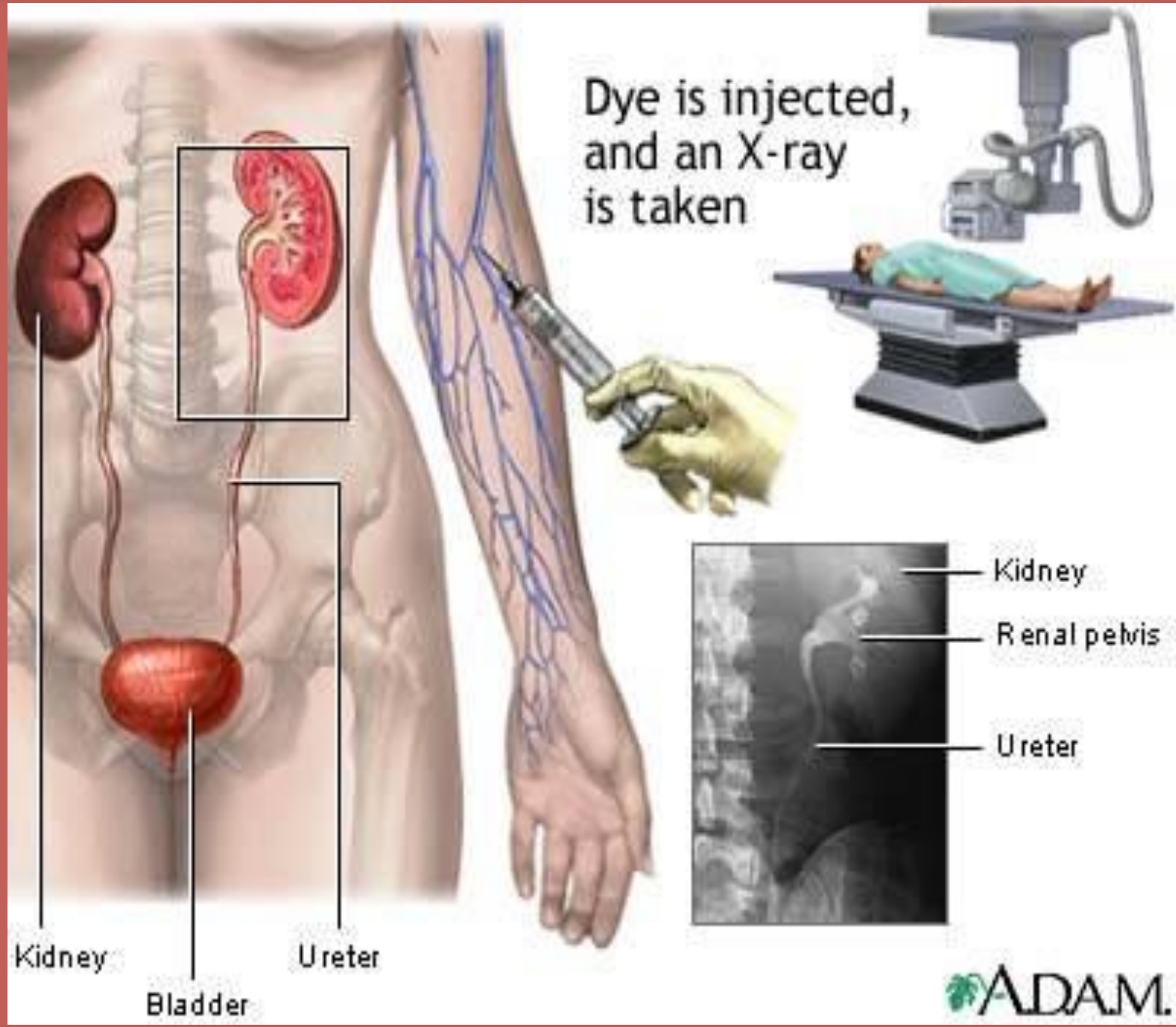


**IVU**

**((INTRAVENOUSUROGRAM))**





Dye is injected,  
and an X-ray  
is taken

Kidney  
Bladder  
Ureter

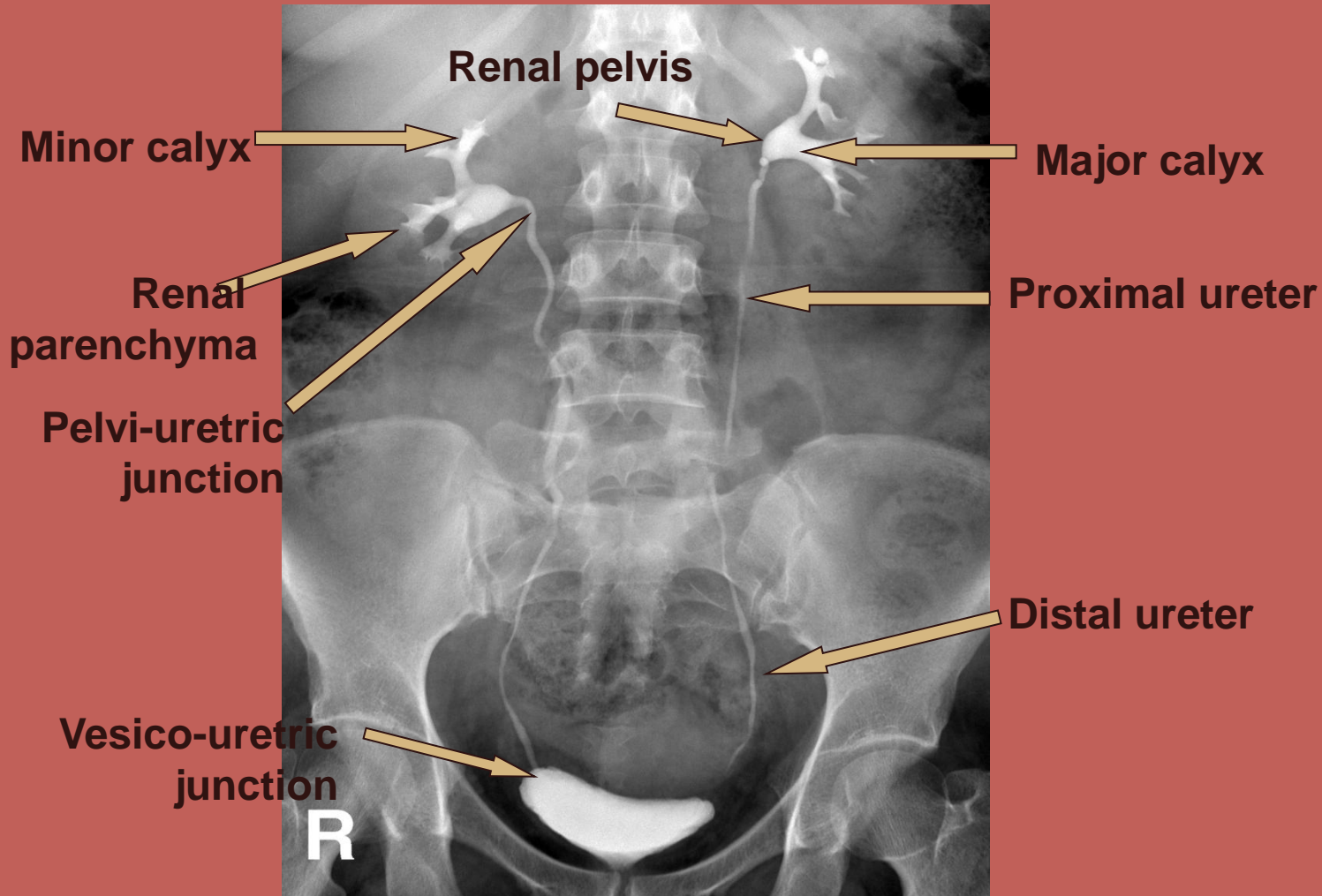
Kidney  
Renal pelvis  
Ureter



# Anatomy

The urinary system consists of :

2 kidneys, 2 ureters, 1 bladder , 1 urethra



**CONTRAST MEDIA:** Is a pharmaceutical given to the patient to enhance the original organ or tissue, e.g. **kidneys, ureters, bladder.**

There are two types of contrast media : positive contrast & negative contrast

1- **positive contrast** → with ↑ atomic number ( $Z$ ), e.g. barium sulphate and iodine compounds

2- **negative contrast** → with ↓ atomic number ( $Z$ ), e.g. air, oxygen & carbondioxide.

### **Administration of contrast media:**

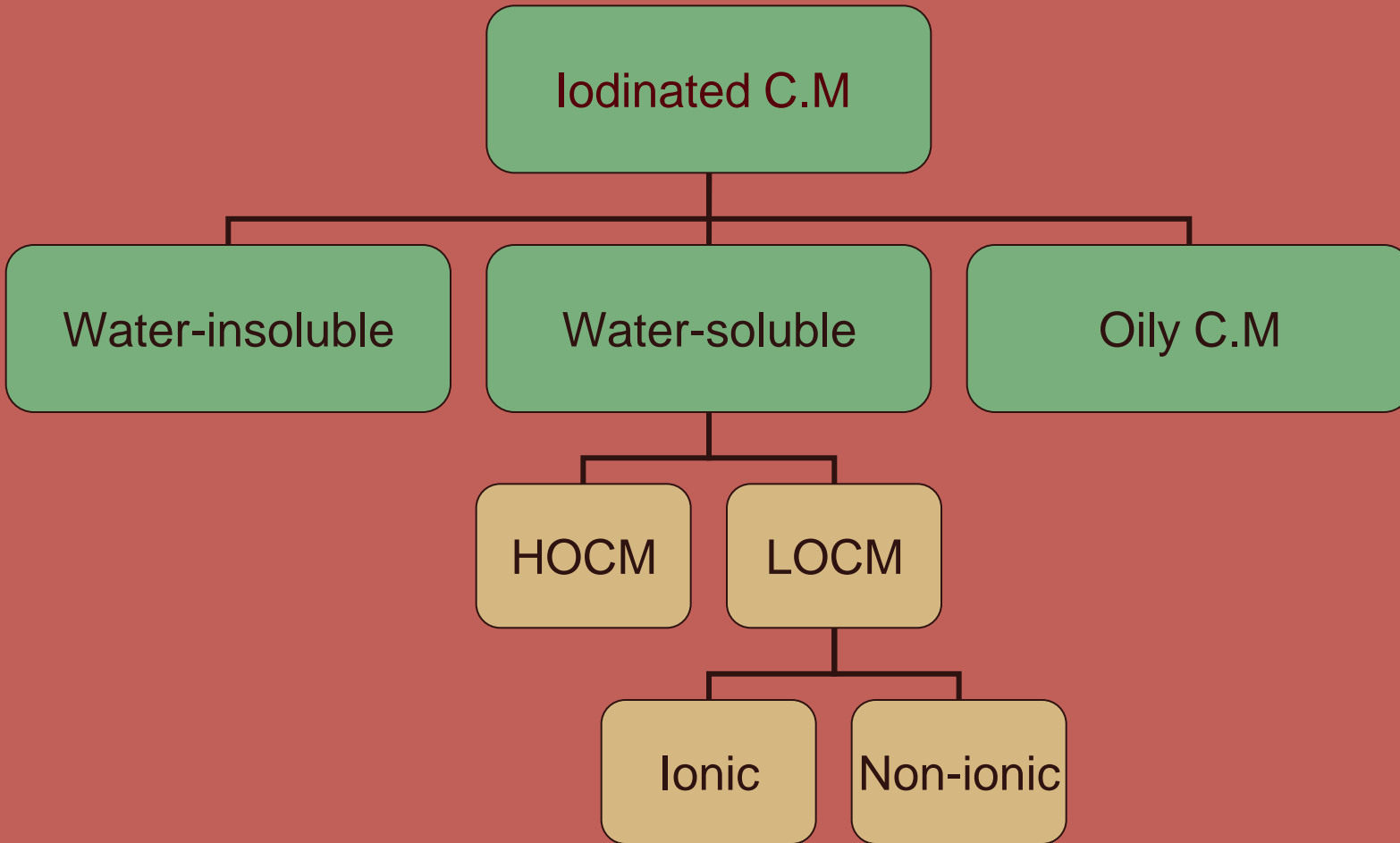
1-injected intravascularly as in IVU exam.

2-ingested as in barium meal examinations

3-injected into the (CSF) cerebrospinal fluid.



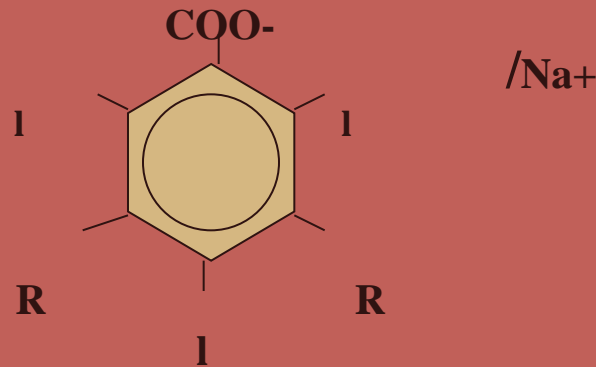
# Iodinated Contrast Media



## 1- (HOCM) :

high osmolar contrast media : osmolality is 4-7 times that of human blood. This HOCM consists of a benzene ring with 3 iodine atoms and a positive cation (usually sodium or meglumin) and a negative anion (usually carboxyl group). Once injected into the plasma the cation dissociates from the compound creating two separate ions in the blood ,these free ions cause an imbalance in homeostasis and an increase in plasma osmolality .This increase in osmolality causes the body to have a reaction.

Monomer

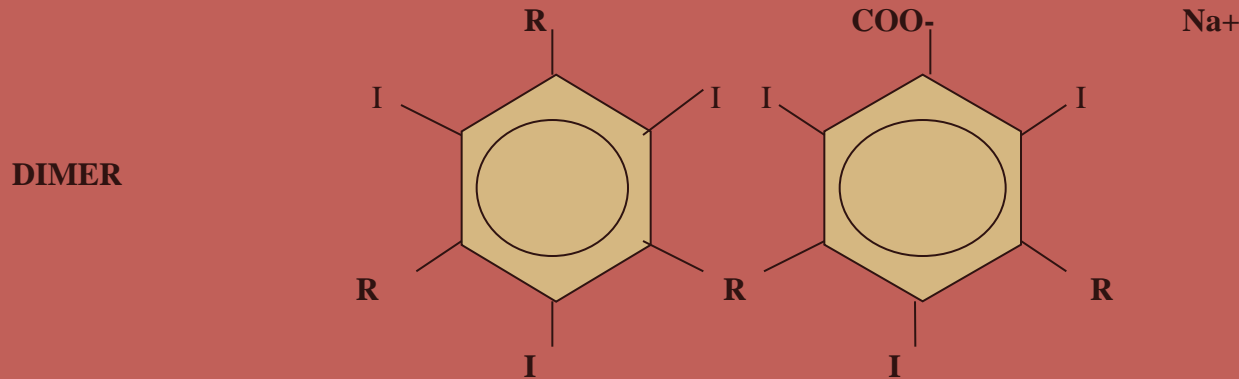


so by reducing the number of free cations which do not contribute to the diagnostic image and are responsible for 50% of reactions , it was possible to ↓the toxicity of the contrast .

## 2-(LOCM) :

low osmolar contrast media: osmolality is 1/3 of HO CM.

By adding another benzene ring with an organic side chain , they were able to increase the iodine concentration with less number of cations Ratio=6/1 and this will reduce the body reaction ,but still cause some reaction (ionic)



Then they were able to modify the contrast even further by eliminating the cation and replacing the (coo-) with an amide or glucose (non-dissociated group) so when injected into the blood the C.M does not dissociate into two separate ions but remains intact (nonionic) .

e.g LOCM Niopam ,Omnipaque ,Isovist ,Ultravist ,Hexabrix . They are all Low osmolar non-ionic contrast media except for Hexabrix it is Low osolar ionic contrast media

### WHEN SHOULD WE USE (LOCM)?

- 1-infants & small children
- 2-pt with renal and /or cardiac failure
- 3-poorly hydrated pt
- 4-pt with diabetes and sickle-cell anemia
- 5-pt who have had previous reactions to CM or have a strong allergic history.

# Adverse Reactions to C.M:

## CONTRAST REACTIONS



```
graph TD; A[CONTRAST REACTIONS] --> B[MILD]; A --> C[MODERATE]; A --> D[SEVER];
```

### MILD

No need for medication  
Just reassure the pt  
e.g. flushing, urticaria  
nausia, vomiting, pruritis

### MODERATE

Needs medication  
& observation  
e.g. facial oedema,  
Bronchospasm  
hypotension

### SEVER

Needs immediate  
response or CPR  
e.g. convulsions.  
cardiac arrest



## **IN CASE OF REACTION TO C.M :**

**Adrenaline ,Aminophylline ,Atropine,Hydrocortisone  
,Lignocaine,Antihistamine, Dopamine**

## **CONTRAST DOSE :**

**adults : 1ml per kg - minimum dose is 50 ml**

**paediatrics :2 ml per kg**

**Neonates :4ml per kg**

## **PT PREPARATION :**

**-Creatinine levels : ↑ levels of creatinine indicates renal disease.(can not do the exam )**

**- If the pt have any allergy to egg or bannana ,or have any history of asthma (need special praparation )**

**Preparation for allergic pt :prednisone tablet 2x25mg twice a day , one day before the exam and the day of the exam .**

**Then 2x5mg twice a day for the 2 days after the exam.**

**Then 5mg one tablet twice a day then stop.**

**- pt should be NPO for 8 hours. and the last meal should be at 7:30 without any dairy products.**



- instruct the pt to take 60 mg of castor oil the night before the Exam around 8 :30 pm.
- In case of female pt do a pregnancy test or use the 10 days rule.
- cleansing enema before the exam to reduce bowel gas.
- pt must micturate immediately before the examination and wear the hospital gown.
- Consent must be signed .
- take the pt weight (to determ C.M dose)
- after that the nurse will make the IV line for the patient

## EXPOUSER FACTOR:

KV	mAS	FFD (SID)
65 -80	50-100	100-115



# Procedure of the exam:

**1-Preliminary film,(scout film),  
(control film):**

## **patient position**

patient supine, with pillow for head ,

arms at side away from body,  
support under knees

full length AP(KUB) of the  
abdomen , it should include the  
symphysis pubis.

## **Center point**

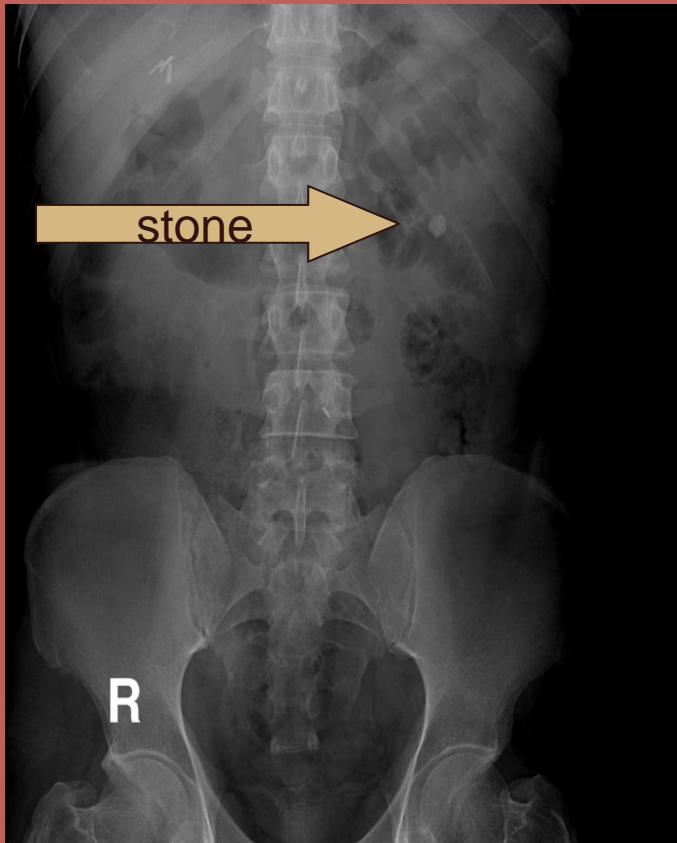
to level of iliac crest

## **the control film is taken to:**

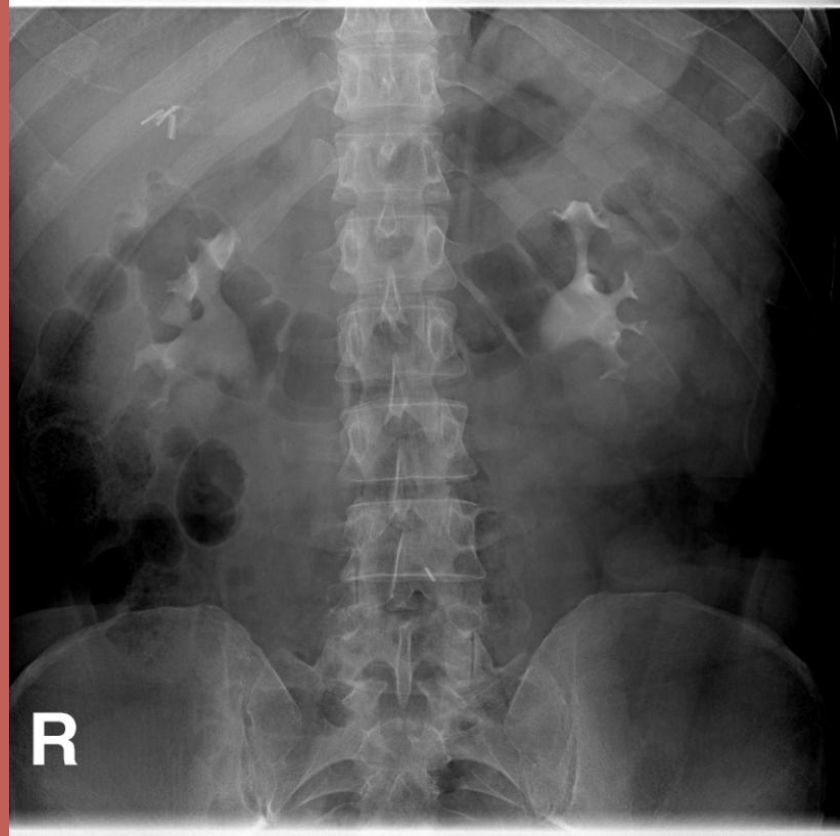
- a)verify pt position.
- b)verify exposure factors.
- c)check pt preparation .
- d) rule out any calcifications  
or stones.



## Calcification appearing better in plain film



plain film



5 Min film



the scout film should be shown to the radiologist before injection of C.M and if the patient has a catheter it should clamp before injection

then we can start inject C.M and the exact starting time should be noted

## **2.Nephrogram(immediate film)**

Is taken immediately after completion of injection

AP supine of the kidney area (the sam position)

### **Center point**

Midway between xiphoid tip and iliac crest

### **this film is taken to:**

Capture the early stages of the C.M entering the collecting system and to reveal any difference in function between the two kidneys.



# Immediate (kidney area)



## **3-5 MIN FILM :**

### **patient position**

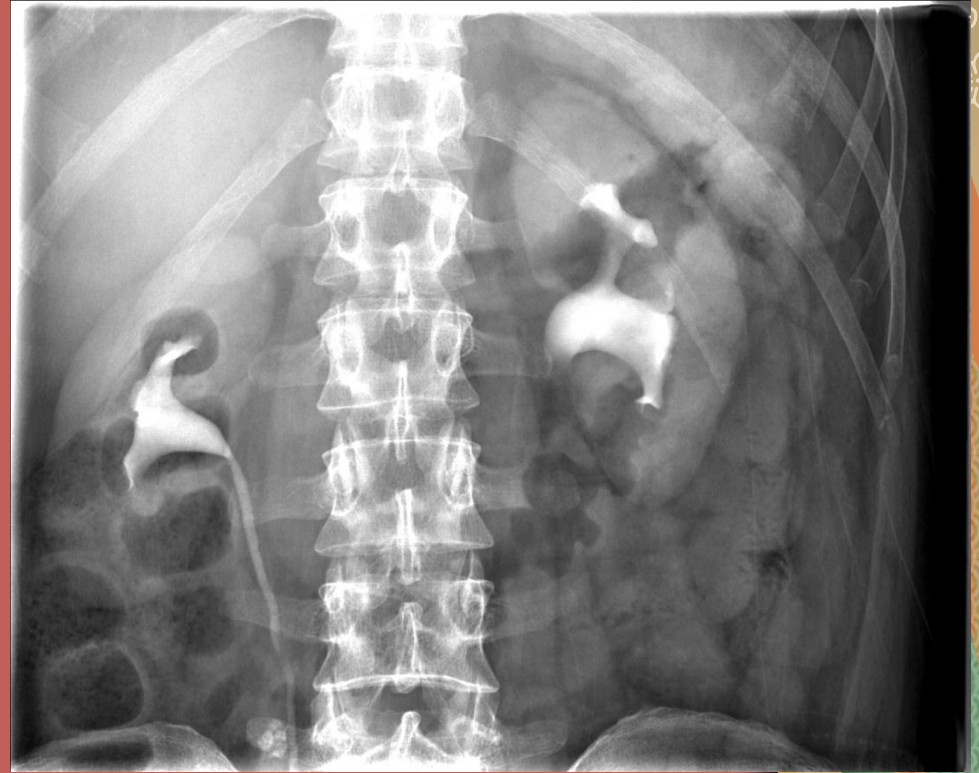
AP supine of the kidney area  
(the same position)

### **Center point**

Midway between xiphoid tip  
and iliac crest

### **This film is taken to**

reveal any difference in  
function or excretion between the two kidneys.



## 4-10 OR 15 MIN FILM

### patient position

patient supine, with pillow for head ,

arms at side away from body,  
support under knees

full length AP(KUB) of the  
abdomen , it should include

the symphysis pubis.

### Center point

to level of iliac crest





## 5-FULL BLADDER FILM

### patient position

It is AP supine of the bladder area, coned view of the bladder (same position of KUB).

### Center point

5 cm superior to symphysis pubis with 10 ° to 15 ° cauded

### This film is taken to

show if there are any abnormalities in the bladder.

If the pt is not full bladder you may ask him/her to wait in the waiting area until he/she is full then take the full bladder film.



**If this film is satisfactory ,the pt is asked to empty his/her bladder.**

## **6-POST VOID FILM**

### **Patient position**

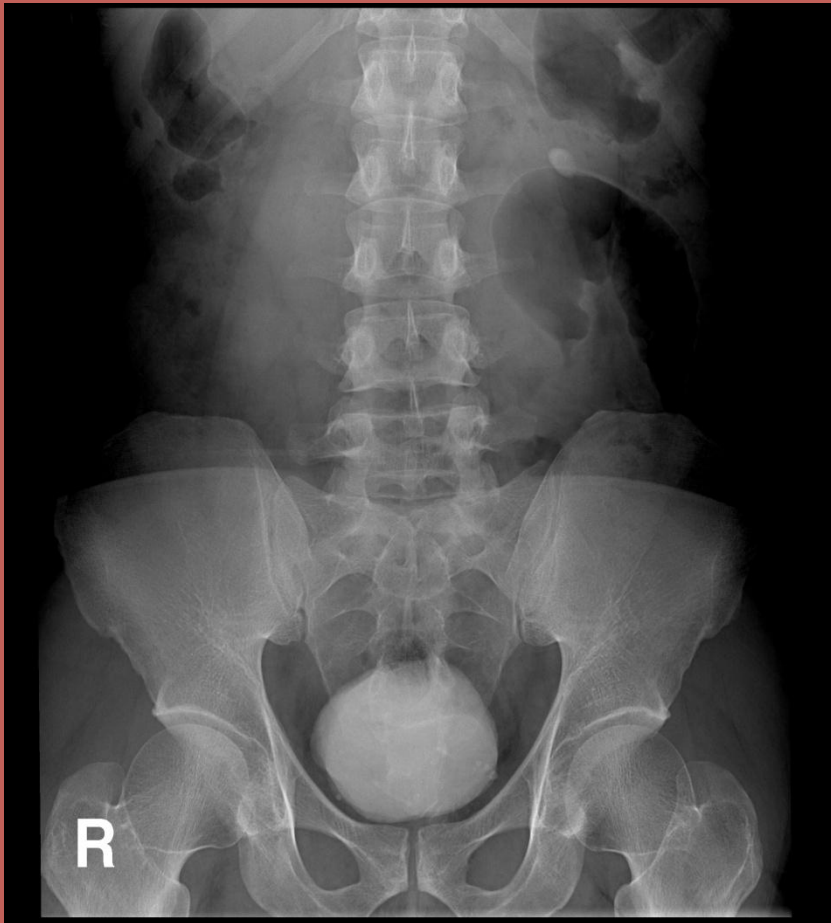
Based on the clinical findings & the radiological findings on the earlier films , this will be either a full-length KUB abdominal film or a coned view of the bladder area with the tube angled 15 ° caudad.

### **This film is taken to**

assess bladder emptying , to demonstrate a return to normal dilated upper tract after the relief of bladder pressure ,to aid in diagnosis of bladder tumours or diverticulms,to confirm vesicouretric calculi, to R/O reflux



# Post void film



## **Additional Film**

### **1-20 minute obliques**

#### **Patient position**

Rotate the body into a 30 ° posterior oblique for both R and L oblique position ,flex elevated side knee ,raise arm on elevated side

#### **Center point**

Level of iliac crest

#### **This film is taken to**

Provid a different perspective of the kidneys and project the ureters away from the spine



## 2- COMPRESSION FILM

### PATIENT POSITION

AP supine of the kidney area,

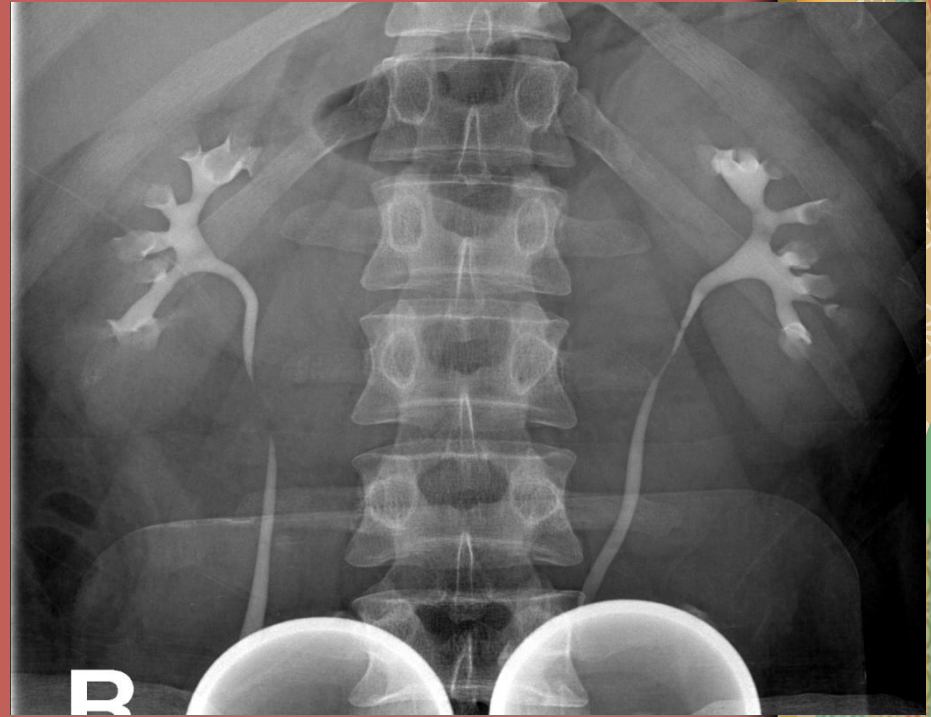
A compression band is now applied and the balloon is positioned midway between the A.S.I.S. ( over the ureters as they cross the pelvic brim).

### Center point

Midway between xiphoid and iliac crest

### This film is taken to

to enhance the filling of the pelvi-calyceal system and upper ureters .



If satisfactory demonstration of the pelvicalyceal system has been achieved , compression is released.

## 4-RELEASE FILM

### PATIENT POSITION

It is a full length AP supine film taken to show the whole urinary tract

**Compression is contraindicated in the following cases :**

- a) after abdominal trauma .
- b) after recent abdominal surgery
- c) abdominal mass.
- d) uretric stone .



- e) infants and small children .
- f) severe abdominal pain .

### **5-PRONE VIEW**

it may provide better visualization of the ureters by making them more dependent.

### **6-DELAYED FILMS**

in cases of obstruction delayed films may be necessary for up to 24h.

### **THINGS TO REMEMBER**

- 1-DON'T FORGET TO PUT THE MARKER BEFORE EXPOSURE .
- 2-MAKE SURE YOU HAVE THE CORRECT (SID) BEFORE EXPOSURE.
- 3-ALWAYS PAY ATTENTION TO THE TIME OF INJECTION , AND MAKE SURE THAT THE EXPOSURE IS DONE AT THE CORRECT TIME IT SHOULD BE DONE.
- 4-IF THE PATIENT IS FEMALE ALWAYS MAKE SURE SHE IS NOT PREGNANT!



# Abnormal Cases

## Horseshoe kidney





## Transitional cell carcinoma.



image shows multiple filling defects in the left renal pelvis and ureter. This finding is typical of lesions that grow slowly into the lumen of the ureter. Multifocal transitional cell carcinoma was confirmed in this case



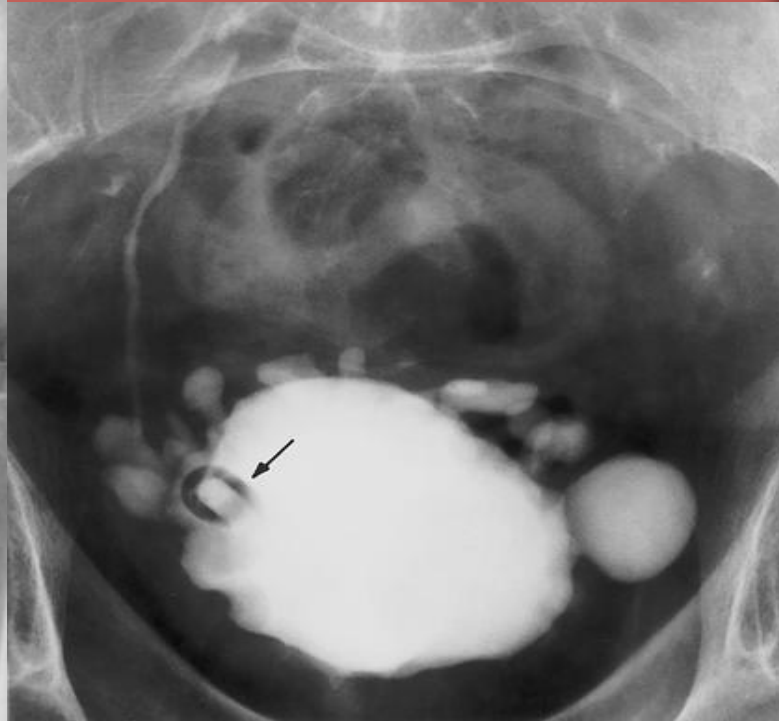
# Bladder transitional cell carcinoma.



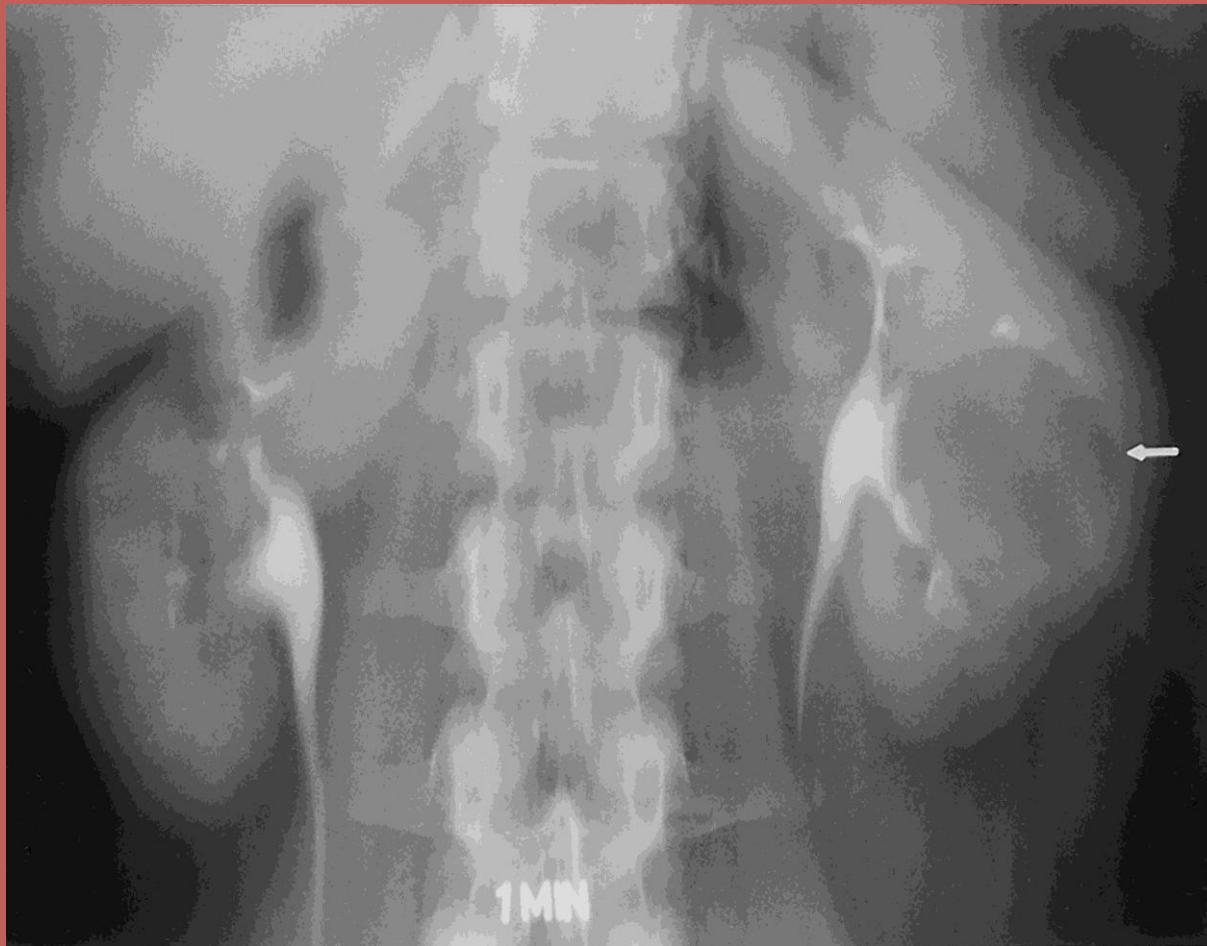
## Urethral diverticulum



## Bladder diverticulum



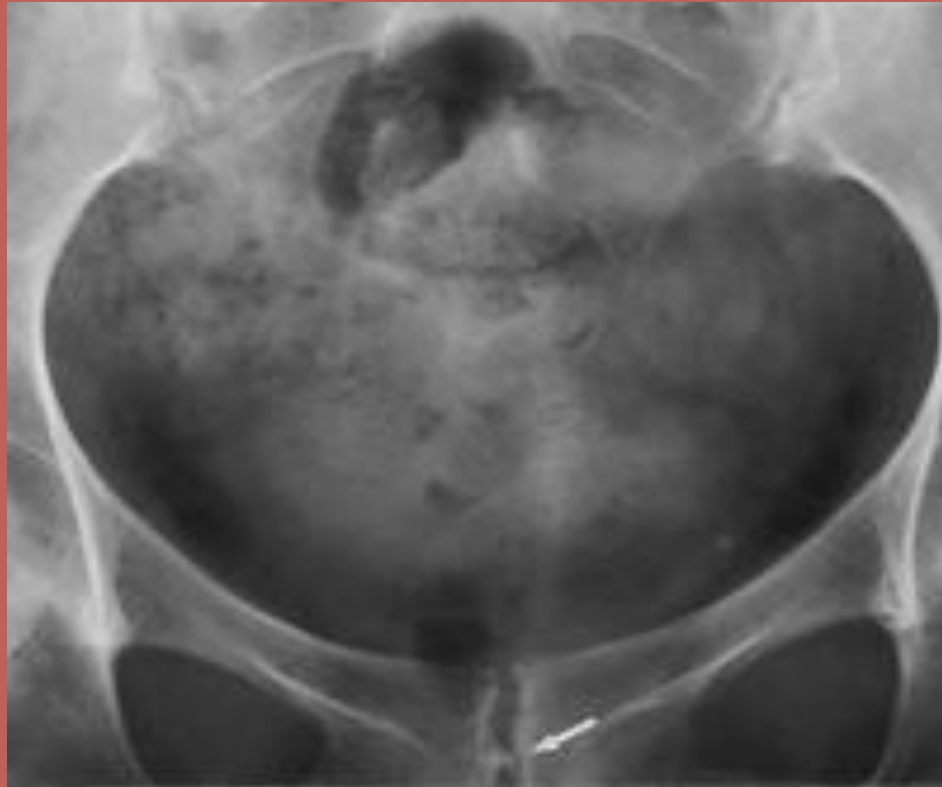
# Renal cyst



## Duplicate collecting system



# Urethral calculus



# hydronephrosis kidney



# REPORT

What type of C.M used for adult and pediatric in KKUH ? What the different between them ? Why there is different?





# Case study:

- Pt history.
- Symptoms and signs .
- Pt preparation.
- Procedure + technique .
- Images taken .
- Additional images and why.
- Show anatomy and pathology in images
- Talk briefly about pts disease.

