The Urinary System

Intravenous Urography

Indications:
Suspected urinary tract pathology e.g. SOL, renal stones, TB kidneys, etc.

Contraindications:
1. Renal failure (resulting volume depletion, electrolyte imbalance and deterioration)
2. Myeloma (precipitation of Bence Jones protein in the renal tubules)

CM:
1. Non-ionic is preferred e.g. Omnipaque
2. Ionic e.g. Conray

Patient preparation:
- ✓ Steroid cover is given if
  - Asthma
  - Allergic to drugs
  - Allergic to contrast medium
  - Severe reactions to seafood and alcohol
- ✓ Consent obtained prior to the examination
- ✓ Nil by mouth for 6 hours prior to the examination
- ✓ Empty the bladder before starting the examination

Protocol for steroid cover:
2 doses of Prednisolone 12 hours and 2 hours prior to the examination

Preliminary film:
KUB; obliques of renal area if opacities seen

Technique and films:
1. 0-minute film
   - AP of renal areas.
   - It is taken when a bolus of contrast is injected IVly and rapidly.
   - To show the nephrogram(the renal parenchyma opacified by contrast in the renal tubules).

2. 5-minute film
   - AP of the renal areas.
   - To determine if excretion is symmetrical and is invaluable for assessing the need to

modified technique.

- A compression band is applied just after the exposure is made. The balloon is positioned midway between the ASIS, i.e. precisely over the ureters as they cross the pelvic brim. This aims to produce better pelvicalyceal distention.

  Compression is contraindicated:

  - After renal abdominal surgery
  - After renal trauma
  - Infants
  - If there is a large abdominal mass

3. 10-minute film
   - AP of the renal areas.
   - To demonstrate the pelvicalyceal system.

   - Optional obliques films.
   - Optional tomographic films (when there are confusing over-lying shadows).

4. Release film
   - Supine KUB.
   - When 10-minute film is checked, the compression band is released.
   - To show the whole urinary tract.
   - The patient is asked not to go to the toilet until it is told to do so.

   - Optional prone KUB (better visualisation of the ureters).

5. Full bladder film
   - Bladder view.
   - To show the urinary bladder.

6. Post-micturition film
   - The patient is asked to empty his bladder before taking the film.
   - To assess bladder emptying.
   - To demonstrate a return to normal of dilated upper tracts with relief of bladder pressure, to aid the diagnosis of bladder tumours and uncommonly to demonstrate a urethral diverticulum in females.

7. Delay films
   - In case of obstructive uropathy 閉塞性尿路病.

Retrograde Pyeloureterography (RP)

Indications:

- Demonstration of the pelvicalyceal system after an unsatisfactory IVU.
- Demonstration of the site, length, lower limit, and the nature of obstructive lesion.

Contraindication:

Acute urinary tract infection.

CM:

Non-ionic with dilution.

Patient preparation:

As for surgery.

Preliminary film:

KUB (to show the position of the ureteral catheter)

Technique:

- CM is slowly injected through the ureteral catheter under fluoroscopic control.
- Spot films are taken (renal areas).
- The catheter is withdrawn slowly, first 10cm below the renal pelvis, and then to lie just above the ureteric orifice. About 2ml of CM are injected at each of these levels and spot films are taken (ureter).
- The catheter is completely withdrawn.

Renal puncture (Antegrade Pyelography) (AP)

Indications:

- IVU was inadequate.
- RP was unsuccessful or not possible.

Contraindications:

- Bleeding diathesis
- The possibility of a renal hydatid cyst.

CM:

Non-ionic

Patient preparation:

As for IVU.

Preliminary film:
AP renal areas or KUB.

Technique:
1. The kidneys are opacified by giving an IV injection of CM.
2. The patient is turned prone. The affected kidney is examined fluoroscopically and the optimum site for puncture is marked on the skin.
3. Using aseptic technique, the skin and deeper tissues are anaesthetized. With the needle still in situ, the kidney is rescreened.
4. The needle is then introduced. The patient is told to stop breathing each time the needle is advanced.
5. The stillette is removed and the cyst contents aspirated and examined.
6. The needle is removed.

Films:
- ✓ Prone lateral
- ✓ Both sides decubitus.
- ✓ Supine lateral
- ✓ Supine AXR
- ✓ Erect AXR

Aftercare:
CXR (to exclude pneumothorax)

<u>Percutaneous Nephrostomy</u>
The introduction of a drainage catheter into the collecting system of the kidney.

Indication:
Obstructive uropathy

Contraindication:
Uncontrolled bleeding diathesis

CM:
Ionic

Patient preparation:
- ✓ Fasting for 4 hours

- ✓ Premedication.
- ✓ Prophylactic antibiotic 預防性的抗生素
- ✓ Surgical backup
- ✓ Empty the bladder just prior to the examination

Technique:

- The patient is lying prone on the couch.
- The collecting system is identified and the site of puncture is planned.
- Having successfully introduced a catheter, it is fixed to the skin and drainage commenced.

Aftercare:

- Bed rest for 12 hours.
- Both BP and temperature half-hourly for 6 hours.

Complications:

- Haemorrhage
- Perforation of the collecting system

Micturating Cystourethrography (MCU) / Voiding Cystourethrography

Indications:

1. Vesicoureteric reflux (exclusively confined to children)
2. Study of the urethra
3. Abnormalities of the bladder
4. Stress incontinence

Contraindication

Acute urinary tract infection

CM:

Non-ionic

Patient preparation:

Micturates prior to the examination

Technique:

- ➢ The patient lies supine on the couch.
- ➢ A catheter is inserted through the urethra.
- ➢ CM is dripped in and bladder filling is observed under fluoroscopy.
- ➢ The catheter is not removed until the patient is likely to micturate.

- ➢ Spot films are taken during micturition.
  - ◆ Males should micturate in an oblique position
  - ◆ Adults will probably find it easily to micturate in erect position
  - ◆ Infants, or small children can lie on the couch during micturition
- ➢ Finally, KUB is taken to demonstrate any reflux of CM.

Ascending Urethrography in the Male

Indications:

1. Strictures
2. Congenital abnormalities
3. Periurethral or prostatic abscess
4. Fistulae or false passages

Contraindications:

1. Acute urinary tract infection
2. Recent instrumentation

CM:

Non-ionic

Technique:

- ✓ The patient lies supine on the couch.
- ✓ The catheter is introduced into the urethra.
- ✓ CM is slowly injected under fluoroscopy.
- ✓ Spot films are taken while CM is injecting. The patient should be in oblique position.
- ✓ MCU should follow (to demonstrate the proximal urethra).