RADIOLOGY

TEAM 435

# UROGENITAL TRACT IMAGING INTERACTIVE LECTURE


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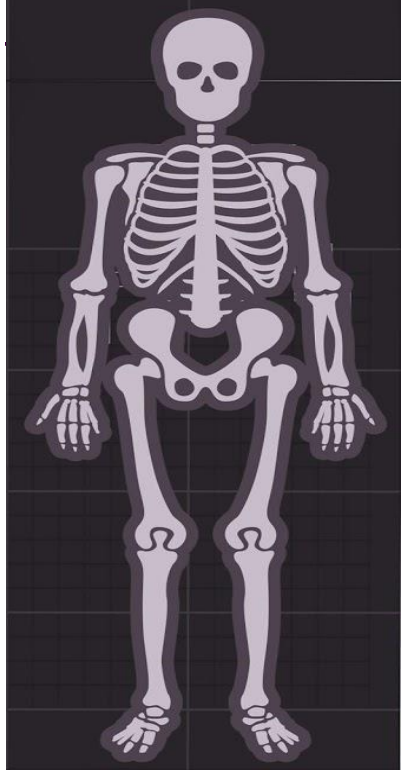
- **Revised By:**
- Luluh Alzeghayer

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# CASE (1)

Young Adult presented with right loin pain and microscopic hematuria. Ultrasound Exam was performed.

- **Which of the following is the likely finding?**
- a- Hydronephrosis
- b- Normal
- c- Renal mass
- d- Upper pole renal stone

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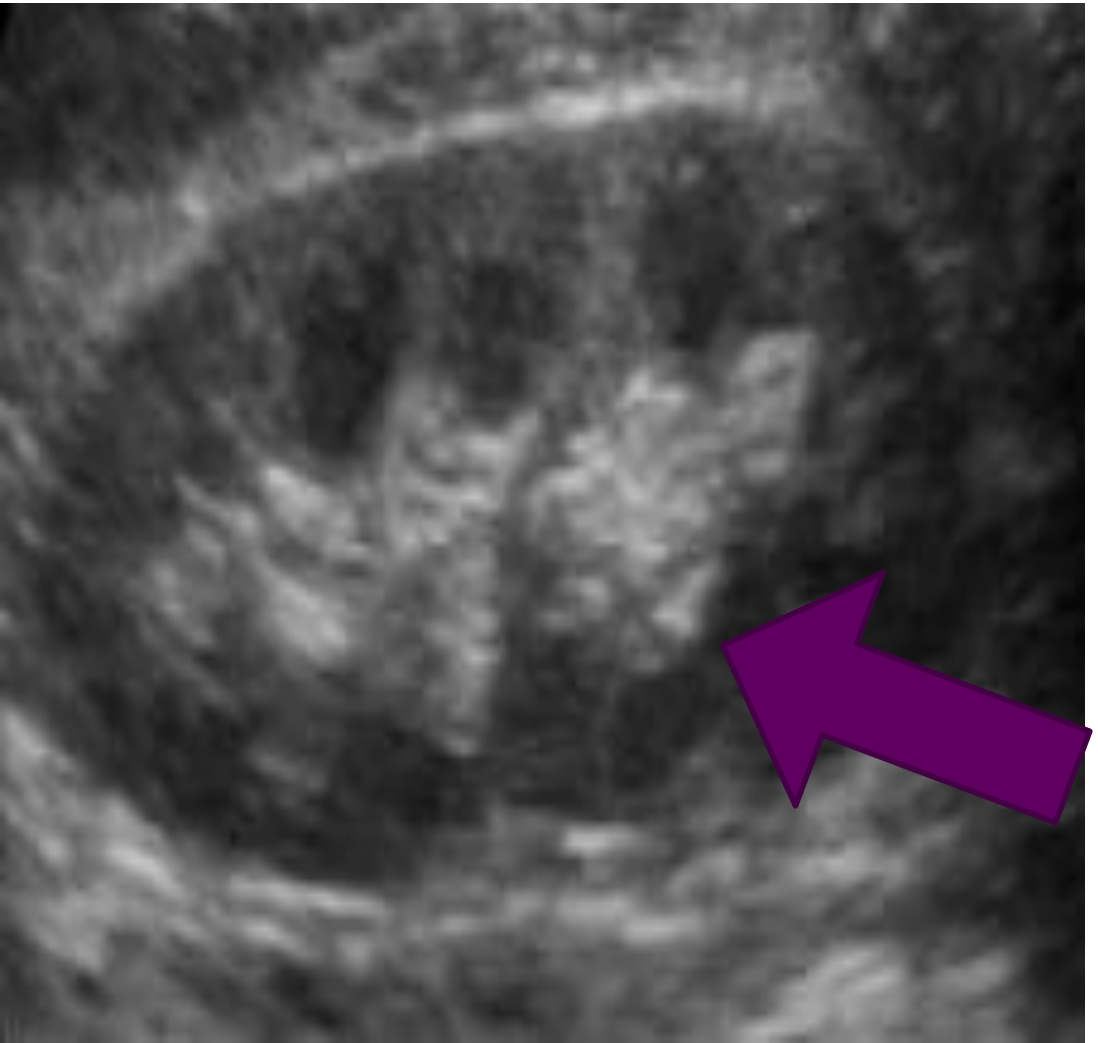

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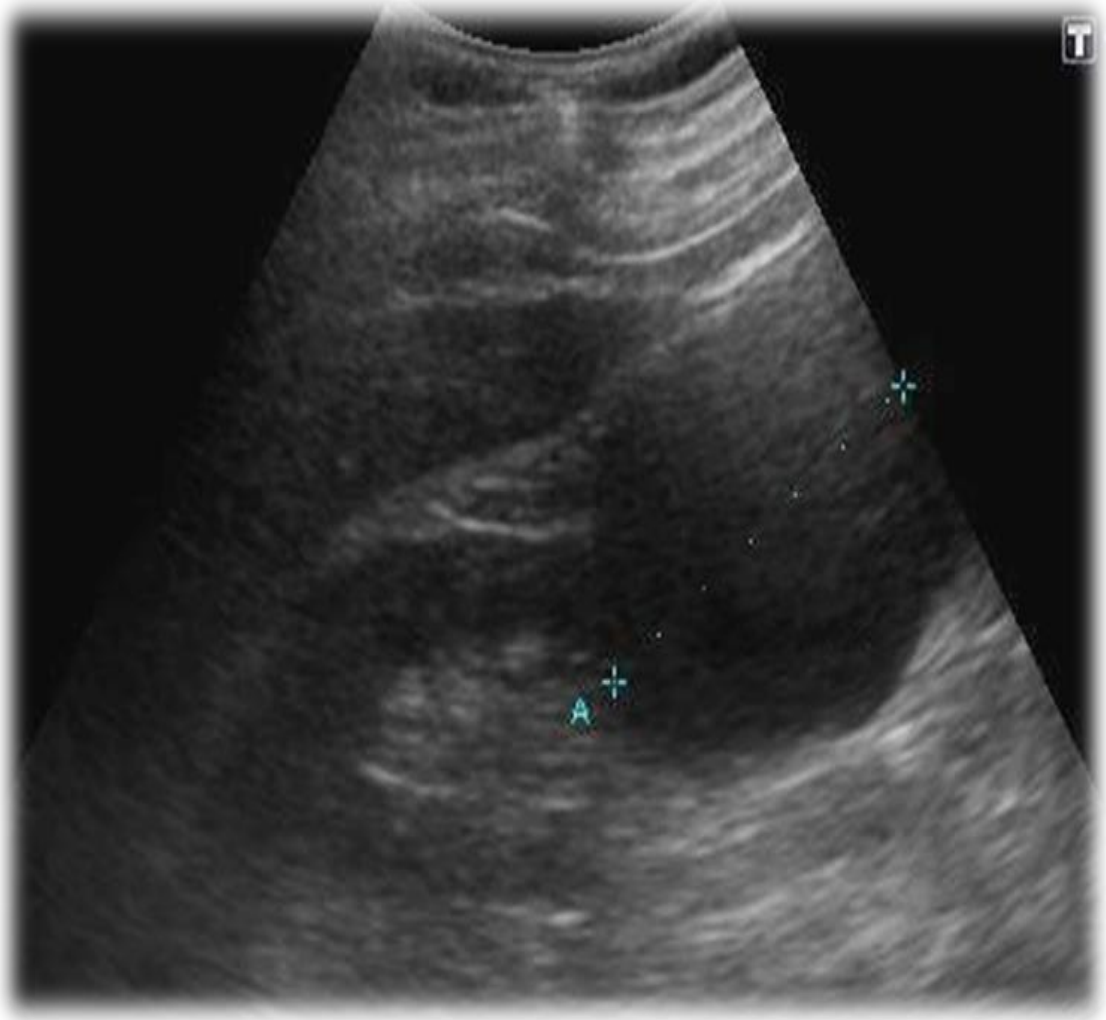
- Which of the following is the likely finding?
  - a- Hydronephrosis
  - b- Normal
  - c- Renal mass
  - d- Upper pole renal stone

You can see normal kidney collecting system

# NOTES

- The cortex is normal and we can see the calyces (black) and there is no dilatation.
- There is good corticomedullary differentiation (we can tell that this is the cortex and this is the medulla)
- We can not diagnose microstructural diseases like glomerulonephritis or autoimmune disease using US because there will be no changes that will be clear and appear in US
- Normal US pic does not mean normal kidney but it means that the kidney has normal morphology
- Doppler US can detect the function of the kidney by detecting the blood flow

# CASE (2)



**Young Adult presented with right loin pain. Ultrasound Exam was performed.**

❖ **Which of the following is the likely finding?**

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d- Lower pole renal stone

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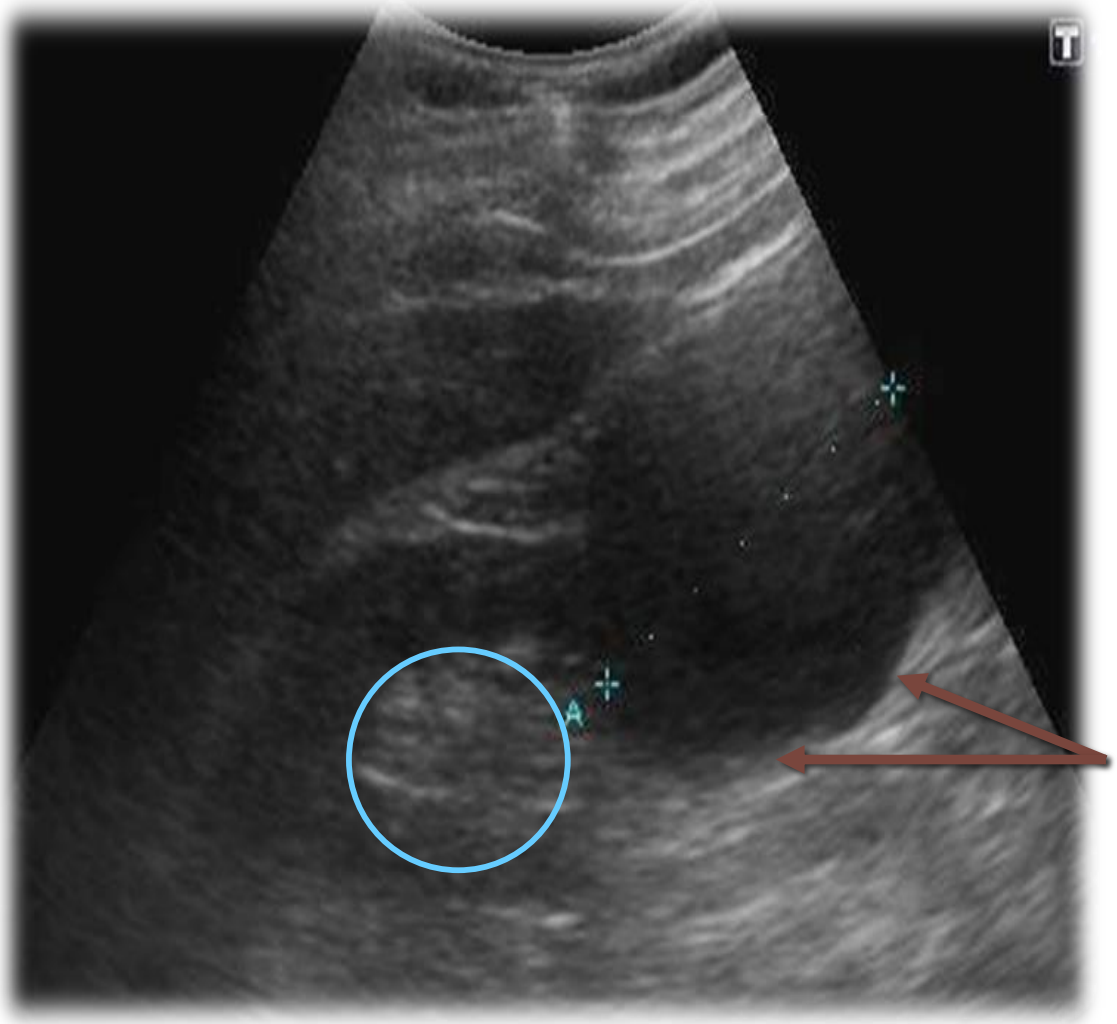

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- **Which of the following is the likely finding?**

a- Normal
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c- Renal cyst
d- Lower pole renal stone

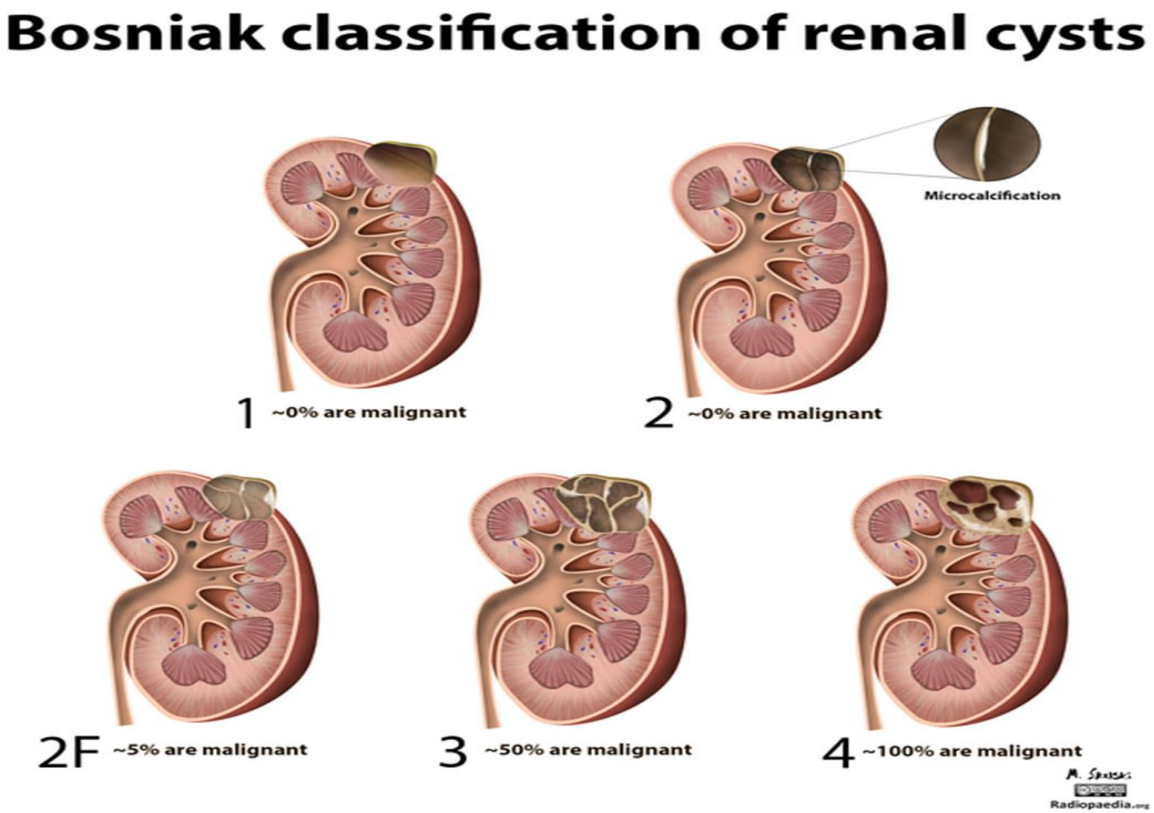
Clear ***THIN*** outline of the cyst

# NOTES

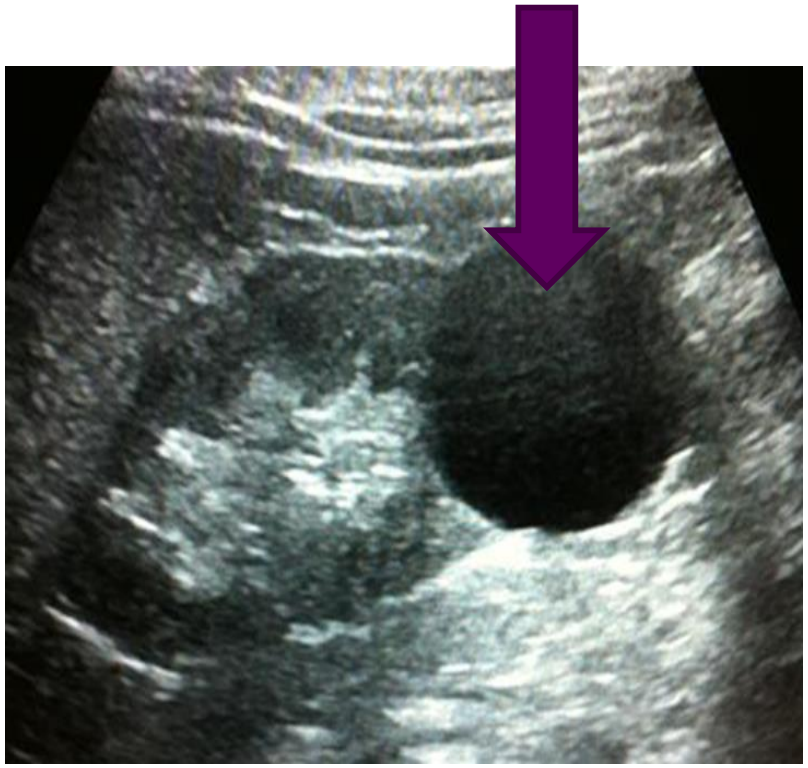
- Always in US if it is longitudinal section the upper pole is in the left and the lower is in the right
- Any black circle and well demarcated (منتظمة) without any irregularity and calcification is renal cyst
- Why couldn't be dilatation? In dilatation it will be diffuse and in the calyces but here is solitary anechoic dark structure In the cortex
- Blue circle is the kidney, while the two blue dots on previous pic represent the cyst.
- This cyst is simple not complex
- When there is collection of fluid there will be enhancement below it

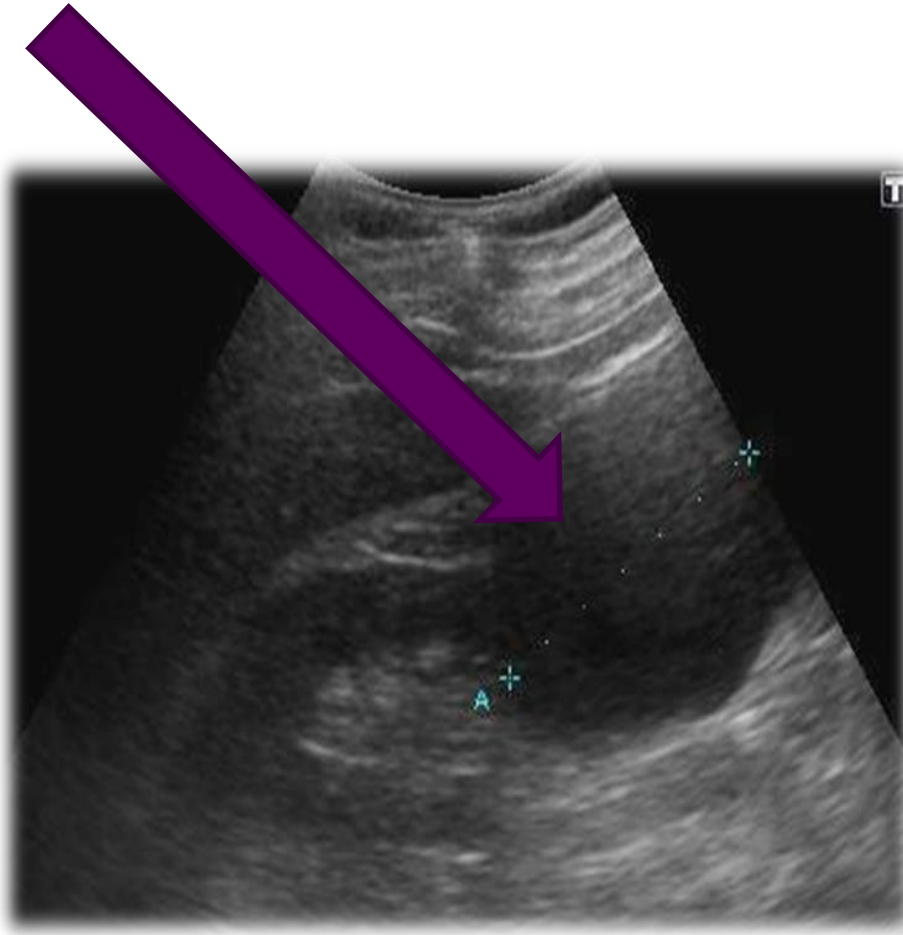
# As a medical student we only have to know simple cyst (type 1), the other types are advanced.

- **Doctor said this slide not important**



# REANL CYSTS ( Thin borders )





- In a CT image with bowl contrast, we can see right kidney cyst
- Why we cant see the left kidney? Because the left kidney is in an upper level compared to right kidney

# CASE (3)


**29 y/o female presented to the ER c/o sudden acute left flank pain radiated to the groin associated with hematuria.**

❖ **What is the name of the exam presented?**

a- IVU

b- KUB

c- Double contrast exam

d- Single contrast exam

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d- Single contrast exam

K: Kidney, U:Ureter, B:Bladder.

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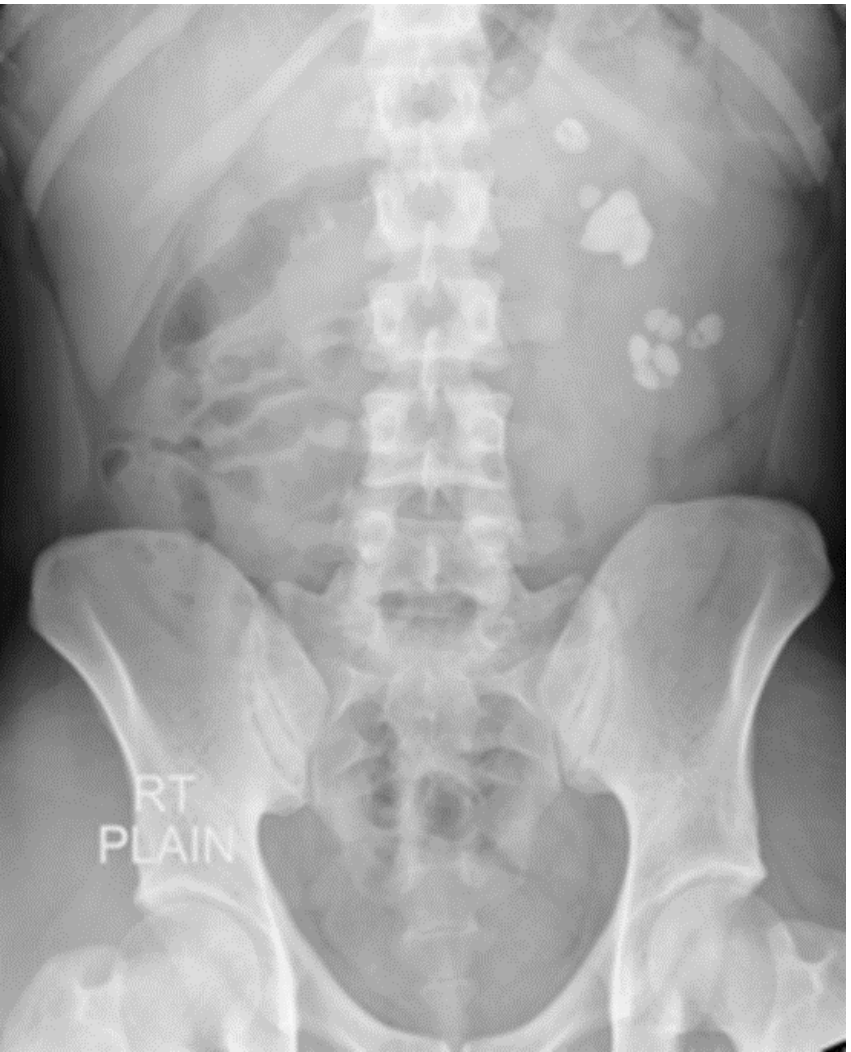


**29 y/o female presented to the ER c/o sudden acute left flank pain radiated to the groin associated with hematuria.**

- **What is the major finding?**

a- Renal mass
b- Renal cyst
c- Renal stone
d- Renal hemorrhage

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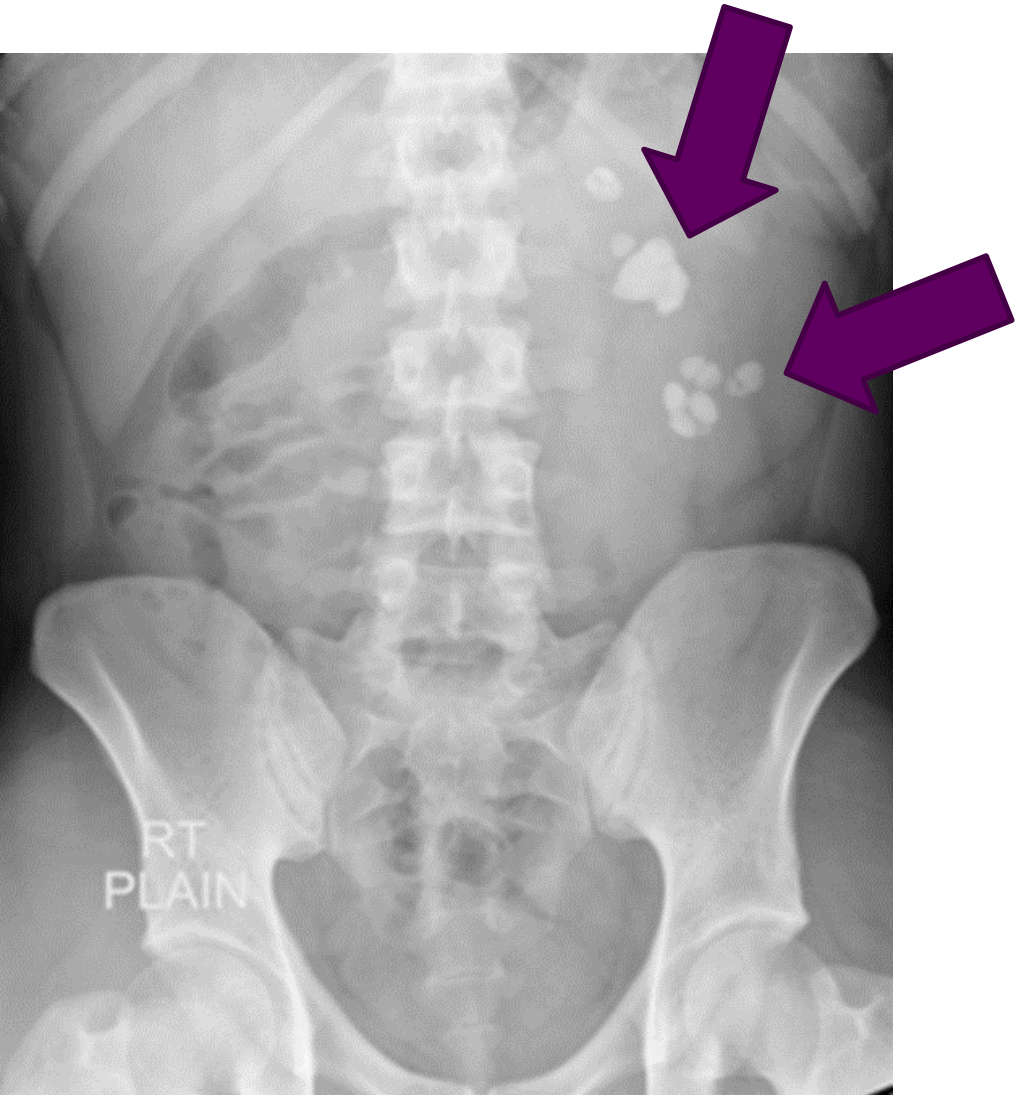


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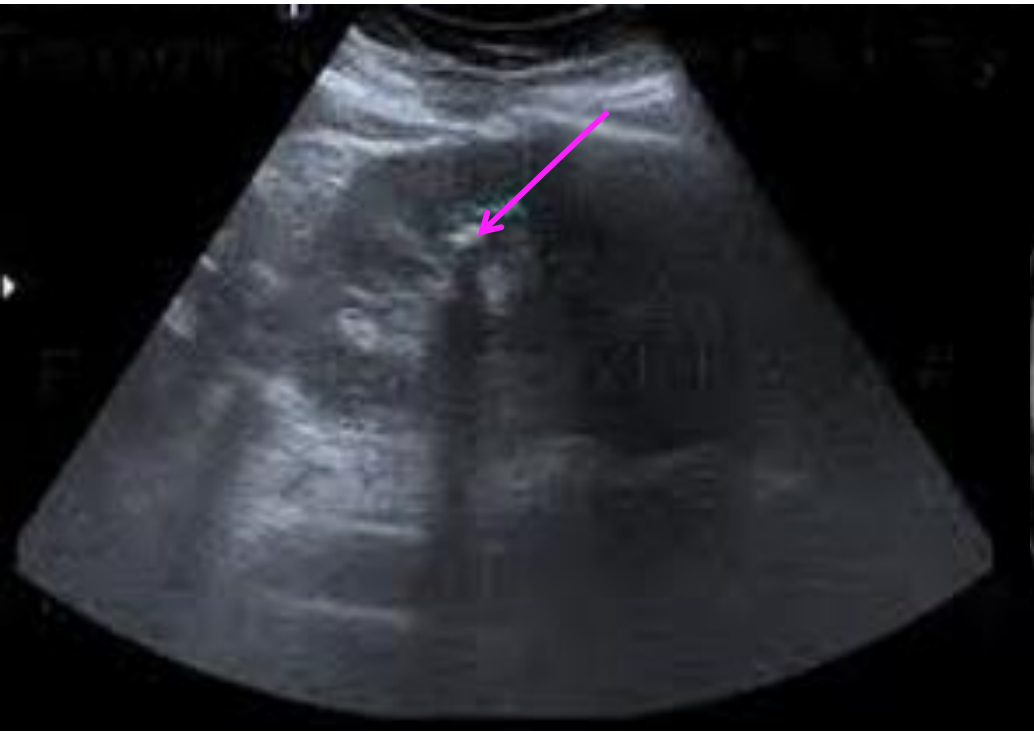
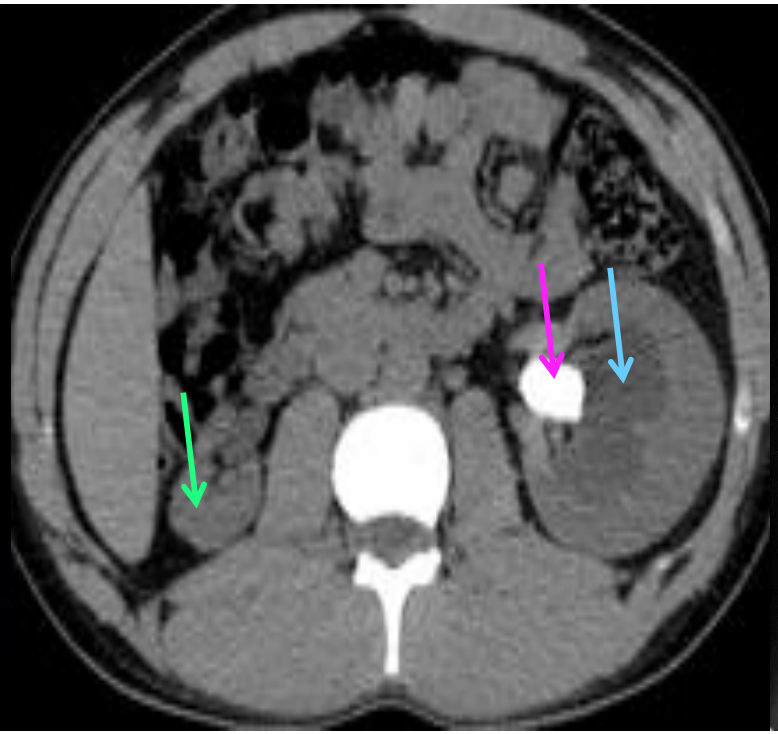
# NOTES

- The first imaging exam in ER is KUB
- In general, we use KUB in ER, US in stone and obstruction and hydronephrosis, and CT for everything!
- We can see multiple stones in the left kidney
- We can’t see the kidney shadow that’s why it is preferred to do CT without contrast to see if there is obstruction, if we want to see if there is dilatation we will start with US.
- In US we can’t see the ureters
- If we want to see the stone clearly we will do CT without contrast.

# STONES IN DEIFFERNT MODALITIES



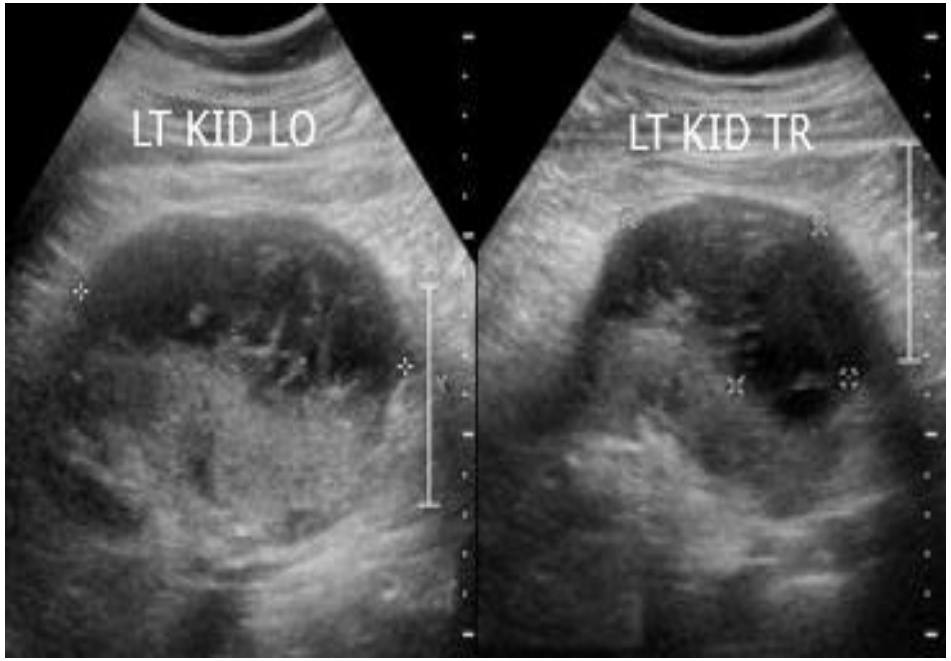
The stone in US appears like hyperechoic structure with shadow behind, it is not obstructive because we don't see dilatation.



CT/- contrast, Stone is in the left kidney in ureteropelvic junction (common site), with a clear obstruction, Dilatation of collecting system, atrophic R. kidney


Staghorn stone filling more than 2 calyces

# CASE (4)

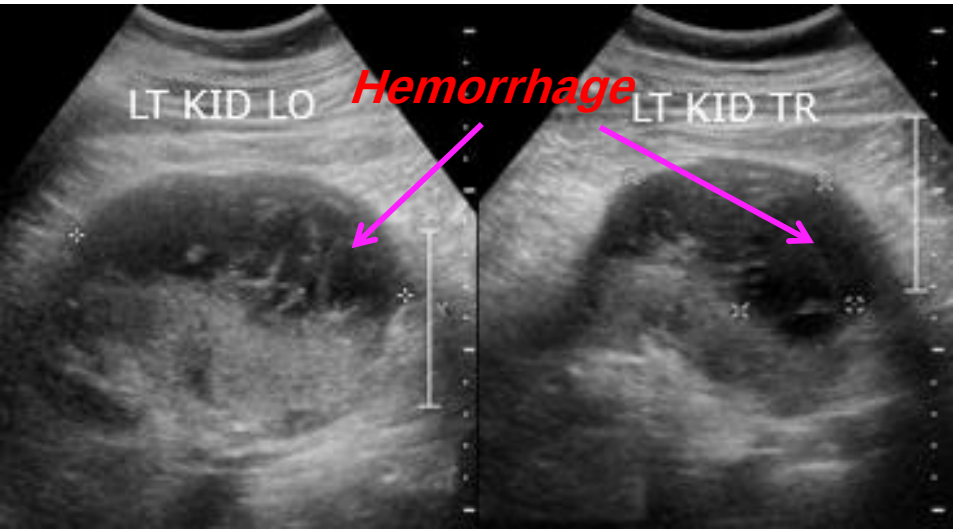



**36 y/o male presented to the ER c/o acute sudden left flank pain radiated to the groin associated with hematuria post RTA. US was performed.**

- **What is the major finding?**

a- Renal mass
b- Renal cyst
c- Renal abscess
d- Renal hemorrhage

# CASE (4)




We should first describe it as “collection” because we can’t know if it’s blood or abscess except based on the clinical scenario

**36 y/o male presented to the ER c/o acute sudden left flank pain radiated to the groin associated with hematuria post RTA. US was performed.**

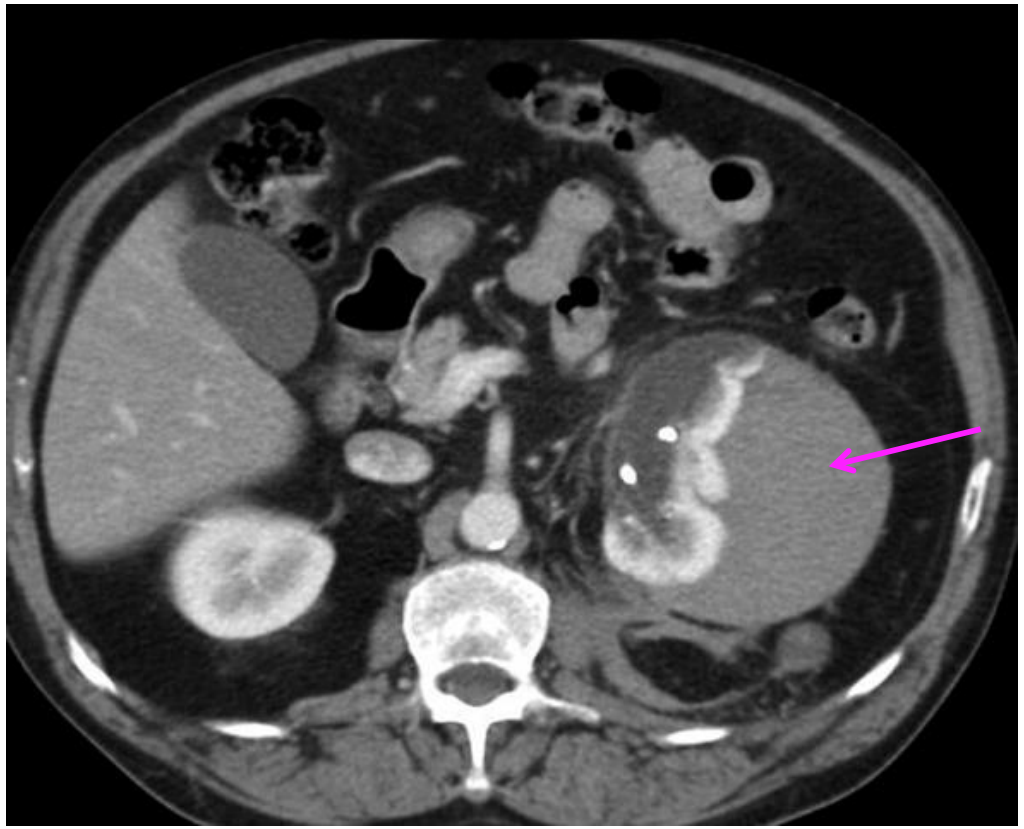
❖ **What is the major finding?**

a- Renal mass
b- Renal cyst
c- Renal abscess
d- Renal hemorrhage

RTA: Road Traffic Accident, so you should suspect haemorrhage secondary to Trauma.

Always you have to correlate with the clinical scenario

• The ***black area*** in the US image represent the haemorrhage
• The blood is the hypoechoic part because it is fresh blood, if it is coagulated it will be heterogeneous and hyperechoic

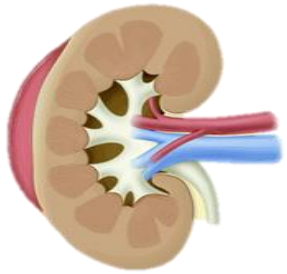


# SUBCAPSULAR RENAL HAEMATOMA

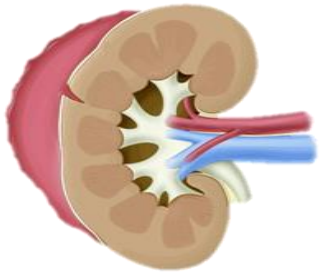
If we leave it, it will lead to renal failure

# GRADES OF KIDNEY INJURY

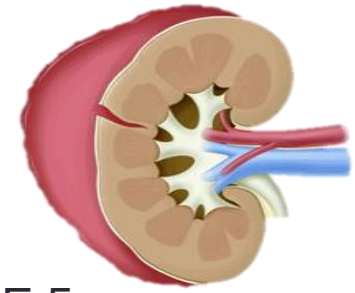
GRADE 1



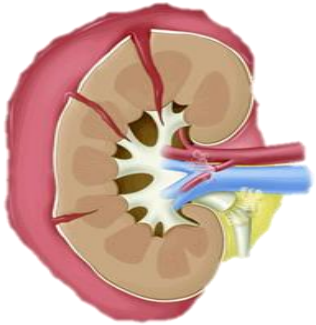
GRADE 2



GRADE 3



GRADE 4



GRADE 5

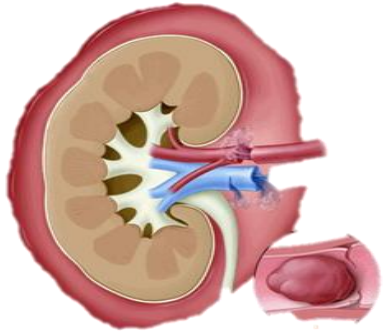
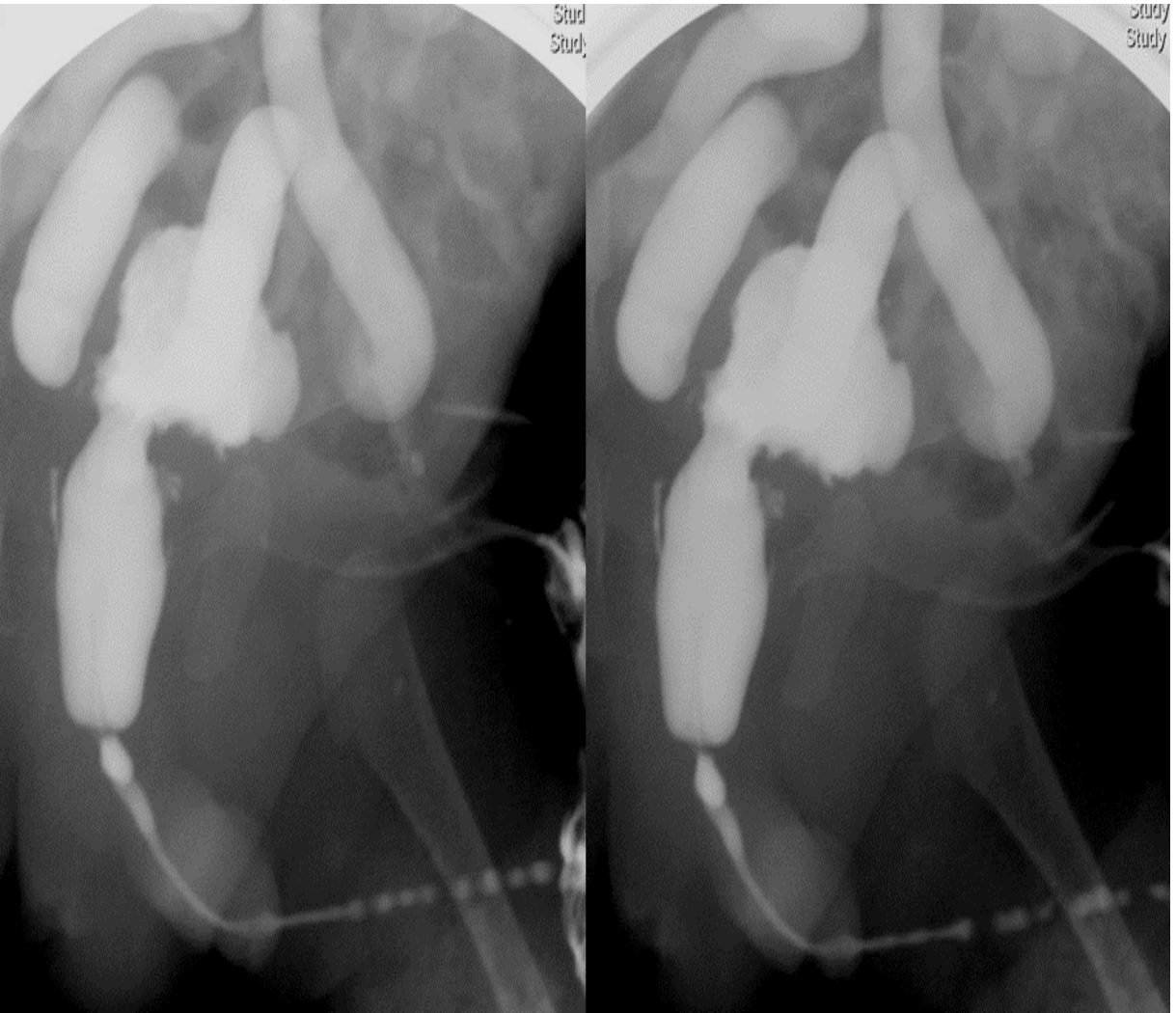


**Table 11. Renal Injury Grades**

| Grade | Extent of renal injury |
|---|---|
| 1 | Contusion: microscopic or gross hematuria, no depiction of injury with any imaging method<br>Hematoma: subscapular hematoma with no parenchymal laceration |
| 2 | Nonexpanding perirenal hematoma or cortical laceration less than 1 cm deep with no urinary extravasation |
| 3 | Parenchymal laceration extending greater than 1 cm into the cortex with no urinary extravasation |
| 4 | Parenchymal laceration extending through the cortico-medullary junction and into the collecting system |
| 5 | Multiple major lacerations resulting in a shattered kidney or avulsion of renal hilum that devascularizes the kidney |

# CASE (5)

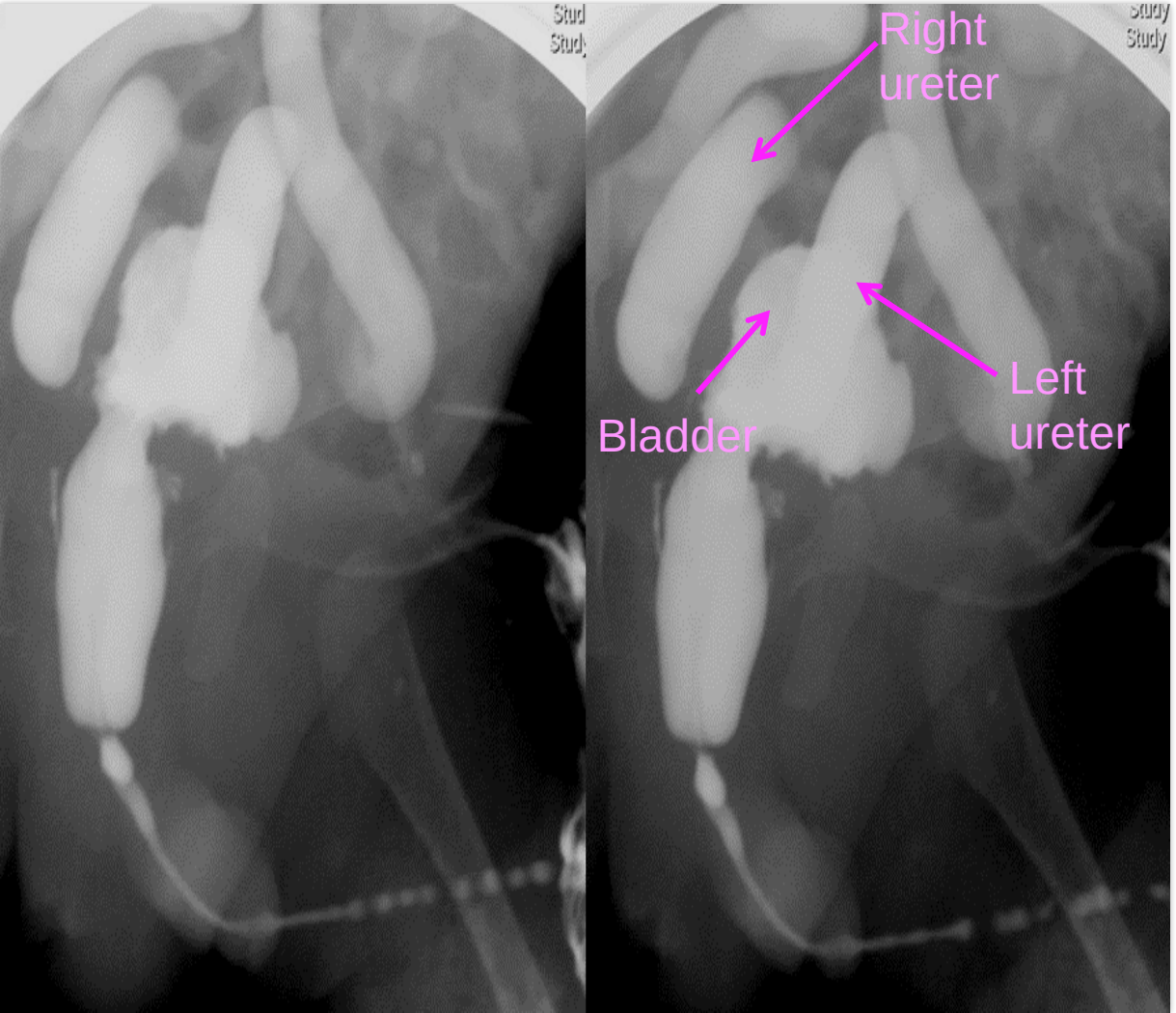


**One month old boy with recurrent UTI.**

- **What type of imaging is this?**

a- Intravenous urography (IVU)
b- CT with IV contrast
c- Voiding cystourethrogram
d- scintigraphy

# CASE (5)

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- **What type of imaging is this?**

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* Tortious ureter, and dilated,
> grade 5 veiscoureteric reflux

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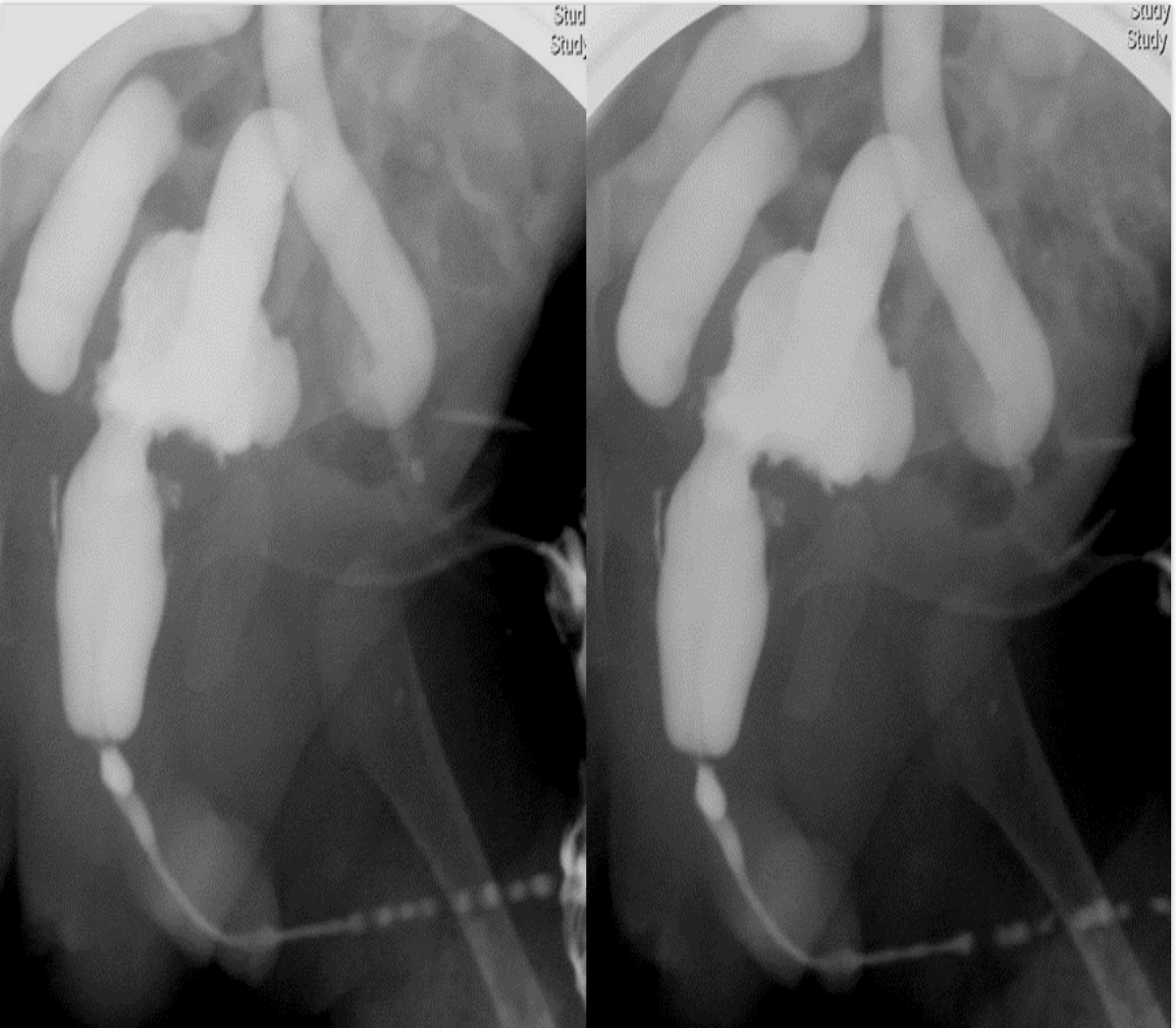
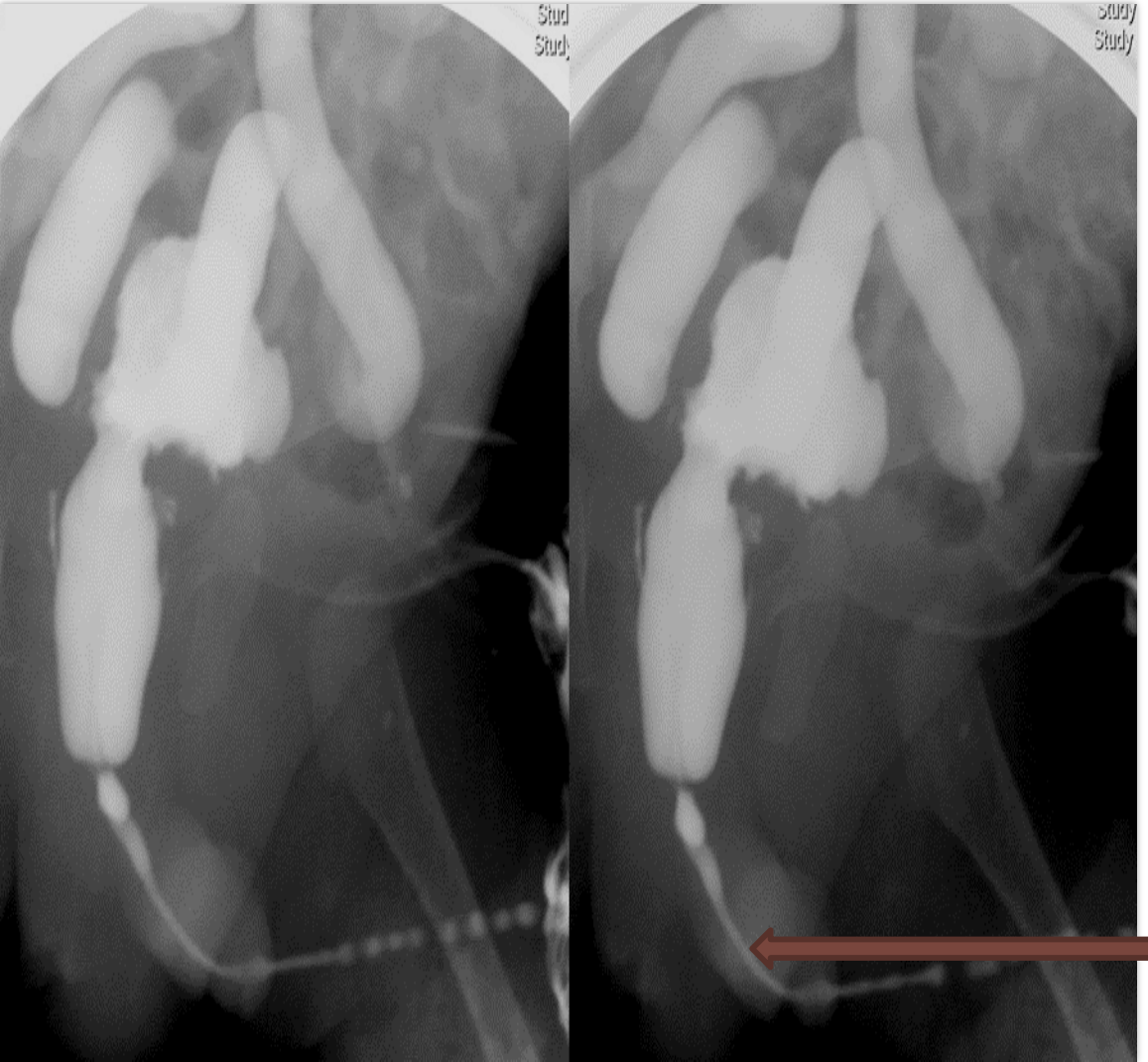


**One month old boy with recurrent UTI.**

- **What is the abnormality seen?**

a- Normal VCUG
b- Vesico-colonic fistula
c- Beaded urethral strictures
d- Vesicoureteric reflux

# CASE (5)



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There is dilatation because of refluxed urine

CATHETER

# CASE (6)

**31 y/o pregnant patient came to ER with high grade fever, right flank pain and vomiting. In addition, she has urinary frequency since 3 days.**

- **What is this imaging modality?**

a- MRI with contrast
b- MRI without contrast
c- CT with contrast
d- CT without contrast

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❖ **How do you describe this abnormality?**

A- cortical mass
B- pelvicalicial dilatation
C- hypo perfused lesion
D- perirenal hematoma

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❖ **What is the most likely diagnosis?**

A- renal carcinoma
B- pyelonephritis
C- type I cyst
D- traumatic lesion

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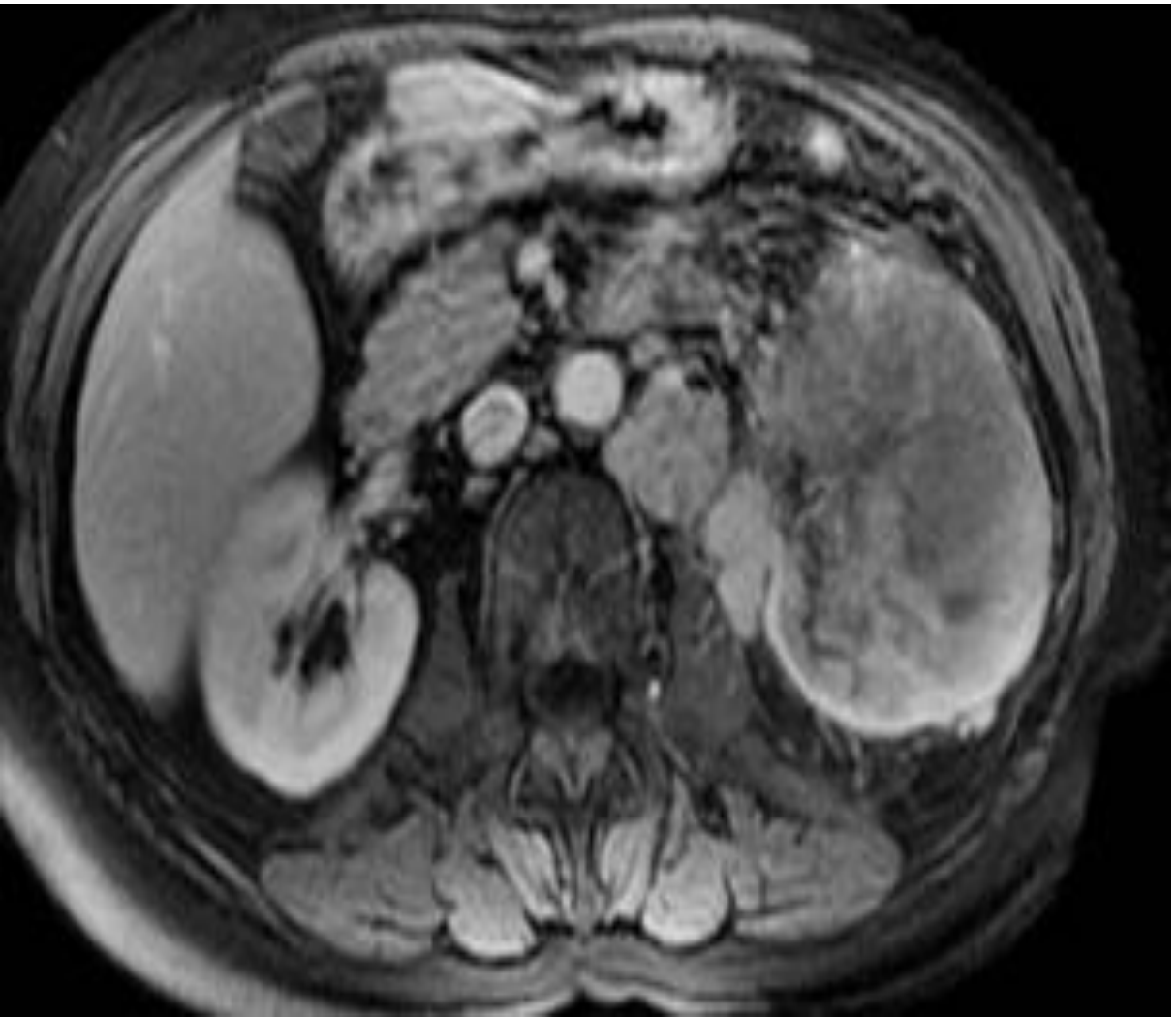


**76 y/o male patient presented with painless hematuria and weight loss.**

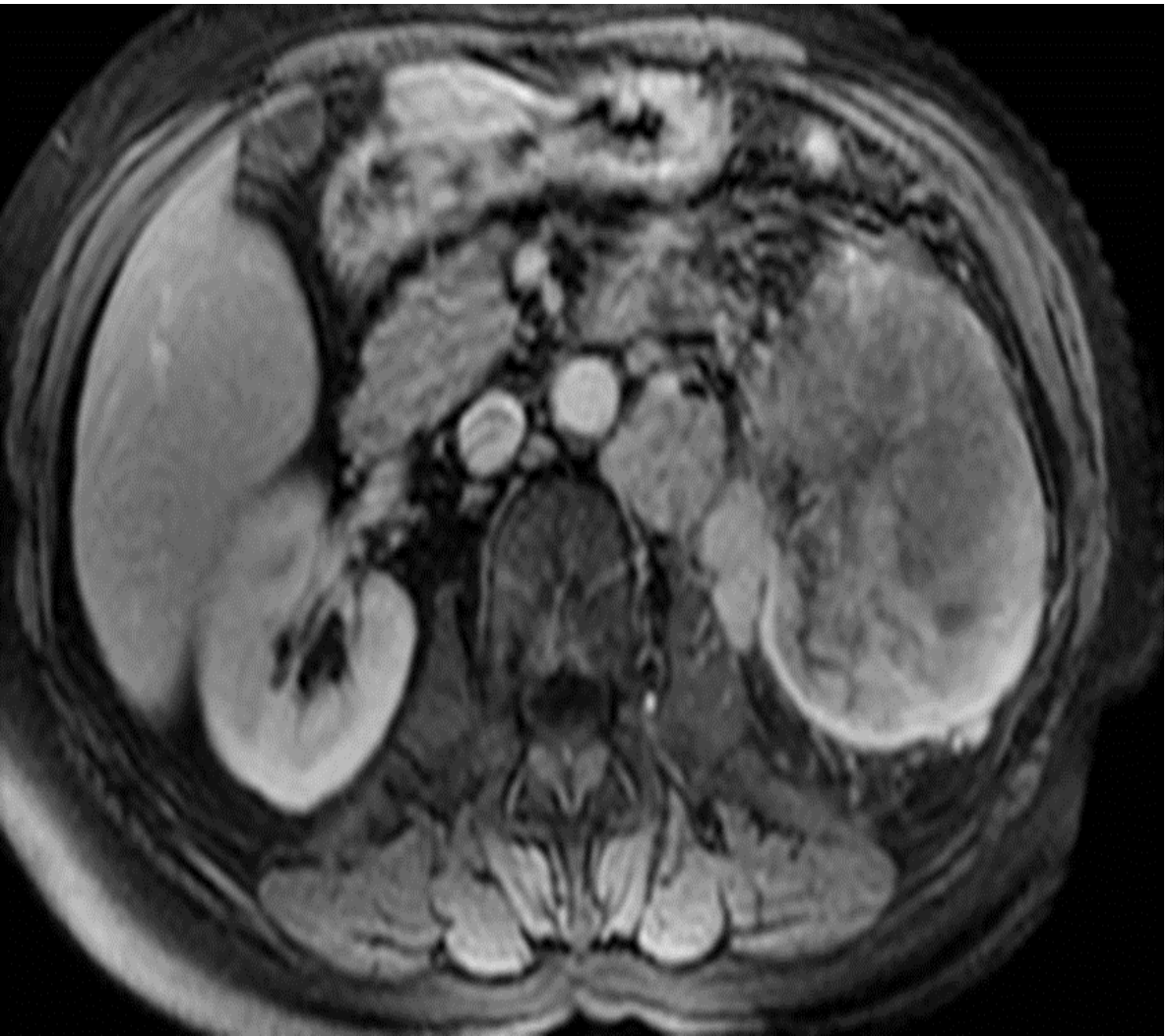
❖ **How do you describe this lesion?**

Huge mass occupying left kidney, irregular border hetrogenous mass

*MRI (T1, + contrast)

*We know it's MRI because the bone (vertebra) isn't white as in CT

# CASE (7)



**76 y/o smoker male patient presented with painless hematuria and weight loss.**

❖ **What is the most likely diagnosis?**

A- pyelonephritis
B- renal adenocarcinoma
C- transitional cell carcinoma
D- angiomyolipoma

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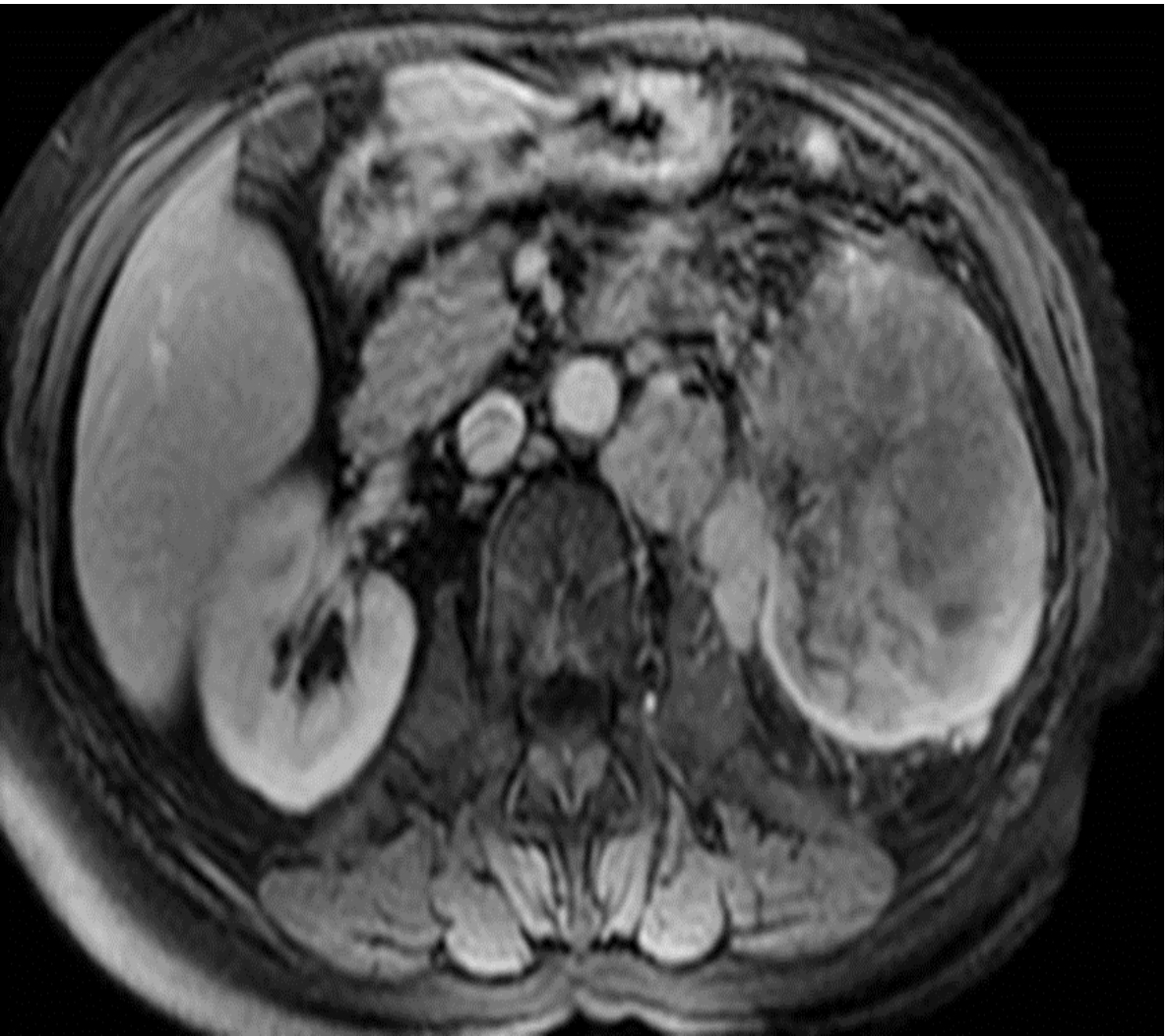

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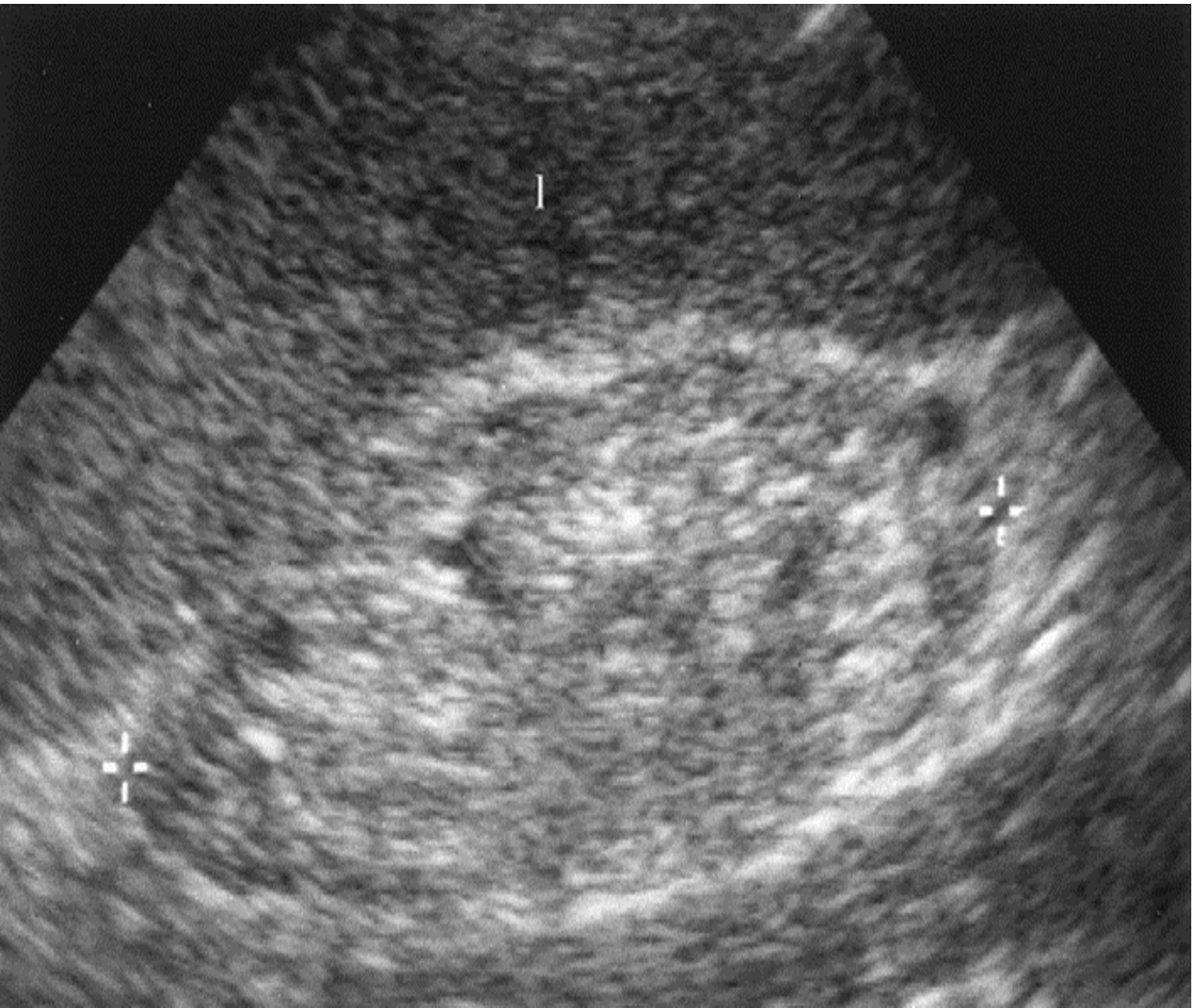

**81 y/o female diabetic patient came to clinic with general fatigue, itching, loss of appetite and easy bruising. Initial lab works show a creatinine level of 180 Umol/L.**

❖ **What does US show?**

A- normal kidney
B- hypoechogenic kidney
C- atrophic undifferentiated kidney
D- atrophic kidney with normal cortico-medullary differentiation

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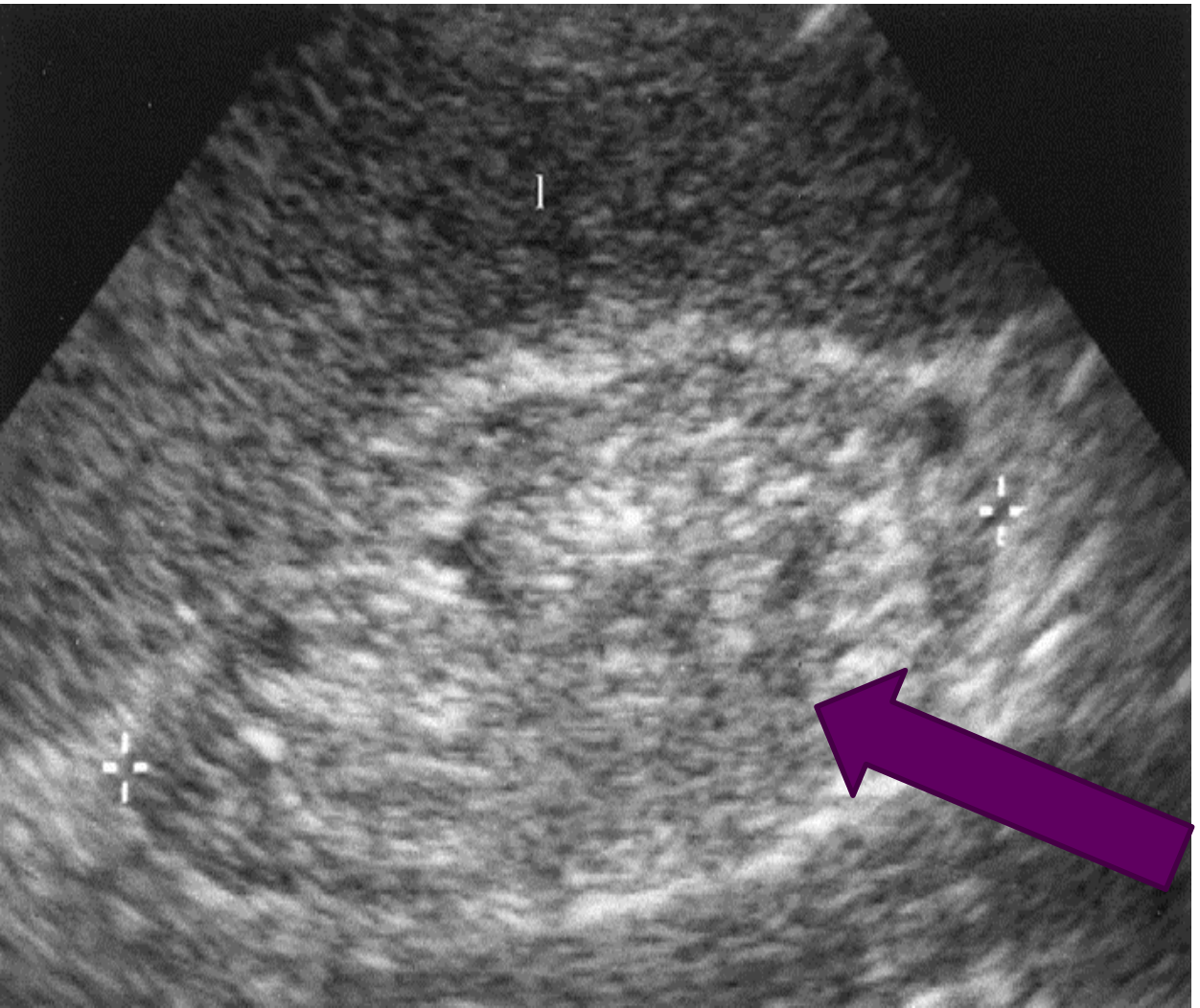

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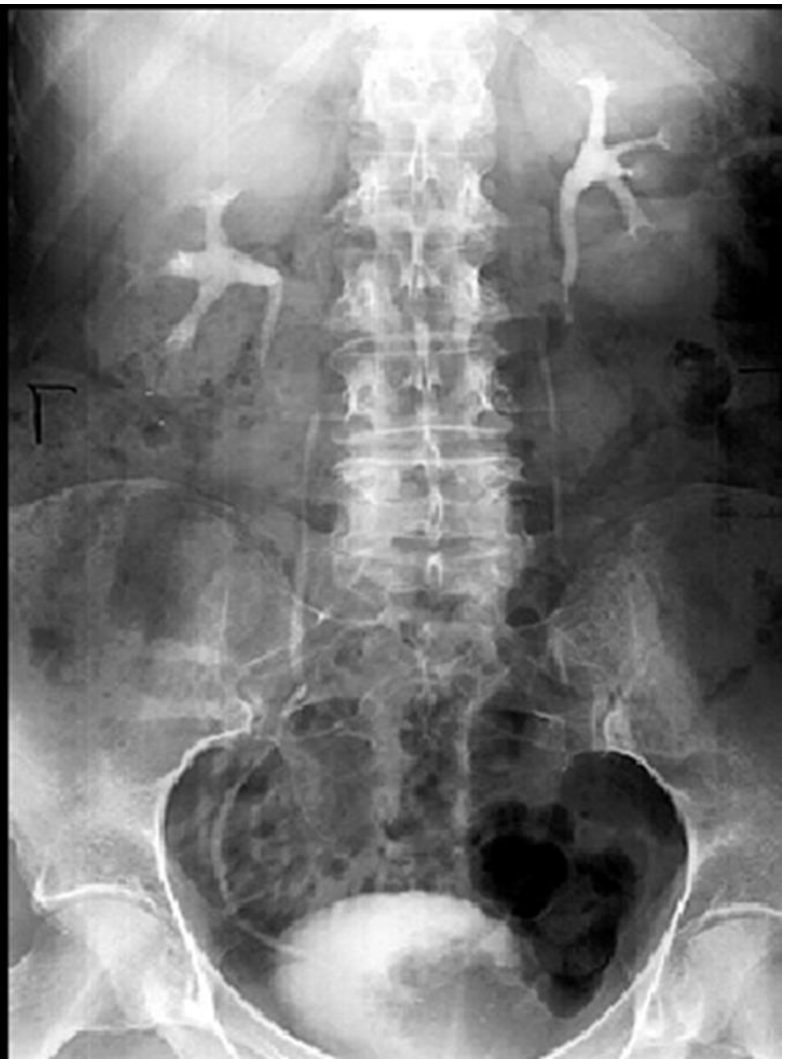
Collecting system is not clearly seen

**You can see the difference between this beautiful kidney with clear collecting system and the diseased one in the previous slide!**

**> NORMAL**

# CASE (9)

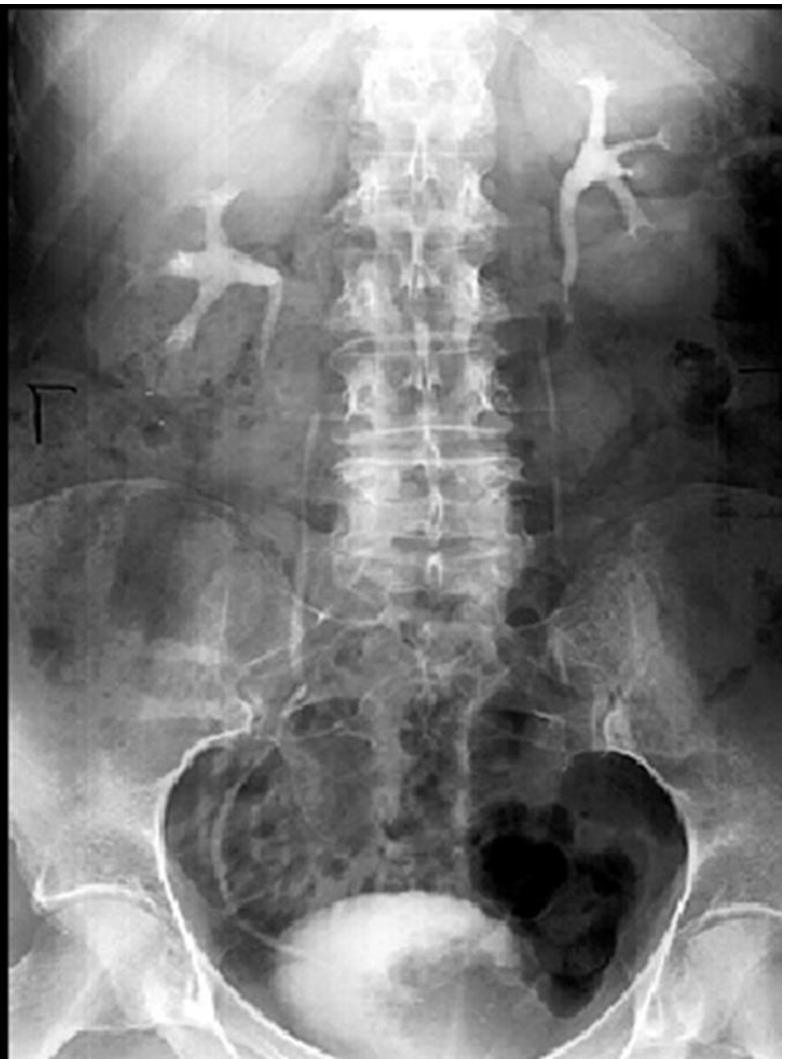


**67 y/o male patient came to ER with worsening hematuria.**

❖ **What is this exam?**

A- KUB
B- IVP
C- CT: coronal section
D- scintigraphy

# CASE (9)



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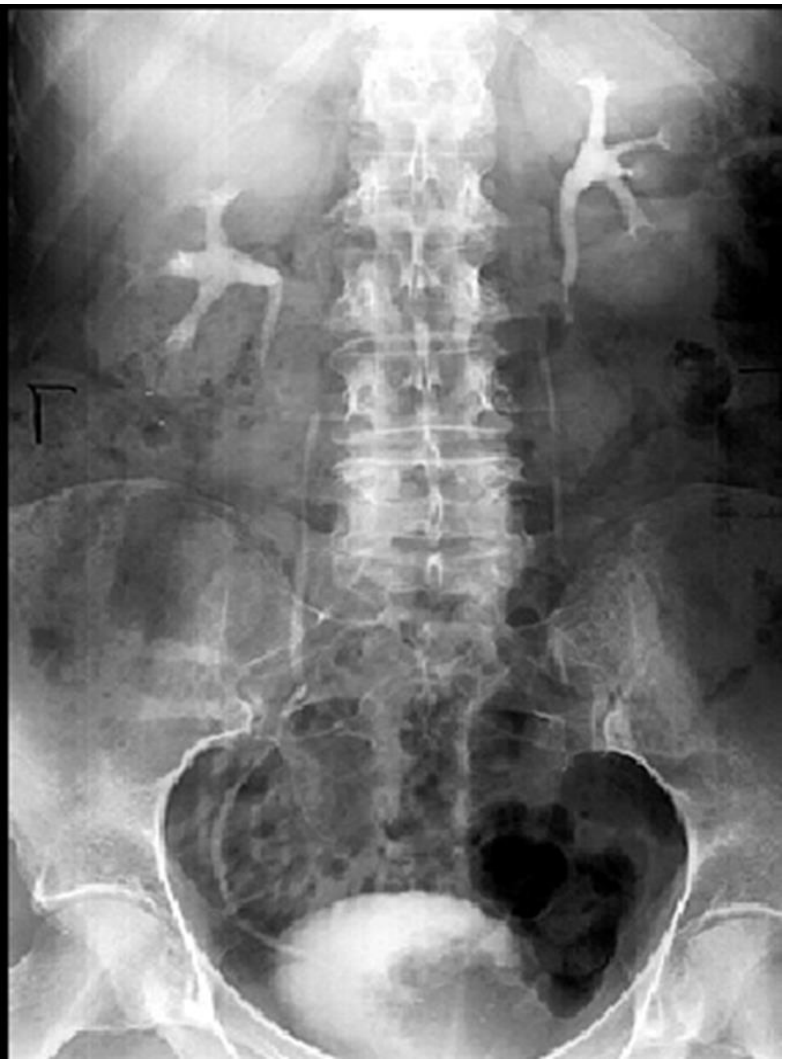

**67 y/o male patient came to ER with worsening hematuria**

- **What is the major finding?**

A- normal
B- left pelvicalicial dilatation
C- right ureteral dilatation
D- filling defect in urinary bladder

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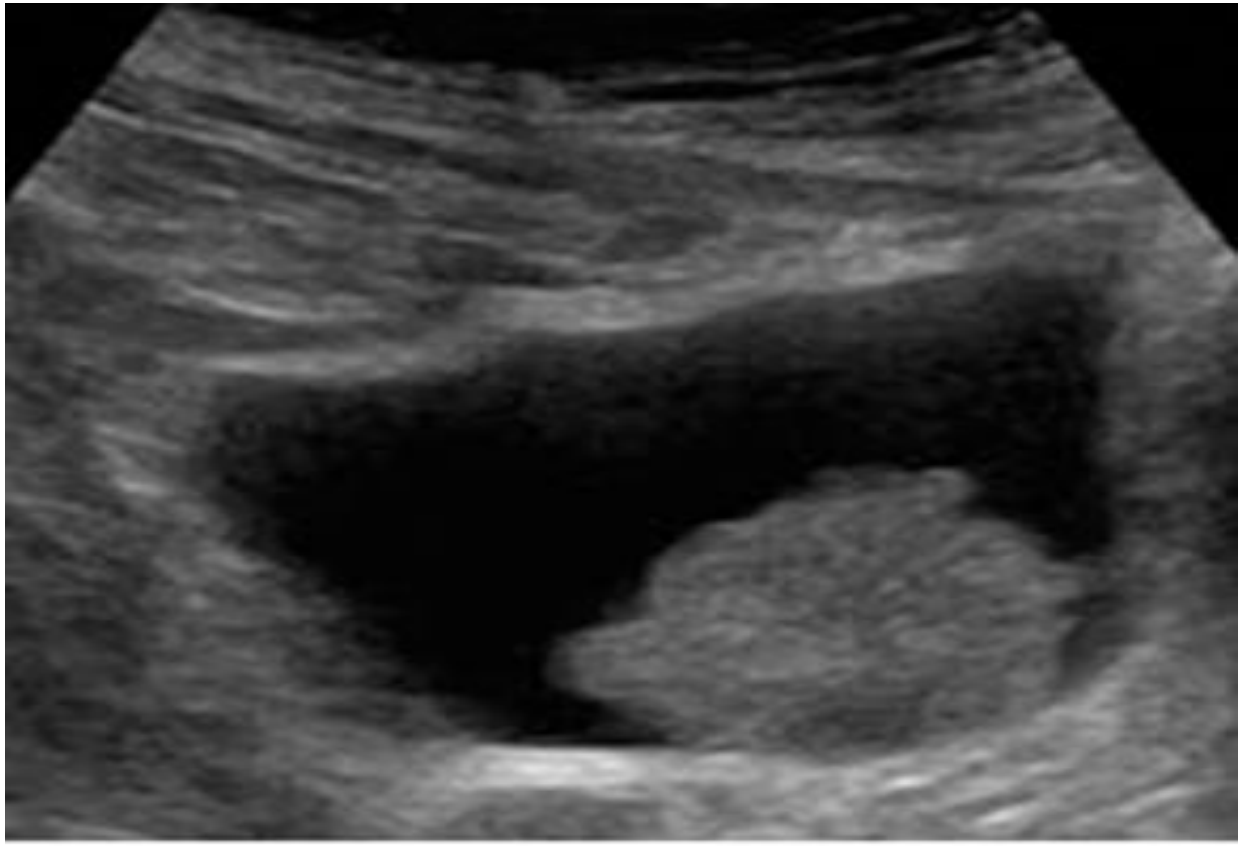


US shows bladder mass.
Could this be blood clot?

Yes it could be blood clot, the only way that we can differentiate between blood clot and tumor in a US image is that the blood clot can move to other place but the tumor don’t.

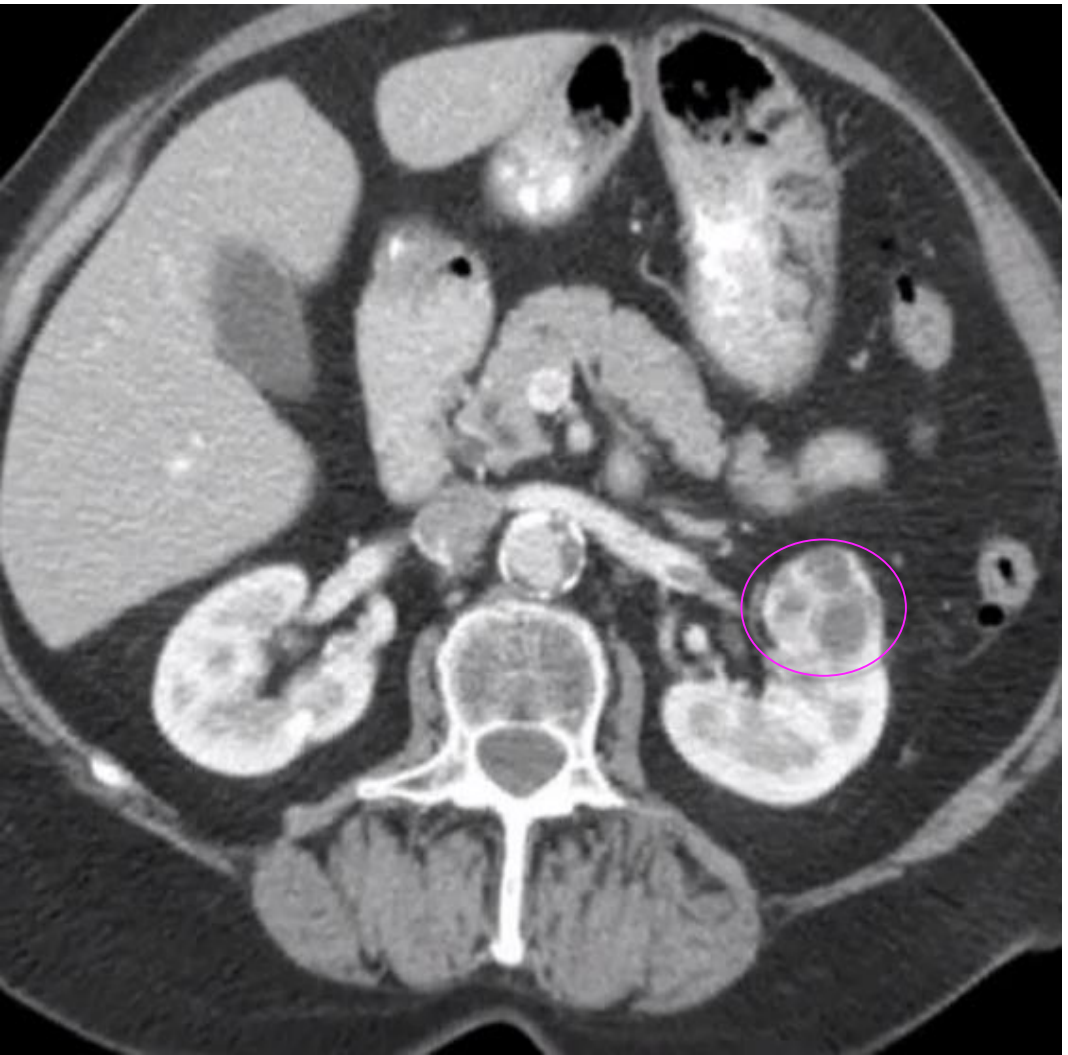
# CASE (10)

**73 y/o female came with painless hematuria & general fatigue**

❖ **What is the major finding?**

A- Bosniak type II renal cyst
B- malignant tumor
C- focus of pyelonephritis
D- normal

# CASE (10)



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❖ **What is the major finding?**

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B- malignant tumor
C- focus of pyelonephritis
D- normal

*forget about Bosniak classification ,even if I put it with mcq choices Don't choose it, just think> is this tumor or cyst?

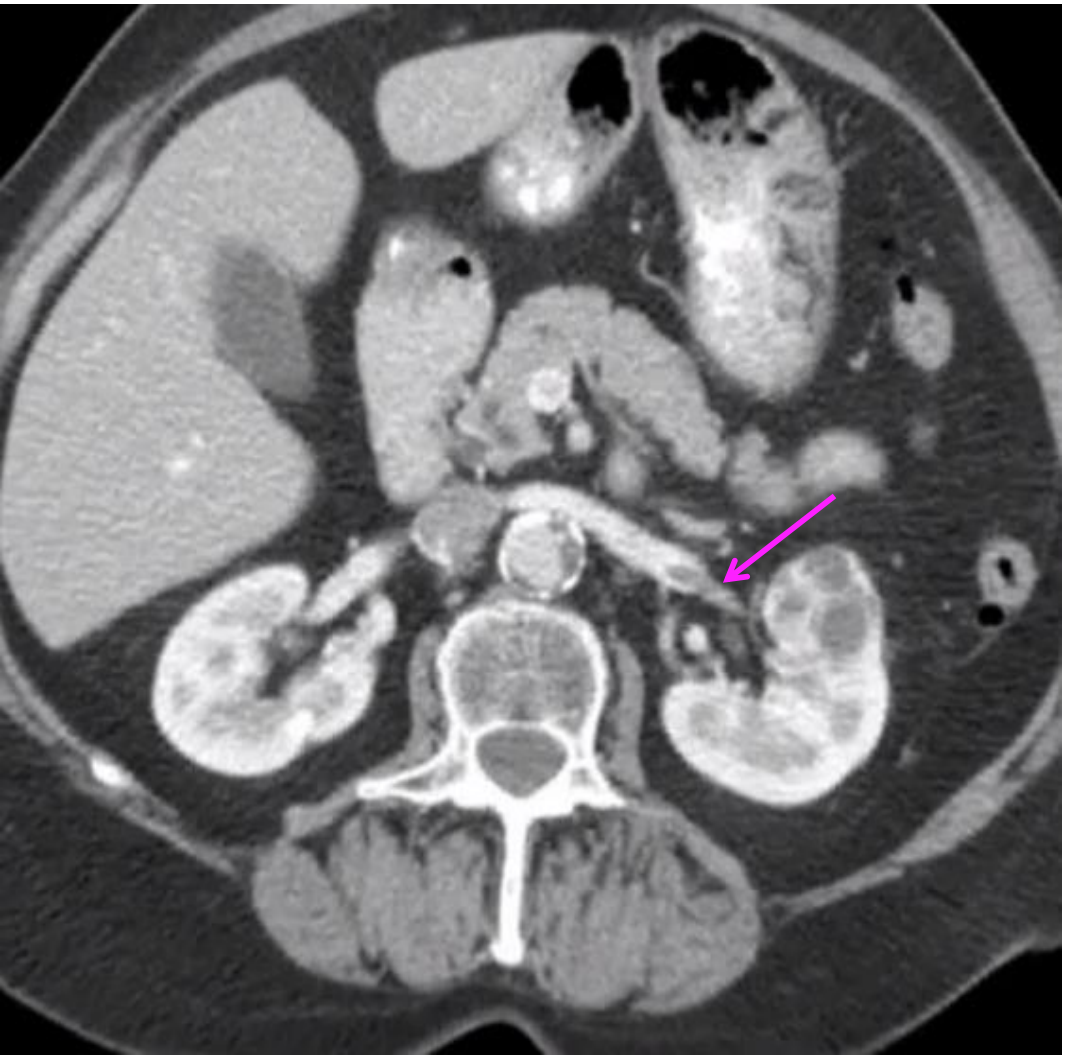
# CASE (10)

**73 y/o female came with painless hematuria & general fatigue**

❖ **What other secondary finding do you observe?**

A- perirenal hemorrhage
B- mass effect on pancreas
C- renal vein filling defect
D- pelvicalicial dilatation

# CASE (10)



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D- pelvicalicial dilatation

*renal vein thrombus common in renal cell carcinoma

# CASE (11)

**Middle aged diabetic male patient came to ER with a history of worsening fever and right abdominal pain since 2 weeks**

- **How do you describe the lesion in right kidney?**

Well circumscribed homogeneous hypo density in the right kidney and the walls well defined and thickened and taking the contrast, other than that lesion the cortex is normal.

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**Middle aged diabetic male patient came to ER with a history of worsening fever and right abdominal pain since 2 weeks**

- **What is the most likely diagnosis in the right kidney?**

A- pyelonephritis
B- renal abscess
C- simple cyst
D- pelvicalicial dilatation

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- **What is the most likely diagnosis in the right kidney?**

A- pyelonephritis
B- renal abscess
C- simple cyst
D- pelvicalicial dilatation

Note: a simple cyst will never cause pain and fever

# MCQs

The first preliminary imaging modality in emergency department for a renal colic patient to generally assess renal stones is one of the following:

A- Intravenous urography (IVU)

B- Plain X-ray (KUB)

C- CT scan

D- ultrasound

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## One of the following is a common site of urinary stone obstruction:

A- proximal ureter

B- mid ureter

C- junction of mid-distal ureter

D- vesico-ureteric junction

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Because the junction between the ureter and bladder is relatively narrow even in normal anatomy. So, it might obstruct some stones down there.

# MCQs

## One of the following is a relative contraindication for CT with contrast :

A- intracranial aneurysm clip

B- renal failure

C- cardiac pacemaker

D- high grade fever

# MCQs

## One of the following is a relative contraindication for CT with contrast :

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D- high grade fever

Because the kidney will not be able to filter this contrast out!

# MCQs

## One of the following is an absolute contraindication for MRI:

A- calustrophobia

B- cardiac pacemaker

C- pregnancy

D- uncontrollable movement

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Because of high magnetic field in MRI

# MCQs

**Which imaging modality is used to measure the renal split function? (one correct answer)**

A- Ultrasound
B- Magnetic resonance imaging
C- Scintigraphy
D- Voidnig cystourethrogram

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# DONE !