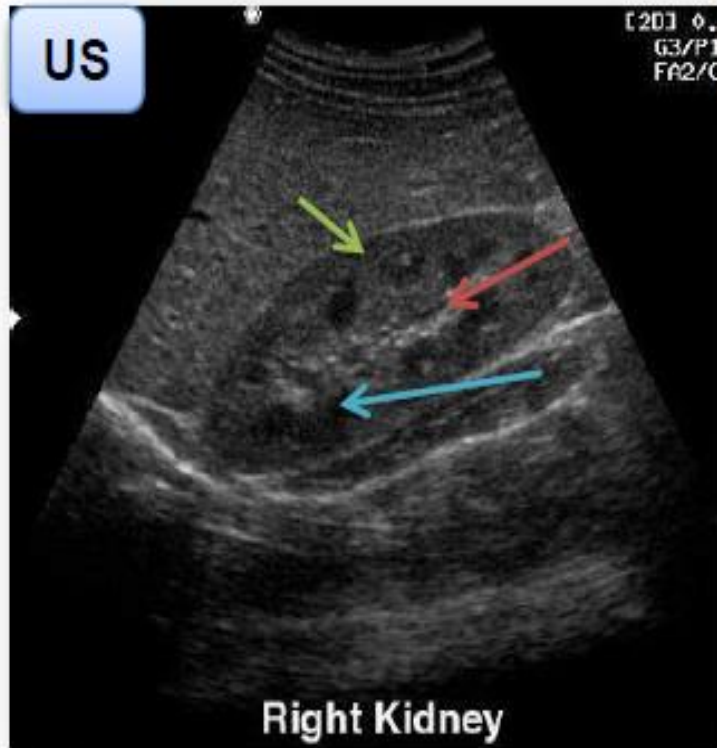


Ralph Hutchings/Visuals Unlimited

Figure 23.4a

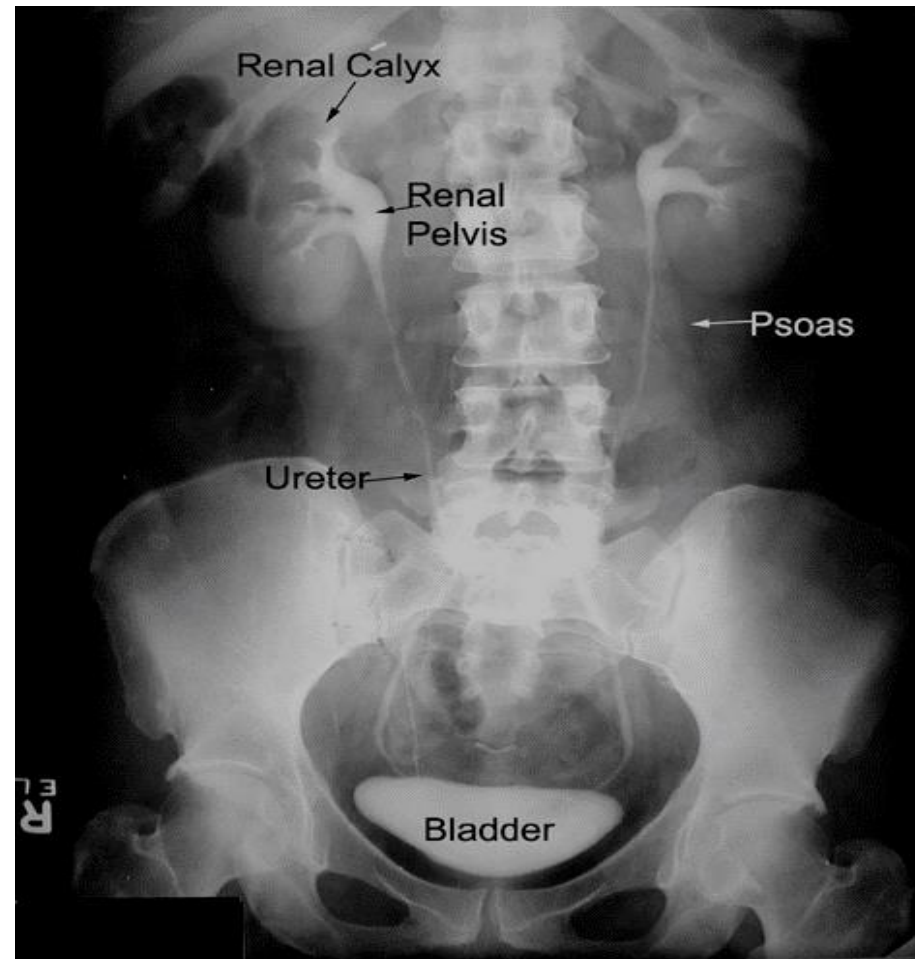


23-10



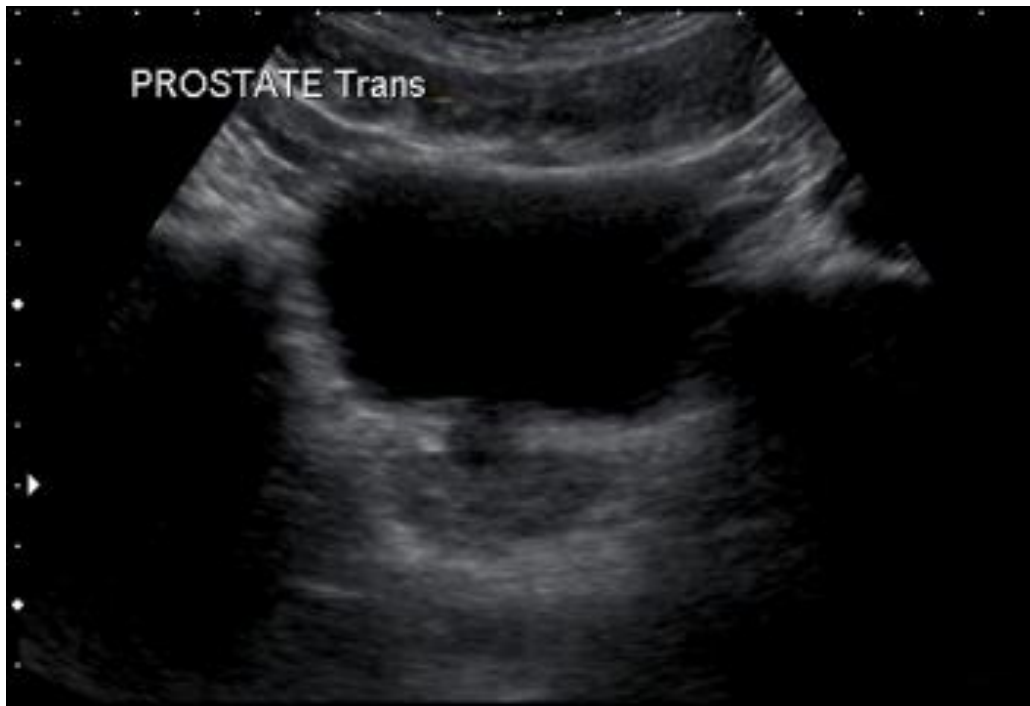
- **Renal Cortex.**
- **Renal Permed or Medulla.**
- **Hilum or Pelvis.**
- **Ureter**

Ureters:



IVP

Urinary bladder

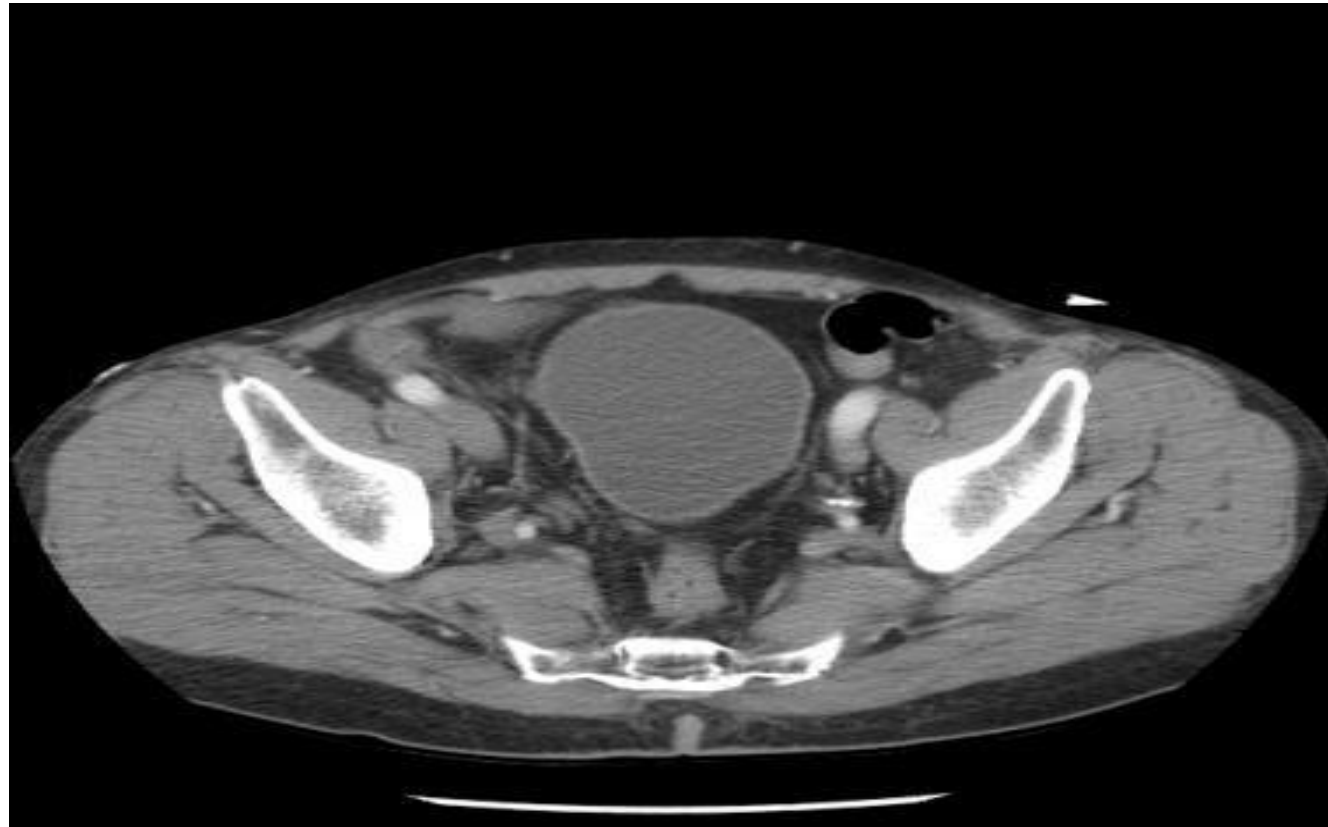


US



US

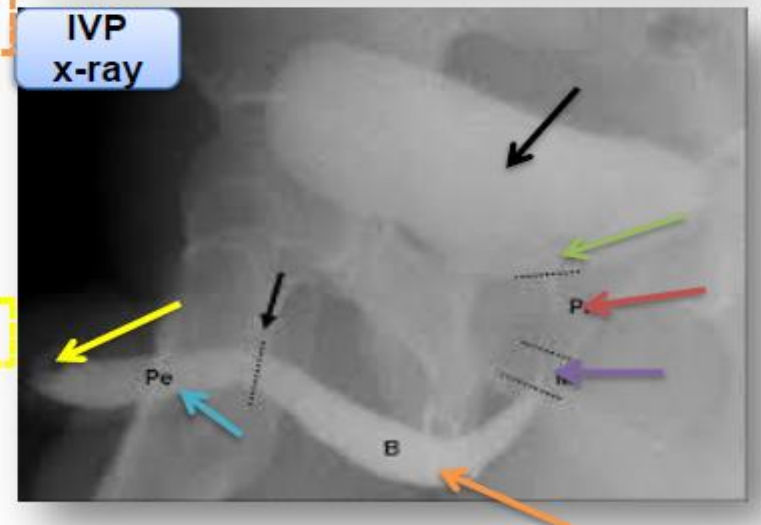
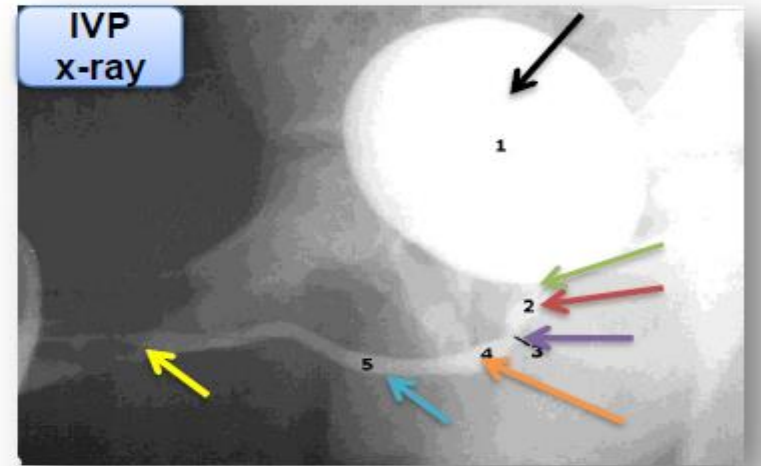
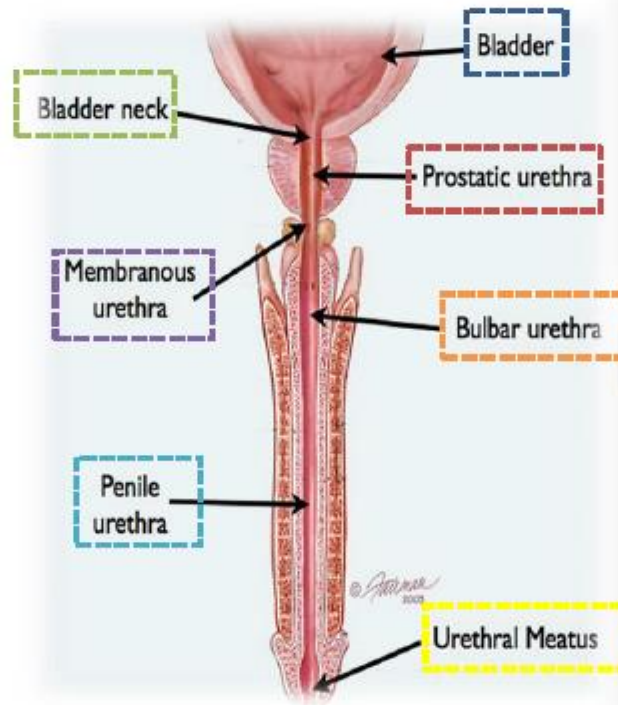
Urinary bladder



CT

Urethra

- **Bladder.**
- **Bladder neck.**
- **Prostatic urethra.**
- **Membranous urethra.**
- **Bulbar urethra.**
- **Penile urethra.**
- **Urethral meatus.**



Common Renal system Pathologies

Common Kidney pathologies:

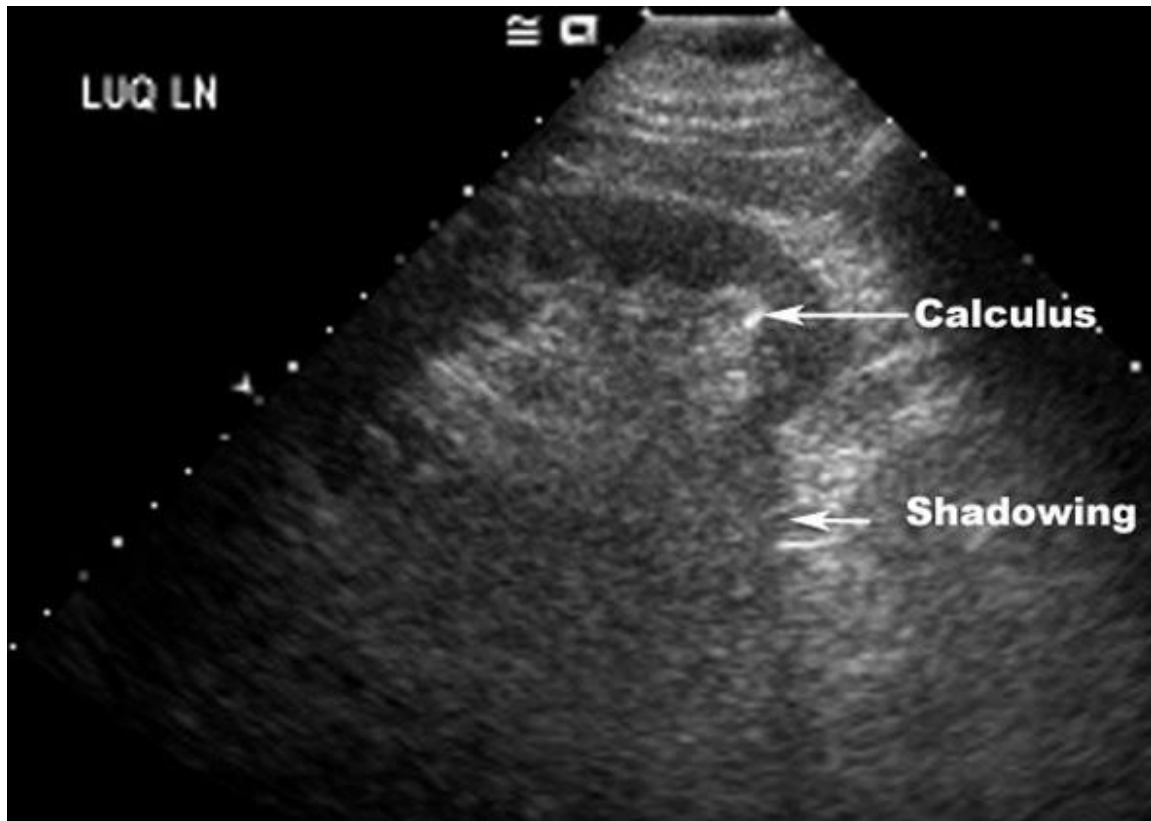
- **Cysts** (benign , common , bosniak classification)



Common Kidney pathologies:

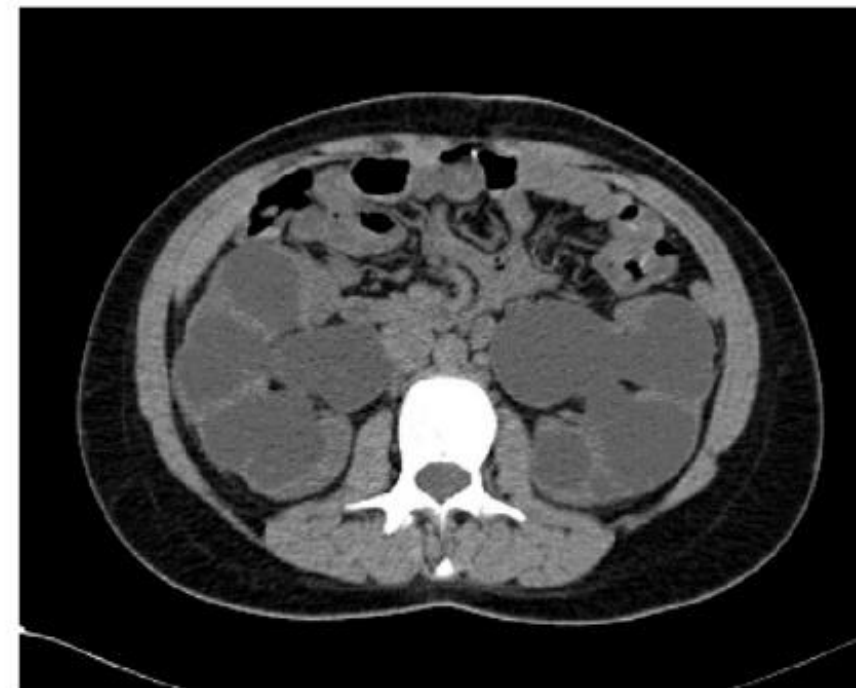
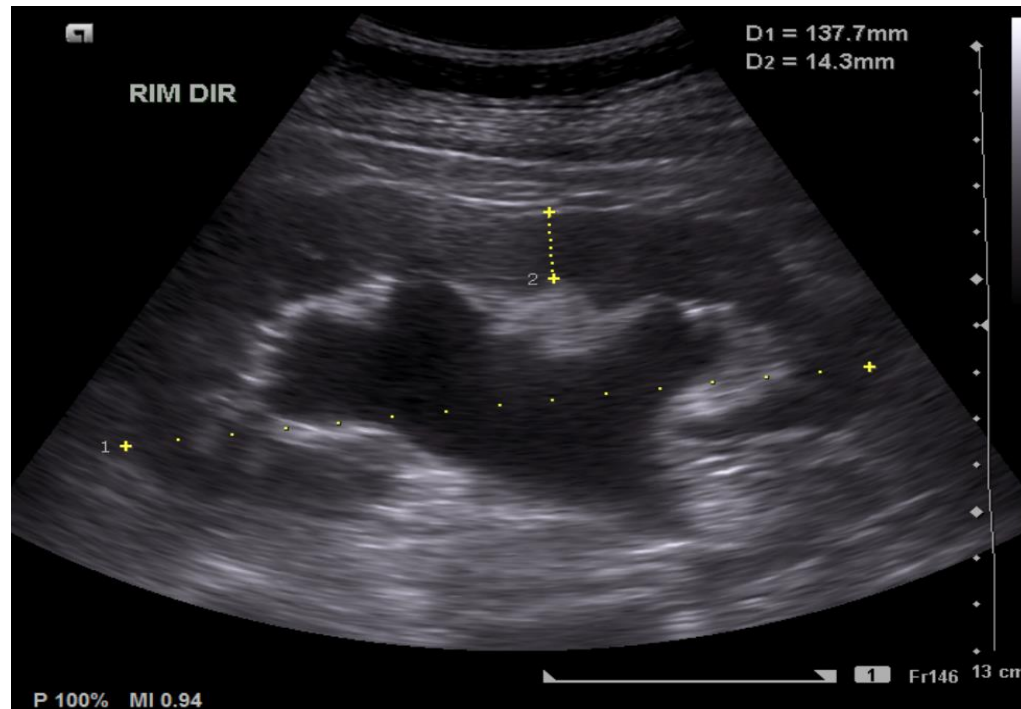
- **Stones :**
 - Radio-opaque (calcium , struvite)
 - Radio-lucent (uric acid , cysteine)





Common Kidney pathologies:

- **Hydronephrosis**



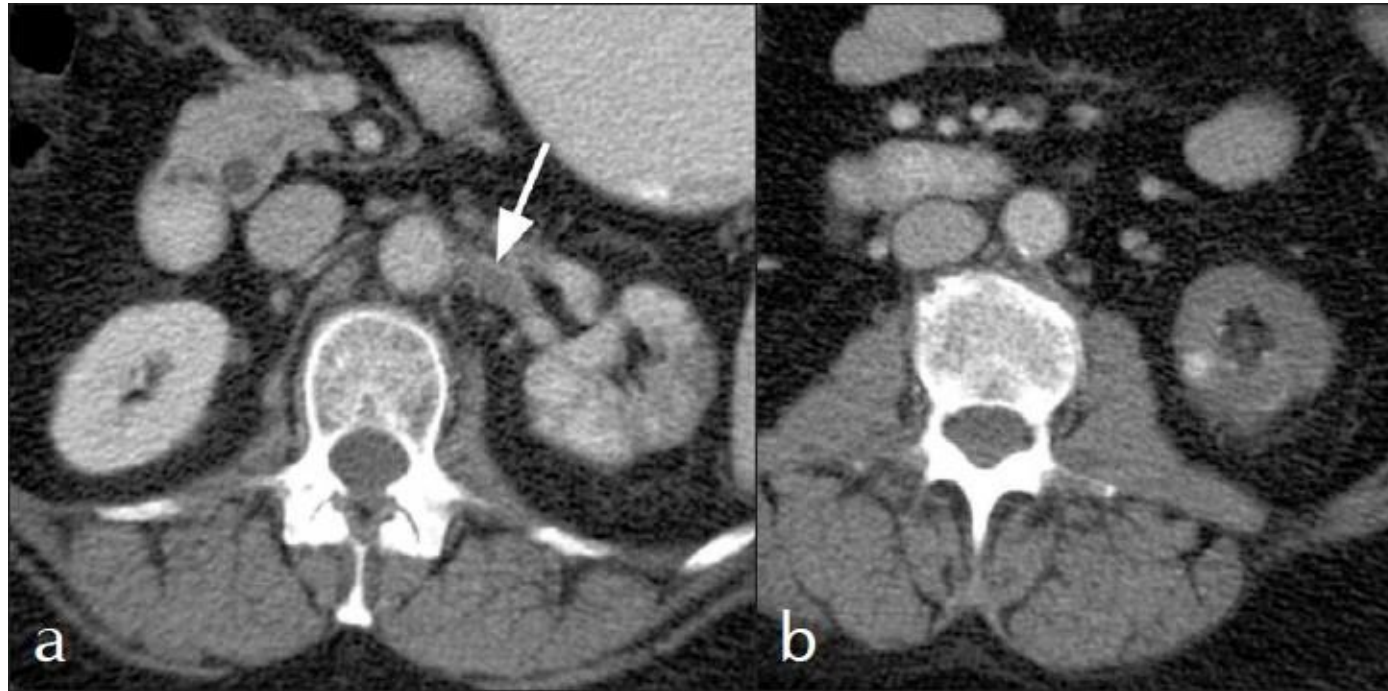
Common Kidney pathologies:

- **Pyelonephritis:**

- is the infection of the kidney.
- Acute pyelonephritis results from bacterial invasion of the renal parenchyma. Bacteria usually reach the kidney by ascending from the lower urinary tract.
- CT scan for a patient with pyelonephritis, we do it only if the patient doesn't respond to the treatment or he had a recurrent pyelonephritis.



Common Kidney pathologies:

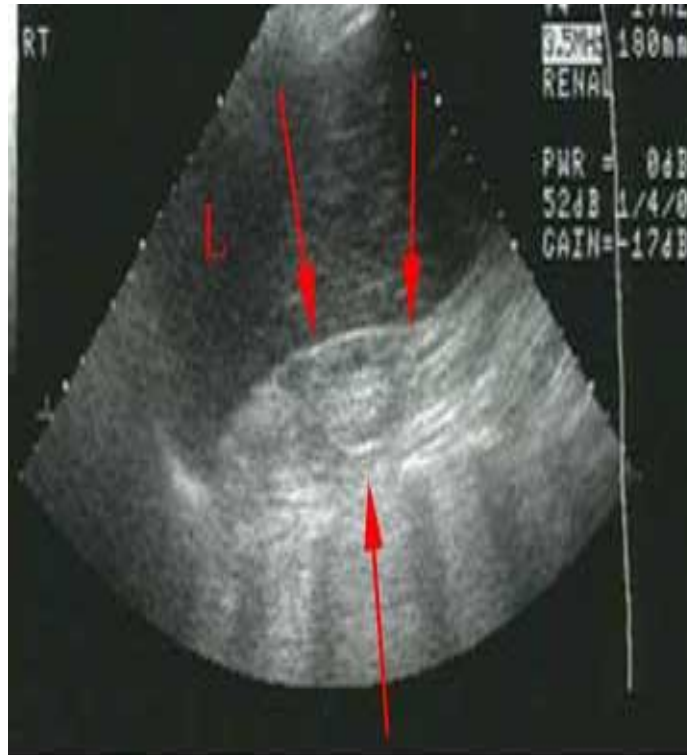


Common Kidney pathologies:



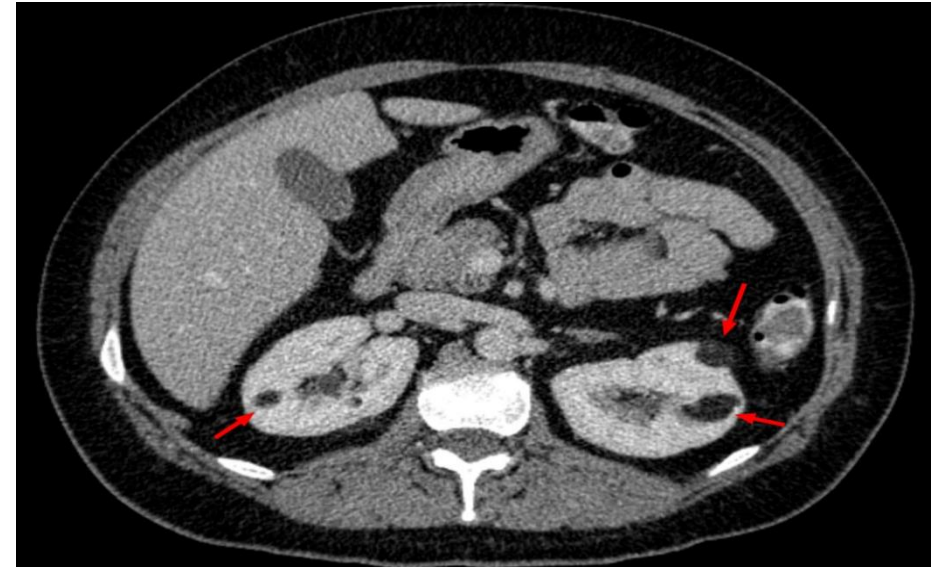
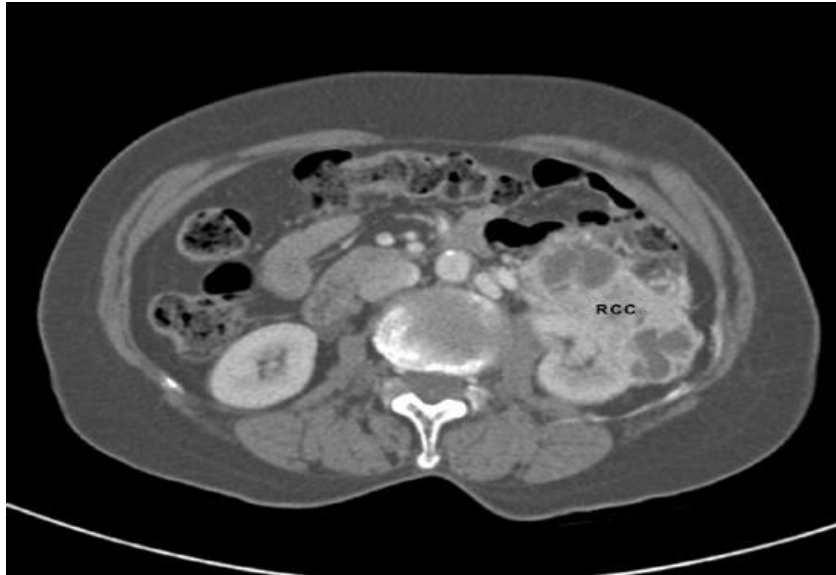
Common Kidney pathologies:

- ESRD



Common Kidney pathologies:

- Tumors:
 - Benign, most common benign is angiomyolipoma
 - Malignant, most common type is renal cell carcinoma



Common Kidney pathologies:

- Congenital

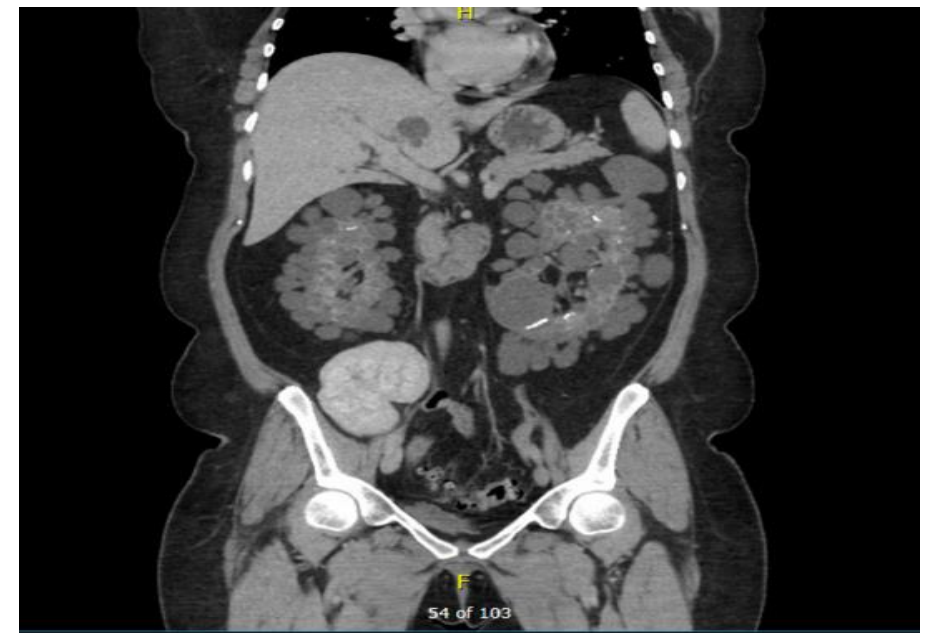
Horseshoe Kidney



Ectopic Kidney



Polycystic Kidney Disease

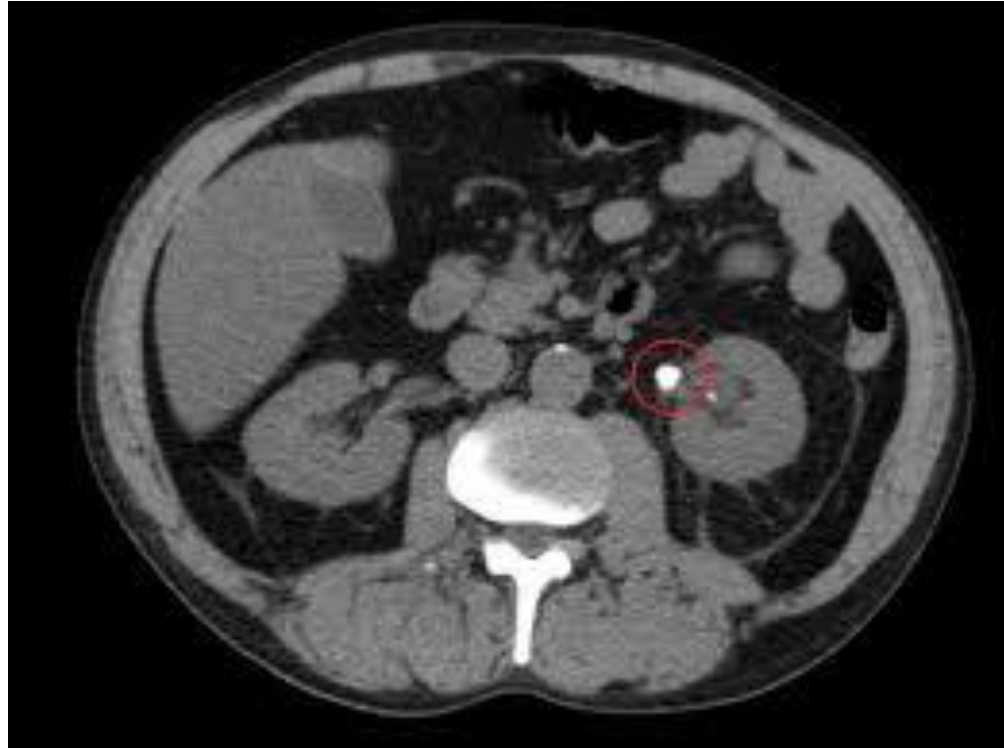


Common Ureter Pathologies:

- **Ureteric Stone:**

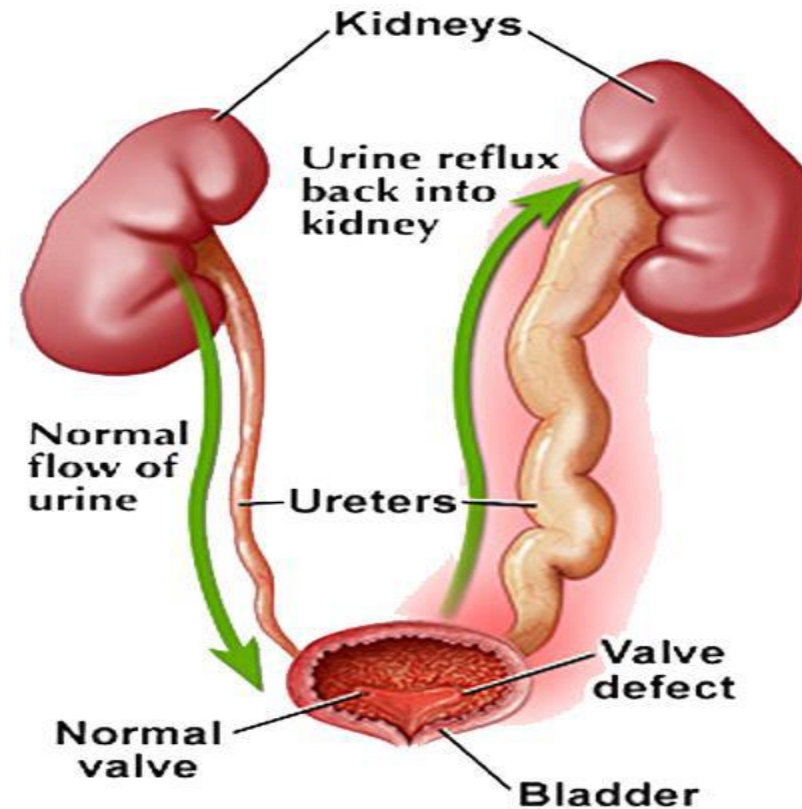
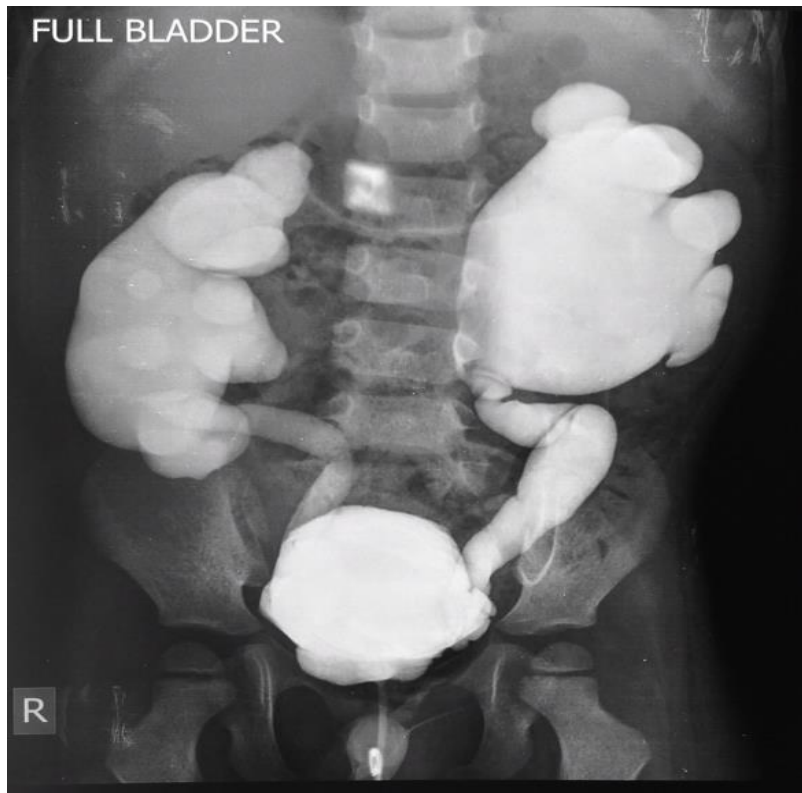
stones in the ureter will make a obstruction and block the urines way to the bladder, which may cause Hydronephrosis.





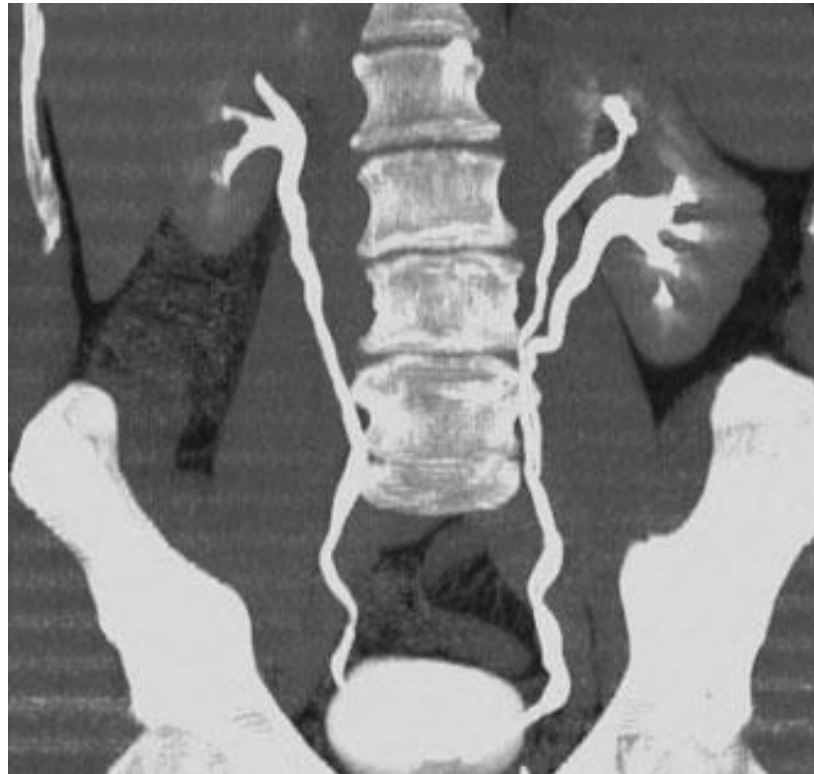
Common Ureter Pathologies

- **vesicoureteral reflux disease**

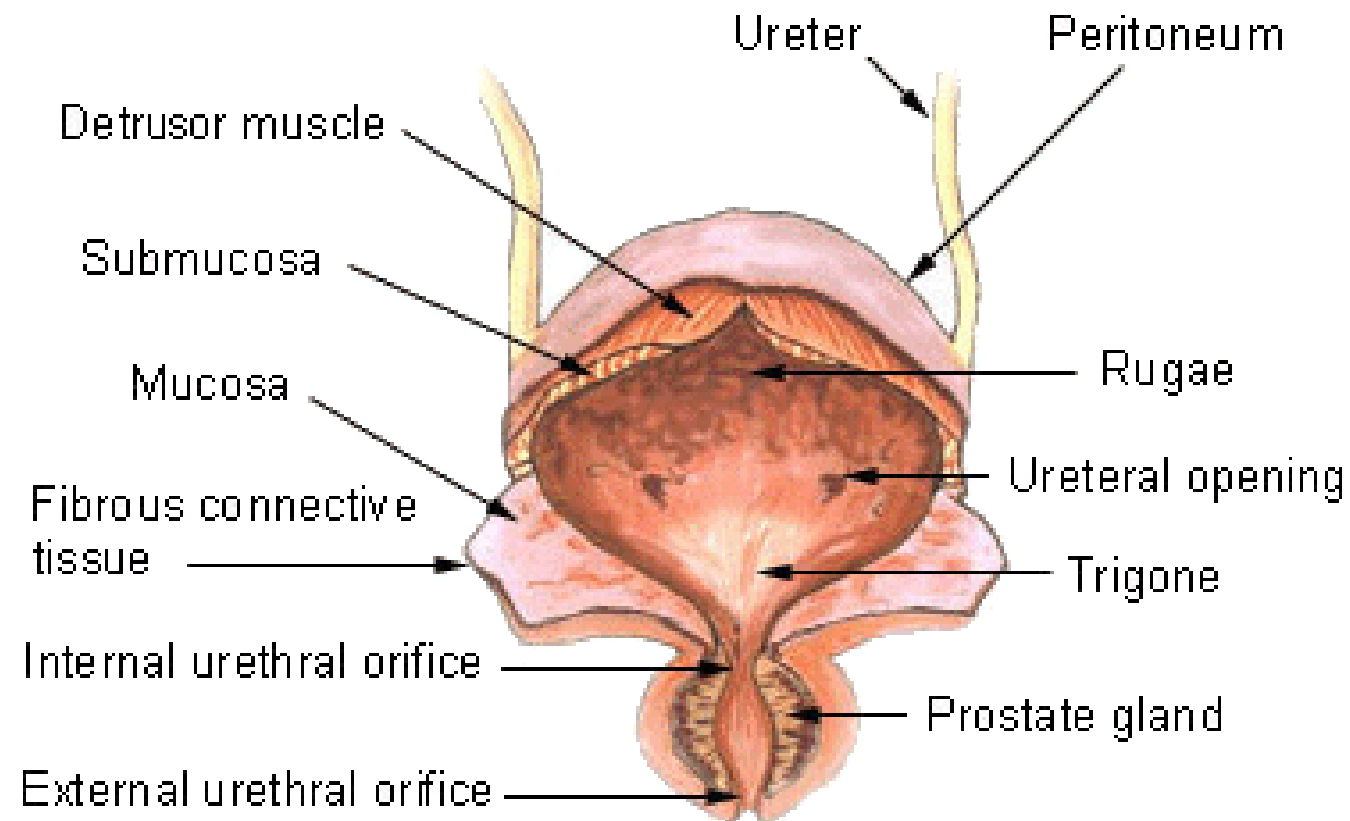


Common Ureter Pathologies

- **Duplicating Collecting System.**



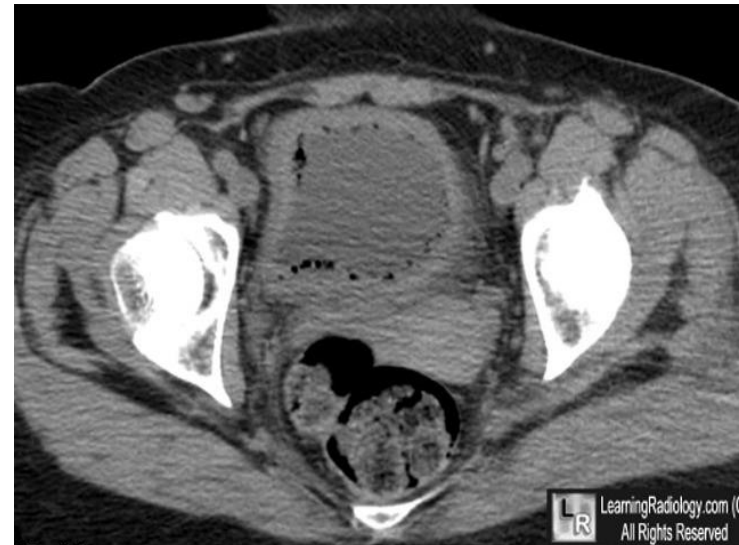
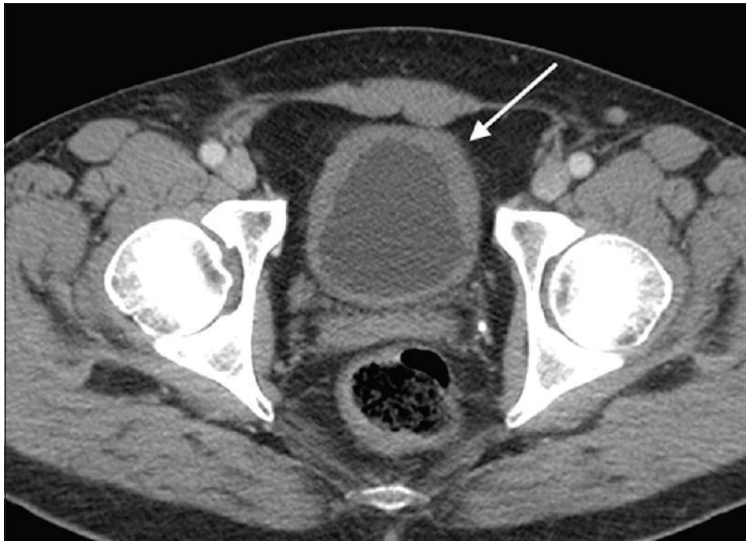
Common Urinary Bladder Pathologies



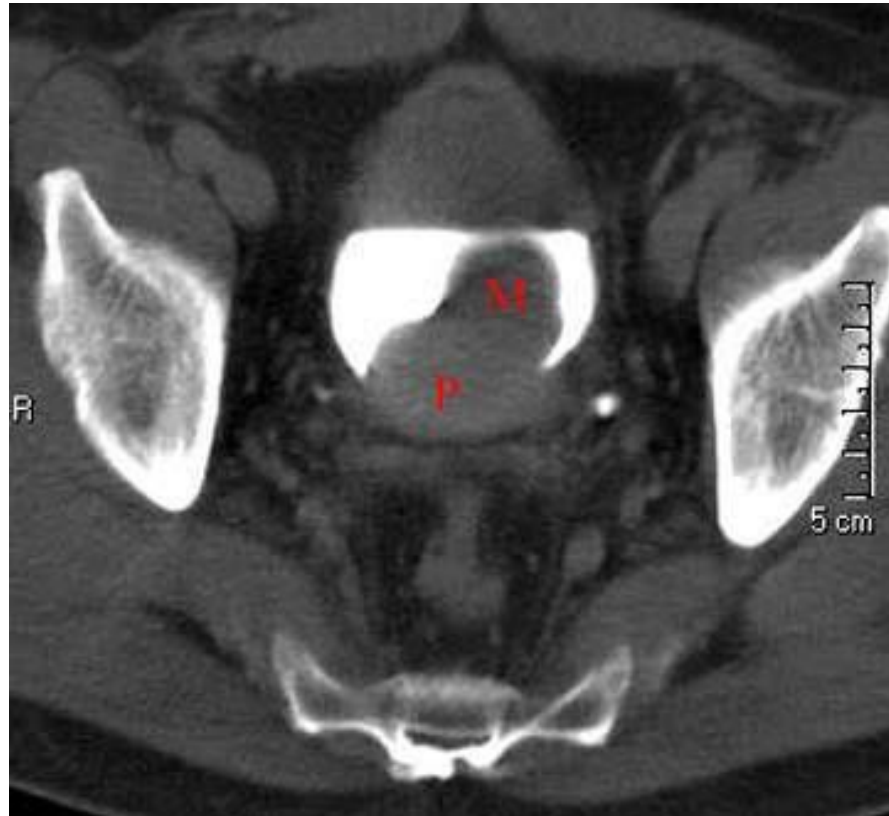
Common urinary bladder pathologies

- **Cystitis:**

- Image 1: an inflamed urinary bladder (thick surrounding walls)
- Image 2: This bladder has gas bubbles that could be due to inflammation or infection from 'gas producing' bacteria.



Benign Prostate Hypertrophy

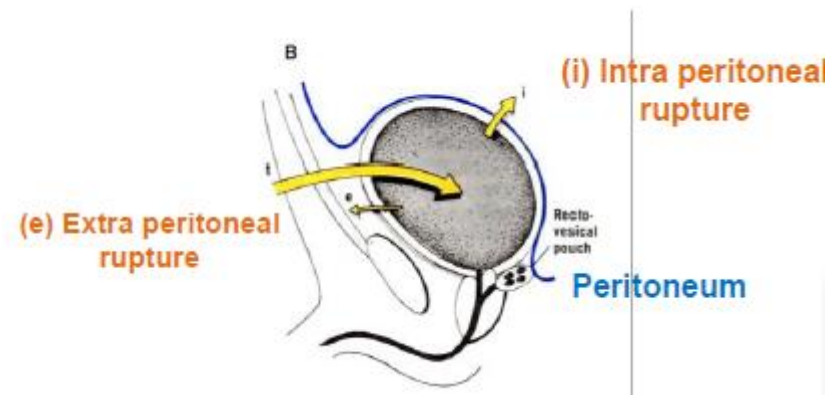




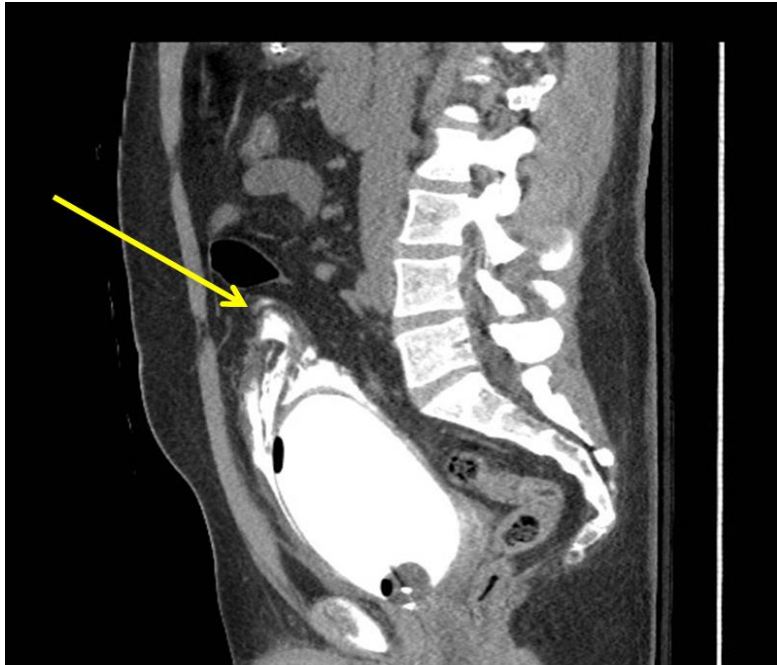
Common Urinary Bladder Pathologies

- **Bladder rupture:**

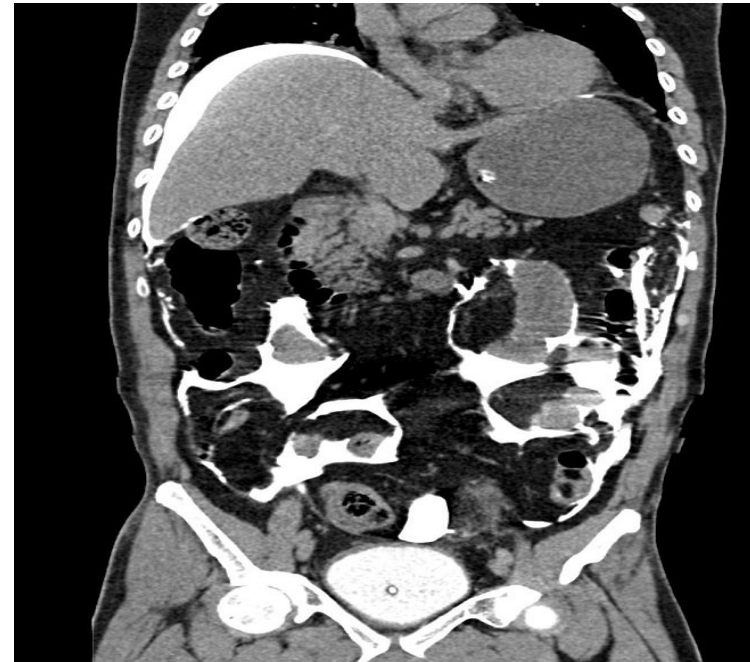
- The abdomen is lined with the peritoneum from inside.
- The bladder is located below the membrane of the peritoneum.



Common urinary bladder pathologies



Extra peritoneum: any rupture or leakage to the content of the bladder does not enter the peritoneum. Patient does not need surgery.



Intra peritoneum: there is a rupture in both bladder and peritoneum. In this case, patient will need surgery.

