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* Attempt all questions:

Q1 If there is non-visualization of ureteral segment on I.V.U and C.T.U which alternative procedure will you perform? What is the general protocol for performing that procedure?

Ans Retrograde pyelography is also referred to as retrograde pyeloureterography - In this study the collecting system is evaluated by directly injecting radiographic contrast through catheters - rather than utilizing the excretory phase of contrast excretion after intravenous injection, as with a C.T urogram (CTU) or intravenous urogram (I.V.U).
Normally urine is produced in the kidney and travels down the ureter in an antegrade fashion and is then stored

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in the bladder - The term
retrograd (moving backwards)
is used in reference to
the direction of the contrast
is introduced

Retrograde - Pyeloureterography

- This test is performed in the hospital radiology department by a urologist and is typically carried out under general anaesthesia.

* Protocols:-

* Indications:-

- Un-explained hematuria, when the ureters have not been completely visualized by IVP.
- Demonstrating the exact site of ureteral fistula.
- Brushing and/or biopsy of suspected lesions.
- Absent or unsatisfactory visualization of the collecting

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- system on I.V.U-
- Evaluating the collecting system in patients who cannot receive intravenous contrast medium.

Contra-indications:

- Acute urinary tract infection.
- Recent instrumentation.
- Pregnancy

Contrast medium:-

- Ionic contrast media can be used safely, however if there is any specific contra-indication like known hypersensitivity etc. Non-ionic contrast media is preferred due to its low cost.
- The strength of contrast media should be 150-200 mg/ml.
- Contrast media should not be too dense as it will obscure small lesions in the ureters and the pelvis.

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* Procedures:-

Patient preparation:-

- Bowel preparation with cathartics is not routinely performed.

Preliminary film:-

- Full length supine AP abdomen before the examination is started.

Anaesthesia:-

- May be performed under local anaesthesia although general anaesthesia is often required. Sterile precautions are mandatory.

* Technique:-

- The surgeon catheterizes the ureter via a cystoscope and advances the ureteric

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catheter to the desired level - Contrast medium is injected under fluoroscopic control and spot films are exposed.

- Urine is aspirated and under fluoroscopic control contrast medium is slowly injected - About 3-5 ml is usually enough to fill the pelvis but the injection should be terminated before this if the patient complains of pain or fullness in the loins.

Films:-

- Supine PA film of the kidney.
- Both 35° anterior obliques of the kidneys. Low kVp (65-75 kVp) technique is used to visualise calculi and contrast medium.
- If there is pelvi-ureteric junction obstruction, the contrast medium in the pelvis is aspirated

Aftercare Cases:-

- (1) Post anaesthetic observation
- (2) Prophylactic anti-biotic may be used.

Complications:

- Complications of general anaesthesia-
- Chemical pyelitis - if there is stasis of contrast medium-
- Extravasation due to over-distension of the pelvis-
- Introduction of infection-
- Mucosal damage to the ureter-
- Perforation of the ureter or pelvis by the catheter-

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Qe: Which radiological procedure is commonly performed for assessing congenital anomalies of renal system? Explain in detail the whole procedure?

Ans: Intravenous pyelography:- (I.V.P)

- An Intravenous pyelography (I.V.P) also called an intravenous urography (I.V.U), is a radiological procedure used to visualize abnormalities of the urinary system, including the kidneys (renal parenchyma, pelvicalyceal system), ureters and bladder.

How is it performed?

- During intravenous Pyelogram, a dye called contrast material is injected into a vein into the patient arm. A series of x-ray picture is then taken at time intervals.

- An ultrasound or a computed tomography (CT) scan may be combined with an intravenous pyelogram - if more details about the urinary tract are needed.
- In patients with kidney failure or suspected renal failure the contrast can damage the kidneys further.

Indications:-

- An abdominal injury.
- Ureteric fistulas and strictures.
- Bladder and kidney infections.
- Blood in the urine.
- Flank pain (possible due to kidney stones)
- Tumours.

Contra-indications:

- Contrast allergy
- Pregnancy
- Thyrotoxicosis
- Raised Serum Creatinine.

Contrast Media:-

- LOCM 370 (LOCM = Low osmolar contrast material)
- Adult dose = 50 - 100 ml
- Pediatric dose = 1 ml for each kg-

Contrast Media:-

HOCM or LOCM 370 are acceptable but the following 'high risk' groups should receive LOCMs

- (1) Infants and small children and the elderly.
- (2) Those with renal and/or cardiac failure.
- (3) Poorly hydrated patients.
- (4) Patients with diabetes, myelomatosis or sickle-cell anaemia.
- (5) Patients who have had a previous severe contrast medium reaction with LOCM or those with a strong allergic history.

Patient Preparation:-

- Patient should, preferably be ambulant for 2 h prior to the examination to reduce bowel gas.
- No food for 5 h prior to the examination - Dehydration is not necessary and does not improve image quality.
- The routine administration of bowel preparation fails to improve the diagnostic quality of the examination and its use makes the examination more unpleasant for the patient.

Preliminary Film:-

- (1) Supine full-length AP of the abdomen in inspiration - The lower border of the cassette is at the level of the symphysis pubis and the X-ray beam is centred in the mid-line at the level of the iliac crests.

The position of overlying opacities may be further determined by;

- (2) Supine AP of the renal areas in expiration - The x-ray beam is centered in the mid line at the level of the lower costal margin -
- (3) 35° posteroan oblique views or,
- (4) Tomography of the kidneys at the level of a third of the AP diameter of the patient. The optimal angle of swing is 25-40°.

* Procedure:-

An injection of x-ray contrast medium is given to a patient via a needle or cannula into the vein, typically in the antecubital fossa of arm. The contrast is excreted or removed from the blood stream via the kidneys, and the contrast media becomes visible on x-rays almost immediately after injections.

Technique:-

- The median antecubital vein is the preferred injection site because flow is retarded in the cephalic vein as it pierces the clavipectoral fascia.
- A 19-G needle is advanced up the vein to reduce the risk of a perivascular injection and the injection is given rapidly as a bolus to maximize the density of the nephrogram.
- Upper arm or shoulder pain may be due to stasis of contrast medium in the vein. This is relieved by abduction of the arm.

Films:-

- (1) Immediate film:-
AP of the renal area. This film is exposed 10-14s after

injection (from to kidney time) -
It aims to show the nephrogram - i.e., the renal parenchyma opacified by contrast medium in the renal tubules.

(2) 5-min film:-

AP of the renal areas - This film is taken to determine if excretion is symmetrical and is invaluable for assessing the need to modify technique, e.g.: a further injection of contrast medium if there has been poor initial opacification.

Film:-

- A compression band is now applied around the patient's abdomen and the balloon positioned midway b/w the anterior superior iliac spines, i.e.: precisely over the vertebrae as they cross the pelvic beam.

The aim is to produce better pelvicalyceal distension.

Compression is contra-indicated:

- (a) After recent abdominal surgery
- (b) After renal trauma.
- (c) If there is a large abdominal mass.
- (d) When the 5-min film shows already distended calyces.

Films:

(1) 15 min Film:-

AP of the renal areas. There is usually adequate distension of the pelvicalyceal systems with opaque urine by this time.

(2) Release films:

Supine AP abdomen - This film is taken to show the whole urinary tract. If this film is satisfactory, the patient is asked to empty their bladder.

(5) After micturition film:

Based on the clinical findings and on the earlier films, this will be either a full-length abdominal film or a coned view of the bladder with the tube angled 25° caudad and centered 5 cm above the symphysis pubis.

Q3 Which procedure is performed for investigation of extra-hepatic biliary obstruction? Discuss the general protocol followed that procedure.

Ans: ERCP:- Overview:-

Endoscopic retrograde cholangiopancreatography is a technique that combines the use of endoscopy and fluoroscopy to diagnose and treat certain problems of the biliary or pancreatic

ductal systems -

How it can performed?

Your provider will guide the endoscope down the esophagus into the stomach, and through the duodenum, until it reaches the ducts of the biliary tree. A small tube will be passed through the endoscope to the biliary tree, and contrast dye will be injected into the ducts. Air may be injected before the contrast dye.

★ General Protocol:-

Technique:-

- The pharynx is anesthetized with 4% xylocain spray and the patient is given diazepam 5 mg min i.v until sedated.

- The patient then lies on the left side and the endoscope is introduced.
- The ampulla of Vater is located and the patient is turned prone.
- A polythene catheter prefilled with contrast medium is inserted into the ampulla, having ensured that all air bubbles are excluded.
- A small test injection of contrast under fluoroscopic control is made to determine the position of the cannula.
- It is important to avoid over-filling of the pancreas - if it is desirable to opacify both the biliary tree and pancreatic duct then the latter should be cannulated first - A sample of bile should be sent for culture & sensitivity if there is evidence of biliary obstruction.

Aftercare Care:-

- (1) Nil orally until sensation has returned to the pharynx -
- (2) Pulse, temperature and blood pressure half-hourly for 6-h
- (3) Serum / urinary amylase if pancreatitis is suspected -

Complications:-

Due to the contrast medium,

- (1) Allergic reactions 'rare'
- (2) Acute pancreatitis - more likely with large volumes, high pressure injections -

Q4 Which radiological procedure is recommended for evaluating the cause of female infertility? Explain the procedure in detail.

Ans Hysterosalpingography:-

Hysterosalpingography is the radiographic evaluation of uterus and fallopian tubes under fluoroscopic guidance.

It is performed to investigate the shape of the uterine cavity and the shape and patency of the fallopian tubes.

- Hystero means uterus
- Salpingo means fallopian tubes.
- Graphy means to draw.

Indications:-

- (1) Infertility (main role)
- (2) Recurrent spontaneous abortions.
- (3) Congenital anomalies of uterus
- (4) Following tubal surgery
- (5) Suspected case of genital

Tuberculosis-

Contra-indications:-

- Suspected pregnancy
- Acute pelvic infection
- Active vaginal bleeding
- Recent dilation and curettage
- Immediate pre and post menstrual phase
- Tubal or uterine surgery within last 6 weeks
- Contrast sensitivity

Patient Preparation:-

- Done in first half of menstrual cycle in proliferative phase b/w 5th to 12th day
- Patient to avoid un-protected sexual intercourse from the date of her period until investigation is over to avoid possible risk of pregnancy.
- If periods are irregular, do urine b-hcg test to rule out pregnancy.

Procedure:-

- Informed consent is taken-
- Antispasmodic (im dactin) given before procedure-
- Patient is asked to empty bladder immediately before procedure-
- Spot film may be taken-
- Patient is placed in lithotomy position and contrast is slowly given-
- 3 ml contrast to fill uterine cavity and another 3 ml to fill tube. (up to 10ml)
- 4 spot film are taken
- After end of the procedure, antibiotic course is given and patient is informed about vaginal spotting for 1-2 days-

Complication:-

- Pain (because of dilatation of uterus, spillage into peritoneum)
- Infection (pelvic)

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- Bleeding
- Vasculase or lymphatic intravasation.
- Vasovagal episode
- Pregnancy irradiation-

Contrast Medium:-

- Oily contrast medium is no longer recommended.
- HOCM or LOCM 300.
- Volume 10-20 ml
- LOCM have no advantage with regard to image quality or side effects but the non-ionic dimer, iohexolan is associated with a lower incidence and decreased severity of delayed pain.

Equipment:-

- Fluoroscopy unit with spot film device
- Vaginal speculum
- Vulvselium forceps

Technique:-

- (1) The patient lies supine on the table with knees flexed, legs abducted and heels together.
 - (2) Using a septic technique the operator inserts a speculum and cleans the vagina and cervix with chlorhexidine.
 - (3) The anterior of the cervix is steadied with the vulsellum forceps and cannula is inserted into the cervical canal - Foley catheter is used, there is usually no need to grasp the cervix with the vulsellum forceps.
- 5 spasm of the uterine cornu may be relieved by i-v glucagon.
 - NB: opiates increase pain by stimulating smooth muscle contract.

Films:

- Using the under couch tube.
- (1) As the tubes begin to fill.
- (2) When peritoneal spill has occurred and with all the instruments removed.

After care:-

- (1) It must be ensured that the patient is in no serious discomfort nor has significant bleeding before she leaves.
- (2) The patient must be advised that she may have bleeding per vagina for 1-2 days and pain may persist for up to 2 weeks.

Complications:-

- Due to the technique:
- Bleeding from trauma to the uterus or cervix.
- Transient nausea vomiting and head ache.

- Intravasation of contrast medium into the venous system of the uterus results in a line-lack-like pattern within the uterine wall - When more extensive, intravasation outlines larger veins -

Q5 Explain in detail the conventional procedure used for diagnosing the disorders of joints, ligaments & tendons?

Ans. Arthrography:-

Arthrography is a procedure involving multiple x-rays of a joint using a fluoroscope, or a special piece of x-ray equipment which shows an immediate x-ray image - A contrast medium (in this case, a contrast iodine solution) injected into the joint area helps highlight structures of the joint -

Method:-

- Single contrast (contrast)
- Double contrast (air)

Indication:-

- Joint capsule torn
- Joint cavity
- Synovial membrane
- Articular cartilage, labrum
- Ligaments
- Tendons
- Loose bodies with joint
- Prosthesis assessment (loosening, infection)

Contraindications:

- Active Arthritis
- Joint infection
- Bleeding problems
- Previous sensitivity to contrast media

Equipment:

- Fluoroscopy with spot films devices

Preliminary film:

- Routine plain film radiograph -
- AP and true lateral of the joint of interest.
- Axial in shoulder & oblique view (inversion / eversion in ankle).
- Radial and ulnar deviation in wrist joint.

After Care:-

- Avoid driving for two days.
- Joint pain may occur.

❁ THE END ❁

