

# URINARY TRACT IMAGING

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تبيين : زميلة من دفعتي و تسن  
الأصبال بعوش (أنتي)

# Urinary tract investigation

lucent → **lytic lesion** in bones ← لنگ ۛ ۛ ۛ  
لنگ ۛ ۛ ۛ

(lucent → black  
opaque → ابيض)

## Plain film: Plain x-ray

- Renal calculi or calcification 
- Stones in the ureters 
- Bladder calcifications and calculi 
- Bone abnormality or metastasis 

→ lumbar, pelvic, sacro-iliac joint (old age)  
hyper-density  
**sclerotic lesion** in pelvic & spine ← سلبه  
Hx of Prostate CA (مريض ۛ ۛ ۛ)

Plain abdomen x-ray show the diaphragm, but not symphysis pubis.

تختلف عن (abdominal x-ray) إذ أنه (Symphysis Pubis) يكون ممتد في الصورة.

## Plain film(KUB):

إذا، يكون فيه كسر في الـ [Symphysis Pubis] رأس تأخر على الـ (ureters)

❖ **The kidneys, ureters, bladder (KUB) radiograph** is optimized for assessment of the urogenital system, and should not be confused with the AP supine abdomen view.

### ❖ Patient position

- ❖ the patient is supine, lying on their back, either on the x-ray table (preferred) or a trolley
- ❖ patients should be changed into a hospital gown, with radiopaque items removed (e.g. belts, zippers, buttons, ECG electrodes)
- ❖ the patient should be free from rotation; both shoulders and hips equidistant from the table/trolley
- ❖ the x-ray is taken on full inspiration
  - this causes the diaphragm to contract, hence compressing the abdominal organs, allowing all renal contents to be visualized on a single image

# Urinary tract calculi

هذه ما يشوفنا في (Simple abd. X-ray)

## (Renal stones)

لـ زمان كنا نشوفهم في (ultra-sound)  
بس هما ههنا نستخدم (C.T. scan)

1. Stones composed **Calcium**  
(majority about 90 %)

not seen by X-ray  
(we use CT-scan)

2. Stones composed of **Uric acid**

له ضامة اذا كان  
الكرينين بقلبي عن  
فوقها كلوي صداد

3. Stones composed of **Cystine**

## Plain film

(radio-opaque).

not visible  
(radiolucent)

minimally dense  
(Semi-opaque)

# Urinary tract calculi / continuation

What is the initial imaging test usually ordered to find urinary tract stones ?

✓ Plain radiograph (KUB), because the majority of stones are radio-opaque ✓

✓ Other calcifications may be confused with urinary tract stones such as a phlebolith in the pelvis, which is a venous calcification, often with a lucent center.

لهذا السبب نستخدم (KUB) كخطى اول (US) ولسنا نعتمد على (CT)

KUB

→ look for symmetry  
for symphysis pubis

(No fractures)

\* shadow of  
the kidney

→  
cause of  
peri-nephric fat  
(out-line)

black  
by X-ray

Rt

shadow of the  
kidney

gastric  
bubble

(Lt)

Transverse  
Process  
مركز الجوز

opaque  
stone

inflammatory التهاب  
& crohns كرون  
sacroilitis

contraindication  
for Foley's catheter  
(No catheterization)

in severe  
hematuria think  
about pelvic fracture  
(trauma)  
injury to bladder  
& membranous  
urethra

look  
at  
calcification  
at pelvis

Kidney normally  
oblique

in horse shoe  
→ abnormally  
(vertical)

abscess → fistula

CS → vagino-  
vascular  
fistula

Post-op

SUPINE

(1st choice)

most common ← X-ray

already radio-dense (without CM)

Contrast media

CT

US

Partial construction

radiation for external genitalia

emergency very small

sensitive for calcium (opaque)

stone

### KUB

\* is an X-ray performed for the purpose of examining the urinary system and its surrounding structures.

\* symmetry of pubis (ay) ↳ or stone in back urethra => urinary retention

### X-ray

(not pubic) diaphragm

\* perforated viscous \* gas in abdomen

#normally ureter cant be seen on plain abdomen except in IVU. #ureters can be seen above the transverse processes of **lumber V.**

5

ملاحظة: دقة الفحص، البقرة فوق ↓

Sacralization :: is when the lowest lumbar vertebra (L5) becomes abnormally attached to the sacrum. Lumbarization :: is when top of the sacrum (S1) can be separated from the sacrum and the lumbar spine appears to have 6 vertebrae, not 5

## هـ تو صبيح فكرة التحنن :-

هون الفكرة من التحنن انه ارتفق ال (inhesive) من ال (heaves) و ال (Cases) اليراح تأنى على جودة و نوع الصورة .

و صبغاً التحنن به وقتاً (٦-٨) ساعات



هون اجتنى صالة هوارى ما فنباتق  
تامة (للضرورة أحكام) و بعض  
الصورة بدون تحنن لبالا

اذا كان عنده تا رخ سابق جهوات الال و الهري البولي  
وقتها بطاي مسكنا = انذلم و بجان المريض للامورة

[عشان (CT) بدون Contrast] للأشدد ممكن اللموة وكونا رها .

@ in cases of soft tissue mass in Psoas major muscle (insertion in lesser trochanter) → irritated in cases of appendicitis (Psoas' sign)

• These masses or calcifications in psoasms.

Caused by → appendicular abscess (تبين به أسبوع)

→ T.B of Bone

→ Paravertebral abscesses "Brucella"

→ Large Hematoma (old age)

@ وبناء عليها نجد

Treatment procedure

• أدوية فذبية للامورة

• تفنن بسيط

• استئصال جراحي

@ If there is a calcification in ureter, pelvic cavity, or secondary infertility such as

(T.B calcification in fallopian tube or in vas deference)

كيف بقدر أمين لهم عن (stones in distal uretra) أو (Vasico-urethral Junction) ؟

Hypercholesterolemia ← بتيسر بيبي ← Calcifications → Central leucency  
(Diabetes أو) ← Stones → more dense.



# Ultrasound of the urinary tract

- Ultrasound is one of the most valuable investigations of the urinary tract and the investigation of choice in children.

↓ radiation (more safe & less expensive)

- It is very effective in evaluating renal size, masses, renal obstruction, bladder residual volume and prostatic size.

early investigation important

→ in small size think about renal artery stenosis (hypertension)  
90% idiopathic

- non-invasive procedure useful in distinguishing the etiology for renal failure
- It is critical for ruling out obstruction

# Ultrasound of the urinary tract

هذه السلاية الدكتور ما شرفه ما ذكر في البين السبق موجود .

## ❖ Preferred procedure in:

- 1- pregnant women
- 2- patients allergic to IV contrast.

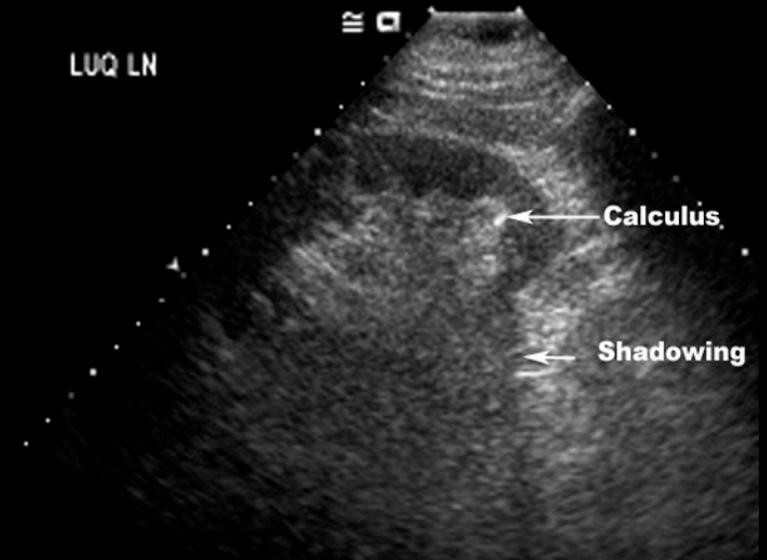
❖ Not dependent on the composition of stones and detects **uric-acid stones** as well as **calcium stones**.

❖ **Stones** are seen as **highly echogenic foci** and often produce **distal acoustic shadowing**.

❖ Detects hydronephrosis

❖ Generally good sensitivity .

❖ Ureteral stones are difficult because of overlying gas



isoechoic

liver

black → hypoechoic  
white → hyper

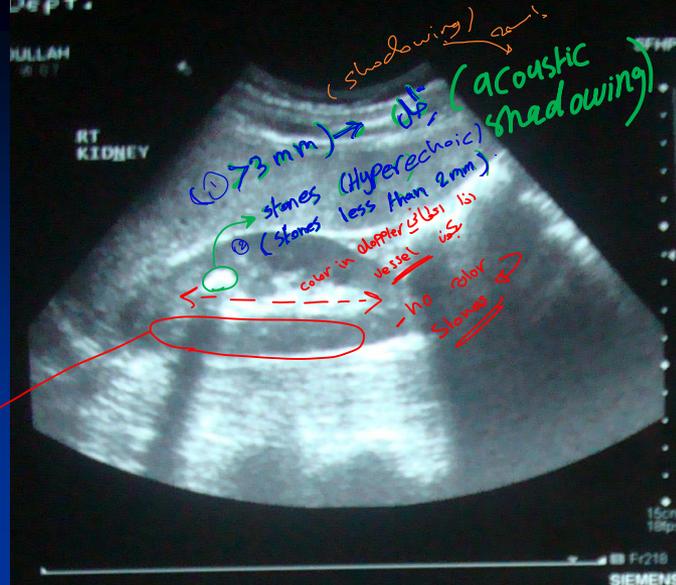
equusity  
→ less than liver, spleen

renal sinus normally

كثوي ملى كفا  
hyper

كس ال CT

النجاس البول  
anechoic fluid



سبب اى  
تبعه

Kidney  
liver  
سواد  
اكثر  
(hypo)

iso → liver, spleen

if kidney hyperchoic

- DM
- hypertension
- systemic disease
- sarcoidosis

(failure, impairment)

Doppler for renal artery stenosis

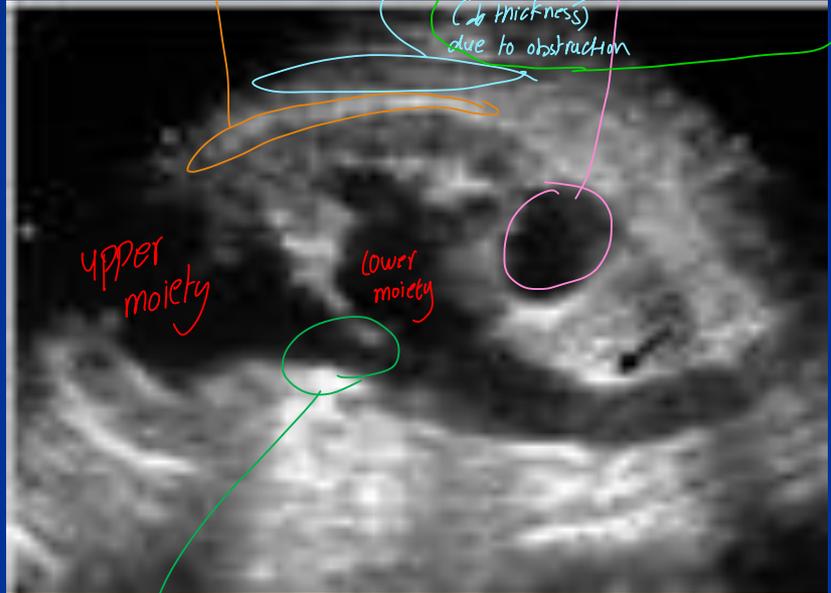
# Blood flow to kidneys can also be evaluated with **doppler US**

(@ in cases of markedly dilated ureter or postions ureter → ureter appears in ultrasound) low obstruction  
 (في حالات تضخم واضح للكلية أو وجود حصاة في المثانة → يظهر الكلى في الموجد فوق الصوتي) منخفضة

no fat in sinus, fluid in sinus (الكلية بدون دهون في الحوض، سائل في الحوض)



double kidney



simple cyst, Corticomedullary cyst (hyper)

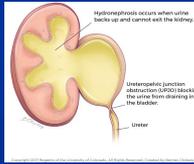
thinning renal cortex (↓ thickness) due to obstruction

upper moiety, lower moiety

effusion at pelvi-ureteric junction

dilated collecting system → hydronephrosis

ureteropelvic junction (UPJ) obstruction (تضييق في)



most common cause is stones, stenosis

mass (كتلة) is

or extrinsic → compression due to a mass

الكلى خارجة بتو في فيها حالة ال (Duplex Kidney) لونها  
 عند كورة في الا شريف

# DUPLEX KIDNEY

2 separate pelvicalyceal systems and 2 renal moieties form a single kidney.

+/- complete or partial duplication of the ureter.

→ most common Radiological renal abnormality

Occurs when a kidney forms in 2 parts.

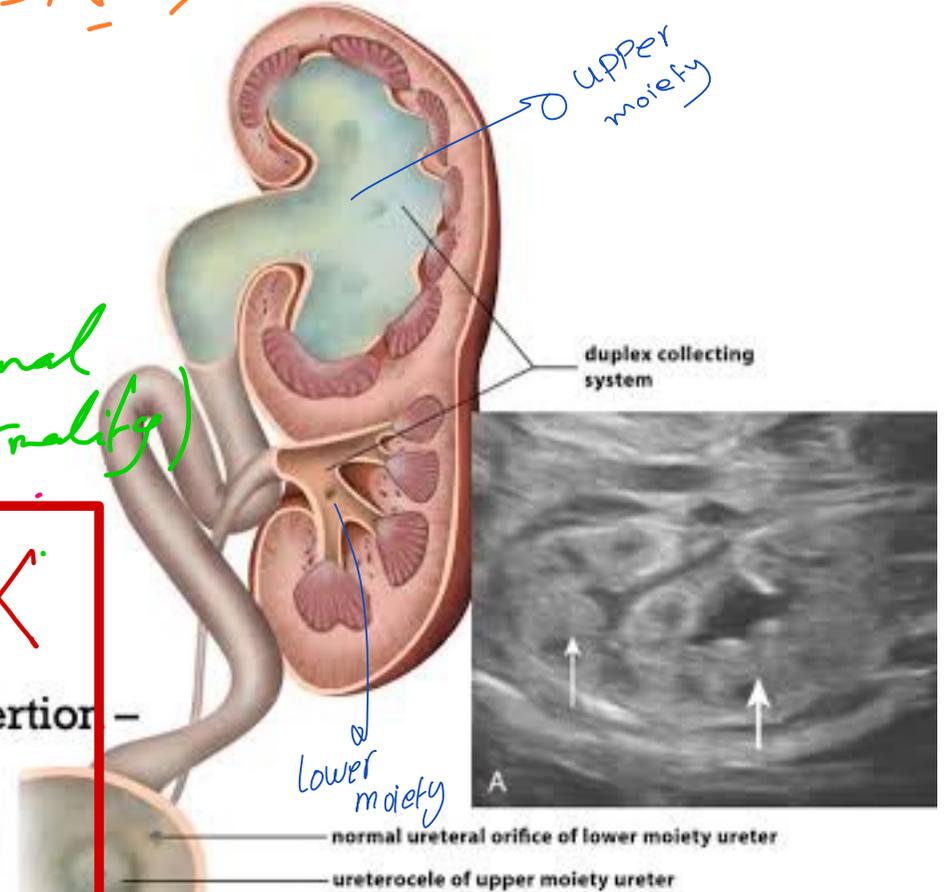
Weigert-Meyer rule = Drooping Lilly

Upper moiety – ectopic ureter insertion with **ureterocele** – obstruction

Lower moiety – normally positioned ureter insertion – reflux

Ectopic ureters can insert

- Males – urethra
- Females - vagina



ملاحظة مهمة في الكلى المتعددة  
 العورتين الي في السلب السابق

- **acute obstruction** → Enlargement in Kidney (Hydrochoic)
- **chronic obstruction** → shrinkage in Kidney

• Hyperechoic = lucenty  
↓ ↓  
(US) (X-ray)

[ • Echoigenicity → in ultrasound  
• Density (Dense) → in CT-scan  
• Intensity → in MRI ] → Terminology

⊗ يعني انه نفس اللفظ ولكن في نوع بديل = قلة بها  
لا (Imaging modality) المستخدم.

simple cyst (No Calcification insight)

Solid

From

Cystic insi

Shadow

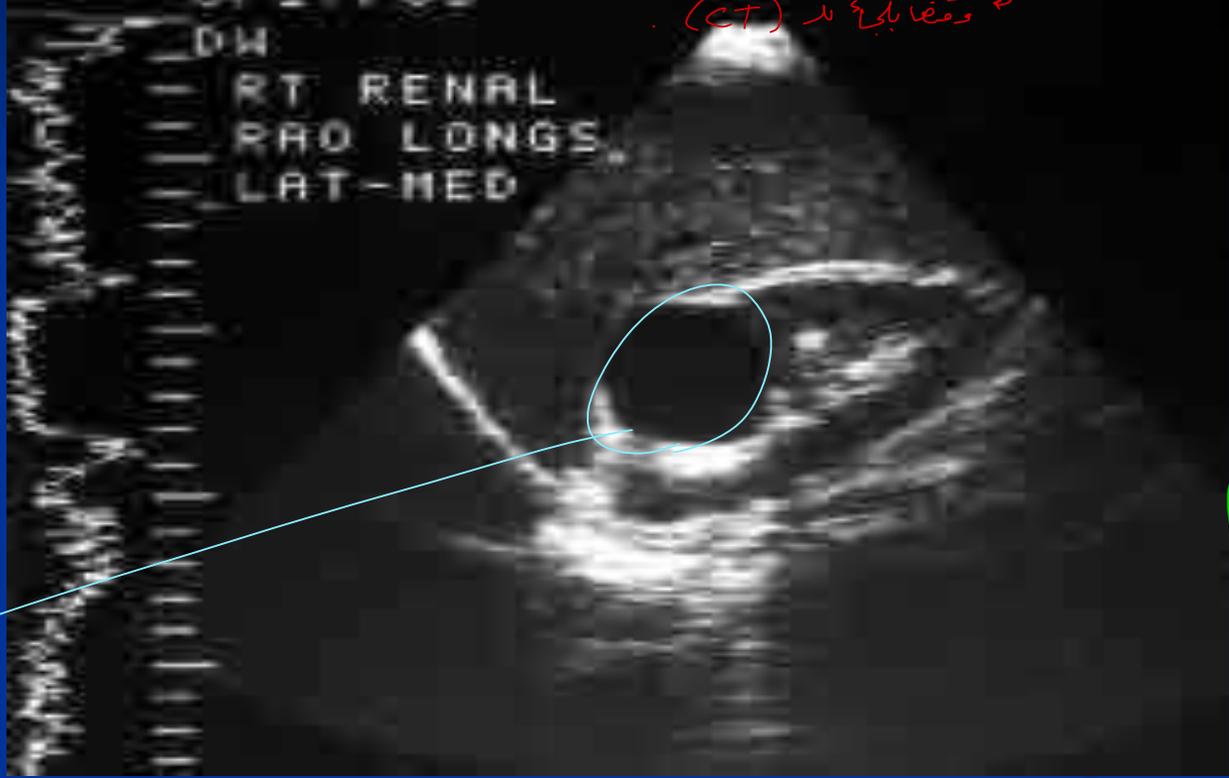
Fluid (black)

location

Simple/huge cyst with Calcification inside → malignant (ex: ovarian cyst in female)

مبستره بهمن آفتاب قی  
- malignant  
(CT) و مقابله ند

Polycystic disease



Cortical  
or  
cortico medullary  
or  
medullary  
or

Para-Pelvic  
Hydronephrosis  
Aspiration

It's a huge  
Para-pelvic  
cyst

Could cause an external  
Compression on ureters  
or vesico-ureteric junction.

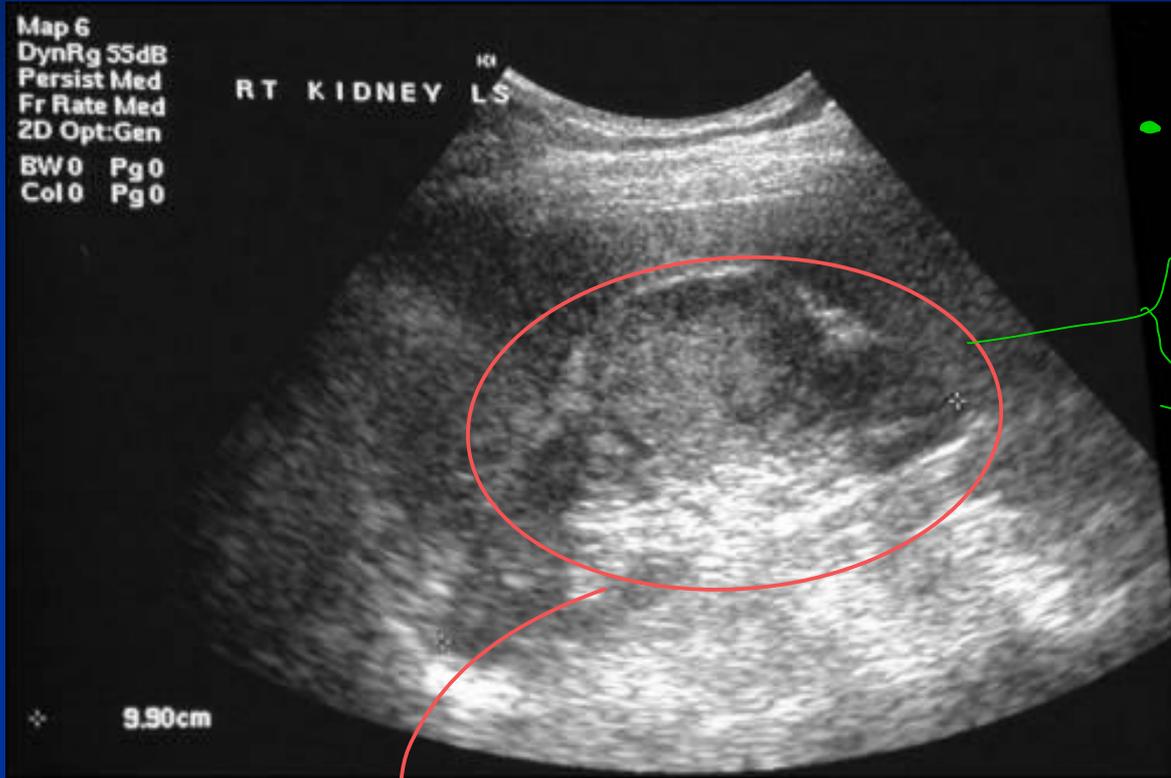
water

become it is  
unequique

liver density  
→ Solid

Soft tissue mass → iso-echoic  
 ↳ considered malignant → then

CT — CM  
 — NO  
 CM



• soft mass tissue :-

- ↳ margins
- ↳ Echogenicity

↓  
 mostly go with Benign lesion regard less the size of the cyst.

[solid region = soft tissue mass on (US)]

size  
 margin  
 echogenicity

← (Renal cell carcinoma) RCC

Solid become

iso echoic

(Angiomyeloma) or (simple cortical lipoma)



is a quick non-invasive technique for diagnosis of Urolithiasis.

# CT of the urinary tract

**Urolithiasis** refers to the presence of calculi anywhere along the course of the urinary tract.

contrast  
↳ radio-dense  
↳ Misdiagnosed

## CT is excellent modality for assessment of:

- Renal masses.
- Obstruction. → at first without contrast
- Retroperitoneal disease.
- Staging of renal and bladder neoplasms.
- Tumor invasion into the renal vein or IVC
- Evaluation after trauma or surgery. (laparoscopy)

@Retro Caval ureter → An embryogenic abnormality, posterior insertion of ureter in kidney pelvis → causing recurrent ureter obstruction.

→ because may lead to renal impairment.   
 (Vesical impression)   
 misdiagnosed with (TCC)   
 [Transitional Cell Carcinoma]

@ In cases of Total (complete) seeding of CA-lesions in Kidney, Kidney Pelvis, Bone, Liver, Spleen → Don't do complete nephrectomy.

# When should MRI be used to evaluate the kidneys ?

- When a renal mass or abscess is suspected but intravenous contrast cannot be administered, because of either contrast allergy or abnormal renal function, in this case MRI can be performed. (reaction)
- Gadolinium, the contrast agent for MRI, can be safely administered in such circumstances.

Also, in some renal impairments  
Gadolinium can cause  
(nephrogenic fibrosis).  $\text{b}^{\text{h}}\text{ip}1$

steroids  
(hydrocortisone) ← Preparation USU  
Patient →  
tapering

adrenal + 02

not anti-histamine

# Intravenous urography (IVU)

كان يستخدم زمان بكثرة  
تبل استعمالات  
استعمالات (CT)  
وكن الآن  
استعمالات قليل

# Intravenous pyelography (IVP)

Anti-grade → نقتن المادة عن الكلي ببطء  
Retro-grade → نقتن المادة عن [الكلي] ببطء

Is a radiological procedure used to visualized abnormalities of the urinary system, including the kidneys, ureters, and bladder by using intravenous contrast.

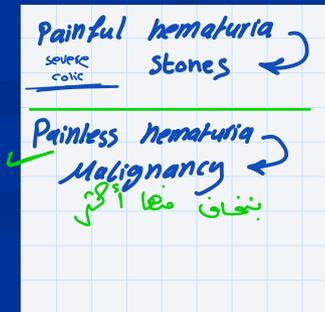
## Indication:

(Uses)

- ❖ Haematuria → or trauma  
→ most painful haematuria due to stones  
→ Kidney shattered, contused
- ❖ Renal colic or calculi
- ❖ Suspected stone in the ureters
- ❖ Renal trauma → extravasation of the contrast from the bladder.

This procedure is contraindicated in patients with (multiple myeloma)

Renal impairments



for Hematuria,  
Renal Polyps

# IVU / continuation (IVU) (تكملة IVU)

- After a preliminary control film of the abdomen, 50ml of contrast medium is injected intravenously.
- Contrast is excreted by glomerular filtration. *scattered (تبعثر) is (هو) ligation (↓ poor quality)*
- Films after 5, 10, and 15 minutes are taken and reveal contrast in the pelvi-calyceal systems, ureters, and in the bladder. *spot film (تصوير نقطوي) → large film (تصوير كبير) ← dose (جرعة) ← body weight (وزن الجسم)*
- Post-micturition film is taken to assess bladder residual volume. *Delay in kidney filtration (تأخر في الترشيح الكلوي) not could give us an indication of unilateral pyelonephritis (لا يمكن أن يعطينا دليلاً على التهاب الحوض الكلوي الأحادي الجانب)*
- Renal obstruction may require a delayed films. *renal obstruction (انسداد كلوي) → (DEMSA) (تصوير DEMSA)*

\* Small kidney, but well-formed → congenital hypoplastic kidney  
 (Doppelan) (كلية مزدوجة) → artery stenosis  
 - نهاية الجزء الأول - [large scattered → ↓↓ quality of the image] 13

[Pt-2]



KUB  
without  
CM

gastric  
bubble

normal  
kidney  
shadowing

This Pre-contrast  
film to rule out  
stones

10

Scale 99%  
W 17  
C 22

CONTROL

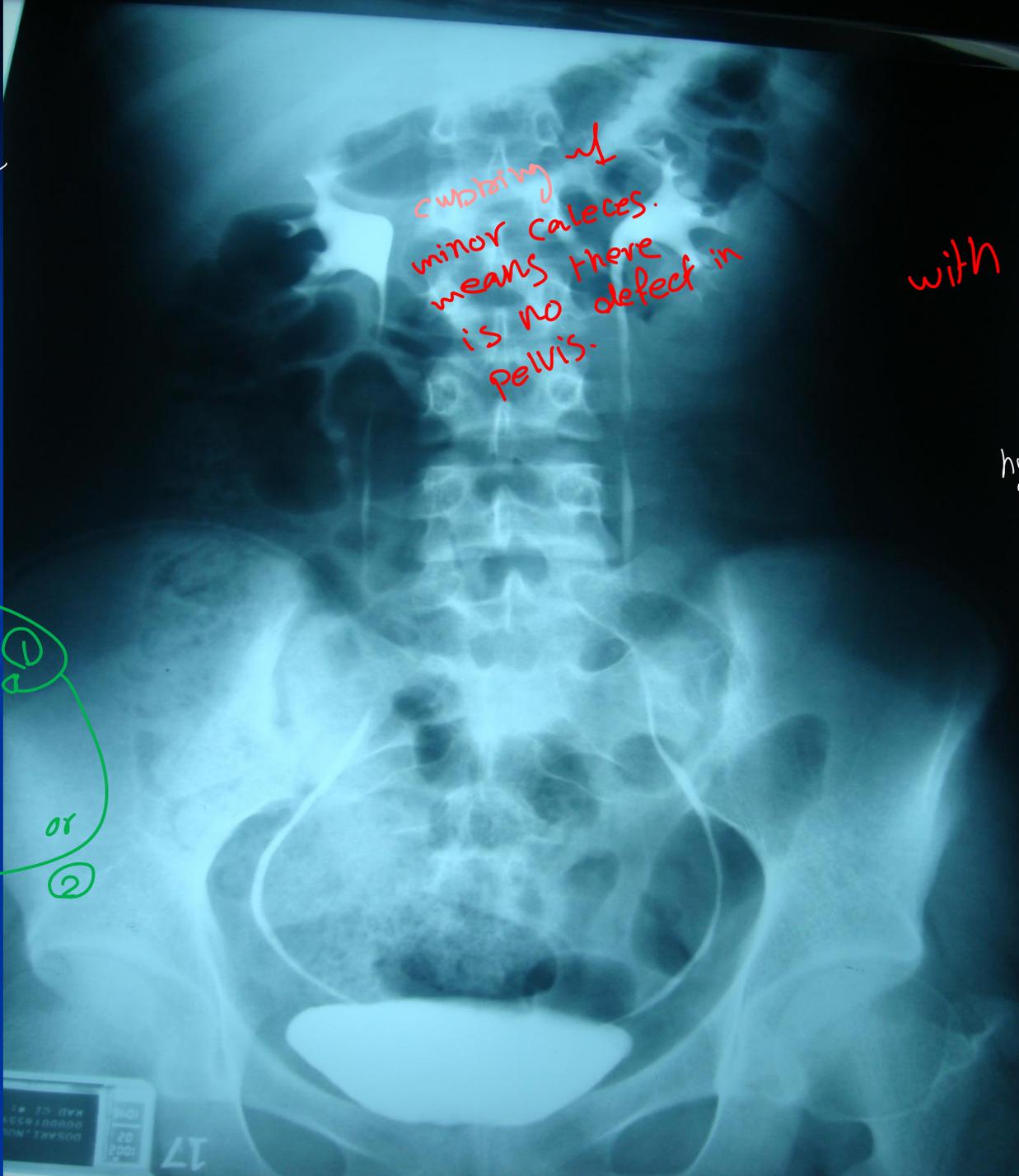
KUB  
after CM

\* اذا كان فيه  
مقاومة في  
بشورتيه  
ureter

① اذا كان فيه  
مقاومة في  
\* Peristalsis  
(spasm)

or

②



clubbing ↓  
minor calices.  
means there  
is no defect in  
pelvis.

with Contrast

\* اذا بيح الكون  
اذا فيه hydronephrosis

or not



بطلع في الـ minor calices



dilated or not

clubbing {  
تأخر في  
clubbing  
تأخر في

⊗ في حالة انسي ما سفتي ال (ureter) بصورة واضحة :

① اذا كان فيه (dilation) للجزء العلوي لا (ureter) معناها انه فيه (obstruction) .

② اذا ما كان ال (ureter dilatation) وتبين اذ

جزء منه ← انا انه فيه (overlapping cases) .

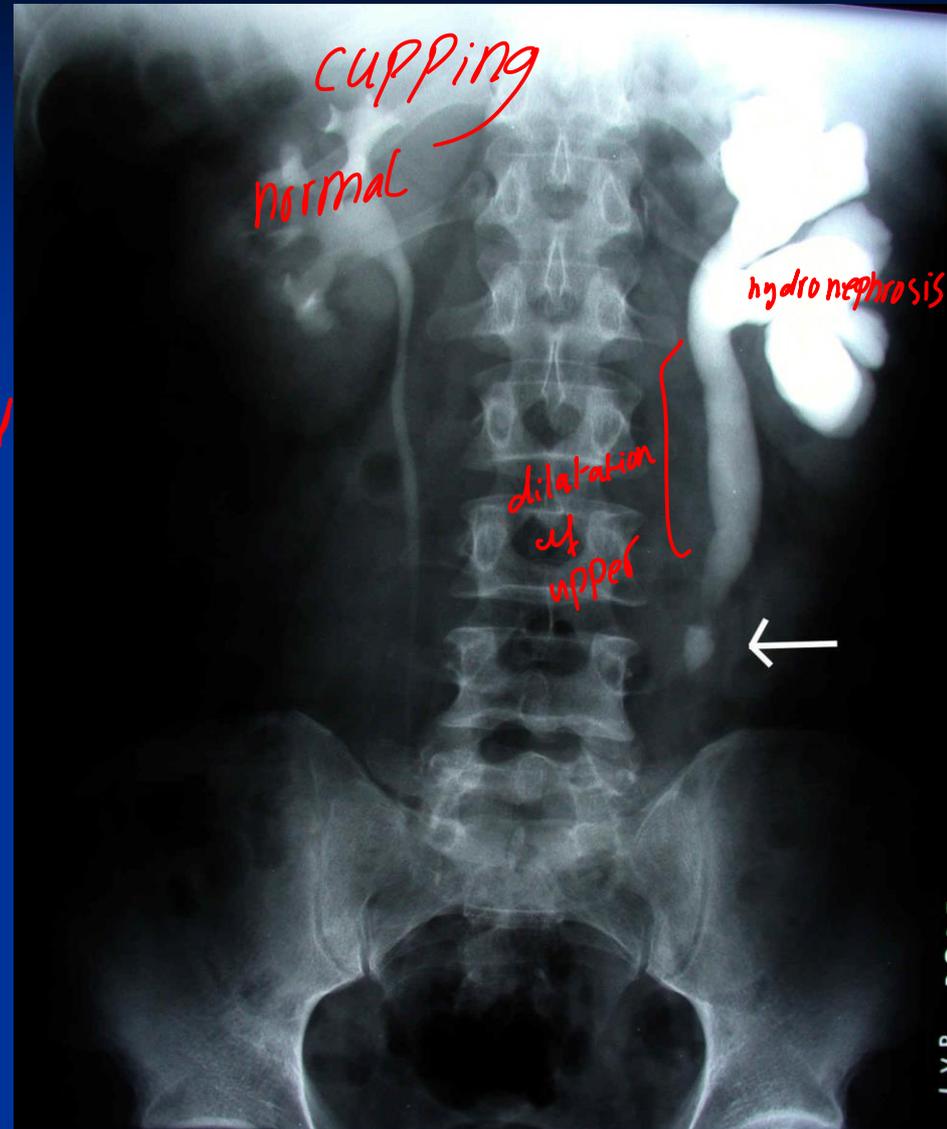
أو انه في (weakness or spasm) .

! انه ما فيه حركة (ureter spasm) .

⊗ في حالات ال (severe hydro-nephrosis) ممنوع ؟ في الرضعات

(Prone position) منه راح يطع ال (urine) من ال (kidneys) .

تقل متاكل عن ال (peritonium) .



⊕ أهم شيء: انه عمل مقارنة بيني وبين ابى عيسى ولاحظت الفرق

Control  
Film

KUB

old age

(No CM)



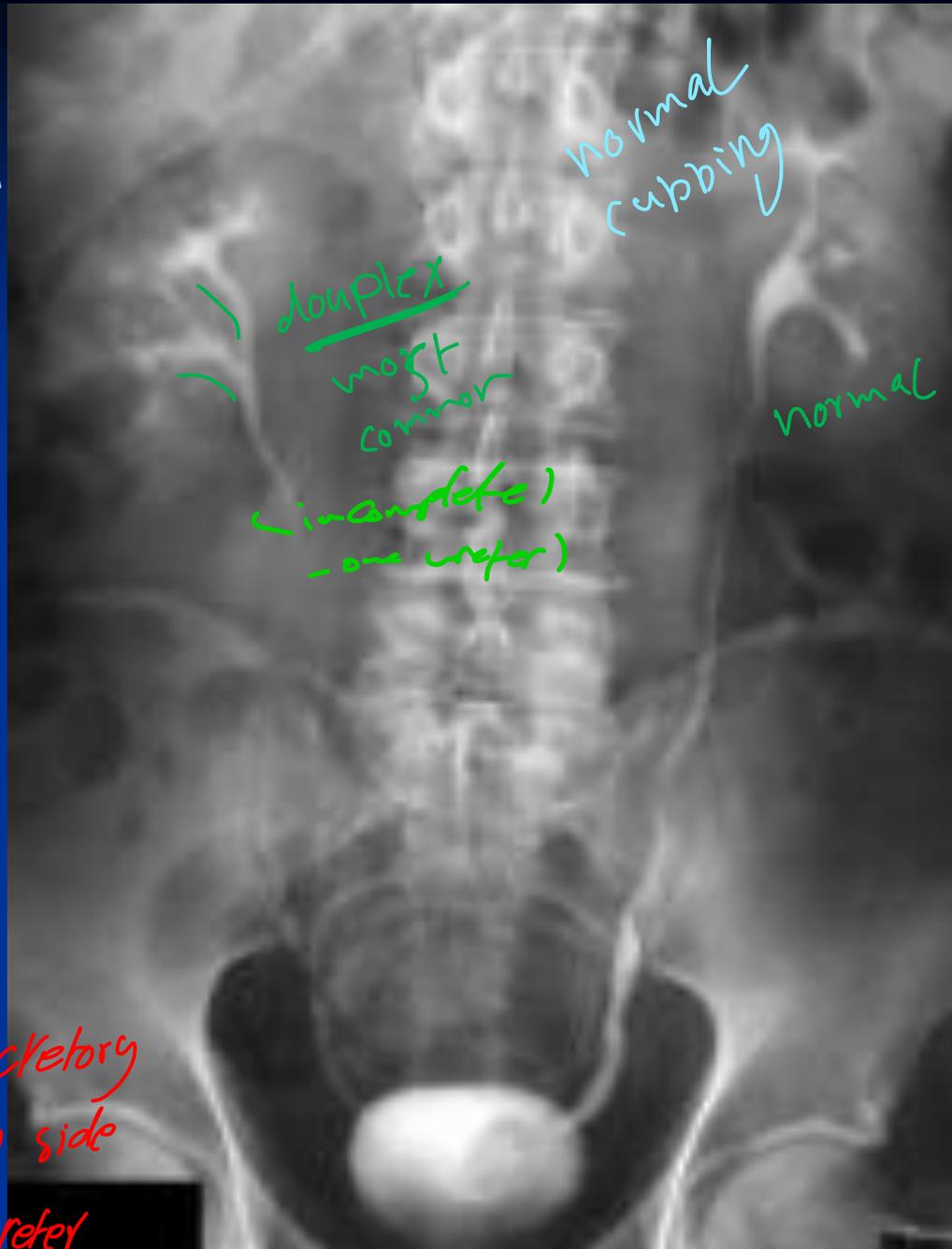
incomplete  
duplication

not separate  
ureter

CM

1) normal excretory  
function of both side

2) normal both ureter



complete

if  
duplicated

کلیتہ کی آئینہ کاری

Kidney

renal Jaundice

Papillary necrosis

# Micturating cystogram

کلیتہ کی آئینہ کاری

① spina- fluida

② sacro agonesis in neurogenic bladder

- ❖ Is the study of the urinary bladder and urethra with contrast medium. → Ballooning with normal saline, then 30% contrast
- ❖ The bladder is filled with contrast via a urethral catheter. Films of the bladder are obtained.
- ❖ After removal of the catheter, patient is asked to void and films are taken during micturation to assess the bladder neck and urethra, as well as reflux.
- ❖ Examination of the urethra in oblique position is necessary, particularly in suspected posterior urethral valves in infants and small children, as they are usually only demonstrated during micturation.

→ Males is oblique

❖ في هذا (technique) وعند الأطفال خاصة  
لما يعمل لهم كاتيس (بين ما بينهم وexamination)  
لأنه ممكن يبيس عند لهم (dehydration) وتعمل مستطيل  
ثانية .

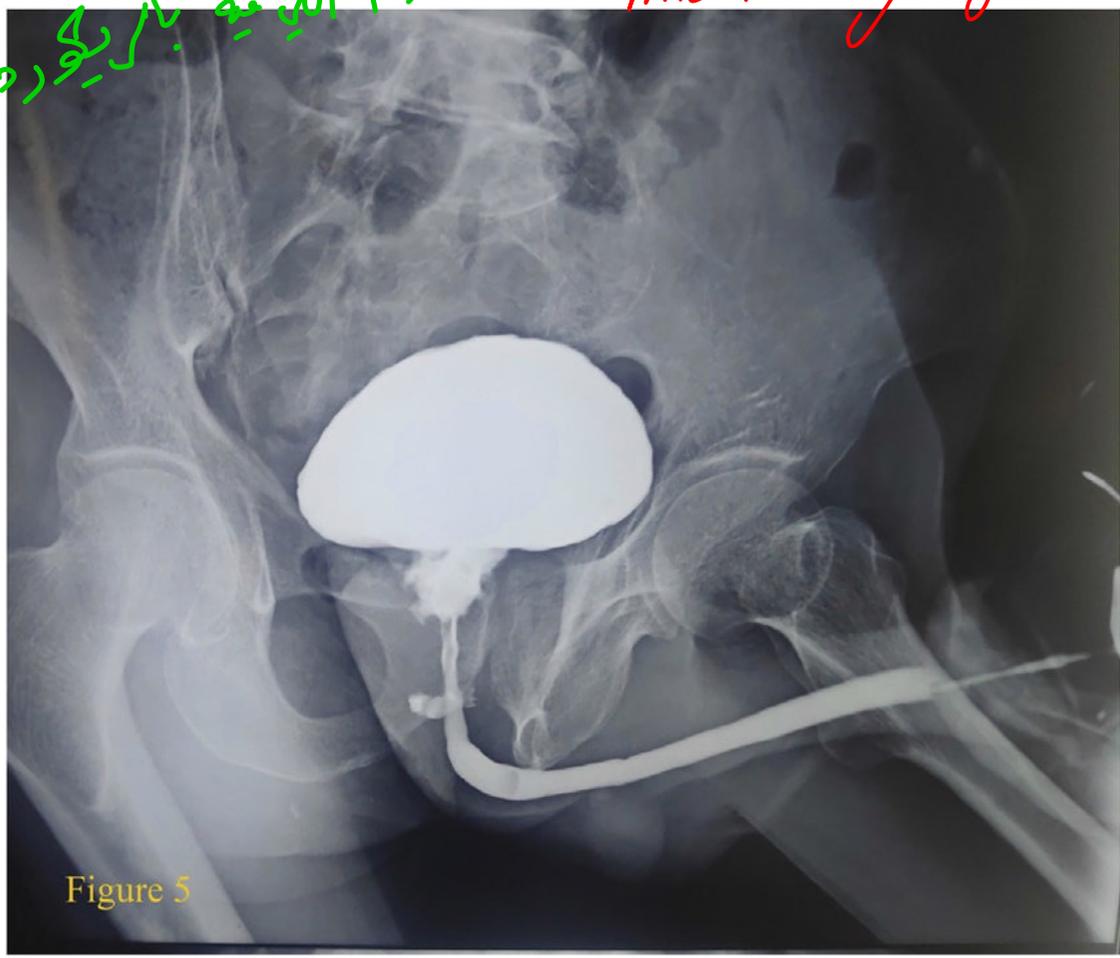
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❖ في بيان حالات ال (dilatation) تبس نتيجة ال (Recurrent UTI) أو  
بسبب (urine stasis) عند الأطفال أكثر من زمان كانت تعالج بالبراصه  
جيتي انهم يعملو اعملية نقل حوالب للأفضل ويعملو ال (insertion) بال  
(Bladder) ، اذا رجعت اى حالة بسلو لها (insertion) بال (same) .

❖ لكن الآن انا اعمل بعلاج بالأعطاء ، وهناك صويك (أشهره Balgafrein)  
مع متابعة دورية كل شهر ثم ٣ أشهر ثم ٦ أشهر وبعدها تراجع  
المراجعة سنوية .

سأرى خارجي لثني الكون، تفتن  
الكرام الأربعة باليكون

micturating cystourethro-gram



### What is a **MCUG**?

A MCUG is a special X-ray test which looks at how well your child's bladder works when they pass urine (wee).

The test can examine how the bladder stores the wee and how it empties through the urethra.

In fossa navicularis *During [micturating or ctying]*

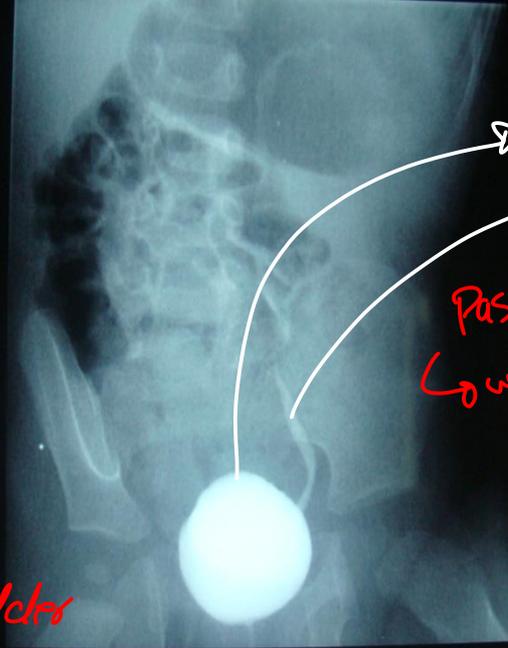
\* Trauma, congenital abnormality of urethra, bladder, neurological disorders in old ages



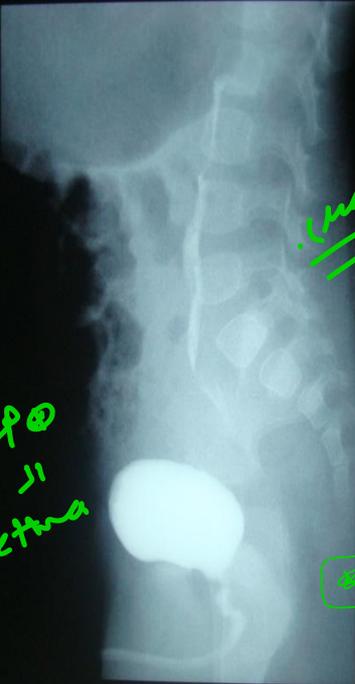
CONTROL

→ gas overlapping abdomen

\*agenesis of sacrum is a sign of neurogenic bladder



→ smooth  
→ lt. ureter/dia  
Passive reflux  
↳ without micturition



14-08-2007  
8:51:19 AM

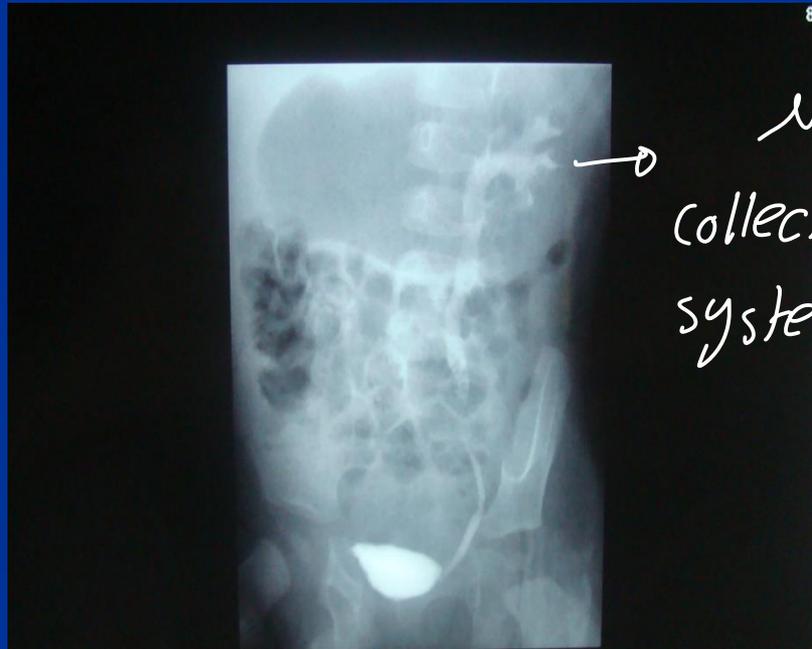
⊙ ضيقة ال (ureter) ⊙

active reflux occur during micturition

⊙ مسار ال Course of ureter ⊙

⊙ Vesi Co - ureteral dilatation ⊙

kV: 75  
H: 0 % mAs: 0.6  
F: 30 % D: 50



↳ dilated collecting system

thickness of the renal pelvis & SI does is is is

operation  
adhesions in  
Anti-biotic

degree is is is

→ severe dilatation + tortuosity at ureter → 5 degree

→ Just dilatation → 4 degree

→ without dilatation → 3

→ limited to ureter → 1, 2  
upper lower

stones are most common cause

# Urethrogram

strictures ←  
is most common indication

ascending urethrogram. → maybe  
inf, tumor

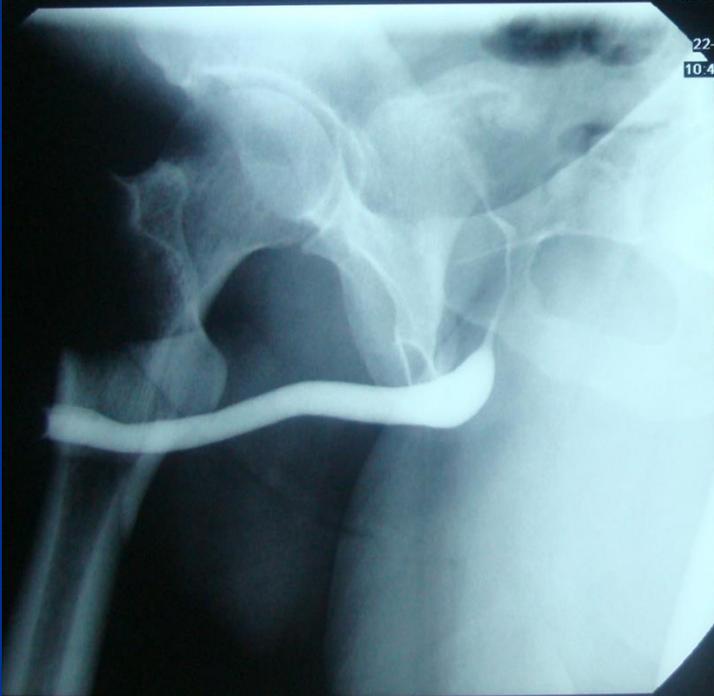
- ❑ The adult male urethra can be studied by ascending urethrogram.
- ❑ Contrast is injected through foley catheter inserted into the meatus, and its balloon inflated with 1 to 2ml of sterile water placed in the navicular fossa.
- ❑ Films are taken to the urethra in oblique position during contrast injection.
- ❑ The most common indication for urethrogram is urethral strictures.

ballooning inflated at top of gland  
in lesser splanchnic

MAJED

S.F.H.P  
FLUOROSPOT

22-11-2005  
10:49:14 AM

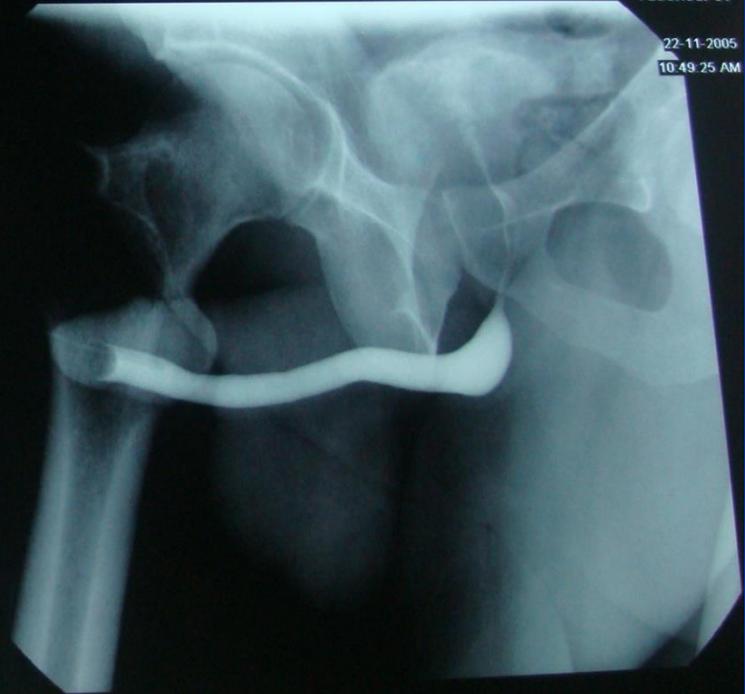


OTAIBI, MAJED

223571  
01-01-1968

S.F.H.P  
FLUOROSPOT

22-11-2005  
10:49:25 AM



H: 0 %  
F: 30 %  
C: 700  
B: 306  
KV: 81  
mAs: 5.2  
D: 50  
4

smooth normal urethrogram

No strictures

median  
۱۰۵۴

اول ال  
کنه الکتار

Colley's catheter  
inserted into  
fossa navicularis

distal

proximal

wipe area  
(normal barrier)  
not stricture

اذا ما ملر تقزینغ ل (Air bubble)  
راغ قعل لهای ار (Sign) (کن باجور)  
طریقاً ۷ فاصلن یلر منه (misdiagnosis).

لهسا اذا آتشاء الحقتن  
كانت لهای (wipe area)  
موجوده و بعدھا رامت  
فهای (air)

81  
As: 2.6  
50

H: 30 %  
F: 30 %

هنا يكون

air bubbles

كان ههنا

لازم افترق

Foley's cath. من  
باللون

العواد.



Prostatic urethra narrow  
due to prostatic loops  
especially Median loop

multiple strictures

# Congenital renal anomalies

## 1- Unilateral renal agenesis

## 2- Renal hypoplasia

the kidney is small but perfectly formed

## 3- Duplex kidney

Is the commonest renal anomaly with a variable degree of duplication ranging from minor changes of duplication in the renal pelvis, to a total duplication (complete) of the renal pelvis and ureters.

→ Rt. ectopic kidney: misdiagnosed with appendicular mass  
or Rt. cystic ovarian torsion (in female)

→ Lt. ectopic kidney: misdiagnosed with inflammatory bowel disease (IBD)  
(ulcerative colitis) عرقلة

⊙ To detect mobile  
Kidney from ectopic  
we use → IVU  
→ CT with  
contrast

# Congenital renal anomalies /2\_

## 4- Renal Ectopia

- ✓ Refers to a birth defect in which a kidney is located in an abnormal position usually in the pelvis
- ✓ The ectopic kidney is frequently malrotated and small in size.

## 5- Crossed fused renal ectopia

- One kidney is displaced across the midline and fused to the other normal kidney .
- The ureteric orifice lie in a normal position .

— There is No Kidney at 16 side  
— both at Rt. side — 2 ureters at Lt. side

# Congenital renal anomalies / 3

## 6- Horse shoe kidney *not oblique*

- Is a fusion anomaly in which the lower poles of the kidneys fuse across the midline .
- The connective tissue may be functioning or non functioning (fibrous tissue)
- In horseshoe kidney , there is increased incidence of infection and stone formation.

normal  
cupping  
calices

external pelvis

NO PUJO



pelvic-ureteric junction  
obstruction



Prone  
Position

منزل  
contrast  
to ureter

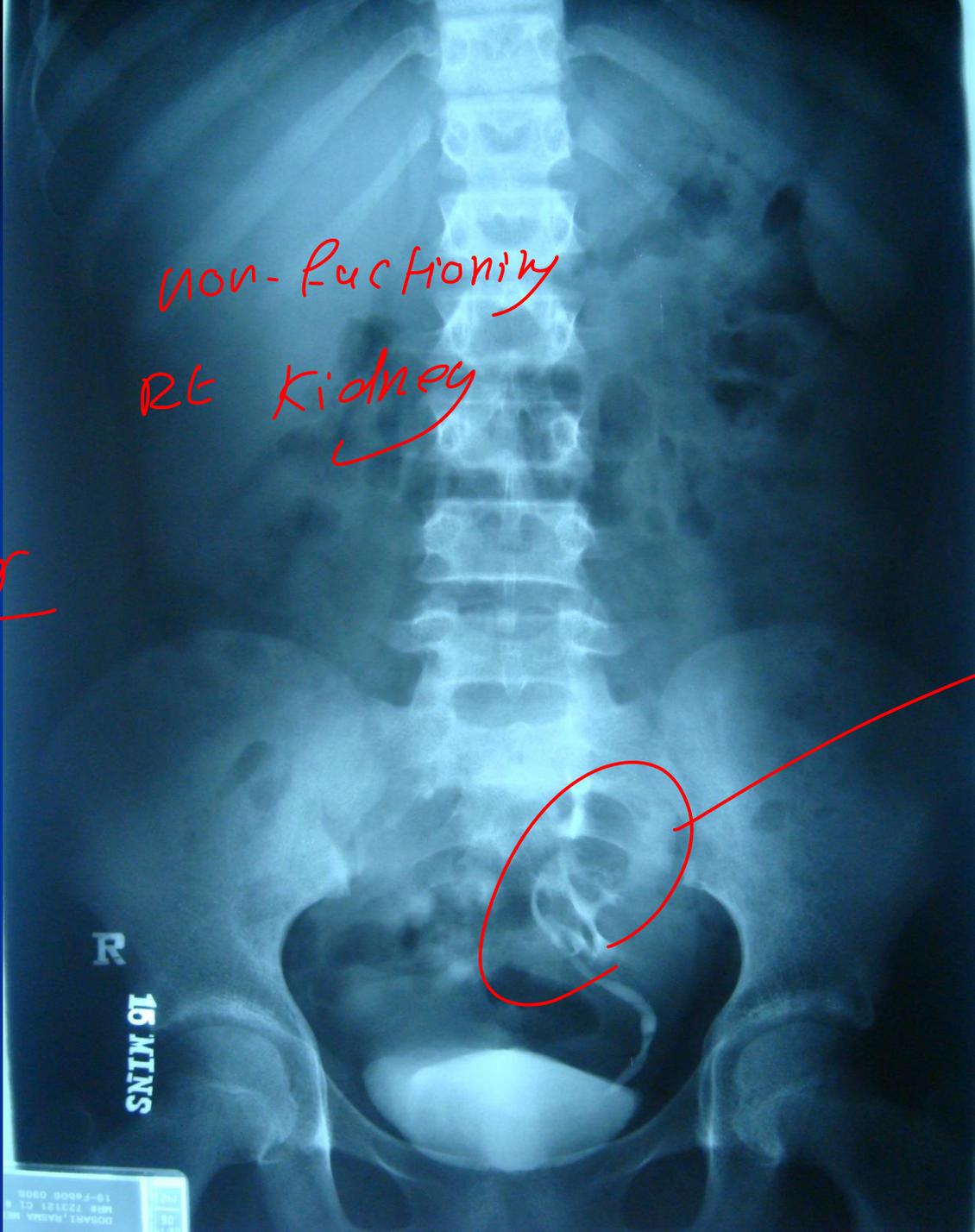
IIVU RT

16

non-functioning  
RT kidney

contrast  
in bladder

ectopic  
Kidney

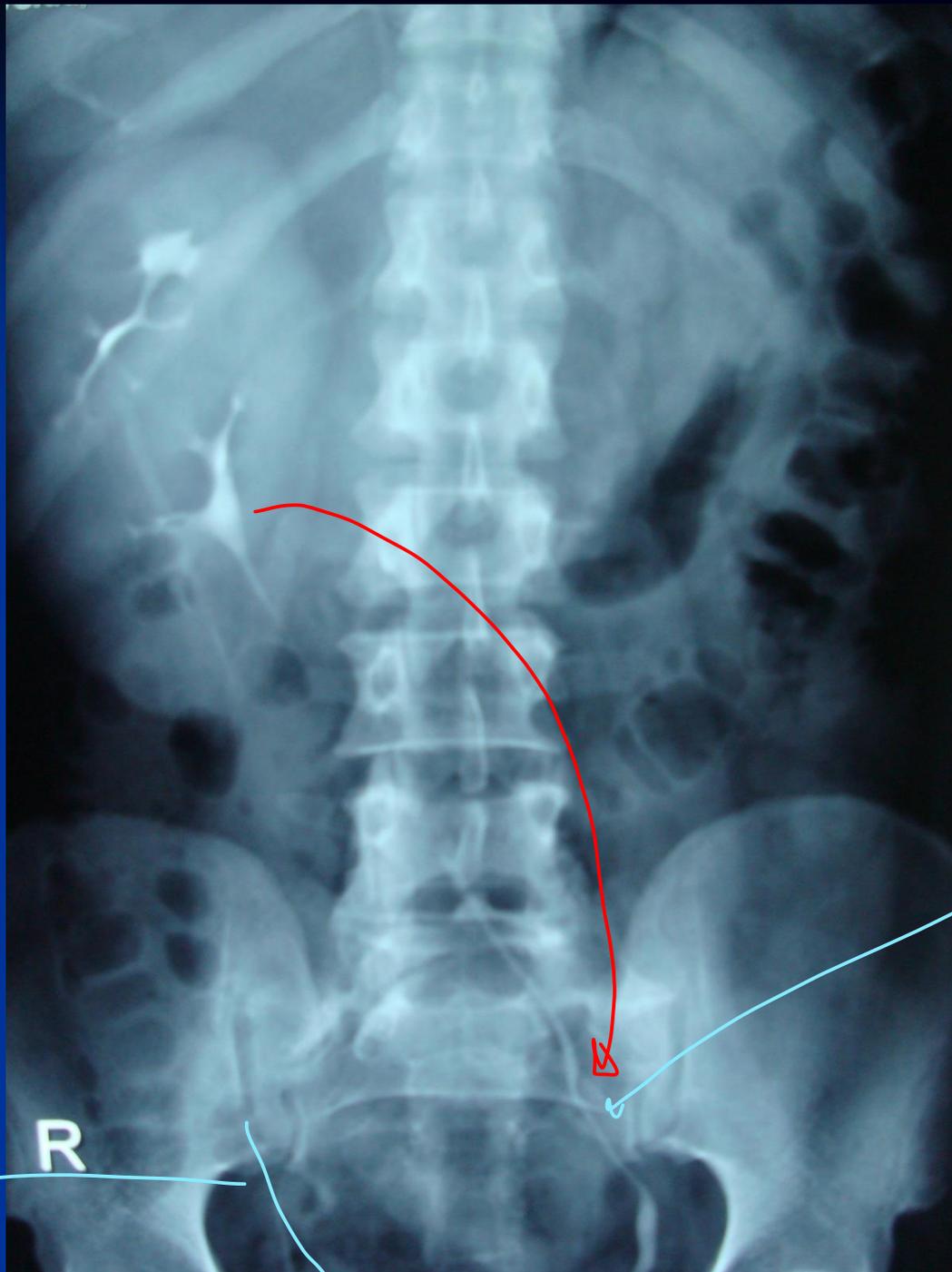


IVU  
contrast

KUB

no contrast

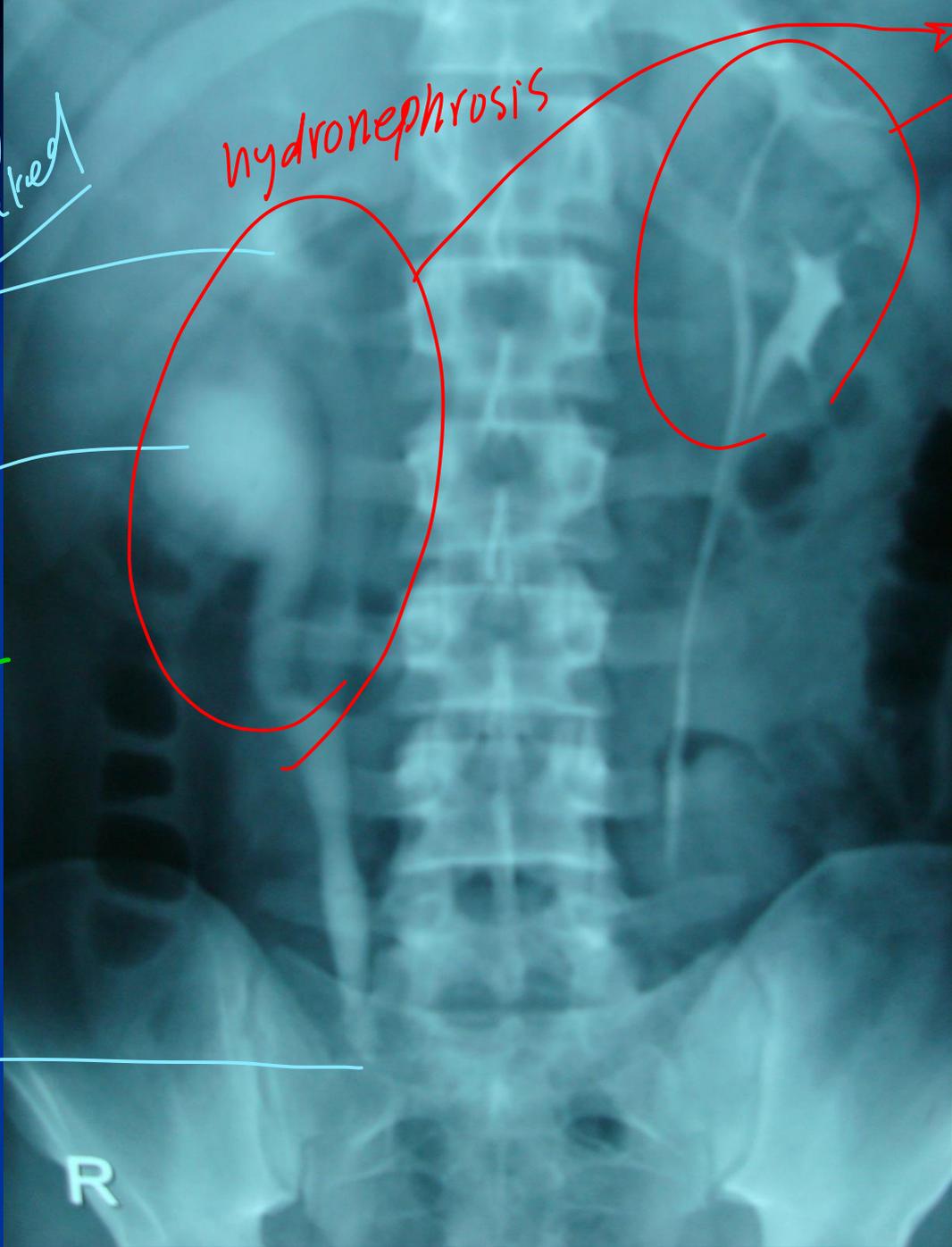
distal  
ureter  
R



Crossed  
Diffuse  
ectopia

with normal  
ureter insertion  
inside the bladder

other  
ureter  
crossed



upper moiety  
dilated

hydronephrosis

incomplete  
duplication

normal  
function

dilated  
ureters

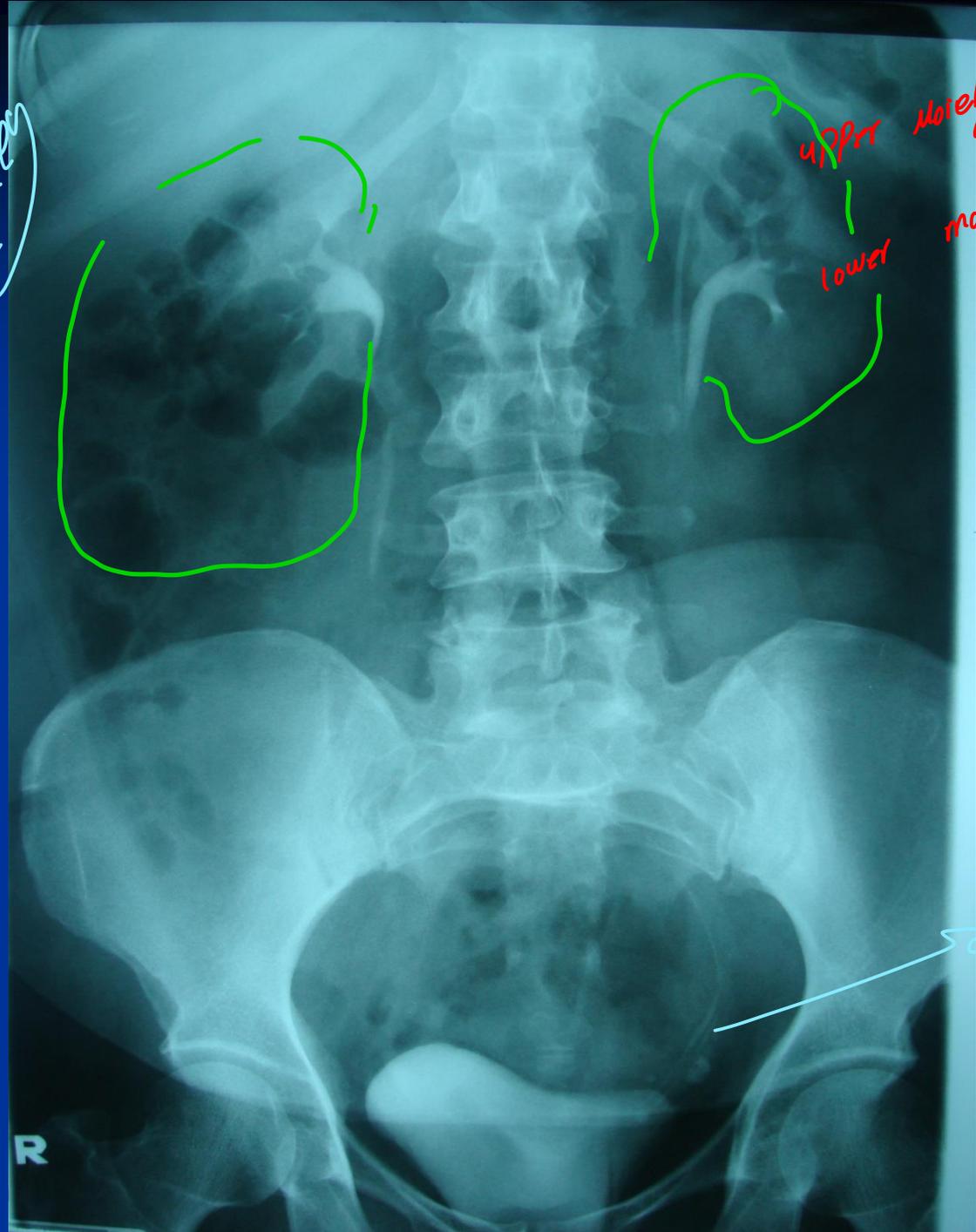
No  
dilatation

في قاع الكلى  
(Control film)  
(Stones) في  
الجزء  
↓

low obstruction

R

WU  
duplex kidneys



upper moiety  
lower moiety

dilated  
Prone  
Position

single ureter

IVU



double ureter  
(complete duplication)  
Lk. side

( In prone position )

L R



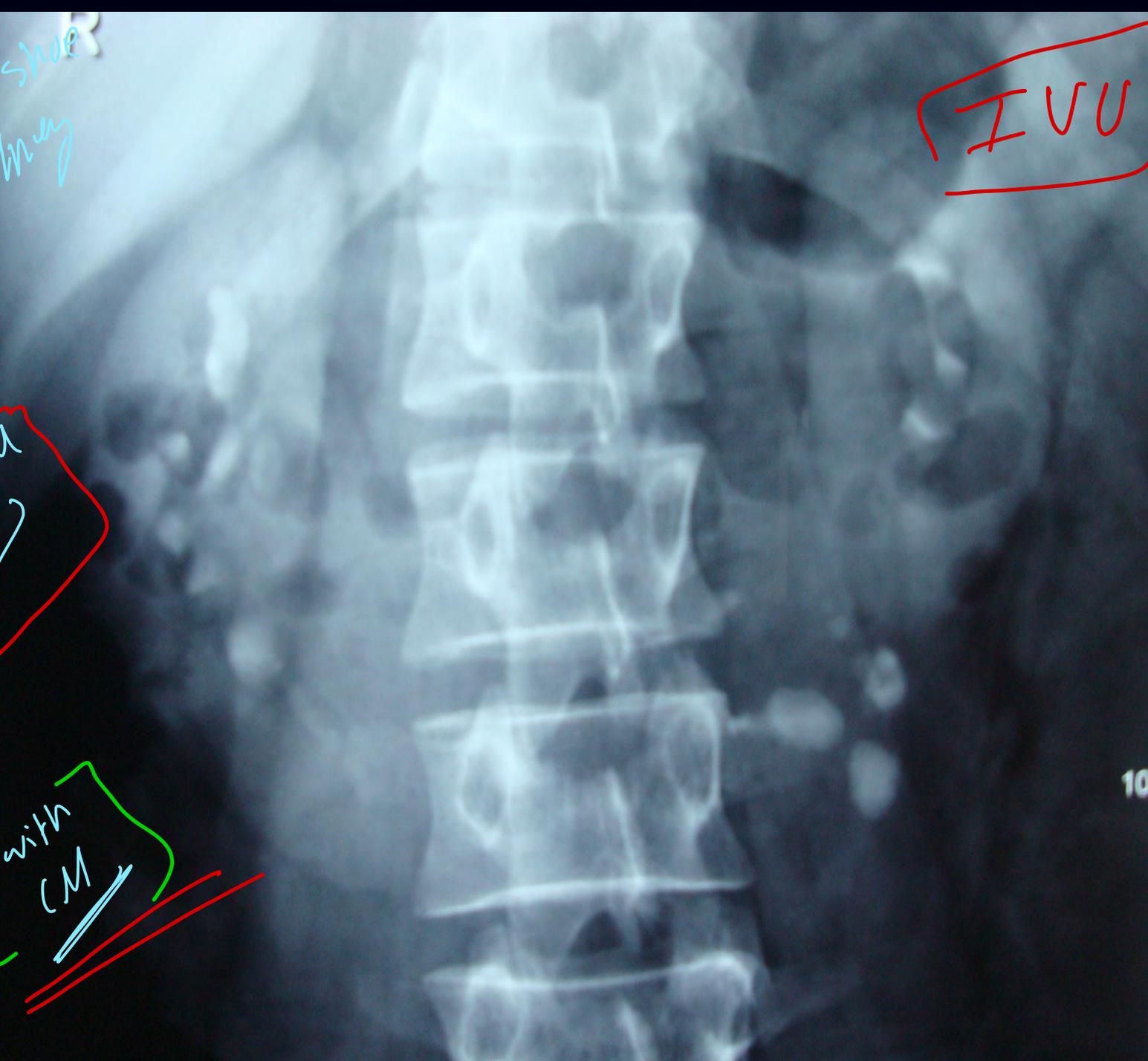
Nourse-shoe  
Kidney

I V U

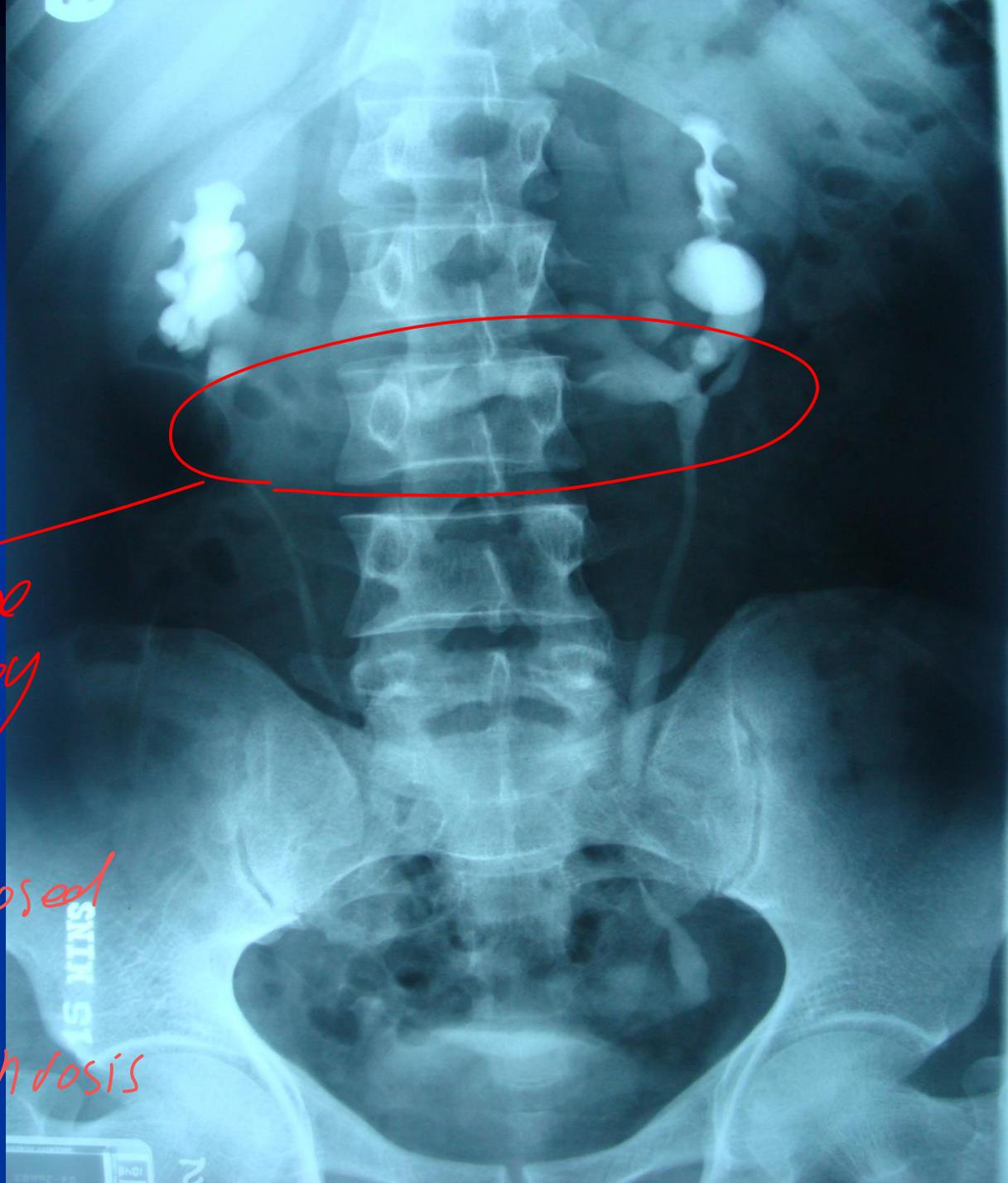
1.5 x 1.0 cm  
stones

with  
CM

10cm



لاکڑی  
سائے  
میں



Notched spine  
Kidney

Misdiagnosed  
with  
hydronephrosis

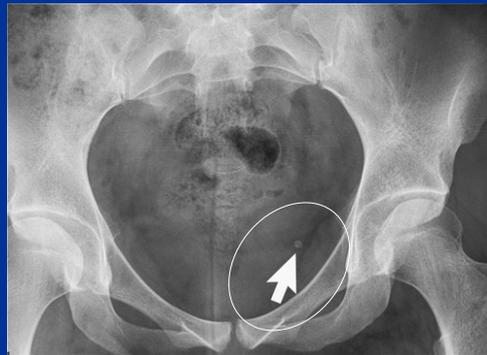
# Urinary tract calculi

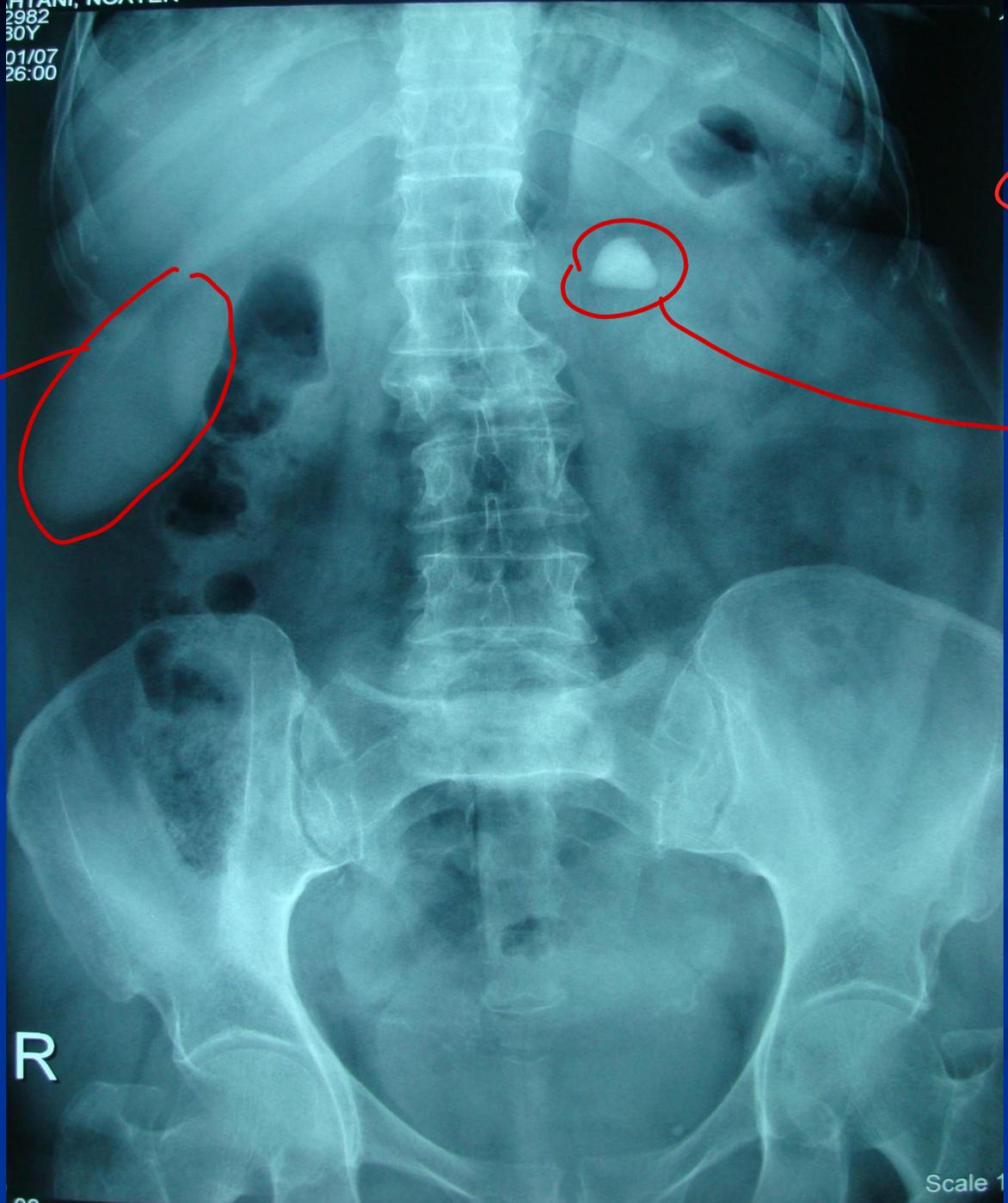
- ❑ The majority of renal stones are composed of **calcium** (about 90 %) and are visible on plain film (radio-opaque) → *أبيض*
- ❑ Stones composed of **uric acid** are not visible on plain film (radiolucent) . → *أسود*
- ❑ Stones composed of **cystine** are minimally dense on plain film (semi-opaque) .

# Urinary tract calculi / continuation

What is the initial imaging test usually ordered to find urinary tract stones ?

- ✓ Plain radiograph (KUB), because the majority of stones are radio-opaque
- ✓ Other calcifications may be confused with urinary tract stones such as a **phlebolith** in the pelvis, which is a venous calcification, often with a lucent center. **small local, usually rounded, calcification within a vein**





soft tissue  
mass  
(Right lobe  
of the liver)  
↓  
"Abnormal  
variation"

Control  
film

R

Scale 1



R



stone  
in  
whole pelvic  
calyx system

staghorn stone

control film

Ultraviolet  
40 35 30 25 20 15 10 5  
CONTROL  
11

اسمها صانغ

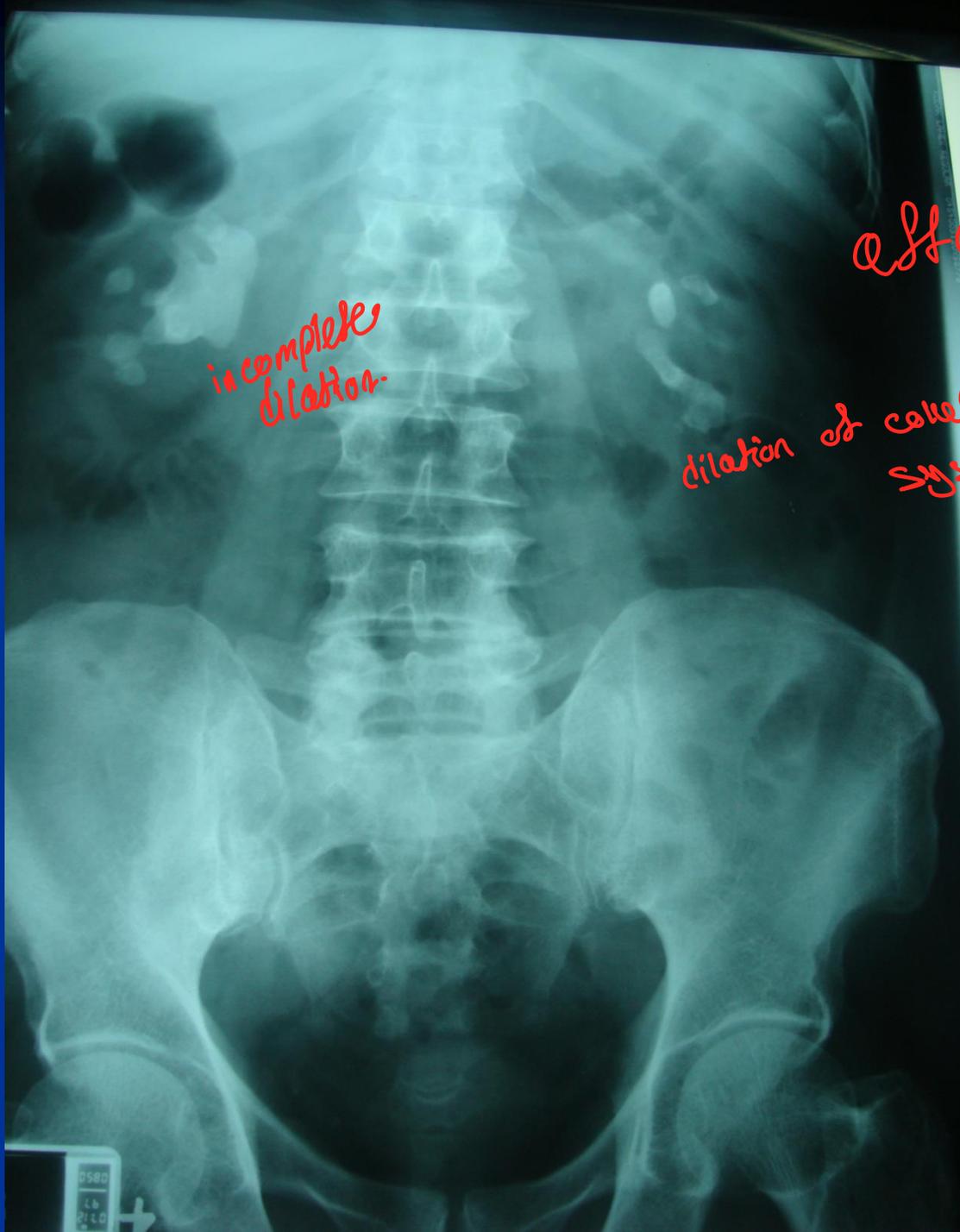
KUB showing staghorn stone



Stag = حيوان الضبي او الايل

staghorn stone ليس سموه بهذا الاسم لانه الهه بروزات يشبهن قرون هذا الحيوان (حيوان الايل او الضبي)





incomplete  
dilation.

dilation of collecting  
system.

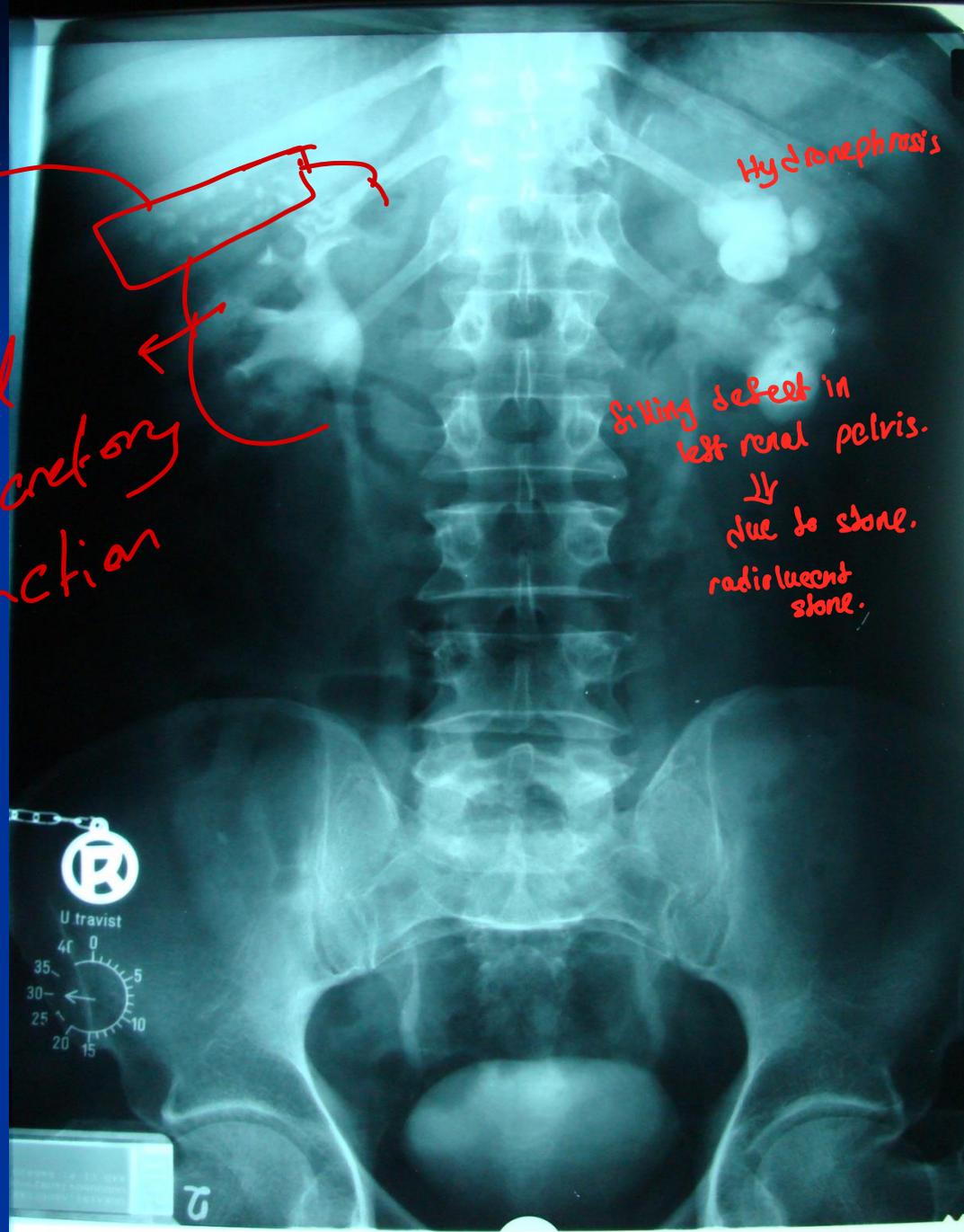
after contrast.

Radio Opaque stones  
in Gallbladder  
(15-20)%

Normal  
Rt. excretory  
function

Hydronephrosis

Sitting defect in  
left renal pelvis.  
↓  
due to stone.  
radiolucent  
stone.





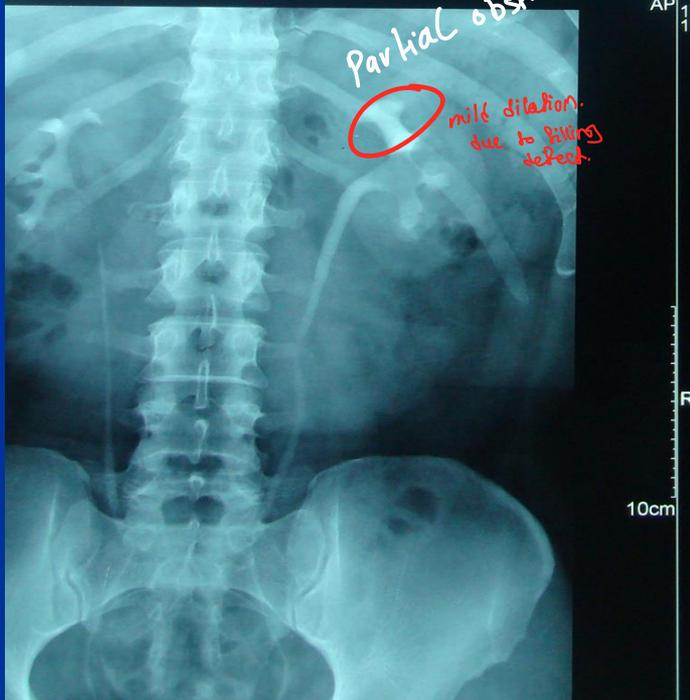
( CONTROL ) - KUB

Scale 43% g.p.  
W 1802 kV 81.0  
C 2129 mAs 21.69



→ Mild hydronephrosis

IVU  
5 MINUTES



Partial obstr.  
mild dilation due to kidney defect.

Security Forces Hospital  
SHAREEF, ALI NAIF  
133453  
1608 M, 47Y  
AP 12/08/07  
10:46:42

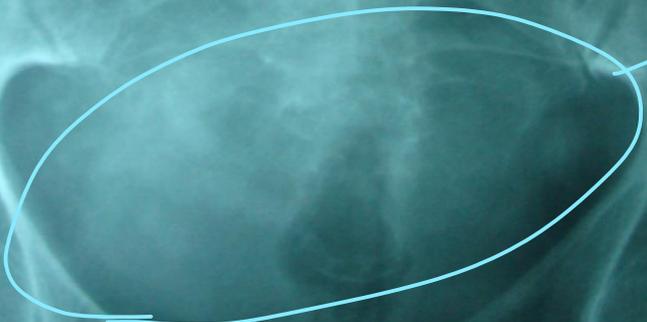


KUB

Control Film



degenerative disc  
means old age.



radio-  
opaque  
shadow  
filling  
Pelvis





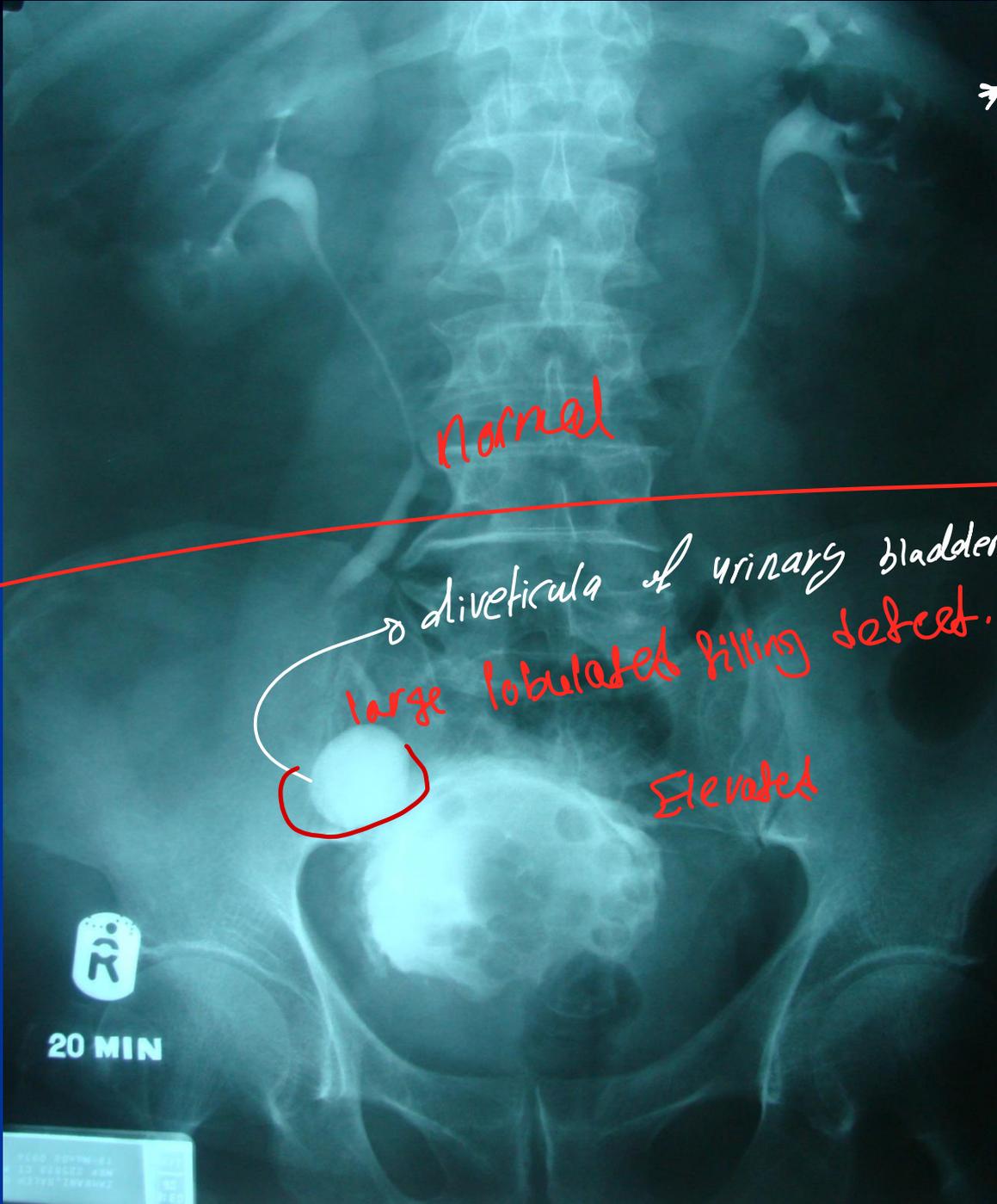
Male Patient

intraluminal multiple radiolucent stones

elevation the base of urinary bladder

↓ Due to urine stasis

prostate hyperplasia.



Normal

diverticula of urinary bladder  
large lobulated filling defect.  
Elevated

\*hypertrophy  
mostly  
in Medial  
loop.

(over-Powching)  
↓  
from prostate  
(median  
lobe)  
cystoscopy  
biopsy

R  
20 MIN

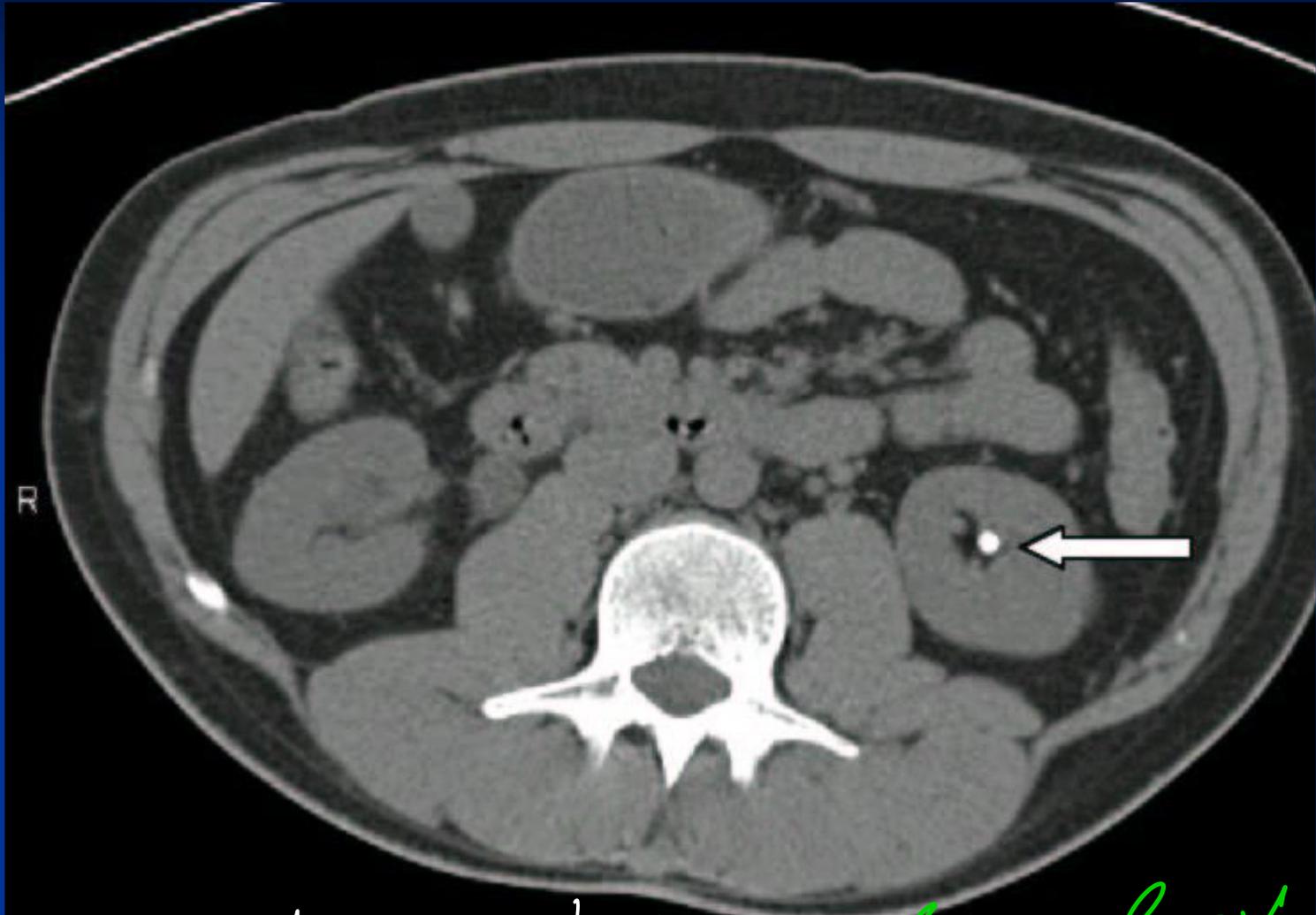
# Urinary tract stones and CT

*What is the most sensitive radiological test for urinary tract stone ?*

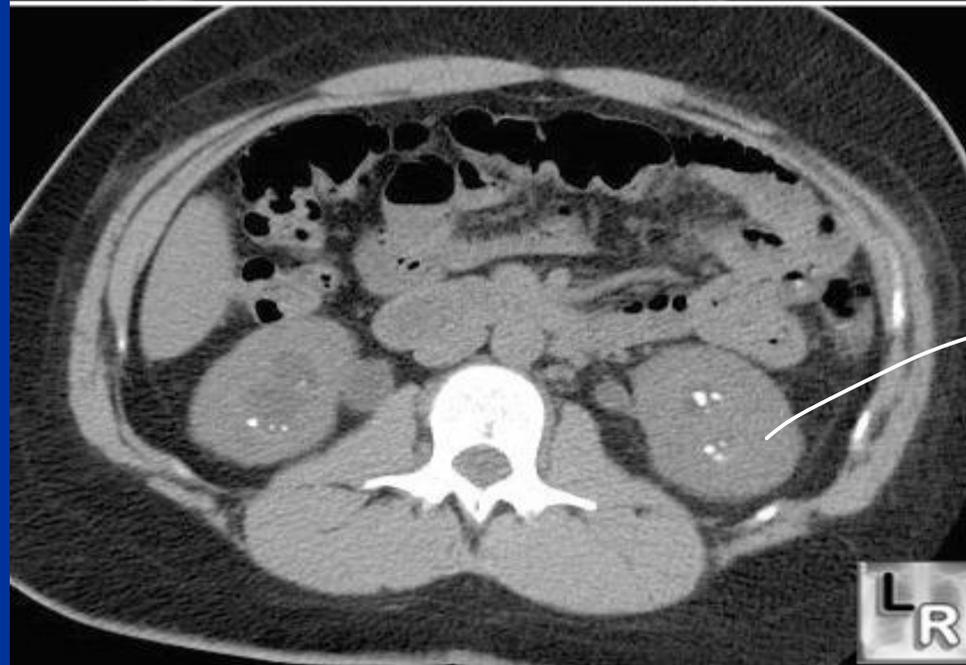
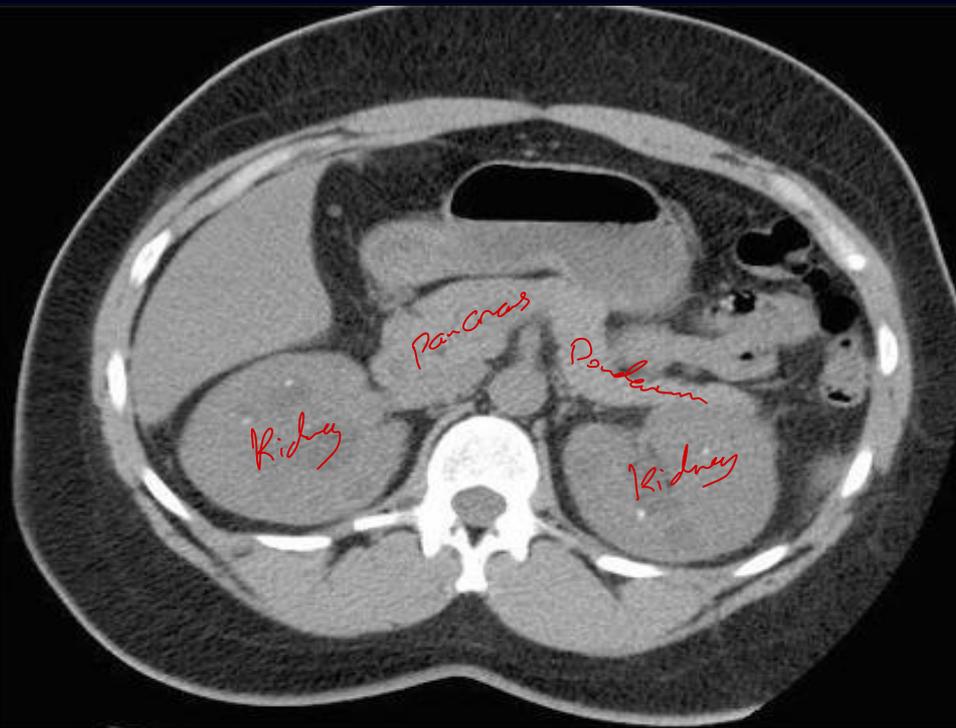
CT , performed without contrast, is highly sensitive for detecting urinary tract stone. (Density)

*Are any urinary tract stones radiolucent on CT ?*

No , virtually all urinary tract stones , regardless of their composition are visible on CT .



in stones → No contrast (to avoid over density)  
in tumors → ✓ → to avoid lucency that seen in (RUB)  
یعنی عسلان آمیزها عندا (stones)



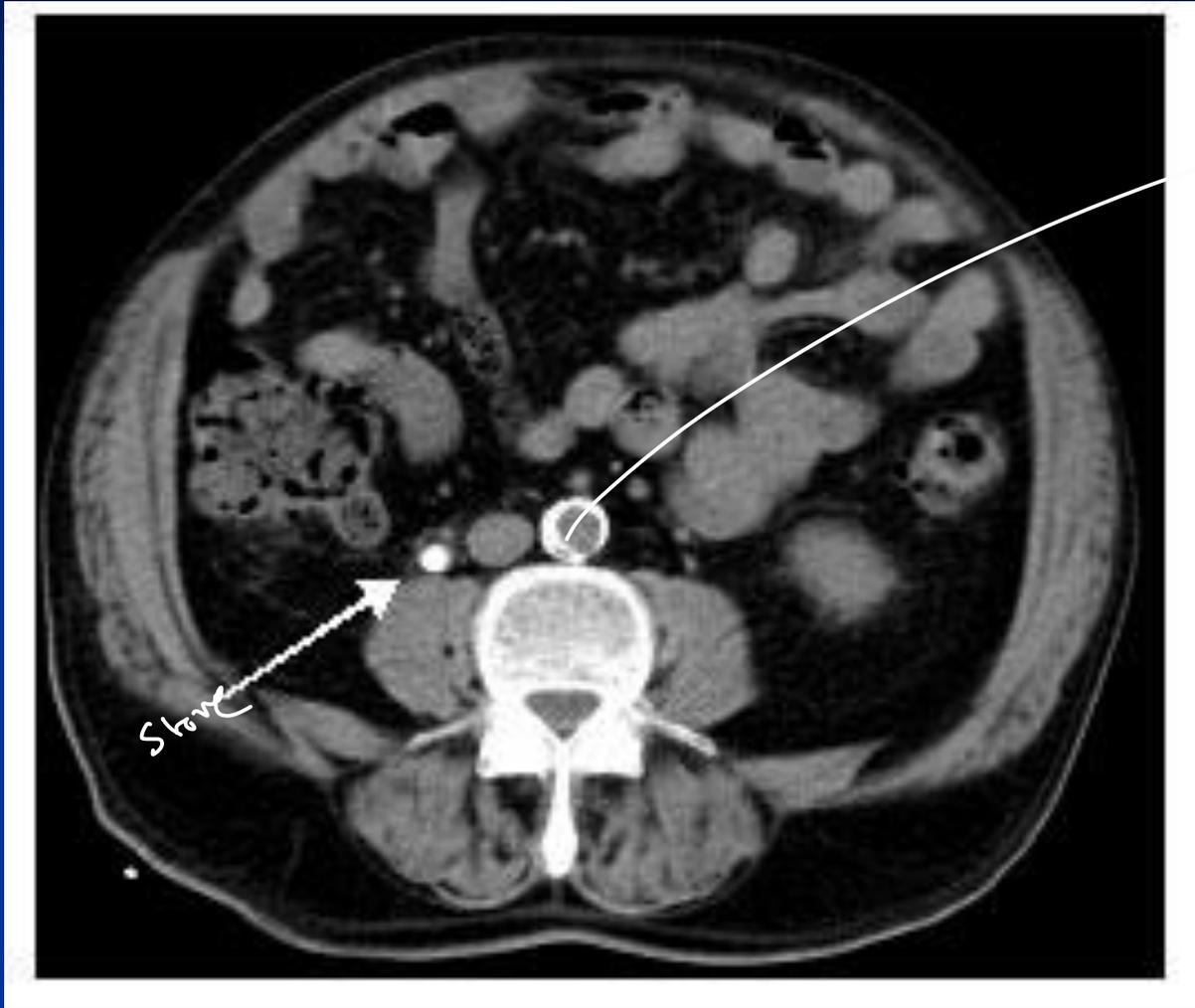
Medullary  
Sponge  
Kidney

Multiple  
Stones

in pseudo-  
parathyroidism

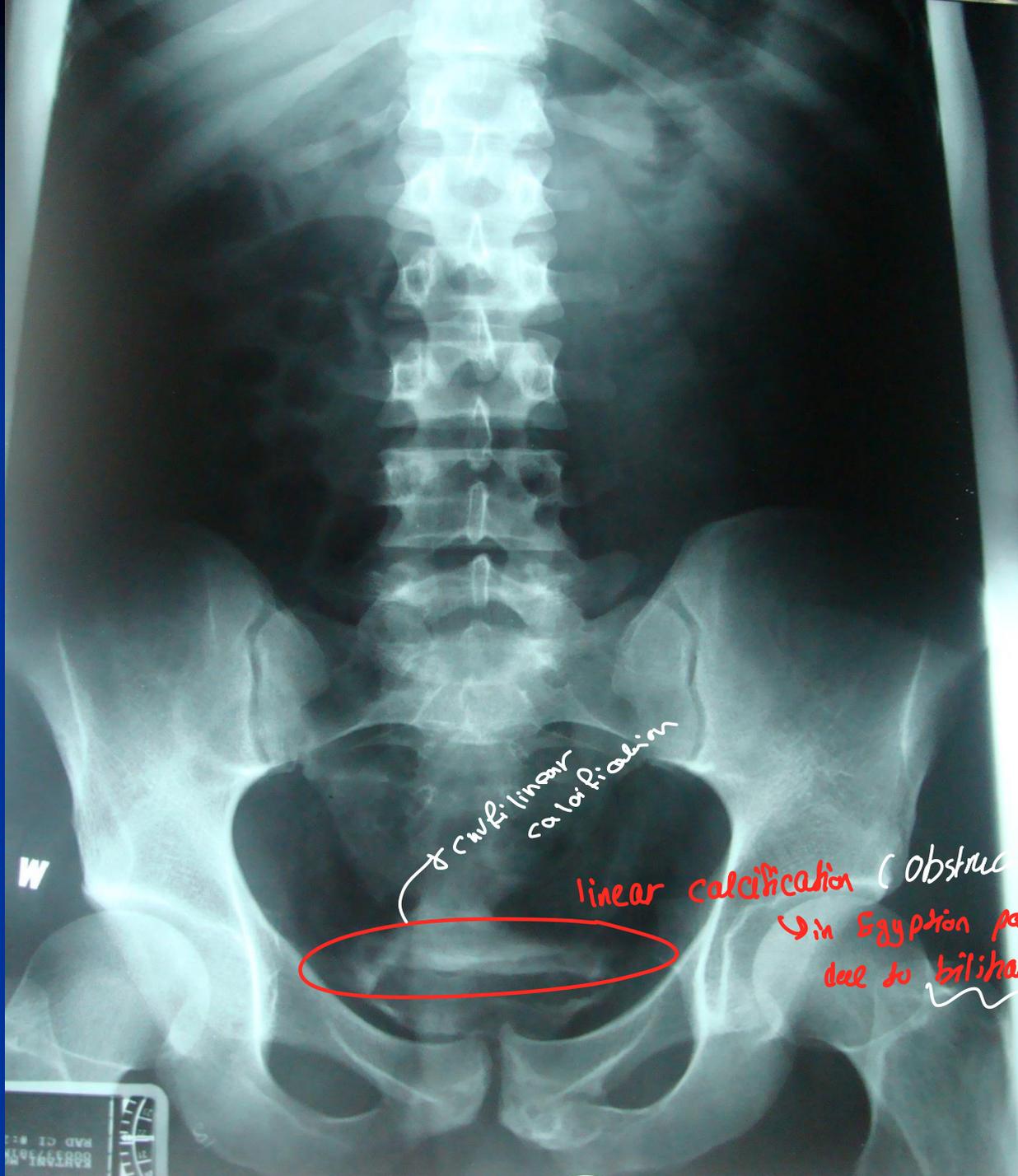
"A congenital endocrine  
disorder"





oral calcification  
in aorta  
aging

Stent



\* curvilinear  
calcification

linear calcification (obstruction vesico-urethral)  
↳ in Egypton patients mostly  
due to bilharziasis?

80859487N  
RAD CI #11

KUB



# URINARY OBSTRUCTION

- ❖ Obstruction of the renal tract may occur at many sites.
- ❖ The most common causes are:
  - Urinary tract stones. → M.C
  - Urinary tract strictures. → ink  
→ Malignant
  - Urinary tract tumors. -
  - Prostatic hypertrophy or cancer. -

# Urinary obstruction / 2

Why is it important to recognize renal obstruction ?

- Because over time, obstructed kidneys may lose function permanently.

What is the best initial imaging test for suspected renal obstruction ?

- Ultrasound. It is relatively inexpensive, safe, and effective. The cause of obstruction also may be identified.



Control  
Film

Normal



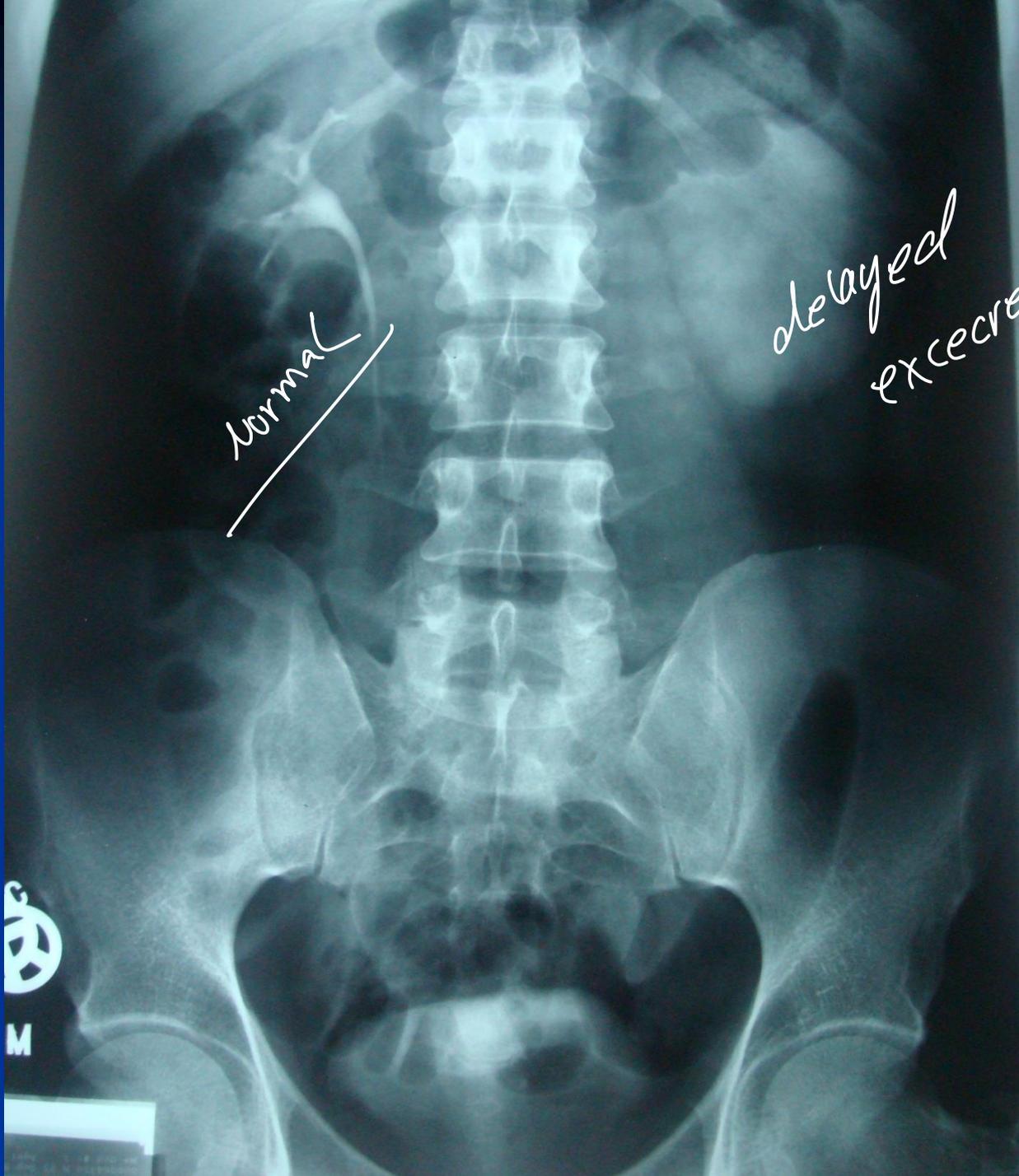
hydronephrosis  
with delayed

after  
contrast

Post CS  
ligation



Control  
Rim



normal

delayed  
excretory

M



delayed  
film

low obstruction

vesico-  
uretric  
junction  
associated with  
edema

# Benign renal lesions

What is the most common renal mass ?

The most common mass is a simple cyst.

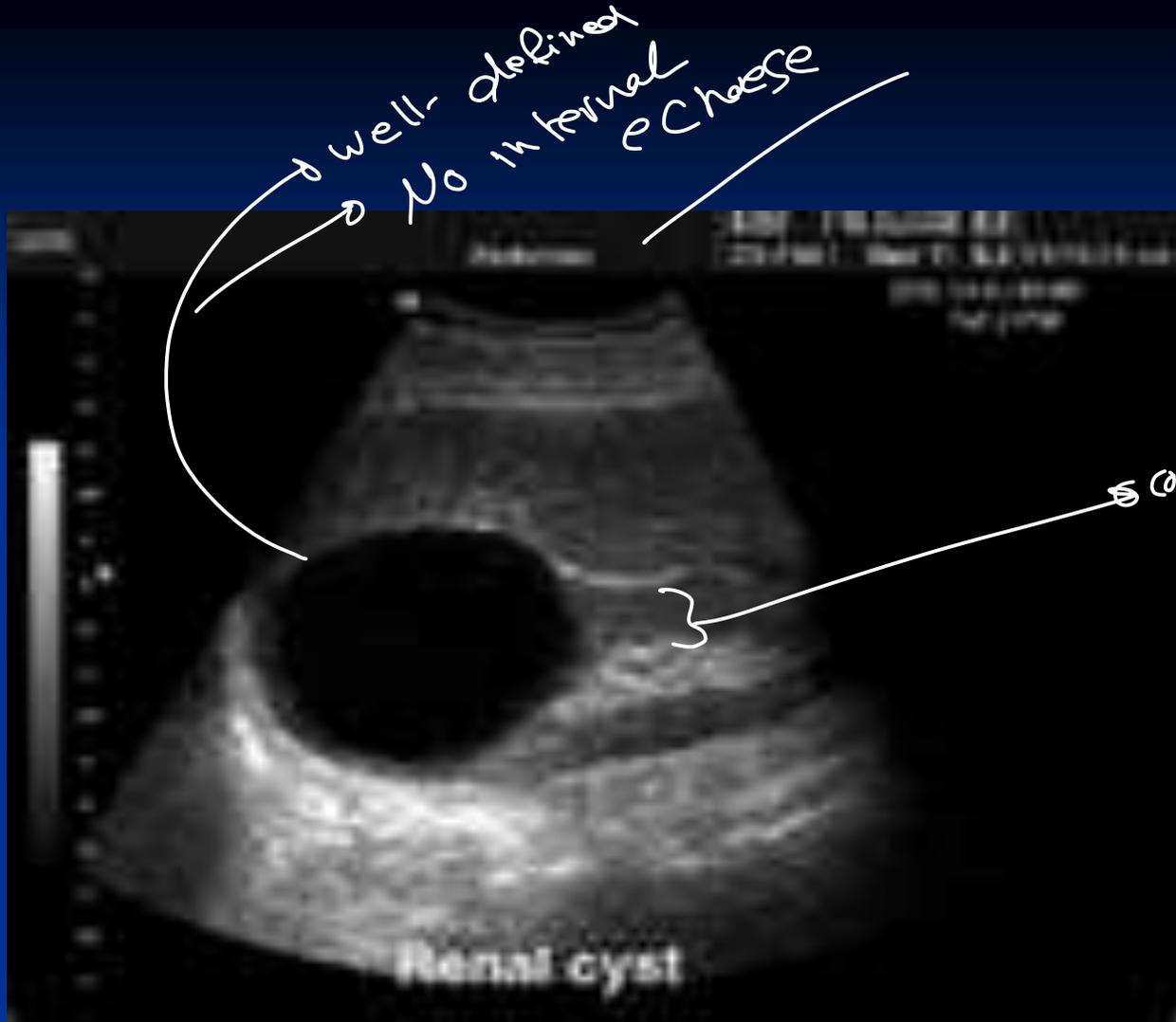
- They are more common in older patients and are found in approximately 50% of the population over 50 years of age.
- They are usually cortical in position and an incidental finding. . .

# Benign renal lesions /2

- ❑ What is the best way to confirm that a renal mass is a simple cyst ?

Ultrasound.

- ❑ The ultrasound appearance of a simple cyst is that of a well-defined round mass with very thin wall, smooth margin and no internal echoes.



cortex of kidney  
thickness



displacement  
to Rt  
simple cyst (Benign)

# Polycystic kidneys disease

*Bilateral*

*multicystic kidney → unilateral*

*[ HTN, Hematuria, Hemorrhagic cyst ]*

■ Adult polycystic kidney disease is a congenital renal parenchymal disorder.

*↓  
Autosomal dominant*

■ Usually both kidneys are involved.

■ In some cases, there is associated cysts in the liver and more rarely in the spleen and pancreas.

*Family Hx. renal impairment & HTN*

*Multiple cyst*

*, unilateral → Multicystic*

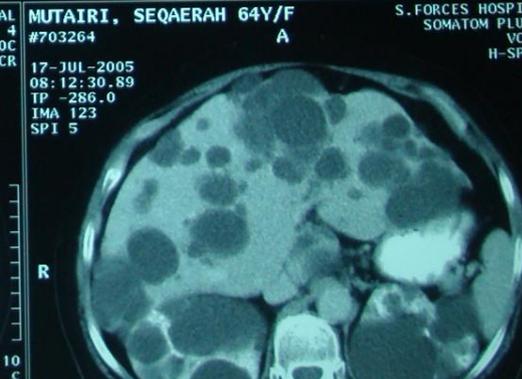
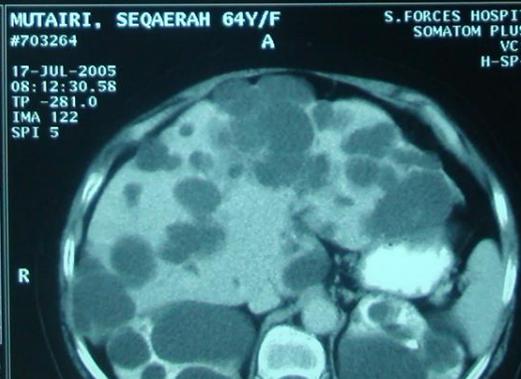
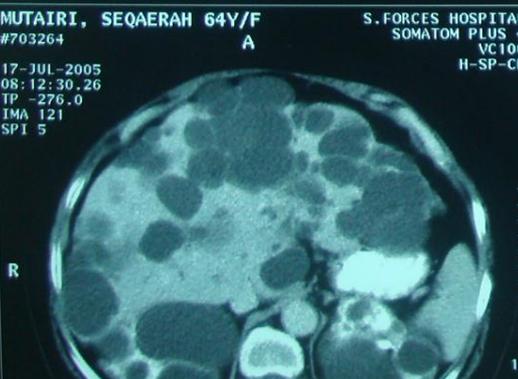
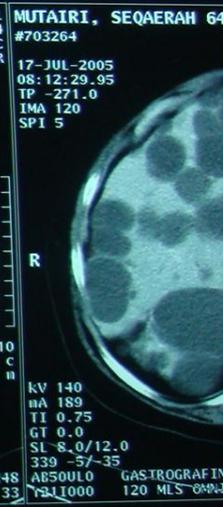
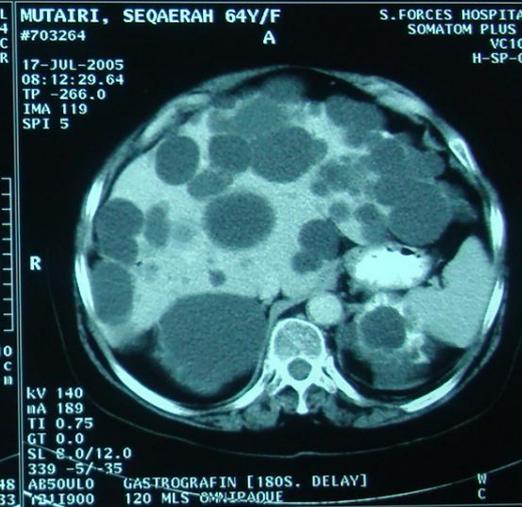
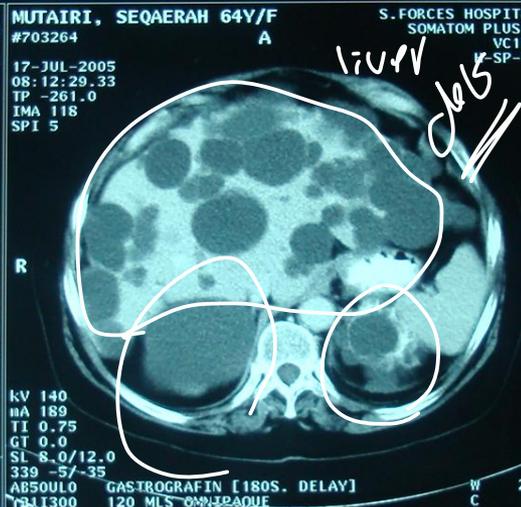
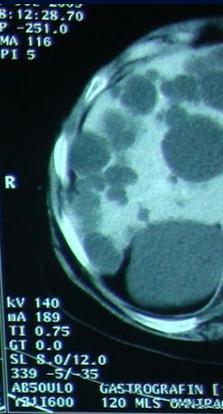
*bi → Poly*

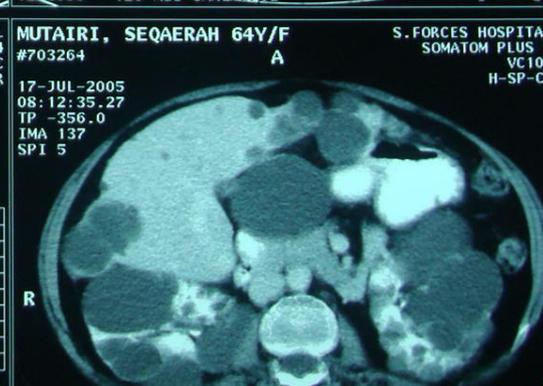
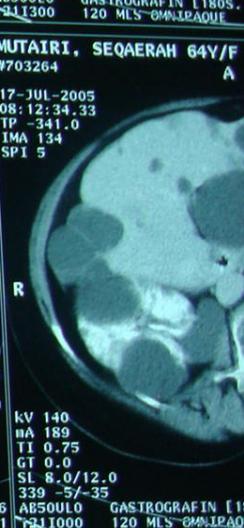
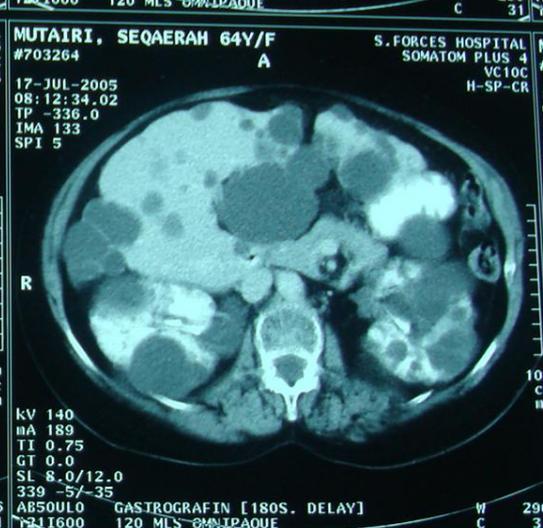
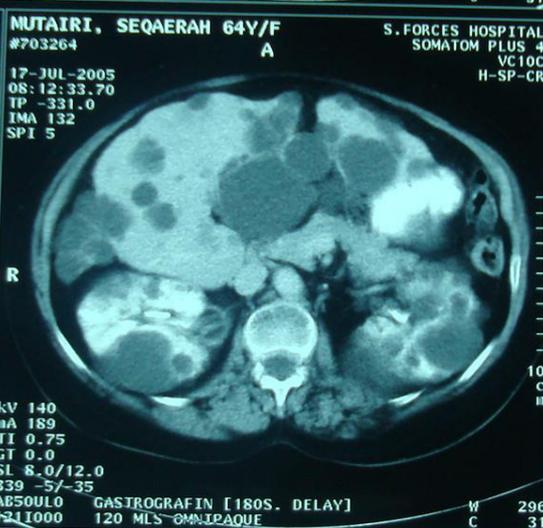
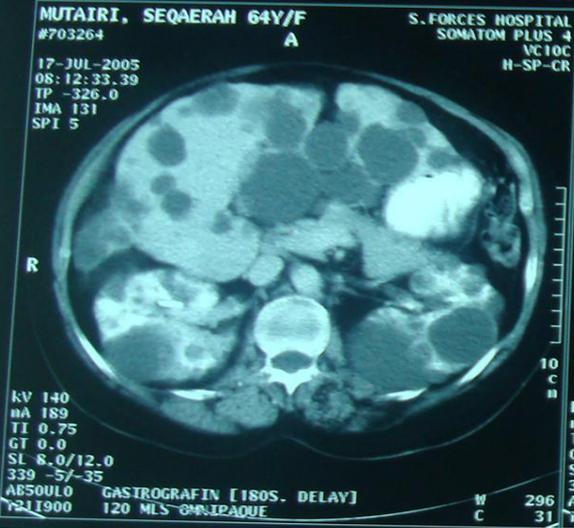
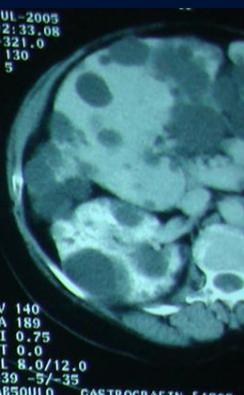
# Polycystic kidney disease / 2

renal failure

## Radiological features on Ultrasound and CT:

- Kidneys are enlarged with lobulated contours. *→ protruded outside kidney.*
- The renal parenchyma is replaced by multiple cysts of varying size, causing distortion of the collecting system.
- Spontaneous hemorrhage into some of the cysts may occur.





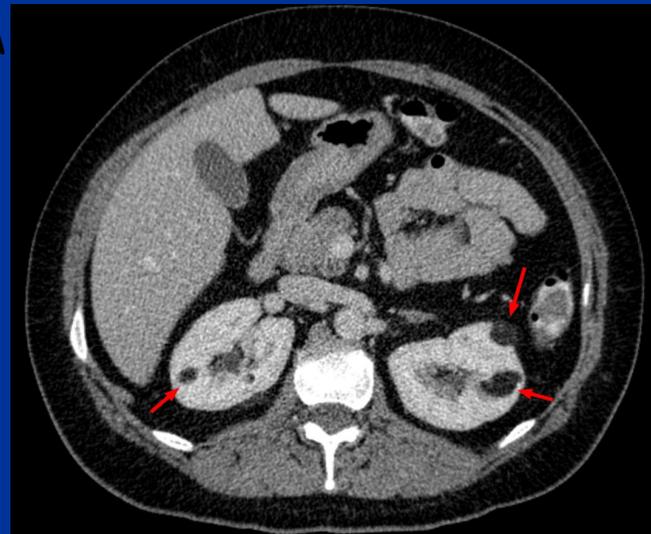
# Benign renal tumors

*⊗ hyperchoic lesions in X-ray*

The most common benign renal tumors are:

❑ Angiomyolipoma

❑ Adenoma

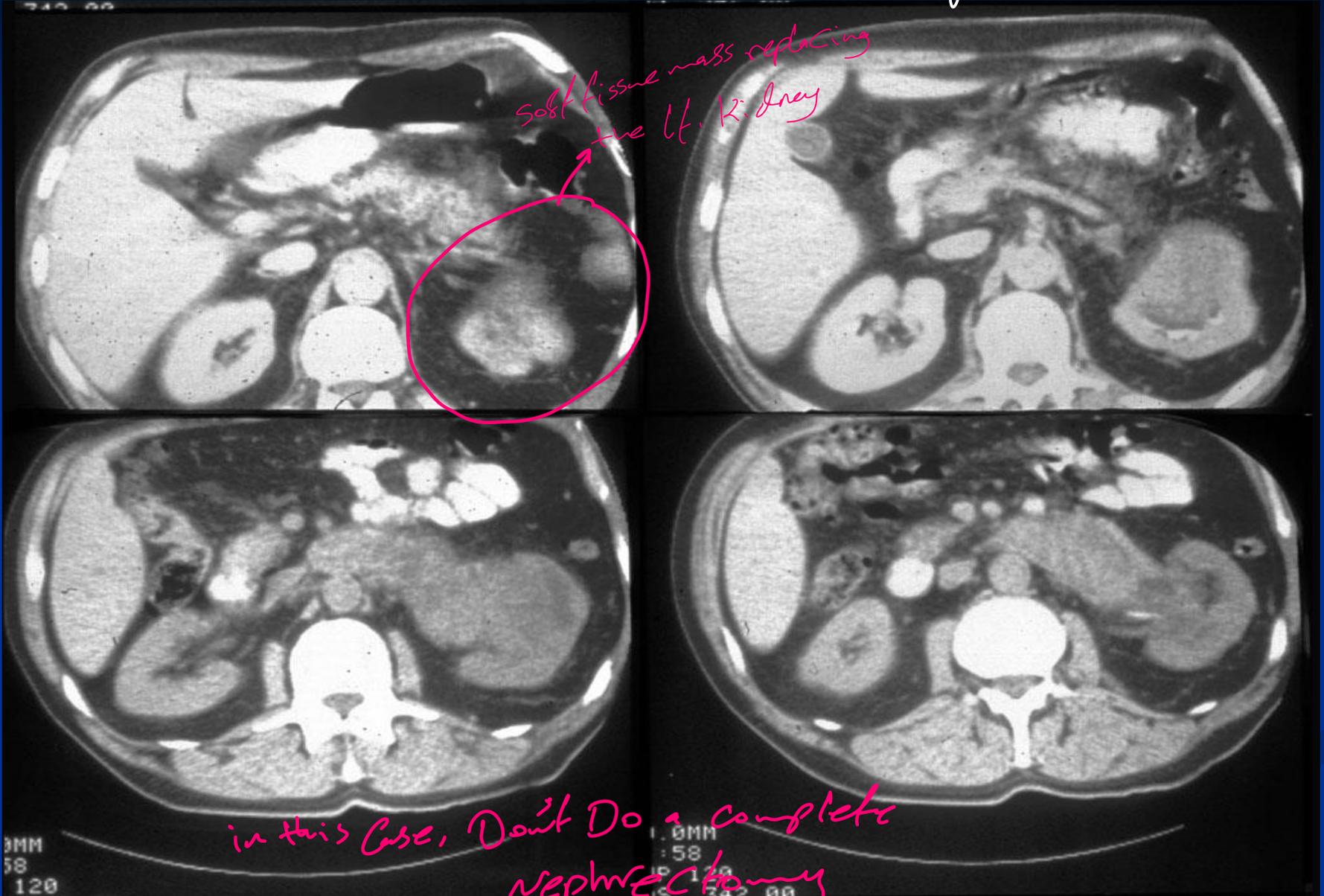


*⊗ misdiagnosed with (RCC)*

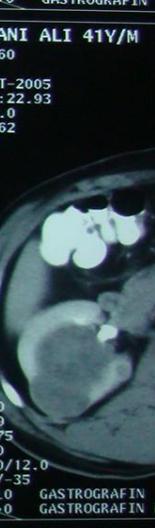
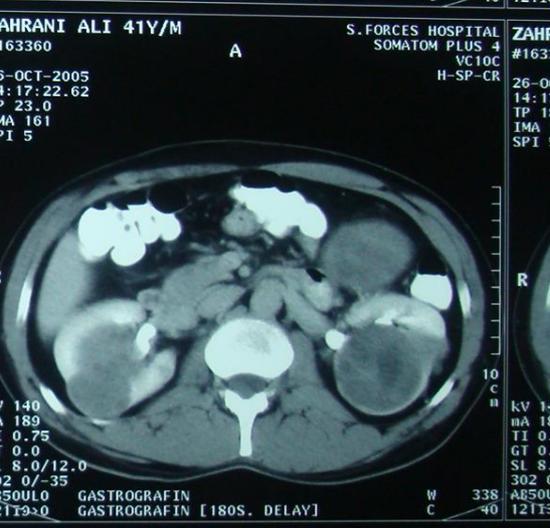
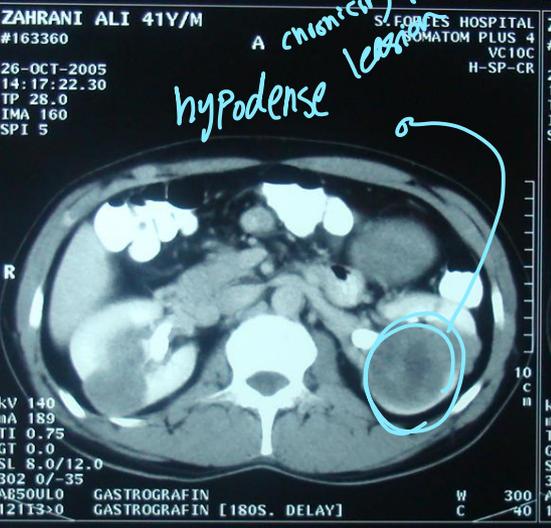
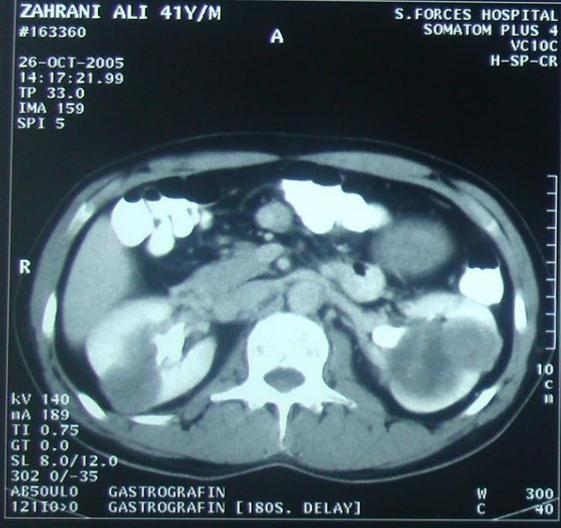
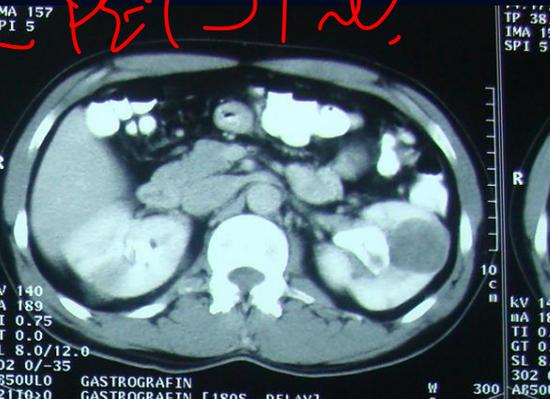
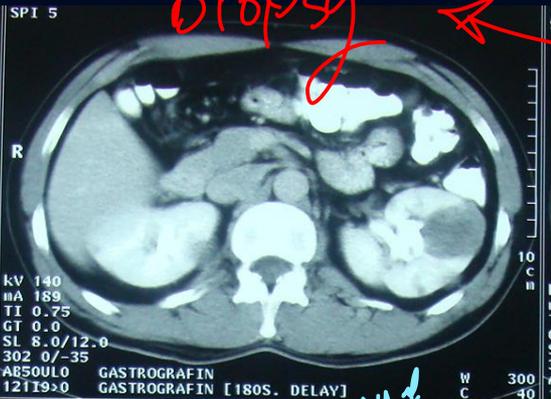
# Malignant renal tumors

- Renal cell carcinomas ( RCC ) or Hypernephroma: account for 85% of renal tumors.
- ❖ Are bilateral in 4% of cases.
- ❖ Von Hippel- Lindau disease is associated with RCC in one third to one half of patients.
- ❖ Patients with polycystic kidney disease and chronic renal failure may also be associated with RCC.
- Transitional cell carcinoma: are relatively rare and represent 7% of all renal tumors.

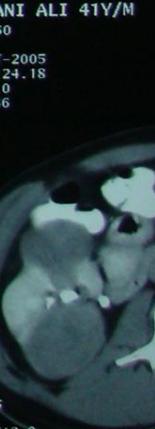
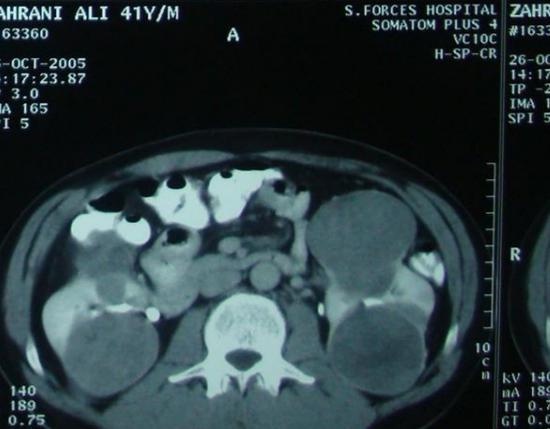
CT - without contrast enhancement ← hypervascularized



biopsy ← PET-CT



A chronicity of hypodense lesion



Multiple (2°) bilateral

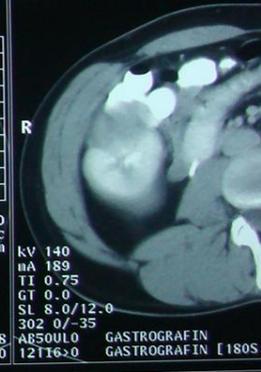


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SPI 5  
S.FORCES HOSPITAL  
SOMATOM PLUS 4  
VC10C  
H-SP-CR

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VC10C  
H-SP-CR

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VC10C  
H-SP-CR

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VC10C  
H-SP-CR



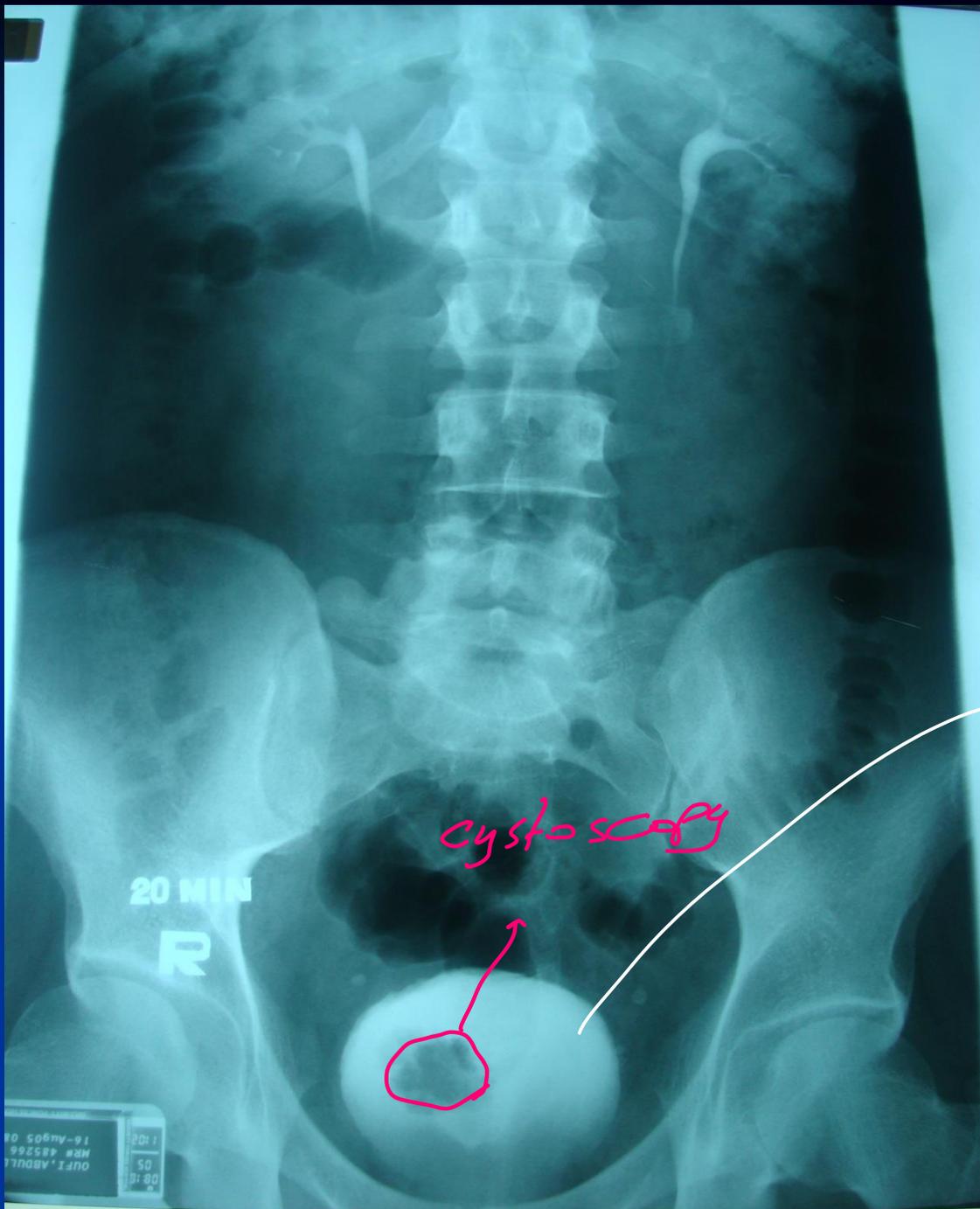
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VC10C  
H-SP-CR

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SPI 5  
S.FORCES HOSPITAL  
SOMATOM PLUS 4  
VC10C  
H-SP-CR

ZAHRANI ALI 41Y/M  
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TP -42.0  
IMA 175  
SPI 5  
S.FORCES HOSPITAL  
SOMATOM PLUS 4  
VC10C  
H-SP-CR





IVU

intra luminal,  
irregular  
filling defect  
(-umor)