Urinary system (Imaging)

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Nephrolithiasis

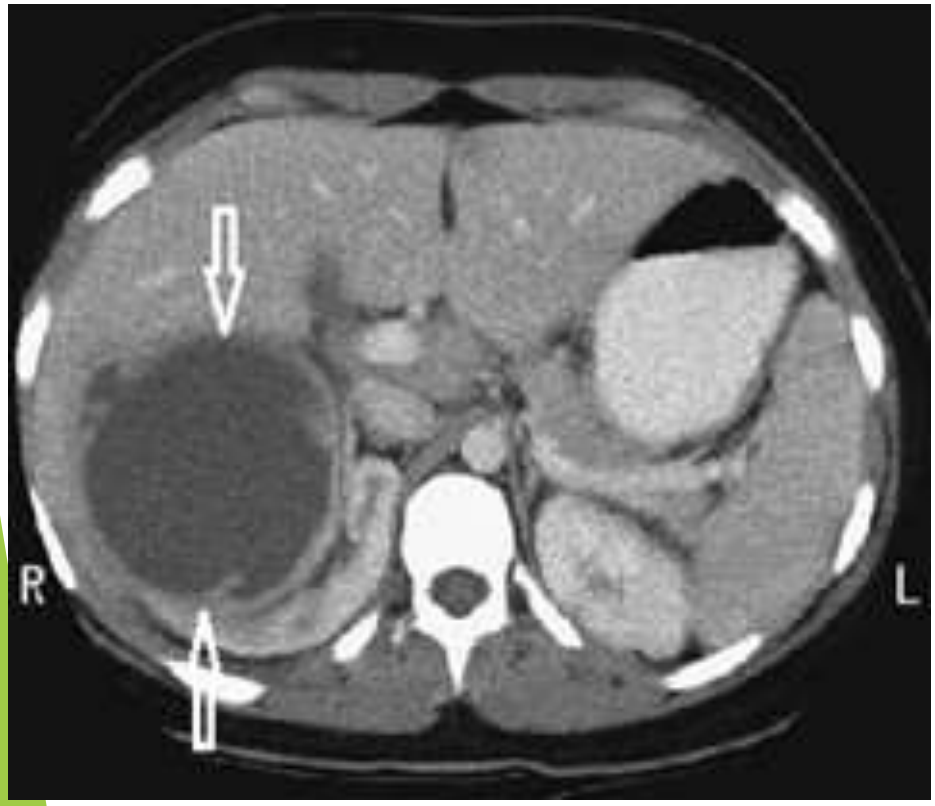
- Symptomatic/asymptomatic. Flank pain hematuria.
- Calcium phosphate stones are opaque on plane x-rays
- Uric acid and xanthine stones are radiolucent.
- All renal calculi have high attenuation(Opaque) on CT

  Sensitivity is 97% and specefity is 96%

  Can cause hydronephrosis, hydro ureter and renal enlargement

Kidney and ureteric stones

CT images of renal abscess with and with out contrast



Renal cystic diseases

Very common. 50% of patient over the age of 50
Associated with many syndromes
Asymptomatic
Rarely cause hematuria or become infected
Smooth thin wall, sharp demarcation from surrounding parenchyma.
Water attenuation on CT, non enhancing
Simple cyst are with out septation or calcification
Could be inherited like autosomal dominant or recessive

Simple cyst in kidney on u/s and CT

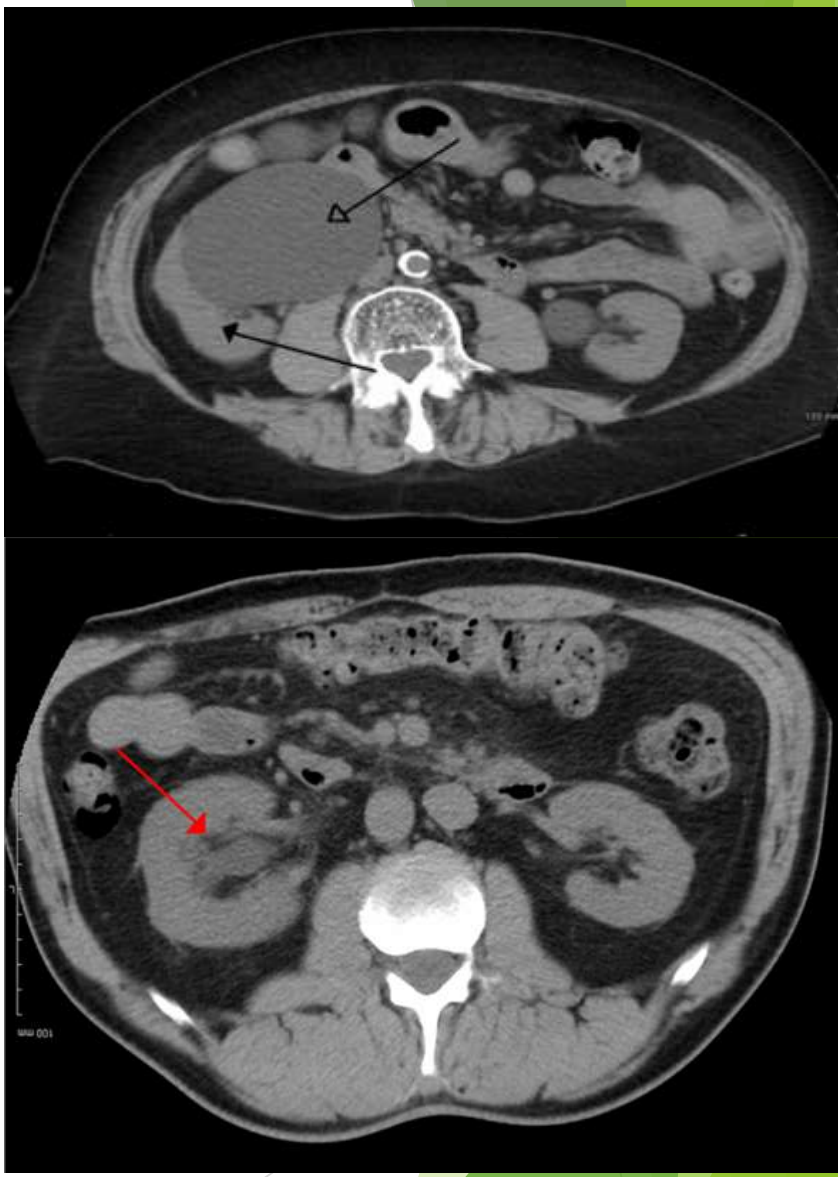
Hydronephrosis

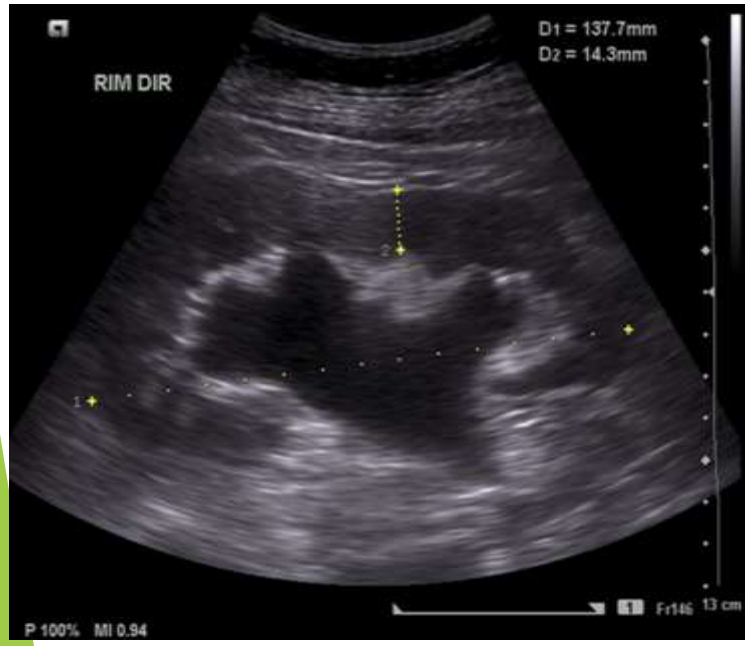
Distension and dilation of the renal pelvis and calyces.

It is usually caused by obstruction to the free flow of urine from the kidney.

If obstruction is at lower level, there is dilation of ureters and pelvis of kidney.

Untreated , initially it cause enlargement of kidney, but finally it leads to atrophy.





IVP

Introduction

- IVP has long been cornerstone of imaging evaluation of urinary tract disease
- Global , important in diagnosis of KUB disease
- Evaluation in hematuria , stone disease , post therapeutic evaluation of stone
- Good technique , understanding limitation , basic rule of interpretation
- Relate with other imaging modality U/S , CT , MRI

Contrast material

- Excrete by glomerular filtration
- Concentration in the postglomerular nephron

  and progressive opacification

  Of the urinary tract

Standard procedure for IVP

- Scout film (technique 65-75 kVp , level)
- **Nephrotomogram** (1-3 min film)
- 5 min KUB film
- Abdominal compression

- **Pyelographic** image (10 min film)
- **Ureter-bladder** image

(release compression , 15 min film ,

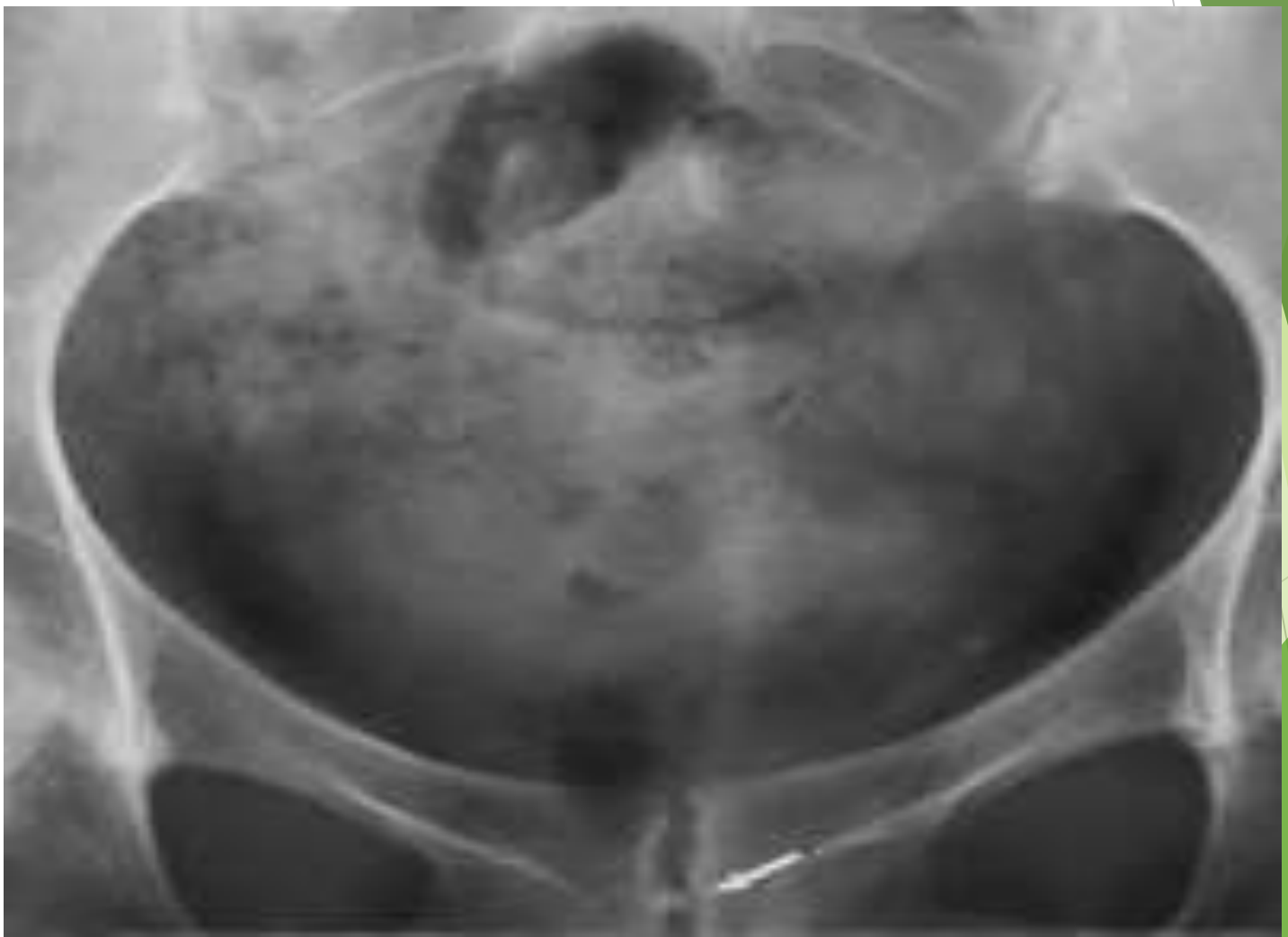
supine , prone , oblique , upright)

- **Bladder** image (delay , oblique , post void)

Middle ureteric

Lower ureteric calculi

Plain film , cover symphysis pubis: urethral calculus



Plain film : left flank pain ,
Sriated gas within renal parenchyma , perirenal ,
RP , URGENT INTERVENTION

Emphysematous pyelonephritis

IVP normal size kidney

Abdominal compression

- Optimal evaluation of ureter and pelvicalyceal system , distension of collecting system
- Contraindication;

*Presence of obstruction

*Abdominal aortic aneurysm

*Abdominal mass

*Recent abdominal surgery

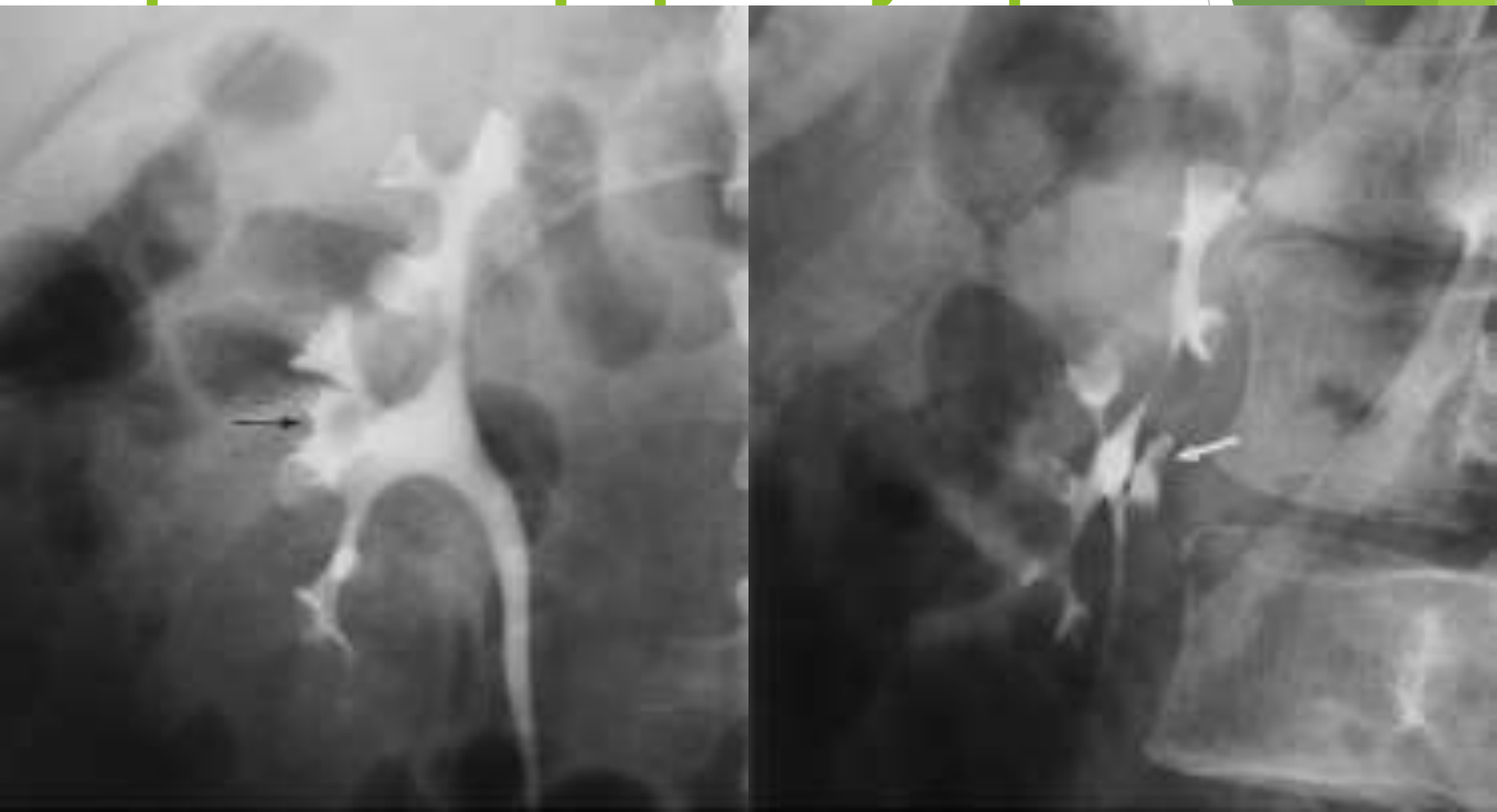
*Severe abdominal pain

*Suspected of urinary tract trauma

*Urinary diversion or renal transplant

Value of abdominal compression

Value of oblique film , posterior papillary tip

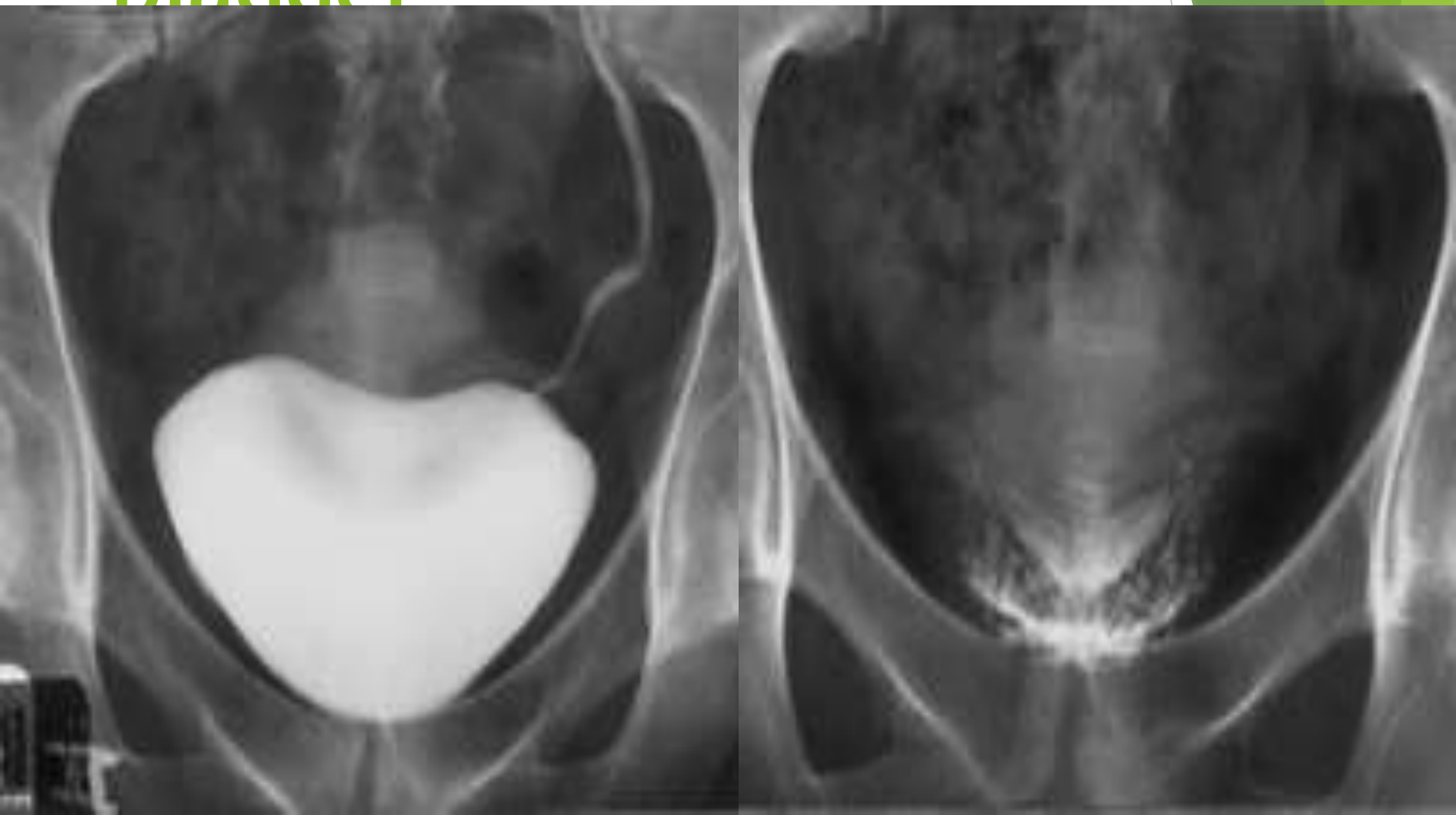


Value of fluoroscopy , demonstrate entire ureter

Bladder image

- Distend and opacity , oblique image , evaluate bladder disease
- Post void image may be useful for evaluate filling defect

Collapse urinary bladder



Urographic interpretation

- **Nephrotomographic phase;**

  Evaluate renal parenchyma , smooth contour, renal size (9-13 cm)

- **Pyelographic and ureteric image;**

  Evaluate renal collecting system

- **Bladder image ;**

  Early , delay , post void film assess bladder pathology

Renal size

- Related with age
- 9-13 cm in length (cephalocaudal)
- Kidney slightly larger in men than women
- LK >RK 0.5 cm
- Significant discrepancies

RK >1.5 cm larger than LK

LK >2 cm larger than RK

Polycystic kidney disease
LK enlarge
Swiss cheese nephrogram

Renal contour abnormality

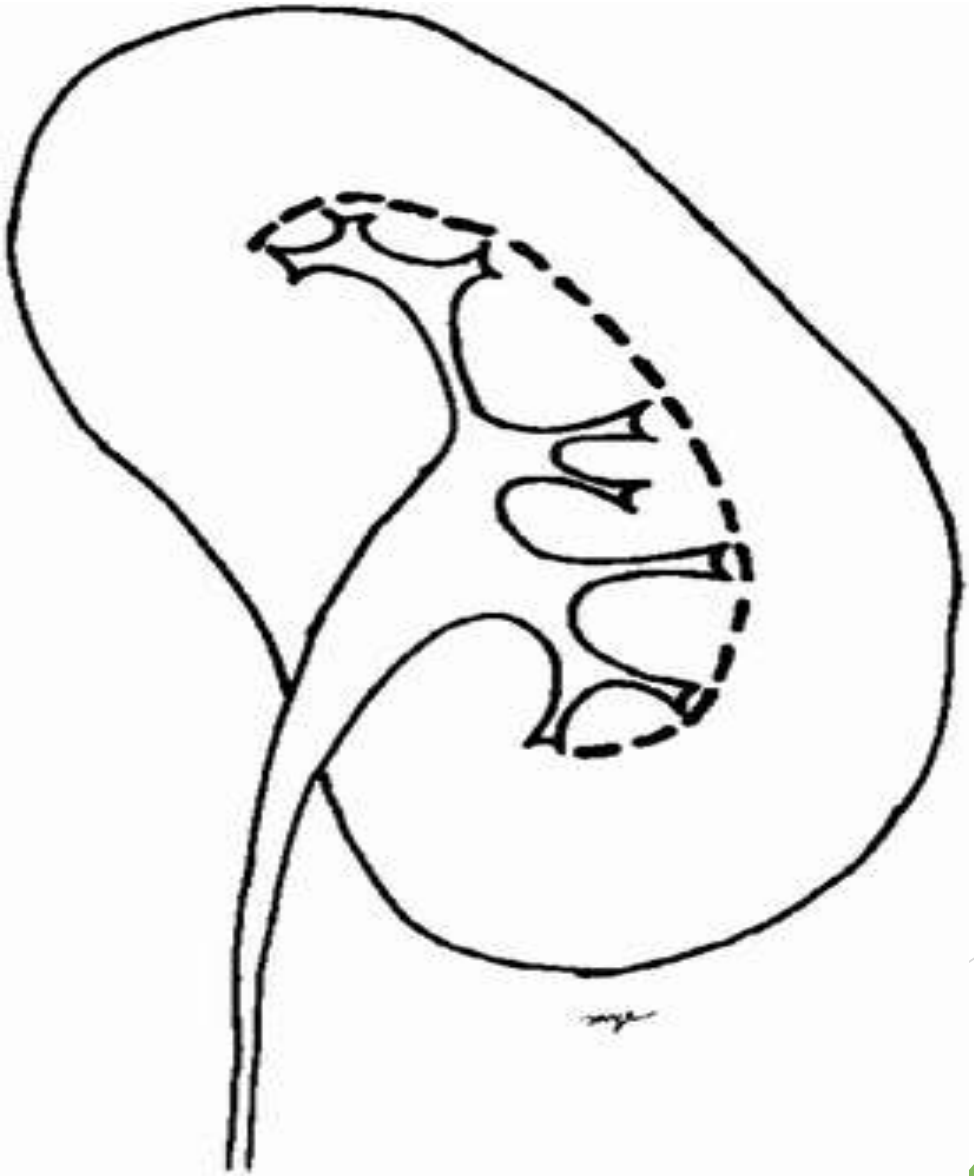
- Contour abnormality associate with change in parenchymal thickness (**interpapillary line**) interprete underlying collecting system

- **Parenchymal thickness :**

  average 3-3.5 cm polar region

  2-2.5 cm interpolar region

Normal interpapillary line



Parenchymal thickness

- Indentation or increase thickness :
  * *Congenital anatomic variation*
  * *Predictable location*
- Increase parenchymal thickness , calyceal distortion : * *Mass*
- Decrease parenchymal thickness , calyceal changes : * *Post inflammation*
  * *Stone-relate scar*
- Parenchymal loss , without calyceal distortion:
  * *Renal infarction*

Indentation , cortical hump

Nephrotomographic image

- Require adequate
  * Renal blood flow
  * Normal parenchymal excretory function
  * Normal venous outflow

10 min film : persist nephrogram small size RK hypotension , CM reaction

Christmas tree bladder.