

# URORADIOLOGY I

~~D.HANA QUDSIEH~~

D.SULTAN ALNAWAYSEH ✓

آهال البهوش  
aya.alajarma ♡

اللون الأخضر ← تبيين دفعة أنتى (مجموعة 1)  
اللون الأصفر ← تبيين سابقا دفعة روع .

# MODALITIES OF IMAGING

KUB

IVU

ULTRASOUND

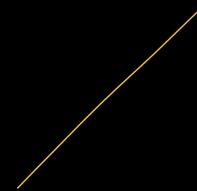
MCUG

CT SCAN (STONE PROTOCOL)

CT SCAN TRIPLE PHASE

MRI

DMSA



# KUB

-(70-80%) gas under diaphragm (R.t) in perforating duodenum ulcer  
Chest X ray included the abdomen abdominal x ray ←

## KIDNEY URETER BLADDER XRAY

gas under diaphragm = pneumoperitunium.

most common solid organ impeded by Truma → Spleen  
by plain abdominal X ray → marker (hematoma in l.t side) → lead to displacement of fundus of stomach.  
in l.t side & displacement of splenic flexure down

hematom = soft tissue mass

FIELD OF VIEW: FROM LOWER RIBS TO SYMPHYSIS EMPHASIS  
NO CONTRAST MUST BE USED  
USUALLY PREPARATION WITH LAXATIVES AND FASTING PRECEED THIS XRAY  
USED MANY TO ASSESS ANY TYPE OF CALCIFICATION OR STONES

### AP projection

centering point :the midsagittal point at the level of the iliac crest

Simple X ray ⇒ fluid + soft tissue → Same density.

بالرغم من أن البطلع عن السبات (ما يعرف إذا مطلوب أو لا)

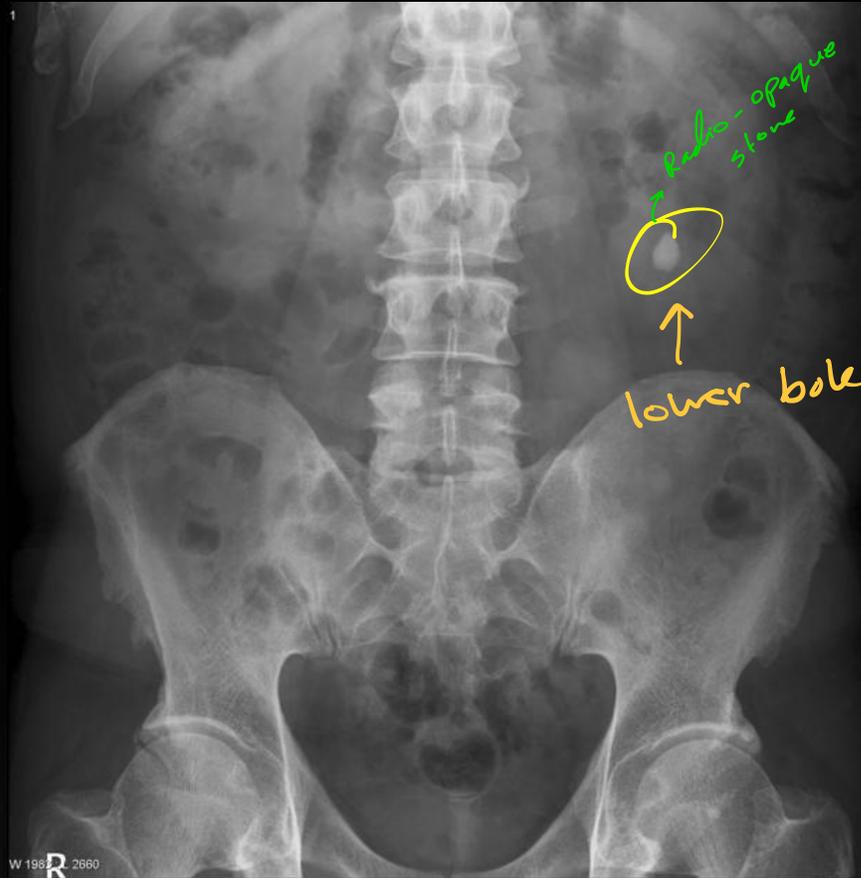


**NORMAL**

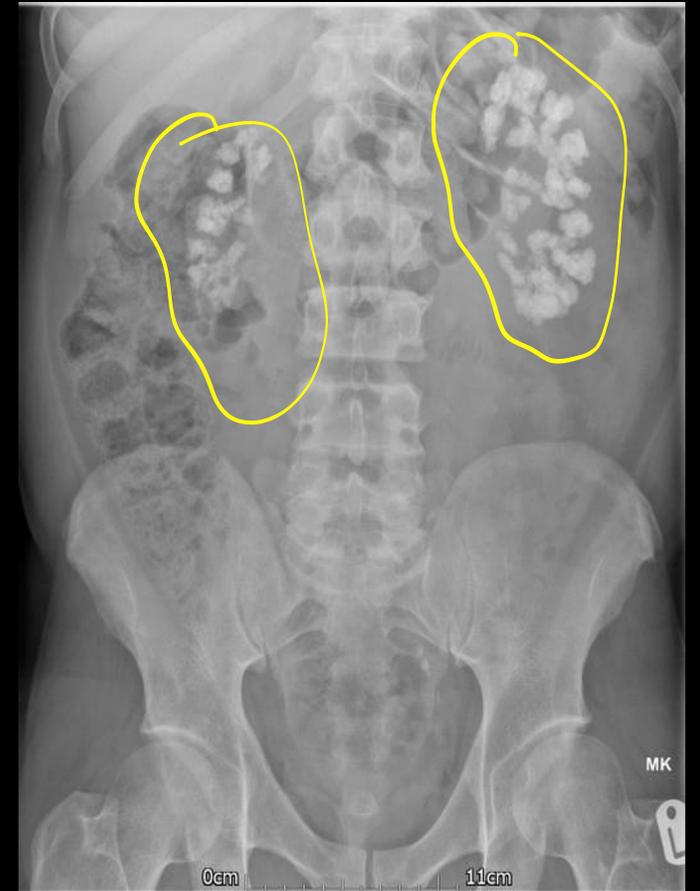
( KUB - Images )



URETHRAL CALCULUS

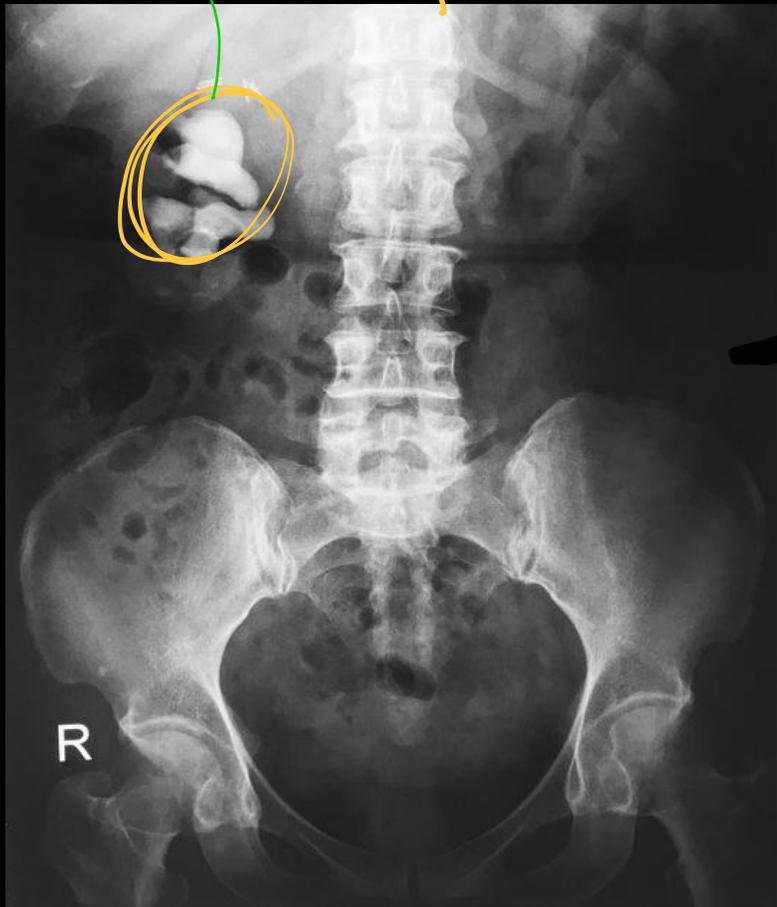


LT KIDNEY CALCULUS



✓ MEDULLARY (Bilateral)  
NEPHROCALCINOSIS

Large radio-opaque stone  
at the RT. Kidney  
plain film (control) (KUB)



كحصى قرون العنبر / الحصاة

RT STAGHORN STONE

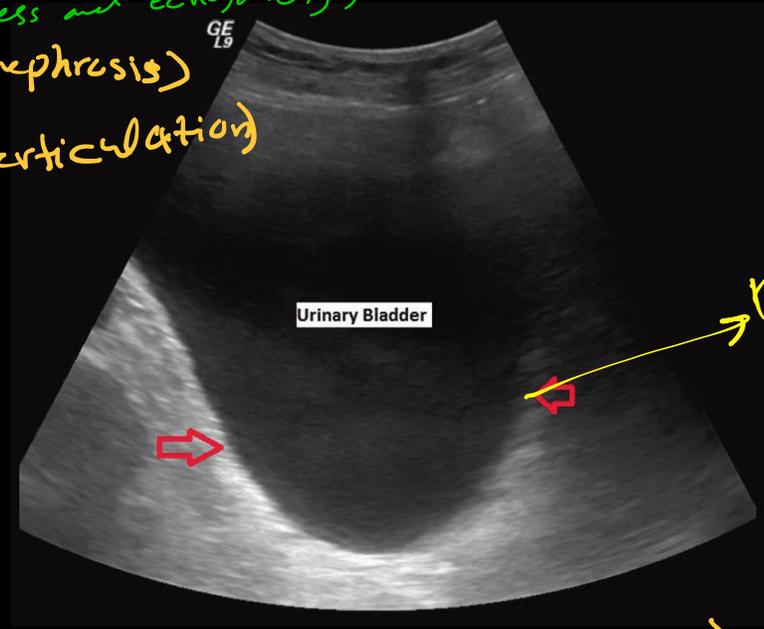
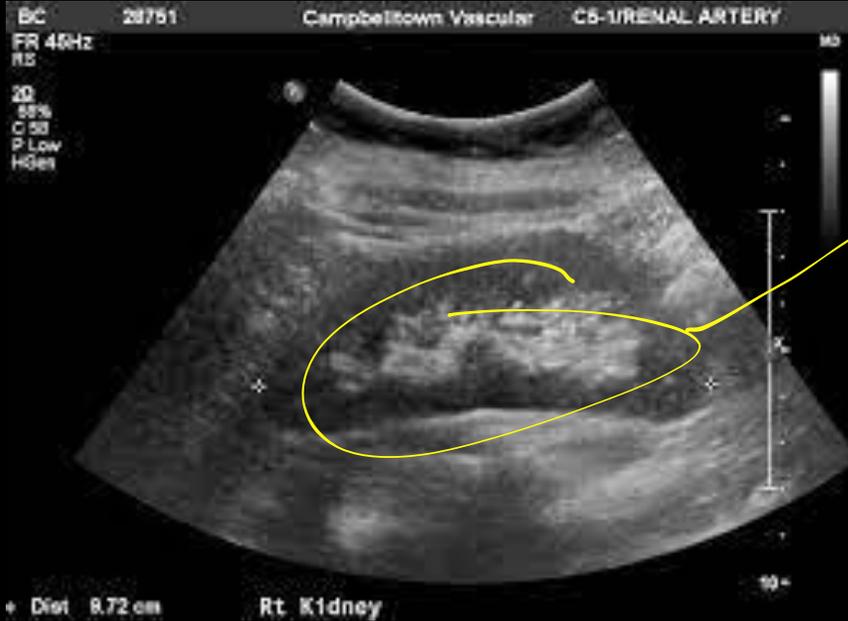


حافض ال  
Renal pelvis

# ULTRASOUND

عنه شئ واحد

- ① Stone
- ② Solid mass or simple cyst
- ③ echogenicity
- ④ Renal Cortex (Thickness and echogenicity)
- ⑤ Renal Sinus (hydronephrosis)
- ⑥ outline (diverticulation)



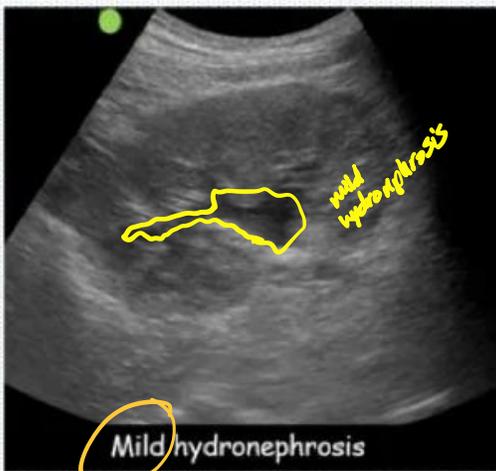
✓ Chronic pyelonephritis (Thinning of cortex + scarring (lobulated))  
 ✓ acute pyelonephritis (enlargement of kidney + thickening in renal cortex)

**NORMAL KIDNEY**      **NORMAL URINARY BLADDER**

↳ mostly seen in old male with Benign prostatic Hypertrophy (BPH)  
 or in females with Asymptomatic Hemorrhagic ovarian cyst.

multiple cause.  
سبب اعلیٰ US

# Qualitative grading of hydronephrosis severity



Mild hydronephrosis



Moderate hydronephrosis



Severe hydronephrosis

← بتی نسی انسداد (obstruction)  
ureteric obstruction

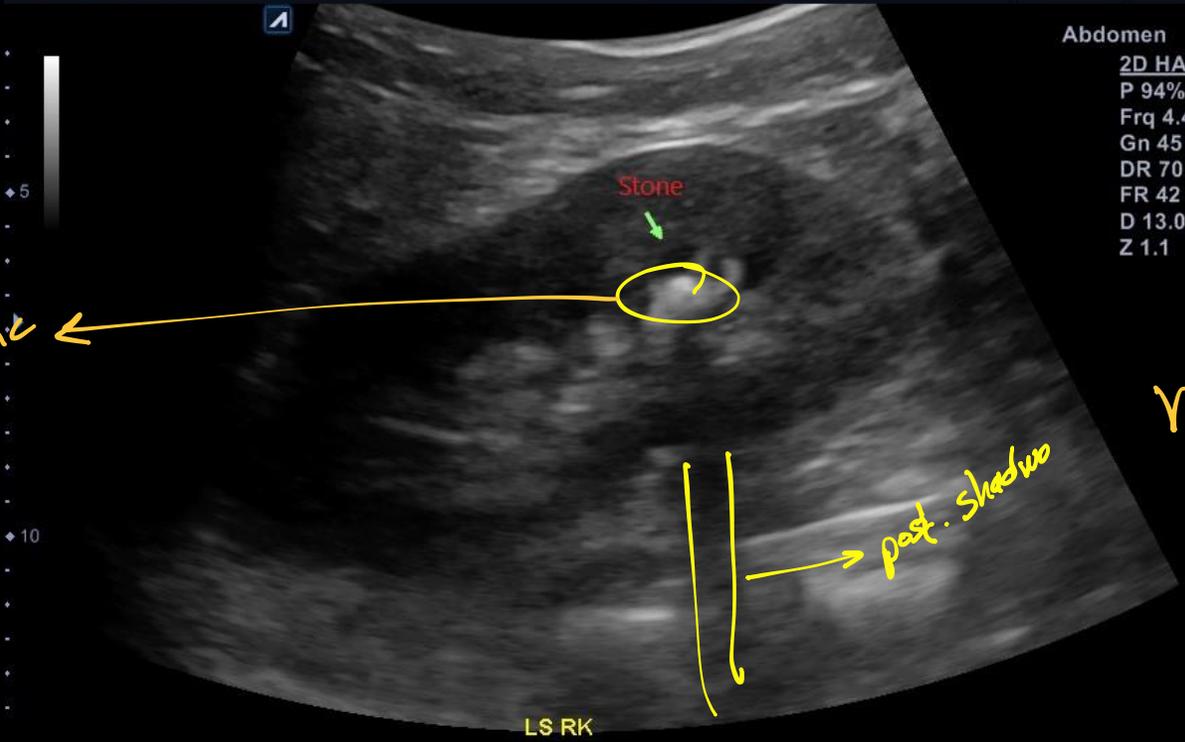


NR IMAGING  
24.08.2018 10:11:06 AM

20180824\_100720  
M20

Admin MI 1.4  
SC1-6H TIS 0.4

Abdomen  
2D HAR  
P 94%  
Frq 4.4  
Gn 45  
DR 70  
FR 42  
D 13.0  
Z 1.1

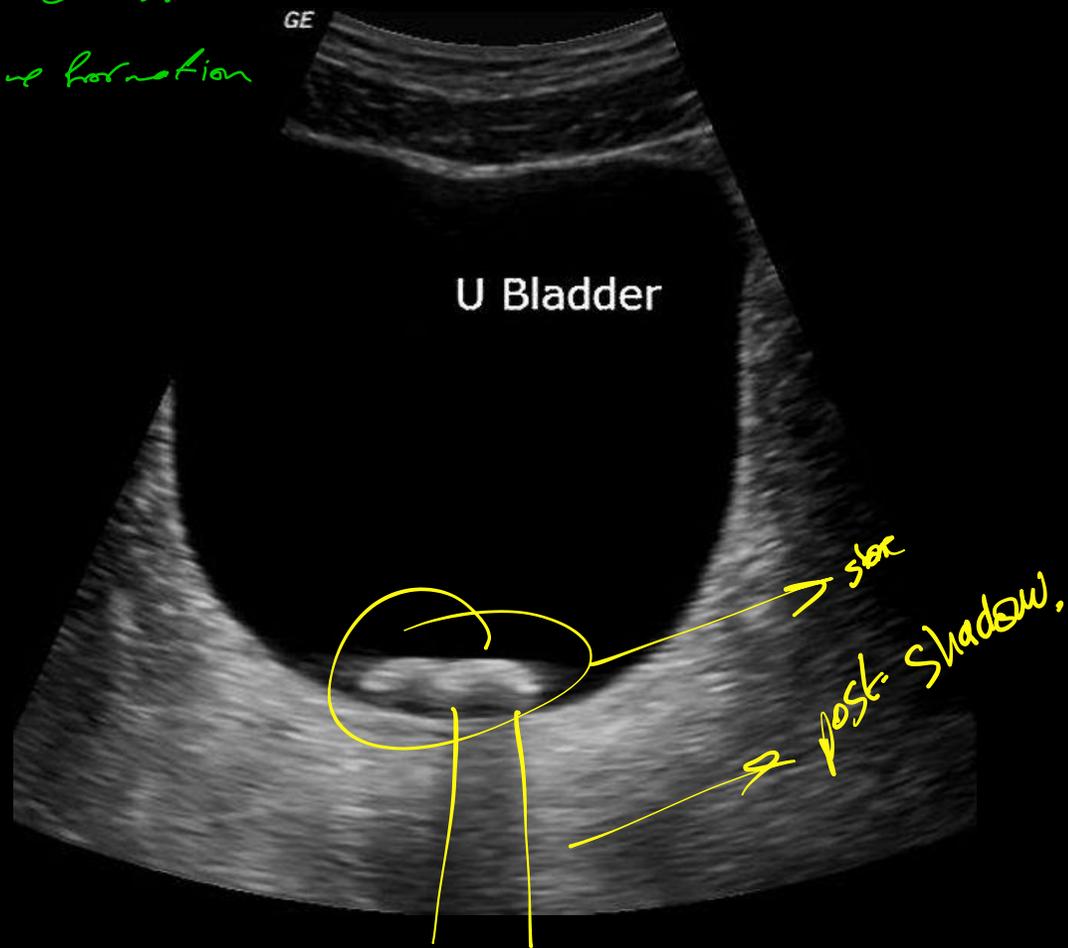


hyperechoic

no hydronephrosis

RENAL STONE : HYPERECHOIC WITH POSTERIOR ACOUSTIC SHADOW

Commonly in old patient with diuretics  
(Urine stasis  $\Rightarrow$  leads to have a recurrent  
UTI  $\Rightarrow$  stone formation)

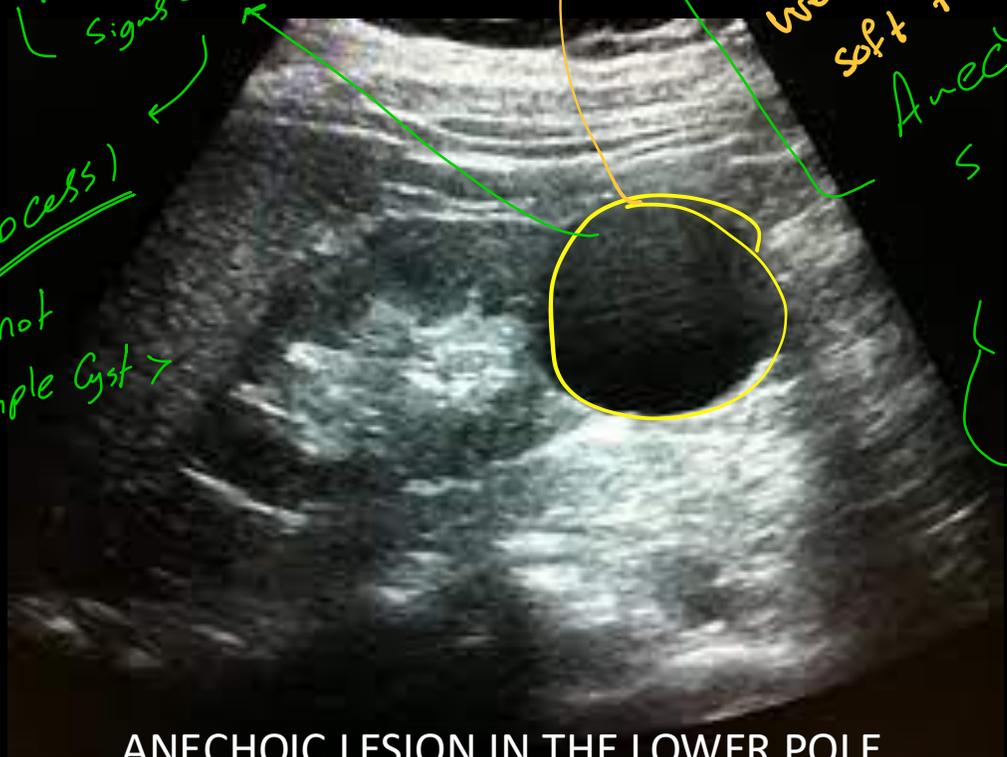


HYPERECHOIC STRUCTURE WITH ACCOUSTIC SHADOW indicating bladder stone

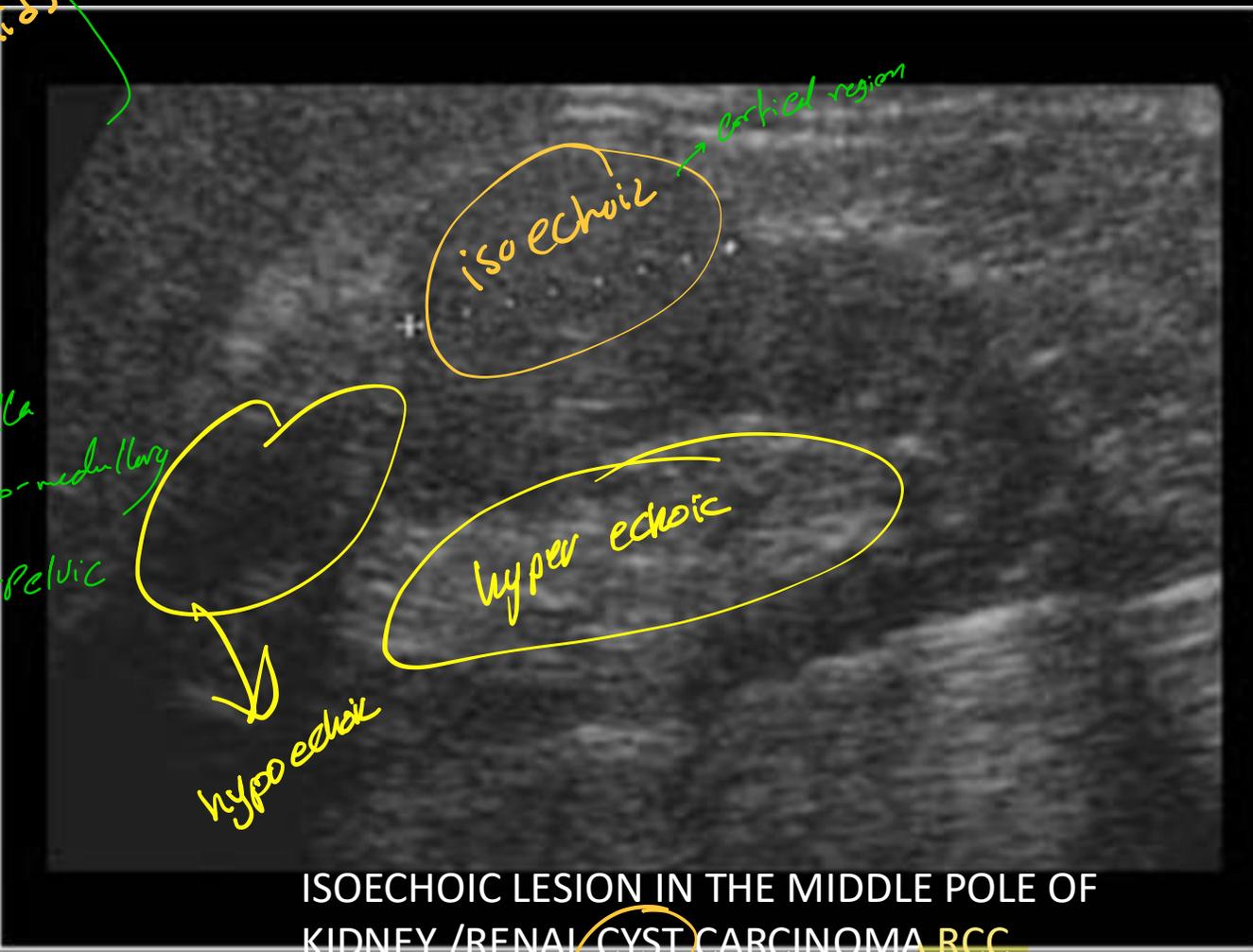
• if these radiographic features present with fever, myalgia, signs of infections

(Abscess)  
not  
< Simple Cyst >

\* Features of simple cyst :-  
no calcification  
no septate  
round, thin wall  
well defined  
soft tissue (solid)  
Anechoic



ANECHOIC LESION IN THE LOWER POLE RENAL CYST



ISOECHOIC LESION IN THE MIDDLE POLE OF KIDNEY / RENAL CYST CARCINOMA RCC

عند تجر hyperchoic اذا في عند bleeding

Solid mass (RCC) ممكن تكون Simple cyst

Superinfection in (polycystic kidney dis.) → hemorrhage within the cyst → lead to abscess.

ممكن اتأكد بال C.T شو هو بالضبط!

para-pelvic  
cortico-medullary

isoechoic  
cortical region

hypoechoic

hyperechoic

Solid mass  
Soft tissue lesions  
Benign  
malignancy

# IVU/IVP: INTRAVENOUS PYELOGRAM/UROGRAM

• IT IS A FUNCTIONAL STUDY OF THE URINARY SYSTEM :

THE PATIENT HAS TIME CONTROL SERIES OF XRAY IMAGES AFTER I.V. NICM (NON IODIATED CONTRAST MEDIA)

Kidney function impairment → رَضْفِر اَعْطِي بَعْضِ  
LOW dose.

TECHNIQUE :

PRE EXAM : CHECK FOR ALLERGY HISTORY, KFT AND CONTRAST RISK

FACTORS

Renal shut down لَا نَه مُمْكِن بَعْضِ

kidney function

لَوْ عِنْدِي allergy :

كَبْر بَكْر لَهِن بَال Steroid

أَوْ بَعْضِ bolus injection hydrocortisone

adrenalin بَعْضِ جَنْبِي +  
anaphyactic shock عَسَانِي

عَا مَبْرُوبُو anti-histamine

مَبْل اَعْطِي C.M

10 m. ←

Spote film not large

→ quality

- EXAM:
- 1- KUB
- 2- GIVE CONTRAST THEN :
- IMMEDIATE FILM
- 5 MINUTES FILM
- 10/15 MINUTES FILM
- 30 MINUTES FILM / POST VOIDE FILM

4 large film.

عشان اسوف ال Urthra

⊕ Scatteradiation to the patient

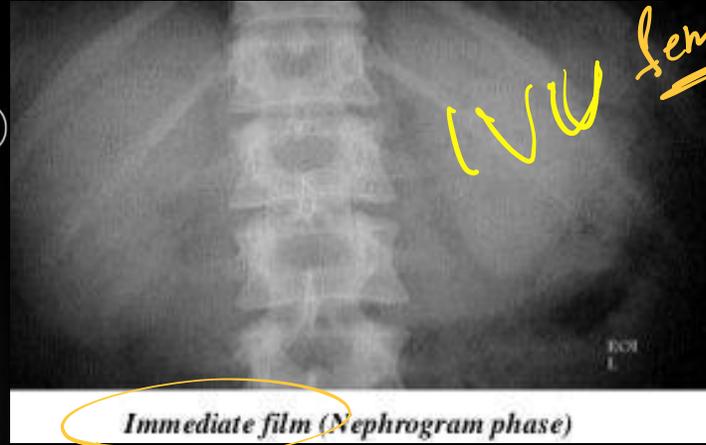
partial or  
 Compleat obstruction  
 Time → duplication  
 اذا كان عيني  
 بعد Stone formation  
 Skip of immediate film.

Control film

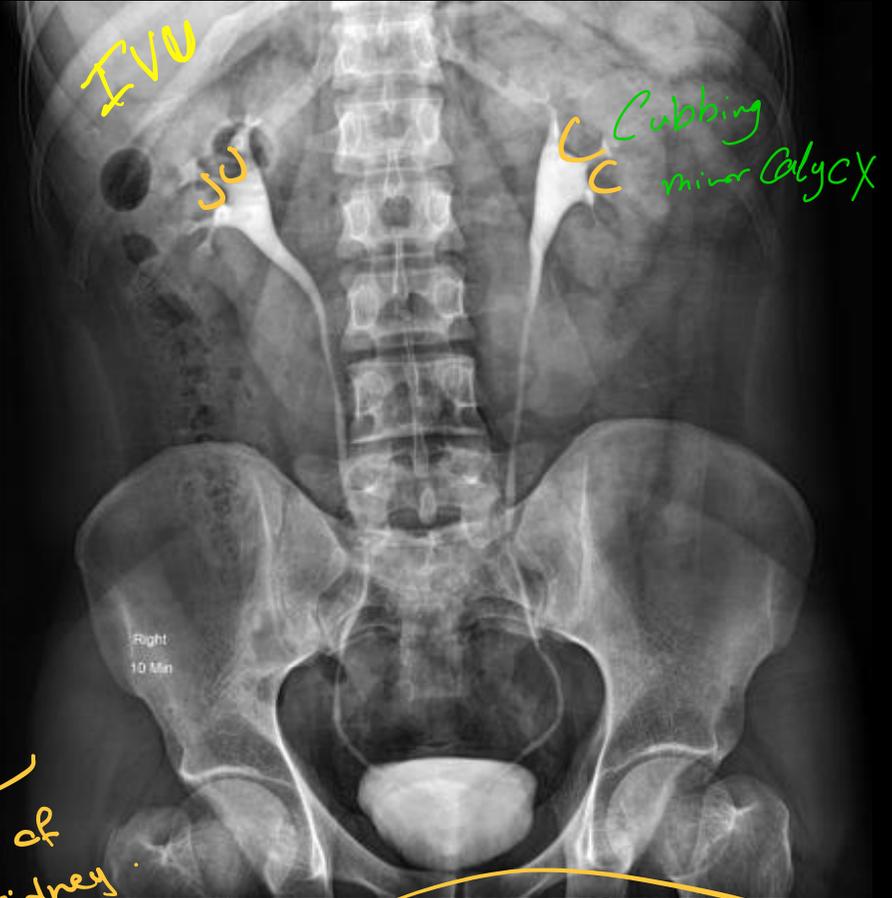


KUB (CONTROL) (PLAIN)

IUC : post voiding film in old age (prostatic hypertrophy) OR recurrent UTI (hemorrhagic cystitis)

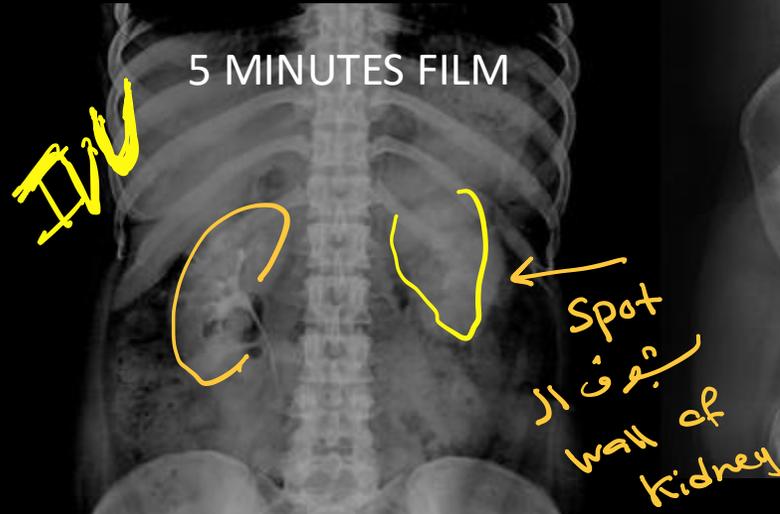


IUC female asymptomatic



10 MINUTES FILM

normal

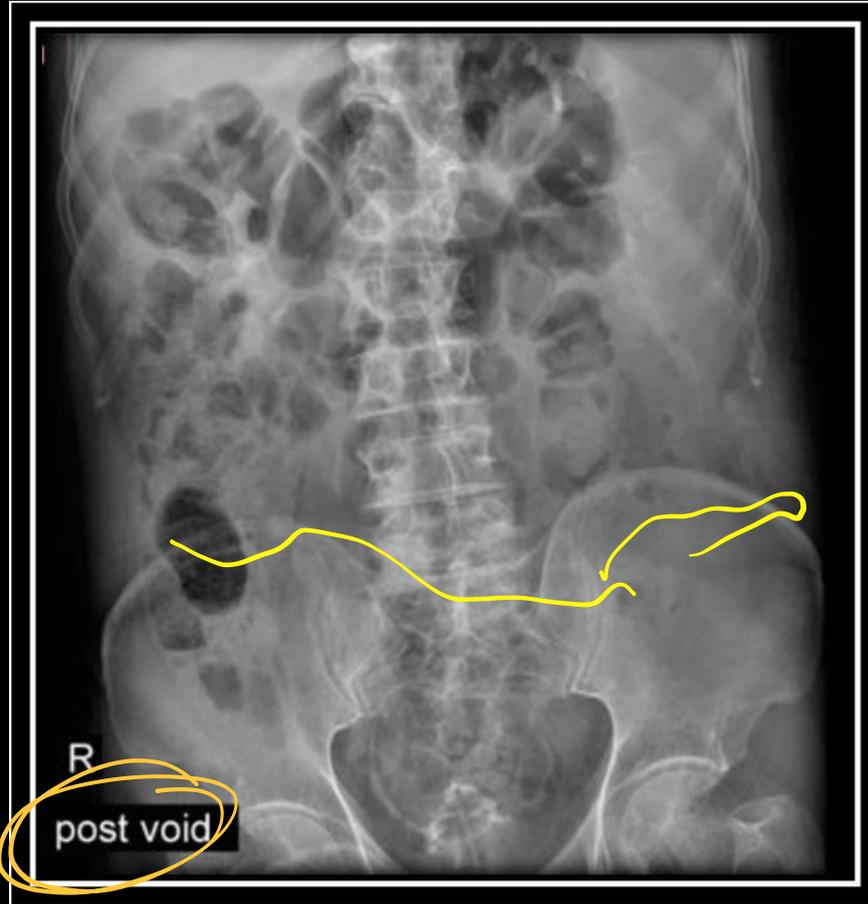


15 min delay بعد 15 دقيقة ✓

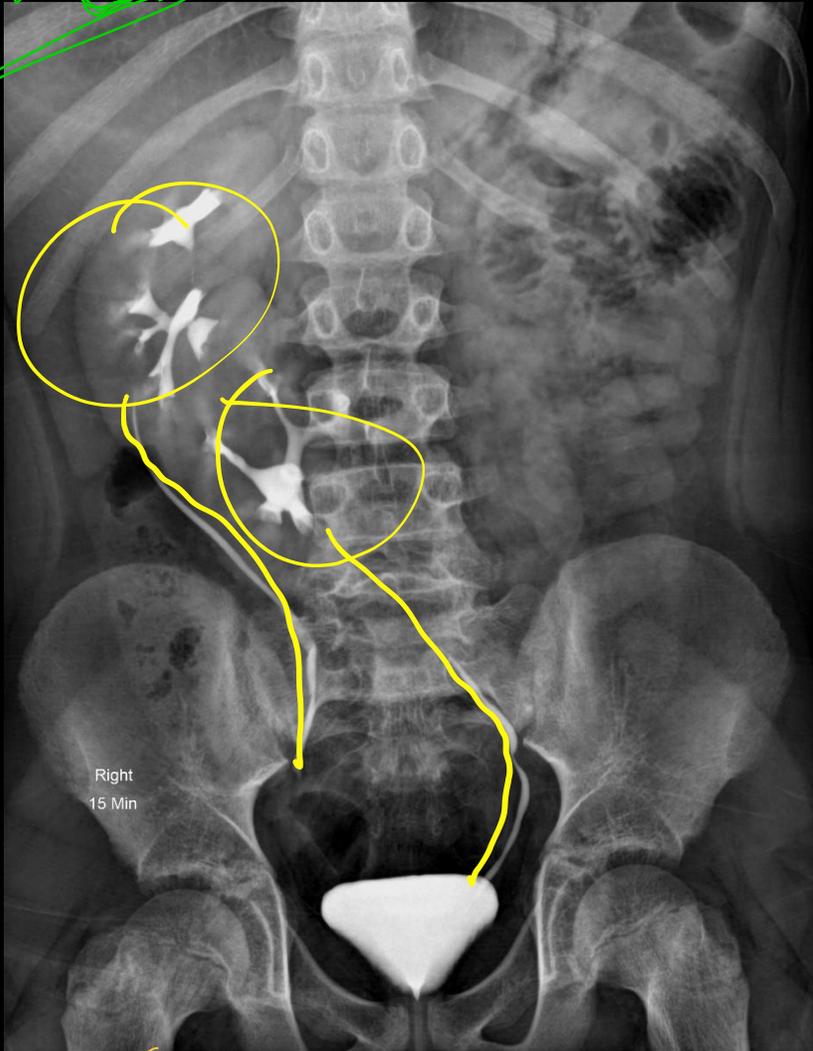
KUB

هناك خطر كبير من التعرض للإشعاع  
of Radiation

Spot film

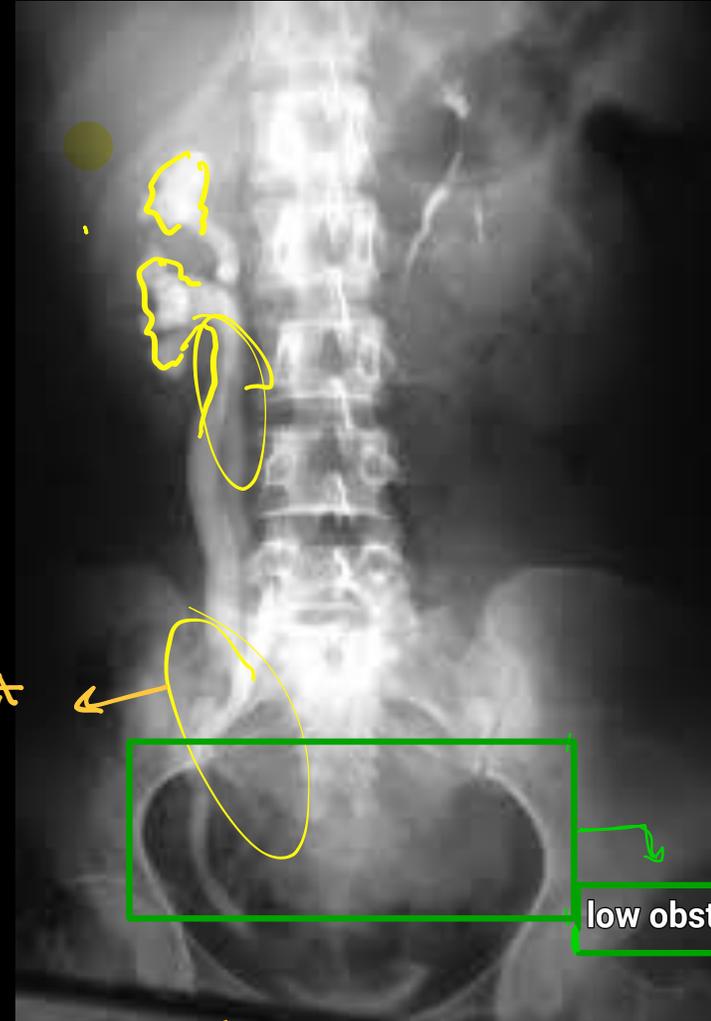


*IVU*

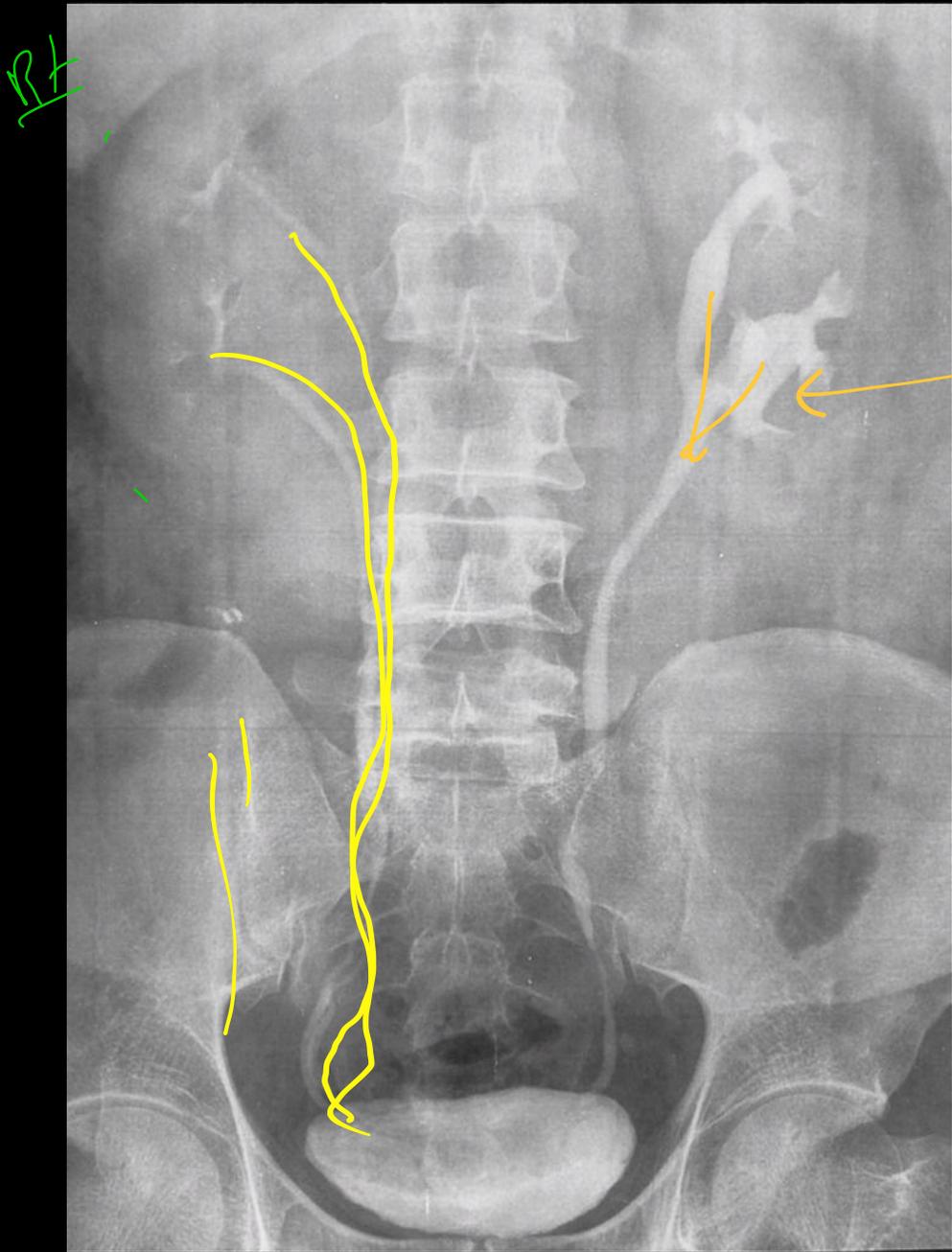


✓ **CROSSED FUSED ECTOPIA  
INSERTION OF LT URETER STILLS ON THE LEFT SIDE**

*Incomplet*



✓ **DUPLICATED RT COLLECTING SYSTEM  
WITH HYDROURETRONEPHROSIS**



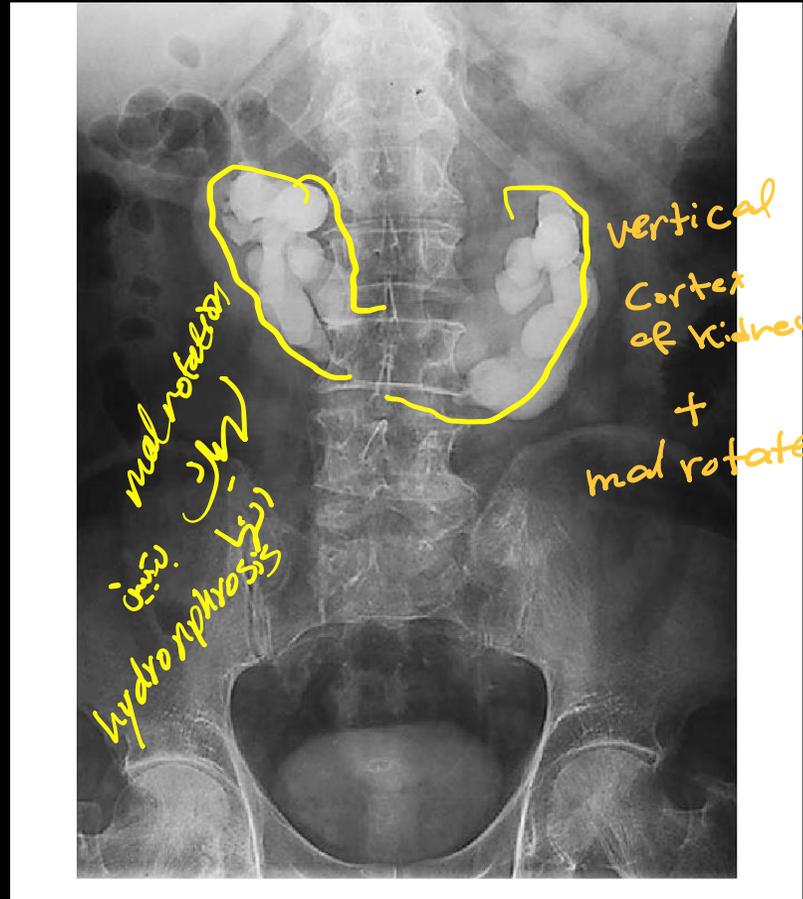
LT

InComplete duplication

COMPLETE DUPLICATION ON THE RT SIDE WITH TWO URETER ORFFICES, INCOMPLETE DUPLICATION ON THE LEFT SIDE

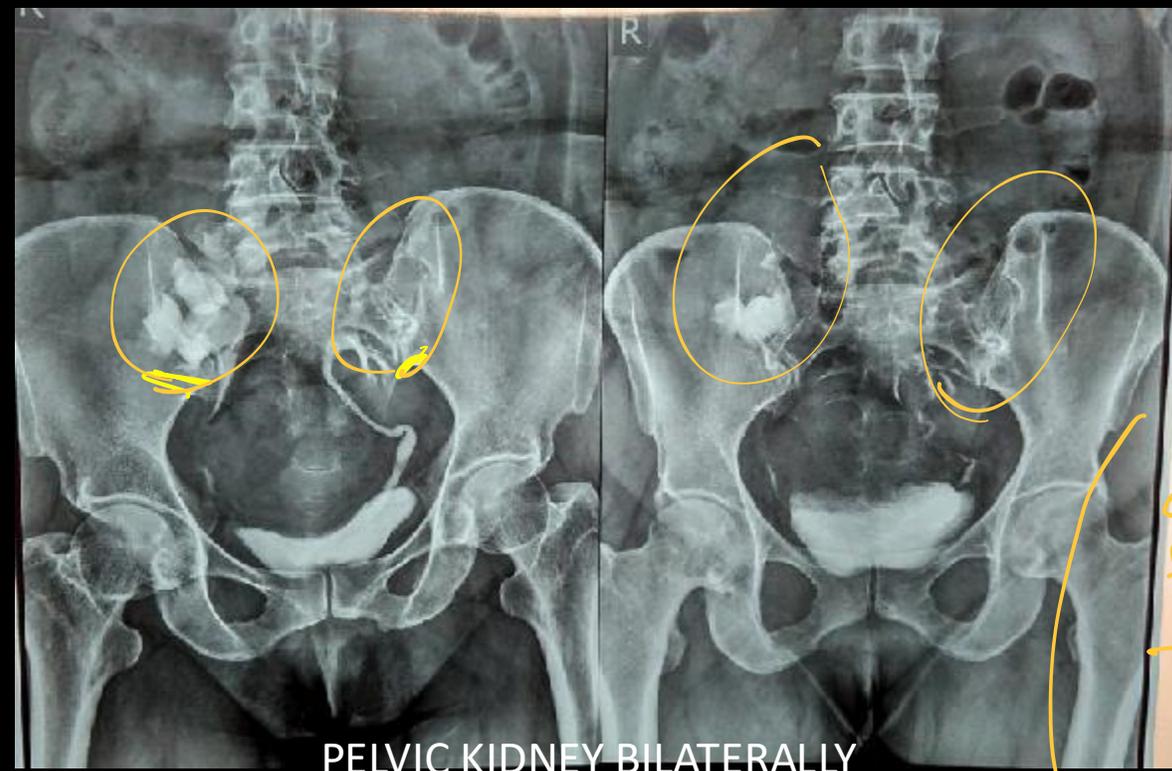
malrotation of the kidney → ① pelvis ant. minor Calyx post. ) later on lead to stasis & Recurrent infection

R.t delayed excretory function:



HORSESHOE KIDNEY

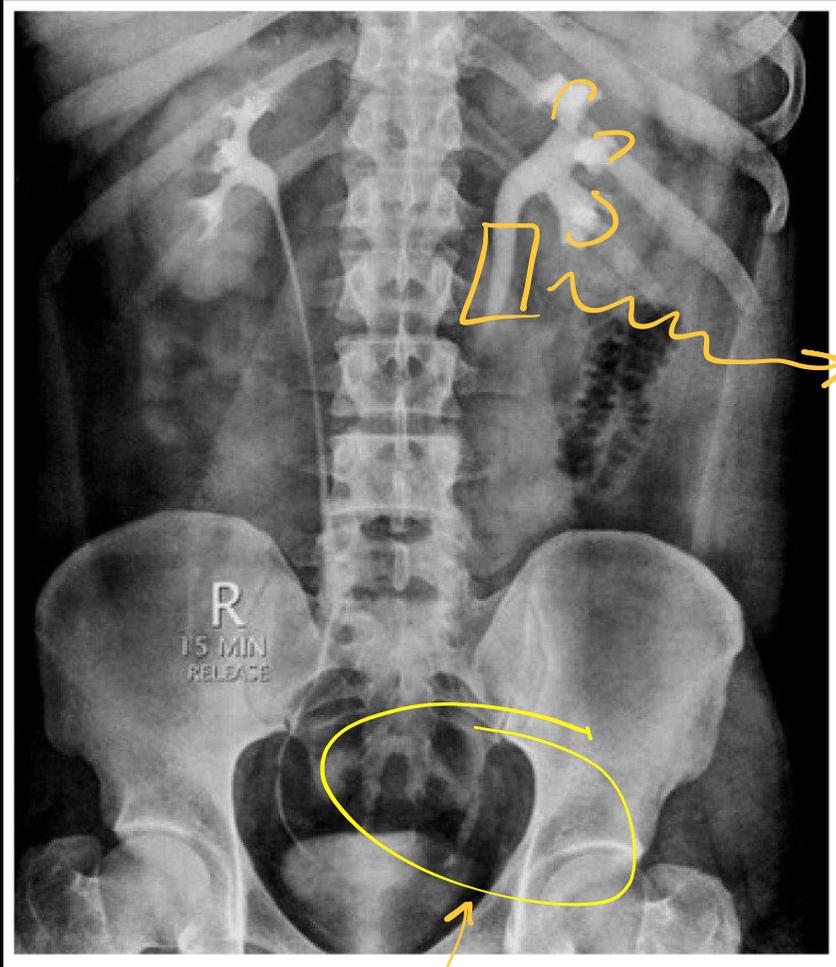
malrotation  
 رتبه  
 hydronephrosis  
 رتبه  
 vertical  
 cortex  
 of kidney  
 +  
 mal rotated



PELVIC KIDNEY BILATERALLY

ممكن تكون  
 Ovarian cyst  
 عند ال female  
 أو  
 Torsion of  
 Ovarian  
 cyst  
 (misdiagnosis)

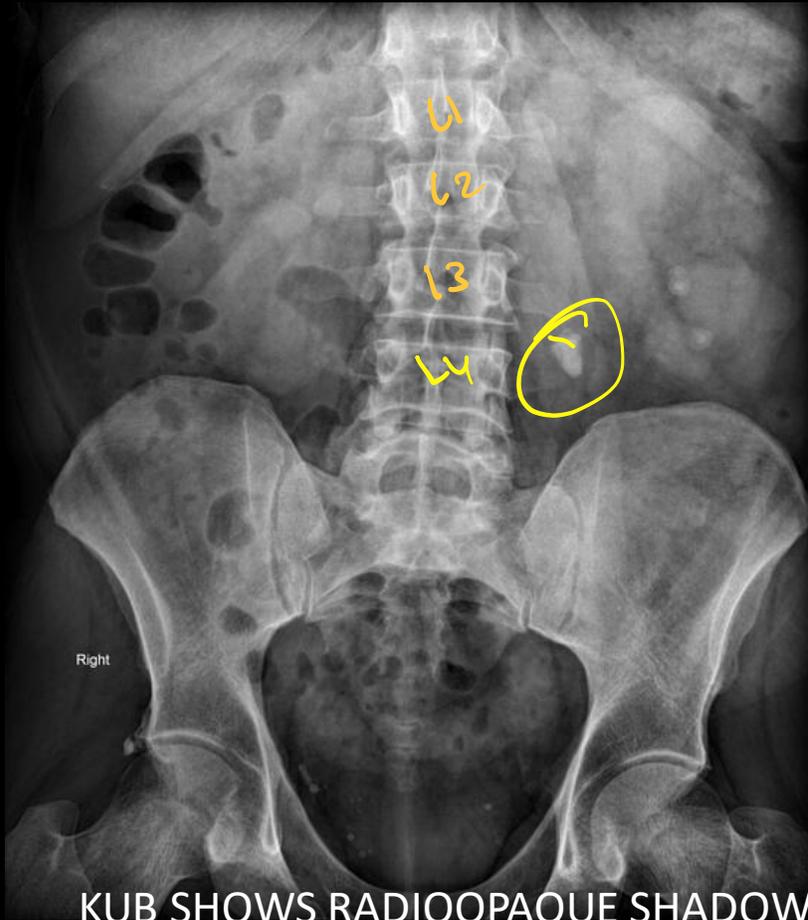
بستخدم ال US عن  
 اميز



IVU  
diltation

هون بنطلب control  
film عشان أشوف  
إذا فيه radio  
opaque stone

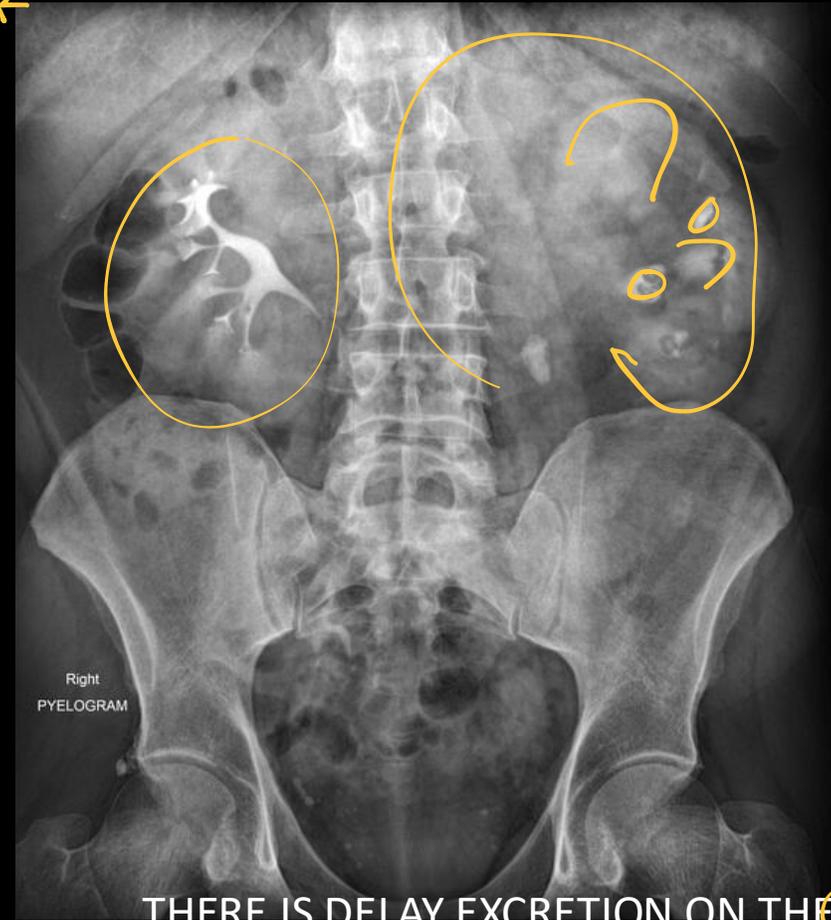
LT URETER PARTIAL OBSTRUCTION WITH  
MILD HYDRONEPHROSIS  
KUB SHOWED STONE AT THE SAME LEVEL



ممكن يكون عنده  
Lumbarization of S1  
Sacralization of L4  
عشان هيل اعدى ال  
diameter of L3

رئيس العريف

KUB SHOWS RADIOOPAQUE SHADOW OPPOSITE  
LT TRANSVERSE PROCESS OF L4



Delay

THERE IS DELAY EXCRETION ON THE LT SIDE  
WITH HYDRONEPHROSIS



IVU

① كيف افترار obstruction & PUJ stenosis

① Ureter (normal diameter)

PUJ stenosis لكون عند

② diuretic اذا احسن الحروفين

لكون عند PUJ stenosis وتبخر ال hydronephrosis

اذا ما احسن لكون عند obstruction

enlarged kidney عند حديثي الولادة ، و يكون عندهم abd. distension ، غالبا يكون عندهم PUJ stenosis بسبب ال

لان ما شفت ال  
Cause of urethra.

A CHILD WITH HYDRONEPHROSIS SHOWED PUJ STENOSIS (PELVIURETRIC JUNCTION STENOSIS)

⊗ Also could be used in cases of neurological urine incontinence  
due to: Trauma, neuro-tumors, etc...

✓  
Voiding cystourethrography (VCUG), also known as a micturating cystourethrography (MCU), is a fluoroscopic study of the lower urinary tract in which contrast is introduced into the bladder via a catheter. The purpose of the examination is to assess the bladder, urethra, postoperative anatomy and micturition in order to determine the presence or absence of bladder and urethral abnormalities, including vesicoureteric reflux (VUR).  
It is more commonly performed in the pediatric population than adults.  
The most common indication is recurrent UTI and hydronephrosis.

↑  
→ mostly used for (VUR)  
that not correct with antibiotics.



مقدمات

# Micturating cystourethrogram (MCU) / Anterior Urethrogram

# بعد Control film قبل ال MCU  
عشان أشوف اذا عنده  
Sacral agenesis or  
Spina parda in L4, L5

## INDICATIONS :-

### CHILDREN

- ① - UTI
- ② - Voiding difficulties.
- ③ - Vesico-ureteric reflux.
- ④ - Baseline study prior to urinary tract surgery.
- ⑤ - Post operative evaluation of (ureteric abnormalities.)
- ⑥ - Trauma.
- ⑦ - Suspected anatomic abnormalities of bladder neck & urethra. (posterior urethral valve)

↳ male baby.

### ADULTS

- ① - Functional disorders of bladder & urethra.
- ② - Suspected vesicovaginal / vesicocolic fistula.
- ③ - Suspected bladder / urethral trauma.
- ④ - Urethral diverticula

by Foley's Catheter



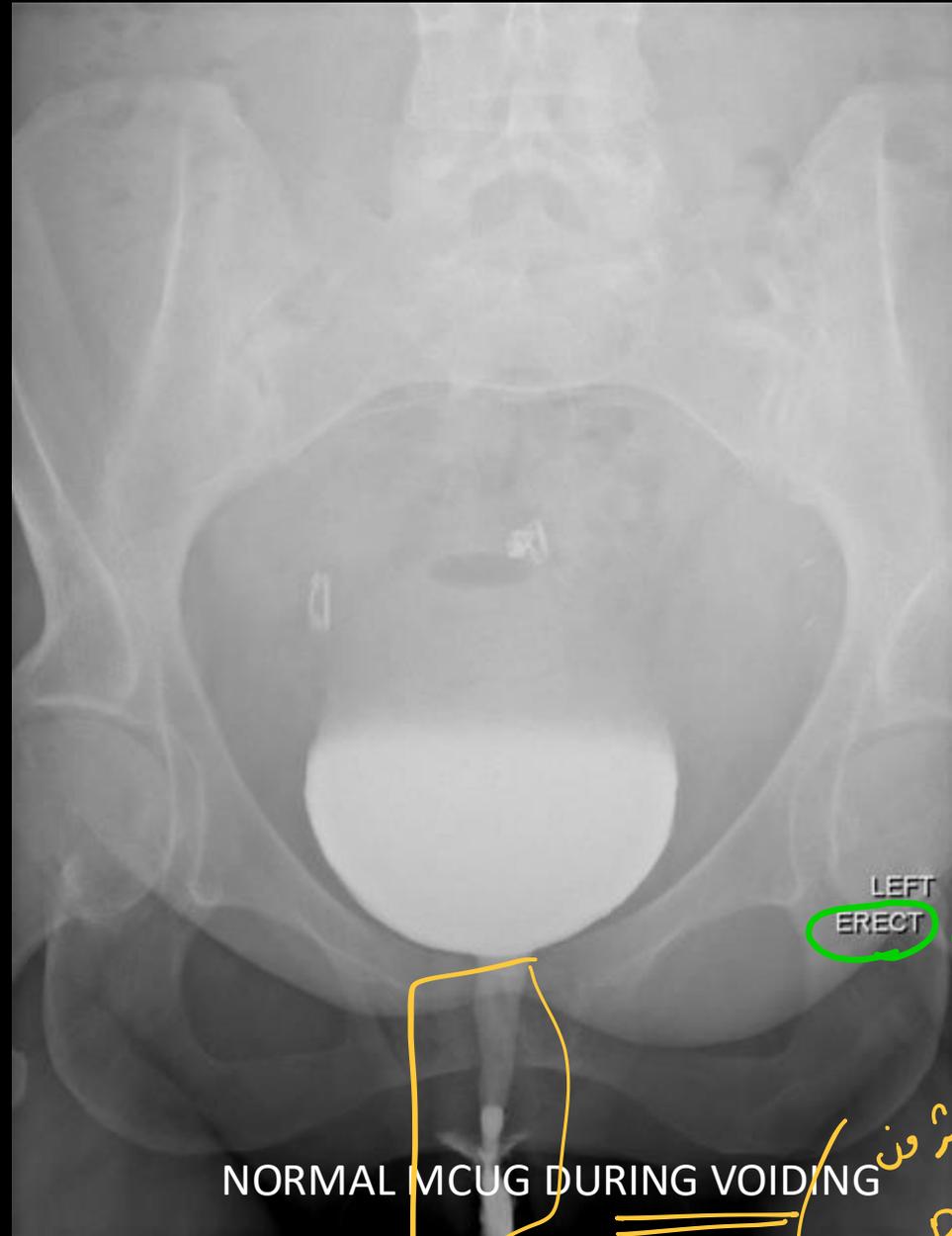
NORMAL MCU

During voiding.

land mark  
(neurogenic bladder) ①  
bilateral reflux ②

②  
posterior urethral valve  
Cystoscope بعد ال MCU

↳ used in male (lateral position) to exclude postero-urethric valve dilatation.



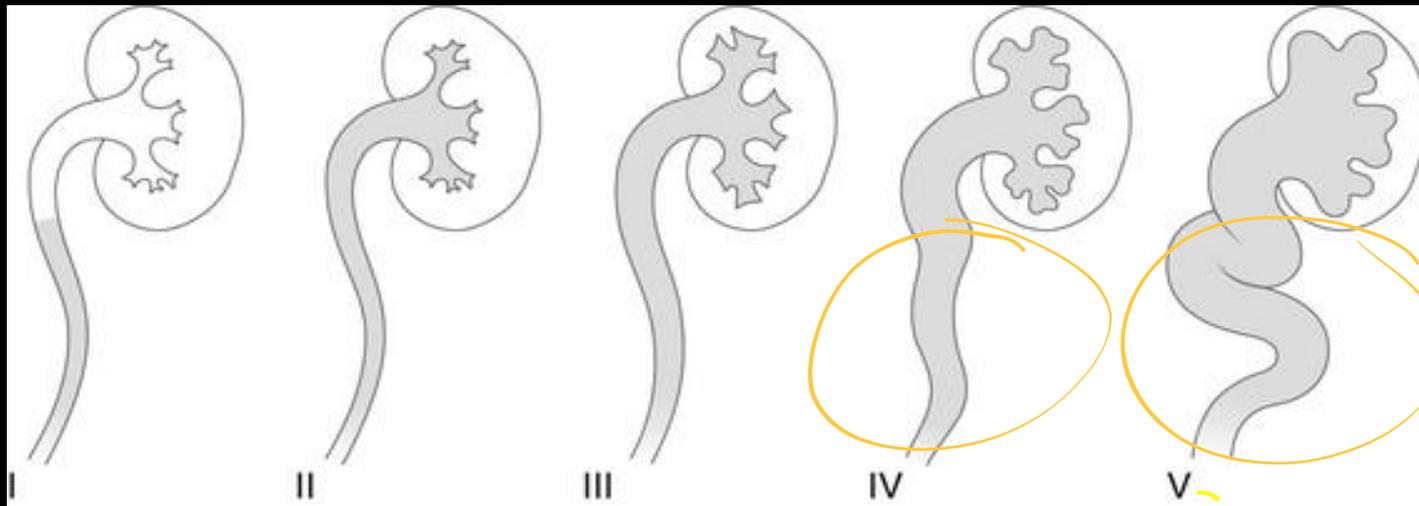
عقبو با کتر فن  
position  
عشان بتون ال  
Course of  
Uthra

و اما که انده واخه  
Stricture

**Vesicoureteric reflux (VUR) grading** divides vesicoureteric reflux (VUR) according to the height of reflux up the ureters and degree of dilatation of the ureters:

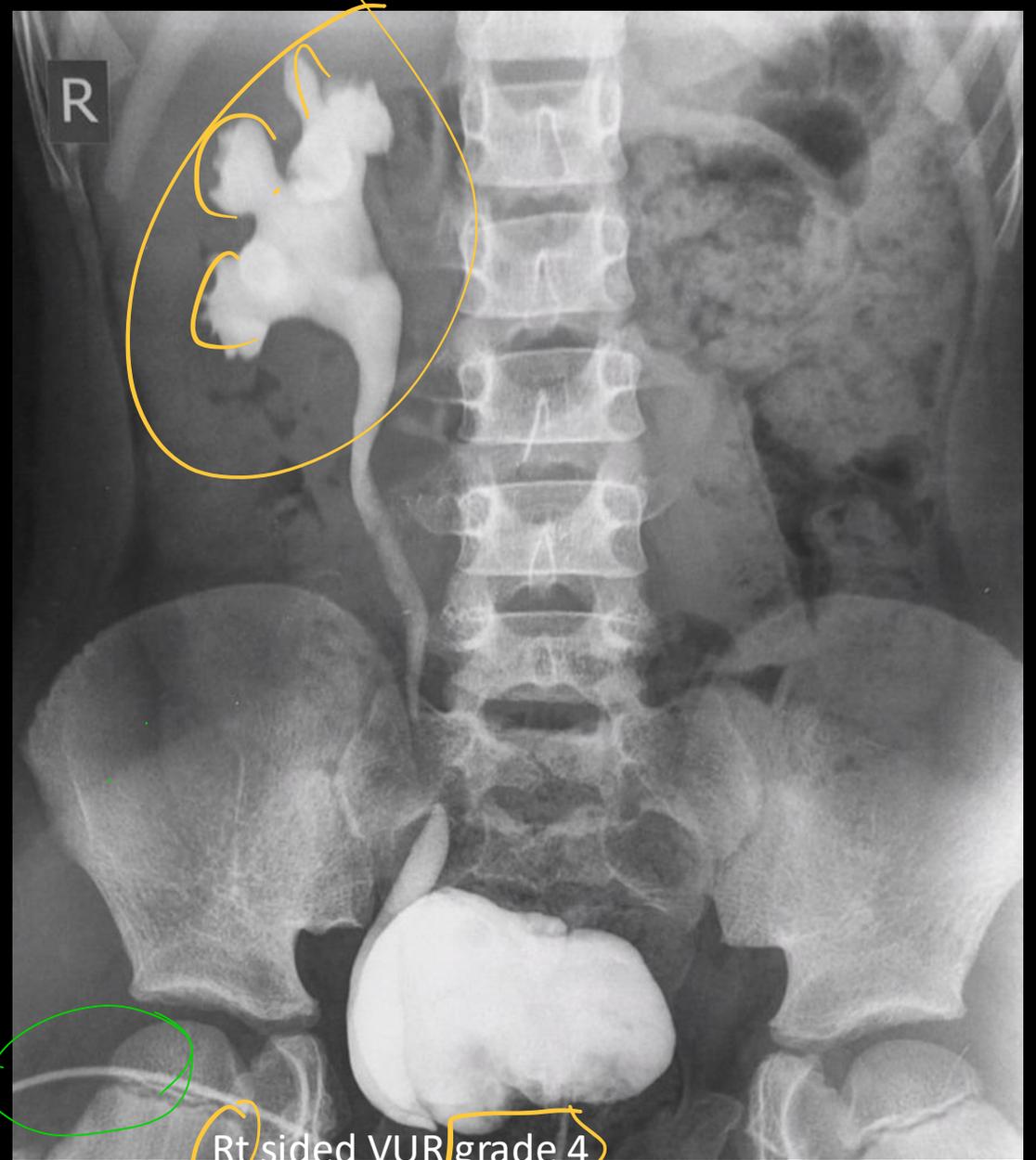
- **grade 1:** reflux limited to the ureter
- **grade 2:** reflux up to the renal pelvis
- **grade 3:** mild dilatation of ureter and pelvicalyceal system → **mild clubbing of the minor and major calyces**
- **grade 4**
  - tortuous ureter with moderate dilatation
  - blunting of fornices but preserved papillary impressions
- **grade 5**
  - tortuous ureter with severe dilatation of ureter and pelvicalyceal system
  - loss of fornices and papillary impressions<sup>2</sup>

It is important to note that each side may have a different grade of reflux.





Bilateral VUR grade 5



Rt sided VUR grade 4

*insertion of  
poly's catheter*



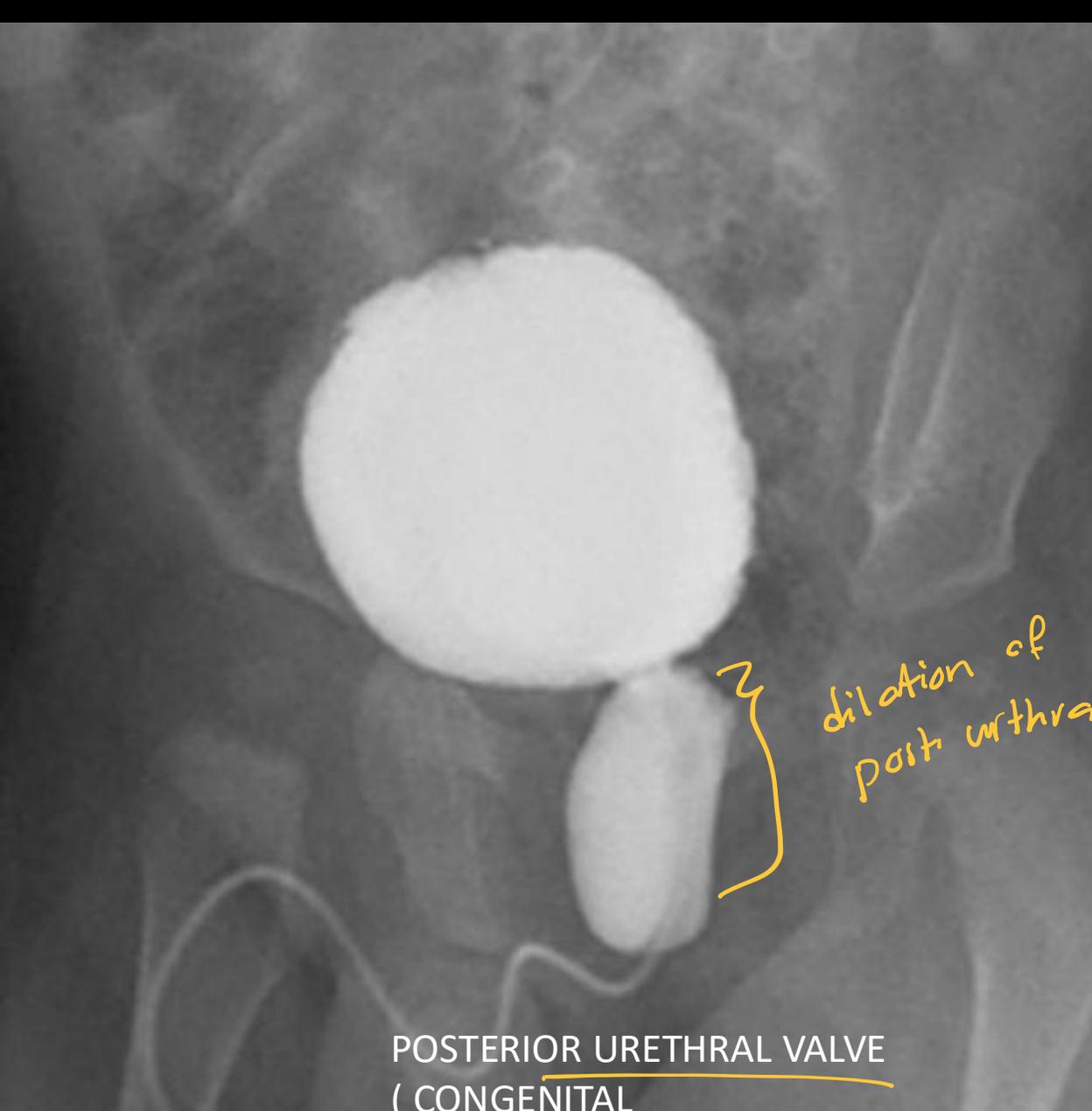
Retrograde  
cystogram.  
(X-ray)



\*

Elongated urinary bladder with irregular outline and trabeculation / diverticuli  
NEUROGENIC BLADDER

→ Cause Bilateral vesico-ureteric Reflux.



POSTERIOR URETHRAL VALVE  
( CONGENITAL

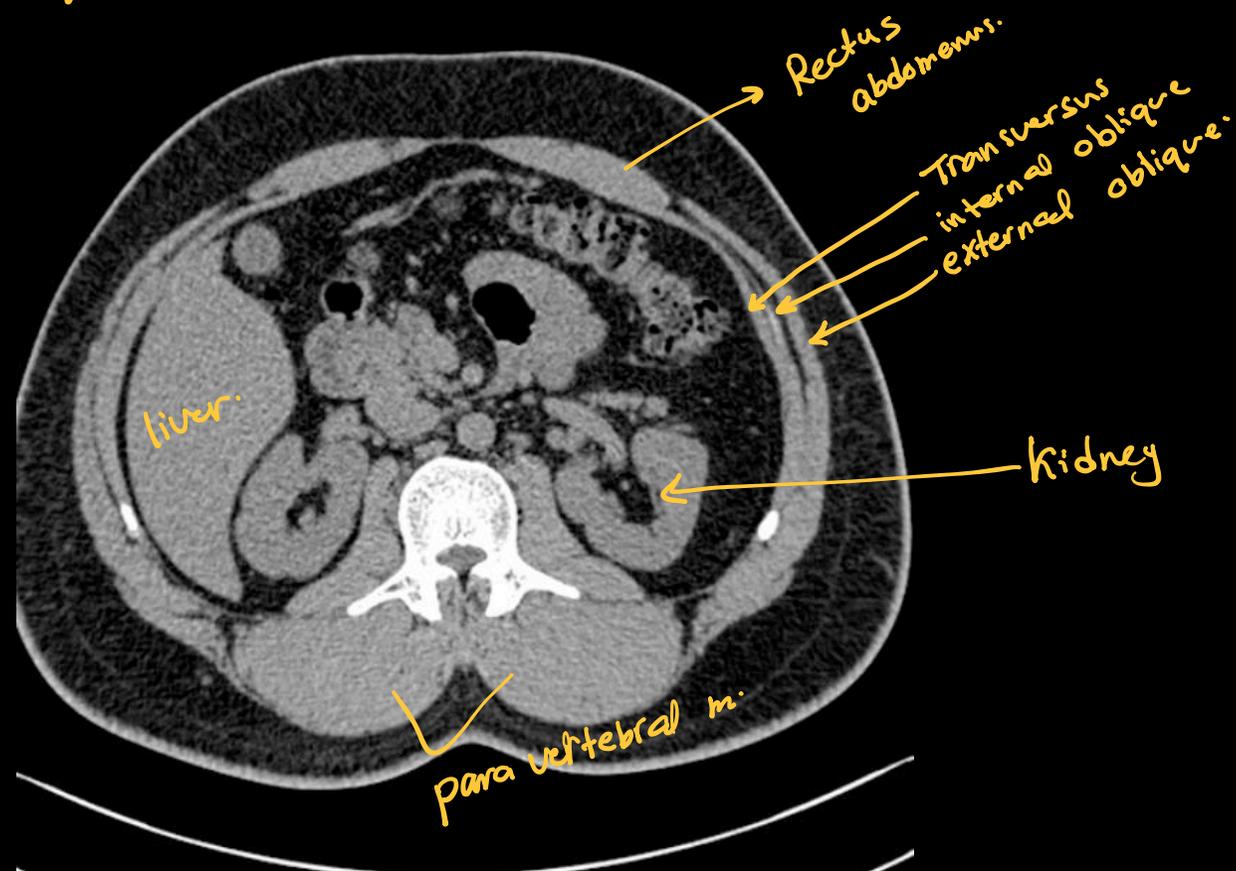
:dilated proximal urethral



axial

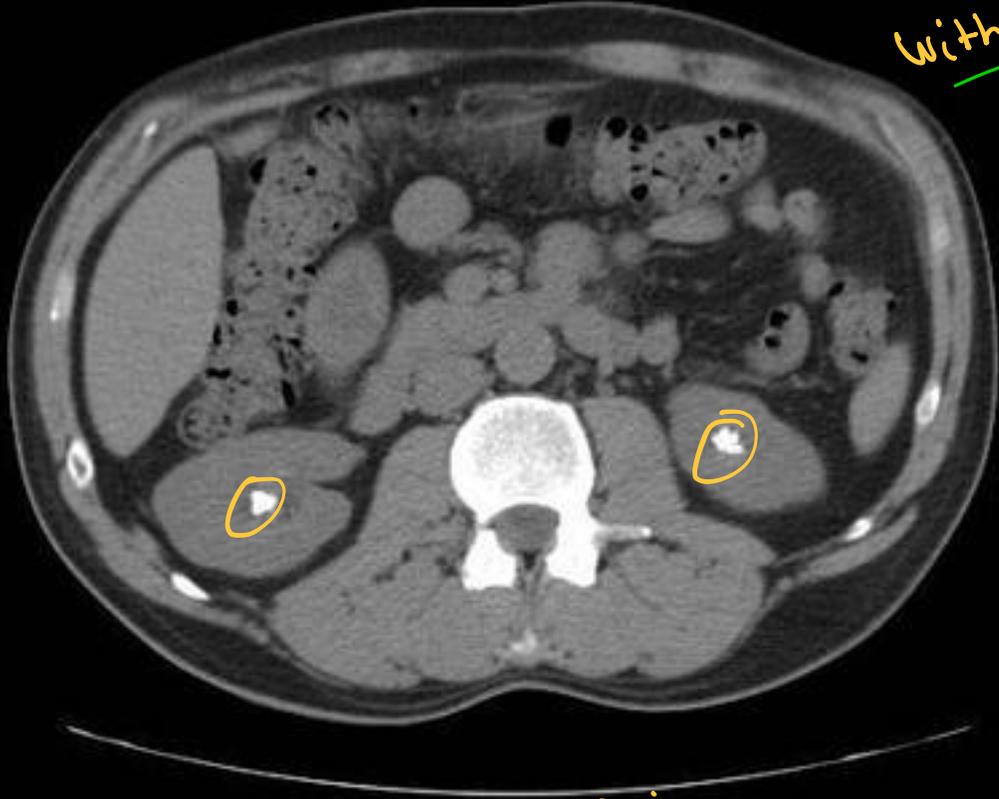
# CT SCAN WITHOUT ORAL AND IV CONTRAST (STONE PROTOCOL) BEST INVESTIGATION FOR

STONES. OR solid mass OR complicated cystic lesion.



We use CT-scan in cases of partial obstruction in ureter.

NORMAL CT WITHOUT ORAL OR IV (PLAIN)

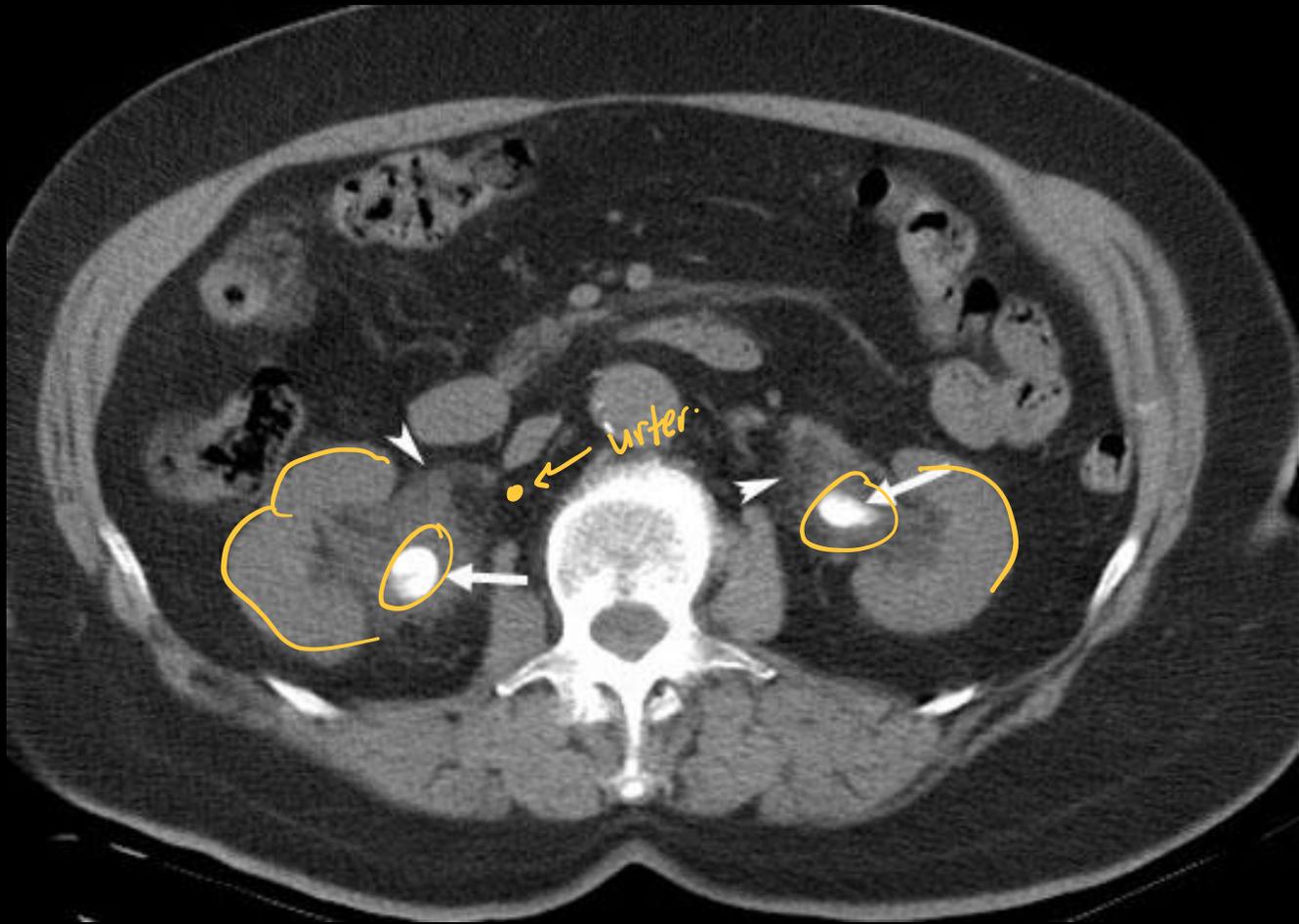


Without C.M.

- X ray
  - C.T
  - US
- Stone  
radiopaque  
radiodense  
Radioechoic

→ Radiodense.

CT SCAN (STONE PROTOCOL) BILATERAL RENAL STONE.



BILATERAL PUVJ STONES WITH HYDRONEPHROSIS

الابلیف صحن جو ار  
کے کنو عرفہ  
Kidney

clubbing

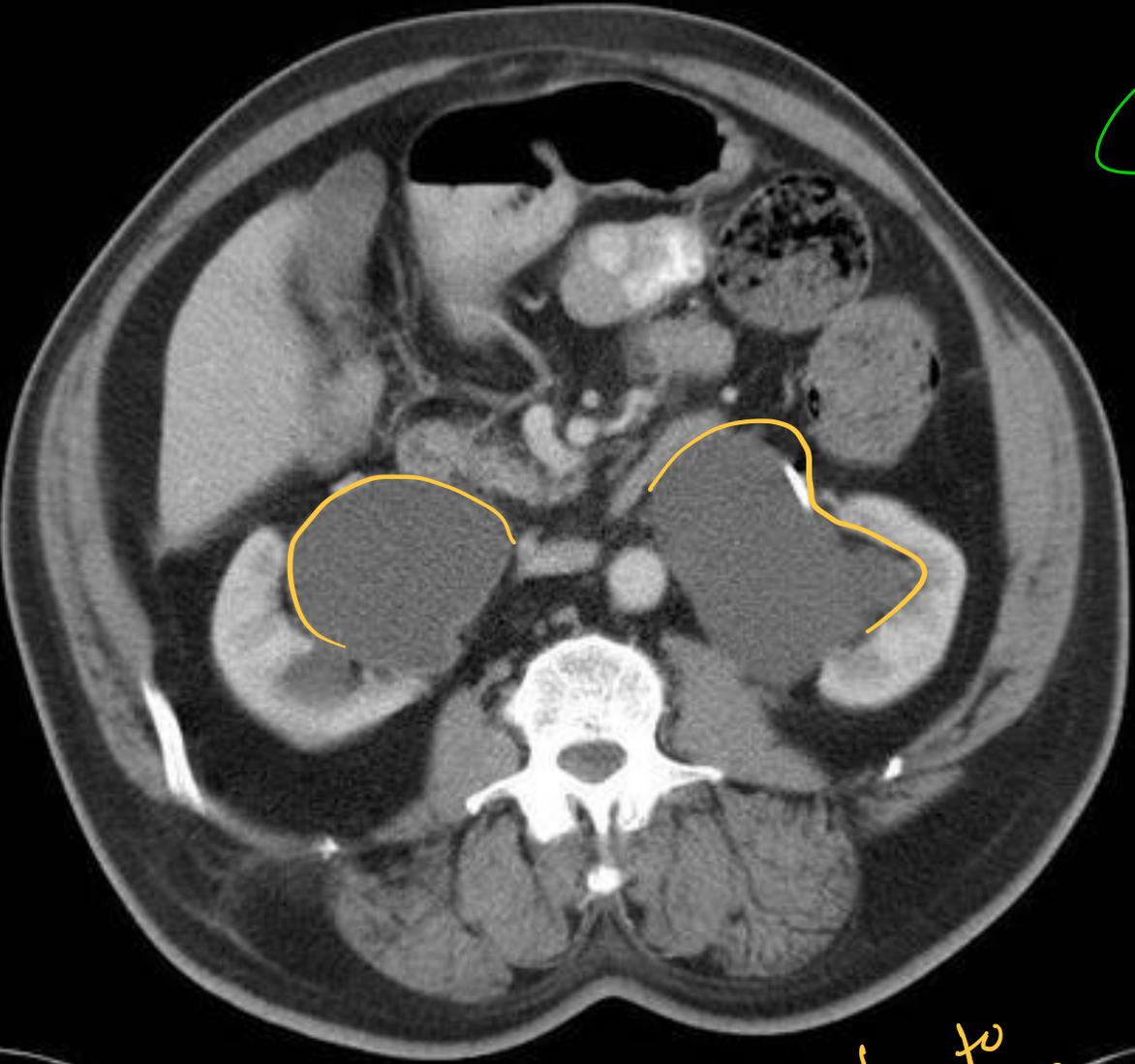
↳ due to Bilateral PUVJ-stenosis



→ Psoas-muscle  
(distal insertion in  
lesser trochanter)

- ✓ CORONAL RECONSTRUCTION CT STONE PROTOCOL
- ✓ SHOWED LEFT RENAL STONE

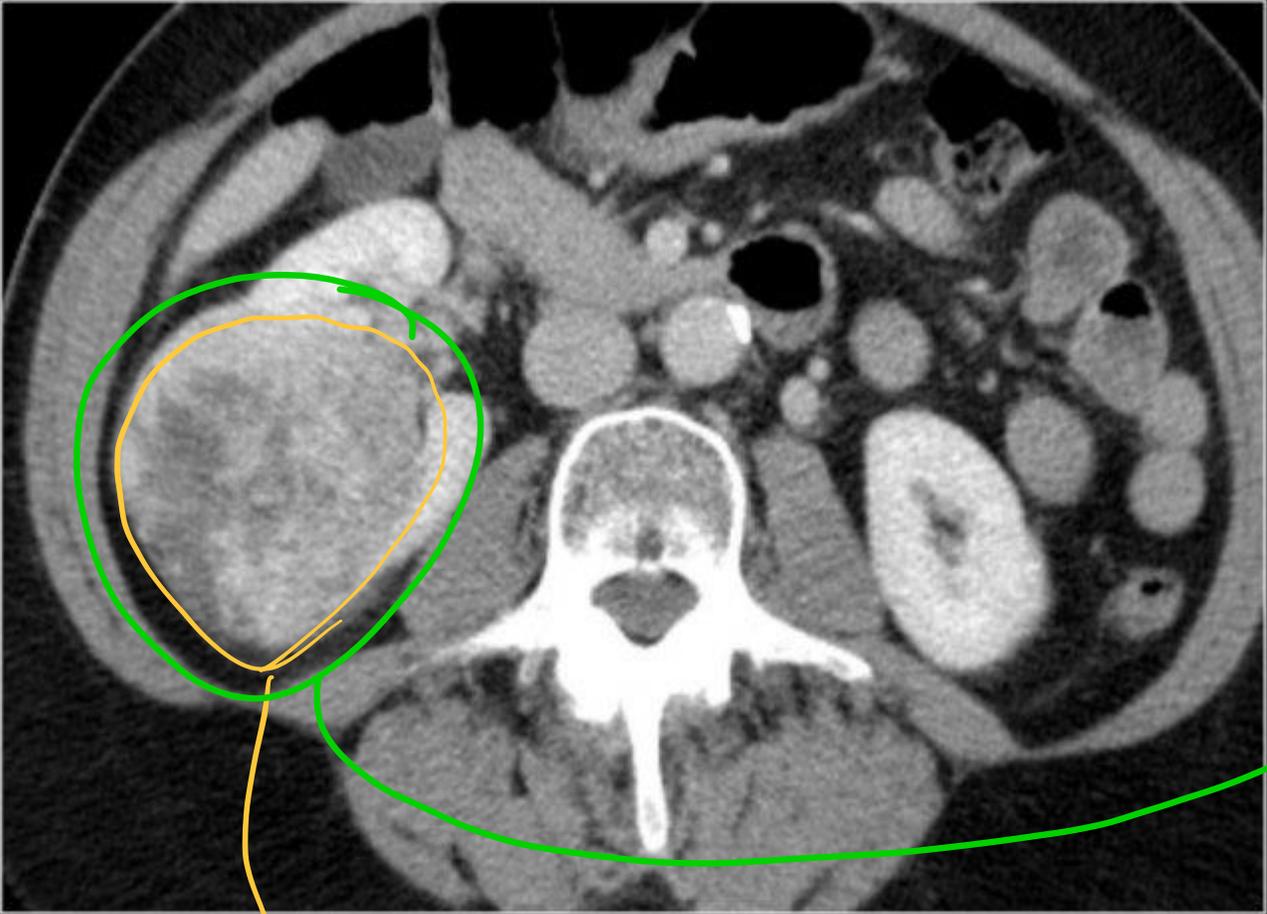
CT-scan with contrast



SEVERE HYDRONEPHROSIS BILATERALLY

due to PUS

CT WITH ORAL AND IV CONTRAST FOR  
PARANCHYMAL LESIONS



نتيجة ال chronicity of the malignancy بصير فيه  
necrotic lesions and nodular fibers

*Heterogenous*  
ENHANCING ISODENSE LESION (RCC) IN THE RT KIDNEY  
*with C.M*