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Handbook of Special Radiographic Procedures

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Dedication

This book is dedicated to my Colleague and my friends who helped me maintain my sanity while writing this book. Not to mention, to my parents who have been a constant support since I was born and almighty who has always blessed me.

Chapter-1 Barium Study

Content -Barium Study

i) **Barium Swallow**
ii) **Barium Enema**
iii) **Barium meal follow through**
iv) **Small Bowel Enema**
v) **Barium Enema**

i) Barium Swallow or Contrast swallow

Introduction - It is a Fluoroscopic Examination to evaluate the Oesophagus till Gastro-esophageal tract after Contrast media ingestion.

- It is a non invasive Procedure.

a)Indication – Dysphasia (Difficulty in Swallowing)

- Achlasia - A condition in which lower esophageal sphincter muscle doesn't allow food to pass in stomach.
- Assessment of Tracheo-esophageal fistulae.
- Assessment of site of perforation or leakage.
- Stricture.
- Carcinoma of Oesophagus.
- Oesophagitis.
- Partial obstruction.

b) Contra-indication – Bowel Perforation (Gastrographin or thin $BaSo_4$ mixture).

- Large esophageal or Bowel obstruction.
- Allergy to Contrast media.
- Aspiration (Contrast media pass into the lungs).

c) Contrast media – E-Z HD 250% W/V 100 ml (Water soluble contrast media).

- Gastrographin (Iodinated water soluble contrast media).
- If perforation is suspected then $BaSo_4$ should not be used.
- In the case of possibility of Tracheo-esophageal fistula or Aspiration then Gastrographin should not used.

d)Equipments –Fluoroscopic unit with IITV System.

- Spot film devices.
- Radiographic cassette.
- Lead Apron for radiation safety purpose.

e) Patient preparation – No patient preparation required.

f) Technique – Pt is asked to take off the clothes and wear a patient Gown.

- Pt is asked to stand in erect RAO Position to avoid the overlapping of oesophagus by spine.
- Barium mixture instilled into mouth and patient is asked to swallow it on request.
- Contrast followed by fluoroscopic screening and spot film is taken for permanent record and interpreted by radiologist.

g) Aftercare – Patient should be warned that the bowel motion will be white for few days**.**

- Patient should be advised, to drink adequate volume of water.

ii) Barium meal

Introduction–It is a fluoroscopic screening examination of the upper GIT involves Stomach, duodenum till the duodenum – jejunum Junction.

- Combination of Fluoroscopy and Radiography is used.
- It may be done with single contrast & double contrast.

a) **Indication –** Dyspepsia (Difficulties in Digestion).

- Hiatus Hernia (Upward movement of stomach).
- Acid-peptic disease.
- Un -explained weight loss.
- Upper abdominal mass or pain.
- Assessment of the site of perforation.
- Gastric carcinoma.
- Partial obstruction.
- Gastro-intestinal bleeding.

b) **Contra-indication –** Complete bowel obstruction.

- Complete bowel obstruction.
- Allergy to contrast media.
- Pregnancy.

c) **Contrast media used –** E-Z HD 250% W/V, 150 ml (Water insoluble contrast media).

- Carbex Granule (For double contrast).
- Gastrographin (Water soluble iodinated contrast media).

- $BaSo_4$ should not used in case of possibility of perforation.
- Gastrographin should not used in case of possibility of Tracheo-oesophageal Fistula or Aspiration.

d) **Equipment –**Fluoroscopic unit with X ray generator.
- Spot film device.
- Radiographic cassette.
- Lead Apron.

e) **Patient preparation –** Patient is asked to report in reporting in fasting.
- Some Laxatives given to patients, to empty bowel & stomach.
- Confirm any contraindication to the contrast being used.

f) **Technique –** Patient is asked to take off clothes and wear patient Gown.
- Lie supine on table.
- An IV Injection of Buscopan 20 mg or Glucagon 0.3mg is given to patient for smooth muscle relaxant.
- There are two different methods

i) Single contrast ii) Double contrast

i) **Single contrast** – Only barium mixture instillation.

No gas agent is used in Single contrast Barium study.

ii) **Double Contrast** – 1st Carbex Granules (Acid Base) is given to the patient after that $BaSo_4$ mixture is given to the patient.
- It makes a barium coating, on the mucosal layer and provides better mucosal information.

- After instillation of the barium mixture, patients is asked to lie on the left side, it prevents barium from reaching the duodenum too early.
- Patient is asked, to roll on for sometimes, it provides better coating of mucosal lining with barium.
- Then spot film are taken for stomach (Right and Left Anterior oblique)
- Duodenal loop (Prone).
- An x ray image of Oesophagus is taken to assess the reflux disorder.

g) After care – patient should be warned that the patient's bowel motions will be white for next few days and may be difficult to flush away.
- Patient is advised to drink adequate water after procedure.
- It can cause constipation, some laxative may helpful for this condition.

iii) Barium Meal Follow Through

Introduction –Also known as Small bowel Follow through.

- It is a Fluoroscopic screening Examination of the whole of the small bowel from Duedenal flexure to the IC Junction.
- A non invasive Procedure.

a) Indication - Diarrhea.

- Crohn's Disease (Affect the Ileum).
- Mal-absorption.
- Gastro-intestinal bleeding.
- Abdominal Pain.
- When Small bowel enema failed.
- Meikles's diverticulum.
- Carcinoma of small intestine.
- Abdominal pain.

b) Contra-indication – Complete bowel obstruction.

- Allergy to Contrast media.
- Paralytic illus – paralysis of intestinal muscles that leads to prevention to the passage of food.
- Pregnancy.

c) Contrast media – E-Z Paque 100% w/v 300 ml.

- After barium meal performed then only 150 ml is required.
- Gastrographin (Iodinated Water soluble contrast media).
- Carbex Granules – For Double Contrast.
- In case of $BaSo_4$ Contra –Indication, then iodinated water soluble contrast may used.

e) Equipment –Fluoroscopic unit with IITV System.

- High power x ray Generator.
- Spot film Device.
- Radiographic Cassette.
- Lead apron.

f)Patient Preparation – Patient is asked for Fasting from the previous midnight before procedure.

- Some Laxative may help to Empty Bowel.
- Confirm any Contra-Indication to Contrast- media being used.
- Meta-clopramide 20mg is given to patient 20 minutes prior Examination, to avoid Vomiting, heartburn etc.

g) Procedure – Patient is asked to take off his/her clothing and wear a patient Gown.

- Ask to lie supine on the Table.
- Buscopan I.V injection is given to patient to relax abdominal muscles.

i) Single Contrast – Only $BaSo_4$ Mixture is given to patients.
ii) Double Contrast -At first Carbex-Granules is given to the patient which produces gas and Expand the Organ.

- After that $BaSo_4$ Mixture is given to the patient.
- It provides Coating of barium on Mucosal Coating and Provide Better Assessment Of Mucosal Disease.
- After the installation of Barium mixture in GI Tract, Patient is asked to lie on his/her Right side and this allows the Barium mixture into small bowel Quickly.
- Meta clopramide increase the rate of Gastric-Emptying.
- Prone film are taken at the interval of 20 Minutes Up to Contrast reached I C Junction.
- Compression films are taken to avoid the Overlapping of the loops of Small bowel.

h) After care – Patient should be warned that his/her bowel motion will be disturbed for few days.

- Advised to take adequate amount of water to avoid constipation.
- Some Laxatives may help to Avoid Constipation.

iv) Small Bowel Enema

Introduction – Also named as Enteroclysis.

- It is a real time Fluoroscopic Examination of the small bowel including the ileo-Caecal Junction.
- It provides better Visualization of small bowel than achieved by Barium meal Follow Through Due to Quick infusion of contrast media with the Help of a plastic catheter directed into Duodenum.

a)Indication – Diarrhea(Food Absorption Decrease).

- Crohn's Disease.
- Abdominal Pain.
- Mal-absorption (Decreased Food Absorption).
- Gastro-Intestinal Bleeding.
- Meikles's Diverticulum.
- Partial Obstruction.

b) Contra-Indication – Complete Bowel Obstruction.

- Allergy to Contrast media that is Used.
- Pregnancy.
- Paralytic-Ilius.

c) Contrast Media –E-Z Paque 70% w/v,1500ml.

- Gastrographin.
- For Double Contrast effect, 600ml,0.5% Methyl cellulose after 500ml of 70% w/v Barium.

d) Equipment – Fluoroscopic unit with IITV System.

- High Power X ray Generator.
- Spot Film Devices.
- Radiographic Cassette.
- Foley's Balloon Catheter.
- Guide-wire.
- Lignocaine Gel.

e)Patient Preparation – Patient is asked for Fasting from the previous midnight before procedure.

- Some Laxative may help to Empty Bowel.
- Confirm any Contra-Indication to Contrast- media being used.
- Meta-clopramide 20mg is given to patient 20 minutes prior Examination, to avoid Vomiting, heartburn etc.

f) Technique – Pt is asked to remove clothing & Wear Patient Gown.

- Ask to patient, Lies Supine on the Table.
- Meta-clopramide 20mg is given to the patient.
- Plastic Catheter with Guide wire may be inserted into GI Tract through Mouth or Nose as planned.
- Lignocaine spray is lubricated on the catheter and into nasal cavity.
- Catheter directed into the Upper part of the Small intestine and inflated at the tip that provide the Prevention of the barium back into Stomach.
- $BaSo_4$ Mixture is instilled with the rate of 100ml/Minute.
- Spot films are acquired of the abnormality including IC Junction and then interpreted by Radiologists.

f) **After care -**Patient should be warned that his/her bowel motion will be disturbed for few days.

- Advised to take adequate amount of water to avoid constipation.
- Some Laxatives may help to Avoid Constipation.

Barium Enema

Introduction – Done for the evaluation of the larger Bowel Disease.

- It is the process in which contrast media is instilled into large Bowel through Anus and the help of plastic catheter.

a)Indication –Blood in Stool.

- Crohn's Disease.
- Chronic Diarrhea.
- Polyps (Inner Folding of Mucous membrane).
- Ulcerative Colitis.
- Melaena – Black terry stool, just because of Gastro-intestinal bleeding.
- Change in Bowel habit.
- Partial Obstruction.

b) Contra-Indication –Toxic Mega colon.

- Pseudo membranous Colitis or Clostridium defficile Colitis (Infection Disease due to over growth of Clostridium bacteria.
- Incomplete Bowel preparation.
- Allergy to Contrast media.

c) Contrast-Media – Polibar 115% w/v, 500ml (or more as required).

- Air (in Double Contrast).
- Gastrographin (if Bowel perforation suspected).

d) Equipment – Fluoroscopic Unit with High power X Ray Generator.

- Spot film Devices.
- Radiographic cassette.
- Plastic Foley's Balloon Catheter.

e)Patient Preparation – Low Residual diet for 3 days Prior to Examination.

- On the day Prior to Examination, patient is given some Laxatives.
- If the patient is not allergic to penicillin, then Amoxicillin 1gm + Gentamicin 120mgI.V,15 minutes prior to procedure & Followed by Amoxicillin 500 mg orally 6Hour prior the Procedure.
- If Patient Allergic to penicillin, then vancomycin 1gm With Gentamicin 120 mg, prior to the start of Examination.
- Plain Enema is applied 1-2 Hours before the Procedure(For the Removal of stool from Colon & Rectum.

g) **Technique –** Patient is asked, to remove his Clothing and Wear a Patient Gown and lie down on the table on one side on incontinence sheet.

- A Well lubricated catheter with local Anesthesia is inserted into Rectum through Anus.
- Patient is advised tight his Anus sphincter Muscles.
- Buscopan 20mg or Glucagon 1mg I.V Injection given to the patient.
- Radiologist instilled the Barium Mixture through the catheter with the help of asepto syringe.
- Two process is used
- i) Single Contrast – Only Barium Mixture is given to the patients.
- ii) Double Contrast – at First, Barium mixture is instilled then air Blows into Rectum.
- It providesbetter Assessment of Mucosal Disease Because of thin Coating of Barium over Mucosal layer. Example – Ulcerative Colitis.
- Patient is asked to rolling from Right anterior oblique to Left anterior oblique position for the better Coating of Barium solution.
- This study is useful for the study of GIT up to IC Junction.
- Then a series of films of Rectum, Sigmoid colon, Hepatic Flexure, Splenic Flexure, I.C Junction are taken for record and Interpreted by radiologist.

h) After care – Patient should be warned that his/her bowel motion will be disturbed for few days.

- Advised to take adequate amount of water to avoid constipation.
- Some Laxatives may help to Avoid Constipation.

Chapter-2 Intravenous Pyelography

Content –IVP Study

Intravenous Urography

Introduction - it is a radiographic positioning to evaluate the Urinary tract including Renal parenchyma calyces(Major and Minor) & Renal pelvis after the IV Injection of contrast media.

- It can show the shape and position of kidneys in urinary system.

Indication – Fistula in urinary tract.

- Any leakage in urinary tract.
- Any Lithiasis or calculi in Urinary system.
- Any Trauma in Urinary system.
- Tumor in urinary system.
- Any obstruction in urinary system.
- Any stricture in urinary system.
- Any Congenital disorder of urinary system.
- For Renal Function.
- Any Infection in Urinary system.

Contra-Indication – Pregnancy.

- Recent abdomen surgery.
- Hypersensitivity of Contrast media.
- Raised Serum creatinine level.
- Thyrotoxicosis.
- Multiple myeloma.
- Incomplete preparation.

Contrast media – Low osmolar contrast material/medium(Ionic) (300-600mgl/ml).
e.g –Urografin.
High osmolar contrast media(Non Ionic)
e.g – Ultravist & Omnipaque (Iohexol).

Adult dose – 1-2 ml for each 1 kg (50-100ml Gaze).

With increasing gaze the sharpness of needle is also increase.
Adult dose – 50ml

Pediatric dose –1ml for each one kg body weight.
Mode – contrast media is usually given as a intravenous bolus injection within 30-60 sec.

Equipment – medium/high powered x ray Generator set up, typical 40-60kw.

- Tomographic equipment (x ray tube)/Radiographic unit.
- Abdominal compression equipment/band.
- Pads & Immobilization aids.
- Intravenous administration equipment.
- Disposable syringe.
- Selection of needles, straight/butter fly 16,19,21 Gauge.
- A Tourniquet is used.
- Emergency Drug & Equipment.
- Anesthesia Arm stand.
- Disposable needles.
- Disposable plastic infusion tubing.
- Oxygen& Blood pressure apparatus in room.
- Fluoroscopy unit.
- IV Set.
- Injection.

Patient Preparation – Ask the patient History diabetics renal disease or allergy or drugs.

- Fasting for 8-12 Hours.
- Explain the exam to patient in laymen/local language.
- Check the patient creatinine level.

For Bowel preparation – low residual diet.

- Bowel wash is given till bowel is clear of fecal matter on previous night.
- Laxative is given 2-4 tablets at bed time for 2 days prior to exam.
- Some blood and urine examination to assess the functioning of kidney.
- The patient is given mild laxatives such as castor oil about 1 Day prior the examination. It Eliminates fecal material & reduces the gas amount in bowel.
- The patient is kept nil by mouth over night & is dehydrated by stopping the fluid intake.
- In practice patient is advised to omit fluid after 11 PM, Omit breakfast which decrease the chance Vomiting & Produce Slight dehydration.
- The dehydration helps in better concentration of the contrast & clear x ray pictures.

- Sensitivity for the dye is checked. Necessary precautions are taken to avoid the allergic reaction.
- Complete dehydration is contraindicated in situation that is given below
  i) Renal failure
  ii) Infancy
- If the patient is diabetic, then advised to do not take metformin before 2 days of procedure.
- Some test must be done – Serum creatinine, urea, Anti sensitivity test etc.

Technique – A scout film is taken to ensure the patient preparation, anatomy of kidney etc.

- Patient is lie down supine on couch.

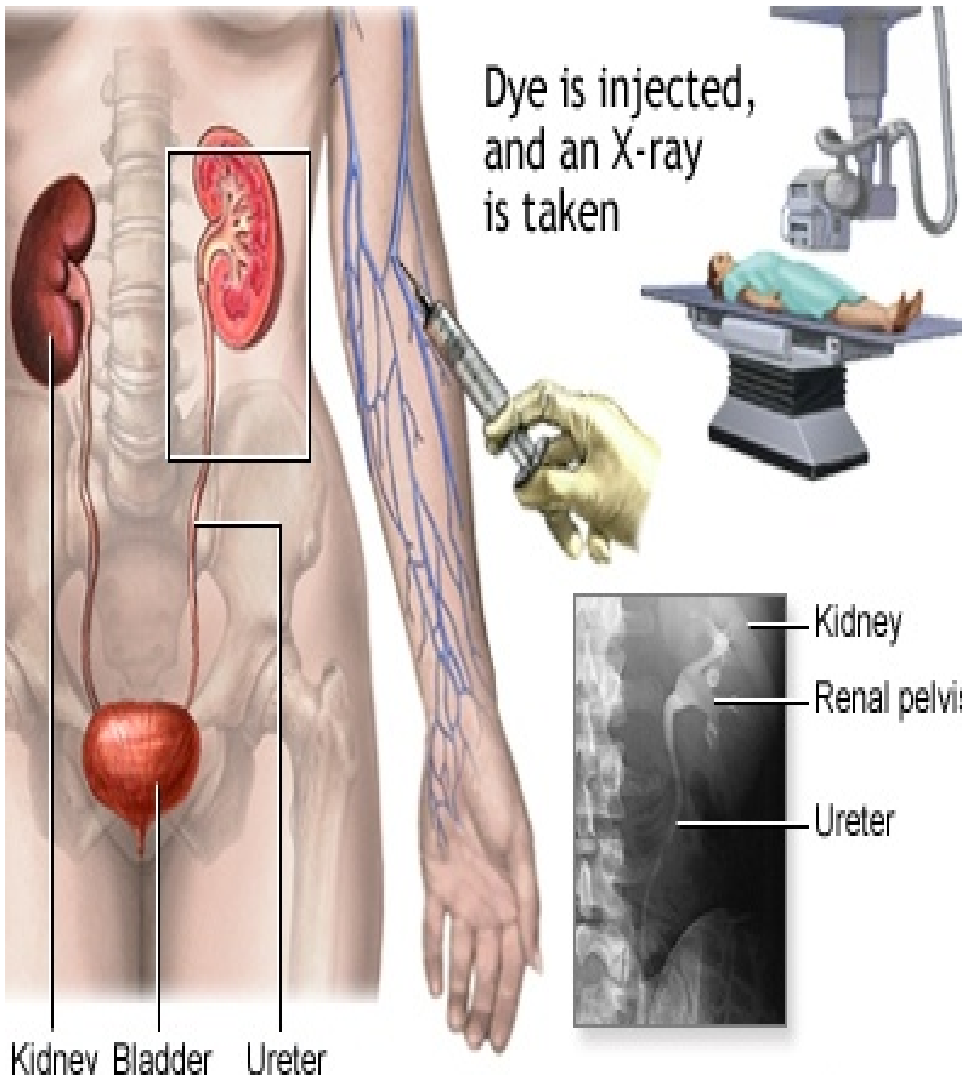


Fig 1.1- IVP Procedure

Source -https://medlineplus.gov

- Then an IV Set is introduced into the median anti cubital vein.
- Contrast media is injected carefully.
- Abdominal compression should be applied before injection, it advances the retaining of contrast in pelvicalyceal system.
- A Series of x ray films are taken as following

  i) Scout film – Ensure patient preparation & anatomy of urinary system.
    - Plain KUB X ray.

ii) Nephrogram – 1-2 minutes after contrast media injected.

- For evaluation of Renal peranchyma calyces(Major and Minor).
- Supine KUB.

iii) After 5 Minutes – Image of upper collecting syatem.

iv) 15 Minutes without abdominal compression – To assess ureters.

- Supine KUB.

v) 25 Minutes/prone position – prone position is chooses because lower ureter located at anterior side.

- Demonstrate for the ureter pelvis junction.
- Prone KUB.
- After the prone position, pt is instructed to drink plenty of water, juice etc.

vi) Pre void – it is taken to view the bladder volume.

- 30-45 Minutes after initiation of contrast injection.
- Full bladder is exposed in supine KUB position.

vii) Post void – it is taken to view the Bladder residual volume.

- It is taken after micturation of patient.
- In some cases, delay films are taken & it make procedure lengthy.
- Injection of contrast is given as a bolus, to examine the density of nephrogram.

After care – ask to patient to take healthy food properly.

- Ask to patient, if patient suffered with allergy then anti-histamines tablet used.
- Drink adequate amount of water.
- Anti - nausea medicines is also given to patient.

Chapter-3 Sialo and Dacrocysto-graphy

Sialography

Introduction – Sialography is a radiological examination, to demonstrate Salivary gland with their ducts after uses of Contrast media.

- Now days the Sialography is replaced by CT & MRI.

Indication – i) Sialo-lithiasis.
ii) Obstruction or stricture in ducts.
iii) Pain & Swelling.
iv) Sicca syndrome.
v) Xerostomia.
vi) Masses & Tumor.

Contra-Indication –i) Contrast Allergy.
ii) Severe inflammation of salivery Glands.
iii) Recent surgery.

Contrast media – HOCM or LOCM (Urograffin 60% or Conray 280)
water soluble.
Volume -2 ml.

Equipment – i) Silver lachrymal dilator.
ii) Silver cannula.
iii) Polythene catheter.
iv) Disposable syringe.
v) Lemon acid to produce stimulation of saliva.

Patient Preparation –any radio-opaque artifacts are removed from the area of interest.

Technique – orifice of the parotid ducts opens into oral vestibules opposite to 2^{nd} upper molar & orifice of the sub mandibular duct opens at the base of the franulum. if they are not visible then citric acid is placed into mouth.

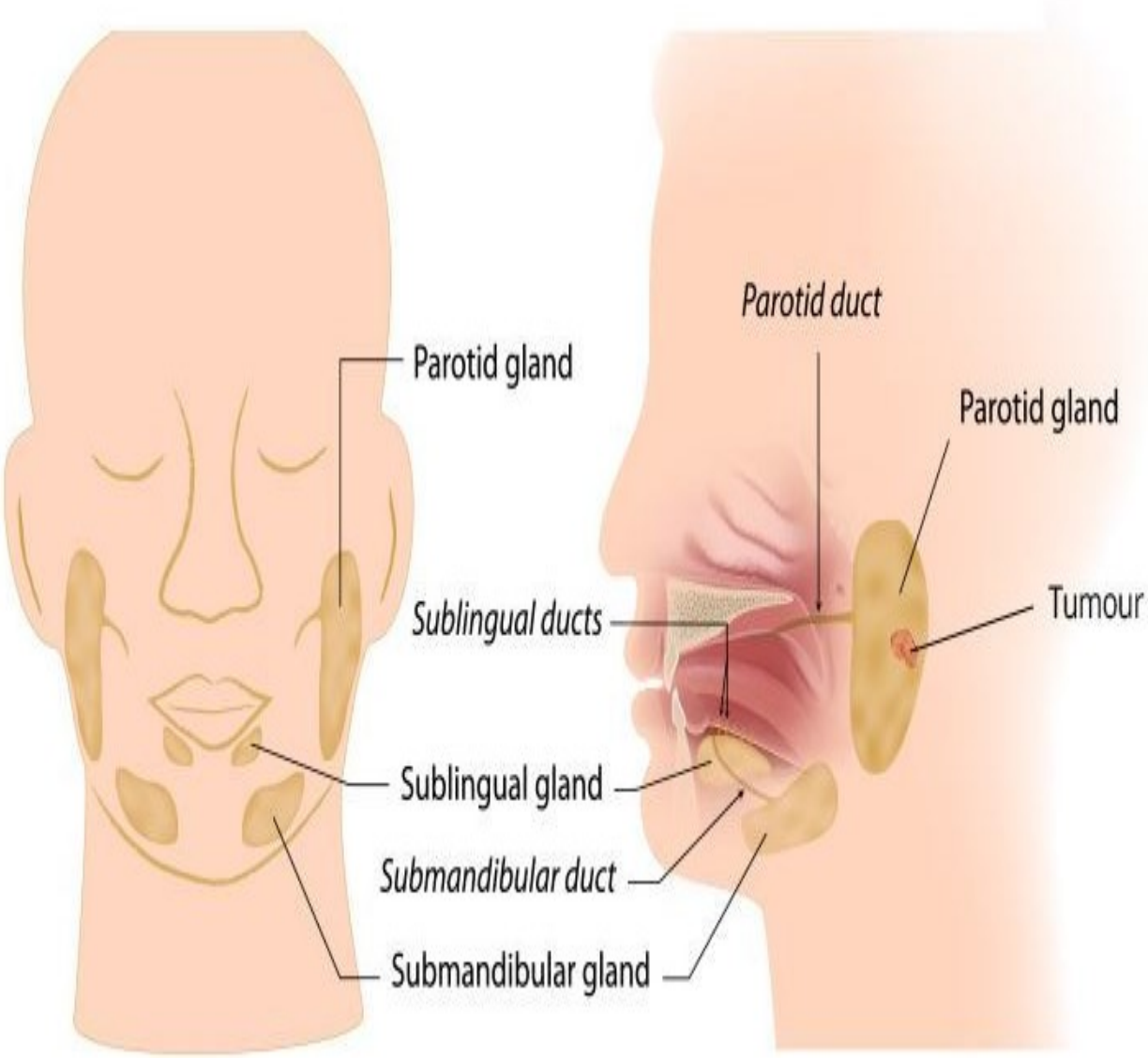


Fig 5.1-Salivery gland and their ducts

Source – www.google.comhttps://www.jagranjosh.com

orifice of the ducts is dilated with the silver lachrymal dilator & the cannula or polythene catheter introduced into the duct.

- upto 2 ml of contrast media is injected. the injection is terminated when patient feels discomfort.
- image taken immediately after contrast injection.

Films – Parotid Gland – AP View with chin rotate 5 degree away from side.

- Lateral & Lateral oblique.

Sub mandibular – Occlusal film for the sub mandibular Gland.

- Lateral & Lateral oblique.

After care – there is no specific after care are needed.

Dacro-cystography

Introduction – It is fluoroscopic examination of the lachrymal system that includes contrast media injection into naso-lachrymal duct.

- Lachrymal Gland, situated into supero-lateral Aspect of the orbit produce tears (Lachrymal Fluid) on the surface of human eyes.

Indication – i) Epiphora.
ii) Lachrymal duct obstruction.
iii) Stricture.
iv) Dacro-cystitis.
v) Canaliculitis.

Contra-Indication –i) Contrast Allergy.
ii) Recent surgery of lachrymal system.

Contrast media – Water soluble contrast media Conray 280.
the volume of contrast is 2-5 ml.
Liopidol (oil soluble contrast) - 0.5 to 2ml per side.
oil soluble contrast may obstruct the ducts, so water soluble contrast media is used.

Equipment – i) Skull unit (using macro radiography).
ii) Silver dilator.
iii) Cannula or 18 G Blunt needle with polythene catheter.
iv) Radiographic cassette.

Pt preparation – i) identify the patient.
ii) ask to patient to complete consent form prior the study.

Technique – Ask to patient to lies supine on the table with head is opposite of the occipito-mental position.

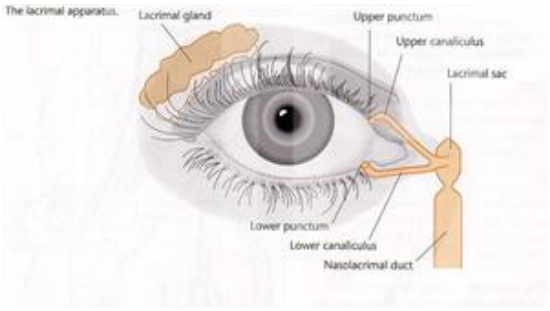


Fig5.1 –Lachrymal system
Source - www.aao.org American Academy of Ophthalmology

- support either side of patient head by immobilization device.

- anesthetic eye drop uses, for patient comfort.
- the lower eye lid is Everted to locate lower canaliculi.
- the lower canaliculi is dilated and the cannula or catheter is inserted into the duct and the contrast media is injected under fluoroscopic guidance.
- x ray films are taken immediately after the cannula is inserted or during the injection if catheter is inserted.

After care – there is no specific after care is needed.

Chapter-4 RGU & MCU

Content –i) Retrograde urethrography

ii) Micturate-cysto urethrography

Retrograde Urethrography

Introduction – it is a Fluoroscopic examination of the Urethra in which contrast is retrogradely injected with urethral orifice occluded to prevent reflux of contrast.
Mainly it is performed in males because male urethra is 18-20cm Long.

i)Indications – i) Urethral stricture.
ii) Congenital abnormalities.
iii) Prostatic abscess.
iv) Fistula.
v) Saddle injury and inability to void.
vi) Urethral Diverticulum.
vii) Pelvic trauma with blood at the meatus.
viii) Difficulty passing foley catheter.
ix) Urethral obstruction.

ii)Contra-Indication – i)Acute urinary tract infection.
ii) Recent surgery of urethra.
iii) Allergy or Hypersensitivity of Contrast media.

iii)Contrast media – i) Conray 280.
ii) iopamidol
iii) Urografin 60%
the contrast is diluted into normal saline.
The volume of contrast used (HOCM or LOCM) is 20ml.

iv)Equipment – i)Tilting radiographic table.
ii) Spot film device.
iii) Foley's Catheter or Penile clamp.
iv) Radiographic cassette.
v) Disposable syringe, Gloves.
vi) X Ray Generator.
vii) Infant feeding tube 6 no.

v)Preparation of patient – i)Fasting prior to 1 day of Examination.
ii) Antiflatulent & Purgatives as given at night prior to them.

iii) Micturate the patient prior to examination.
iv) Pt is asked, to micturate prior to the procedure.
v) Confirm Contrast sensitivity prior to exam.

vi) Preliminary films – prone film of Urethra and bladder base is acquired.

Fig –Retrograde urethrogram procedure

Source -https://www.nuhospitals.com/blog/retrograde-urethrogram/

vii) Technique – after taking a preliminary film, the patient lies supine on the x ray table**.**

- In supine position, penile clamp is applied on the penis or A catheter is used to insert at penis tip.
- so the balloon lies on fossa Navicularis.

- After that Balloon is inflated with some amount of water.
- Contrast media is injected under fluoroscopic supervision.
- Patient is made to lie supine with slightly oblique position that provides that visualization of urethra.
- Foley's catheter lubricated with Lignocaine up to 2-4 cm inserted in the urethra through urethral orifice.
- Pressure is applied over the Glans penis to avoid secretion of contrast in surrounding from the catheter.

viii) Filming –Oblique image of Pelvis with urethra is taken.

- Supine PA before injecting contrast.
- 30 degree left anterior oblique with right leg abducted & Left knee flexed is taken.
- 30 degree right anterior oblique with left leg abducted and right knee flexed.

ix) After care – no specific after care is require in the procedure.

x) Complication –

i) Due to contrast media – Adverse reaction due to absorption of contrast media through bladder mucosa.

ii) Due to technique – Urinary tract infection.

- Urethral Trauma.
- Backflow of injected contrast – due to use of excessive pressure in stricture.

Micturation cyst Urethrography

Introduction -Also known as Voiding cysto urethrogram (VCUG).

- MCU is fluoroscopic examination of urethra & urinary bladder while the person urinates (Voiding).
- Bladder is filled with contrast via supra-pubic catheter or retrograde catheter.

i)Indication for childrens - i)Voiding Difficulties.

ii) Vesico-ureteric reflux.

iii) Baseline study prior to urinary tract surgery.

iv) Trauma.
v) suspected anatomical abnormalities of bladder neck & Urethra.
vi) Post operative abnormalities of bladder neck & urethra.

ii) Indication for Adult – i) Functional disorder of bladder & urethra.
ii) suspected vesico-vaginal fistula.
iii) suspected bladder / urethral Trauma.
iv) Urethral Diverticulum.

iii) Contra-Indiaction – i)adult urinary tract infection.
ii) iodine Hypersensitivity.

iv) Contrast media – i)Urografin 76%, diluted in normal saline.
ii) low osmolar contrast media such as Iopamidol.
iii) the volume of contrast used is about 150ml.

v) Equipment – i) Tilting radiography table.
ii) spot film device.
iii) X Ray generator.
iv) Radiographic cassette.
v) Gloves, Disposable syringe.
vi) Foley's catheter or infant feeding tube.

vi) Preparation of patient –the patient is asked to urinate prior to the examination.
Other pt preparation is not needed.

vii) Preliminary films –Coned bladder image is taken.

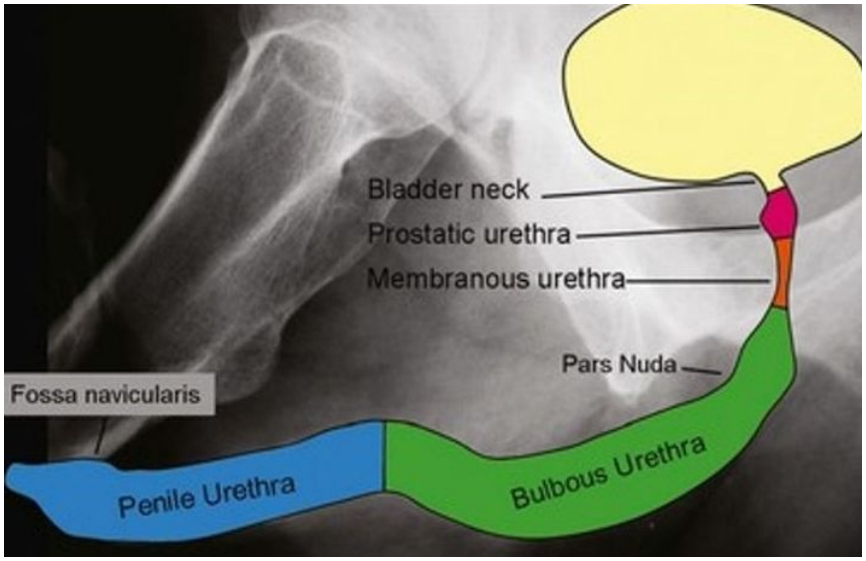


Fig1.2 - MCU Procedure

Source - https://epos.myesr.org

viii) Technique – the patient lies supine on the x ray table.

- Using aseptic technique, a catheter is lubricated with 1% lignocaine jelly is introduced into bladder.
- Residual urine is drained.
- Contrast media is slowly dropped in & Bladder filling is observed by fluoroscopy.
- Any reflux is recorded on spot film.
- The catheter should not be removed until the radiologist is convinced that the patient will micturate or until no more contrast media will pass into the bladder.
- Older children & Adults are given a urine receiver but smaller children should be allowed to micturate into absorbent pads on which they can lie.
- Spot films are taken during micturation & Any reflux is recorded a video recorder may be useful.
- The lower ureter is best seen in anterior oblique position.
- At the end of procedure A KUB Image is taken to demonstrate any reflux of contrast media.

ix) Filming –when bladder is full then pelvic region with urethra (AP view is taken).

- To demonstrate a vesico-vaginal fistula or recto vesicle fistula films are taken in lateral position.

x) After care – no special after care is necessary, but patient & parents of children should be warned that dysurea, possibly leading to retention of urine, may rarely experienced.

- In such cases a analgesic is helpful & children may be helped by allowing them t micturate in a warm bath.
- Most children will already by receiving antibiotics for their recent UTI Infection.
- Patient should be warned of dysurea and retention of urine.

xi) **Complications –**

i) Due to contrast media – adverse reaction may result from absorption of contrast by the bladder mucosa

- Contrast media induced cystitis.

ii) Due to technique – Acute urinary tract infection.

- Catheter trauma – may produce obstruct urination, frequency, blood in urine and urinary retention.
- Complicated bladder filling.

Chapter-5 Pre-operative Cholangiography & Post operative cholangiography

Content –i) Pre-operative Cholangiography
ii) Post operative Cholangiography

Hepato - Biliary tract Examination

Pre-operative Cholangiography

Introduction -This is sometime performed during cholecystectomy to demonstrate any Gall bladder stone with the biliary tract.

- It is performed before surgery.
- It is Radiological procedure, that involves the injection of contrast media directly into the ducts of biliary tract during cholecystectomy.

i) **Indication –** i)Reveal any stones that may in the common bile duct.
ii) Allow the surgeon, to see anatomy of bile duct, liver and Gall bladder.
iii) Jaundice, Pancreatitis, Elevated bilirubin, Abnormal LFT.
iv) Choly-statsis (Bile can't flow from liver).
v) Dilated cystic duct.

ii) **Contra-indication – i)** Sensitivity for contrast media.
ii) Pregnancy.
iii) Barium study within last 3 days.

iii) **Contrast media –** Hypaque 25% w/v**.**

- Urografffin 60%
- Dose of contrast media -20 ml

iv) **Equipment – i)** Mobile X Ray machine.
ii) Needle 22 Gauge (To protect by winding it with wire).
iii) Disposable Gloves.
iv) Catheter.
v) Operating table.

vi) Fluoroscopic unit with IITV System.
vii) Radiographic cassette.
viii) Cannula.

v) **Preparation of Patient –** Inform the doctor if patient has allergy to contrast media.

- Fasting is not required but some restrictions on food & drink apply.

vi) **Technique –** Contrast examination should be performed both before and after duct exploration by the cannulation of the cystic duct with a thin polythene catheter or with the help of T-Tube catheter placed in the Common Respectively.

- Contrast media should equal to body temperature.
- Ask to patient to lies supine, in 20degree right posterior oblique, concerning to project the common bile duct off the supine.
- After injecting contrast media, radiographs are taken in different positions such as AP, LAO and RAO .
- If any stones, stricture or other obstruction are detected in the x rays, then they are removed by the surgeon, before closing of incision.

vii) Filming – After injecting the certain amount of contrast media the radiographs are taken.

viii) Complication – i) Damage of bile duct.
ii) Pancreatitis.
iii) Infection & Bleeding.

Post operative Cholangiography

Introduction –T-Tubeis typically performed 8-10 after Gallbladder removed.

- Contrast media (Urograffin) is injected through a T shaped tube that is placed in the common bile duct during surgery and x ray image are taken after the injection & then residual stone may be assessed.

i) **Indication – i)** Assessment of Residual calculus in Hepatic duct.
ii) Biliary leakage.
iii) Bile duct stricture.
iv) Obstructive Jaundice.
v) To look for remaining stones or stone fragements in ducts after cholycystectomy.
vi) To show Blockage within Hepatic duct.
vii) To remove T-Tube.

ii) **Contra-Indication – i)** Contrast or Iodine sensitivity.
ii) Pregnancy.
iii) Barium study within last 3 days.

iii) **Contrast media –** Urograffin 60%.
HOCM or LOCM.
Dose -20 to 30ml.

iv) **Equipment –** i) Fluoroscopy unit with spot film device.
ii) IITV Camera.
iii) Artery Forceps.
iv) Needle and Disposable Syringe.
v) Radiographic cassette.
vi) Extension tube.
vii) Disposable Gloves.
viii) Spot film device.

v) **Preparation of Patient –** i) Prophylatic antibiotics before the procedure.
ii) Fast from solids for 4 hours prior to the procedure or examination.

vi) **Preliminary Film–** Coned PA View of Right side of the abdomen.

vii) **Technique –** the Examination is performed 7-10 days after the operation of Gall-bladder.

- Ask to patient to lies supine on the table the drainage clipped off with Artery forceps.
- A small needle is inserted into the tube proximal to the clamp followed by the aspiration of air bubbles & Bile.
- After aspiration of air & bile the contrast media is slowly injected under fluoroscopic Guidance.
- During the injection of contrast media radiographs are taken.

viii)**Filming –** AP, PA view of image.

- LPO & table tilted 30 degree head down.
- Oblique i) RAO ii) LAO

After care of Patient – No special after care is needed.
ix)**Complications** -i) Cholangitis.
ii) Duct Rapture.
iii) Vomiting.
iv) Headache.
v) persistence biliary fistula.

Chapter-6 Bronchography, Arthrography & Myelography

Bronchography

Introduction – it is a Fluoroscopic study of the Tracheo-bronchial tree after followed by contrast media.
Now it is not used in practice and replaced by High Resolution CT.

Indication – i) Bronchiectasis.
ii) Tracheo- Oesophageal fistula.
iii) Haemoptysis.
iv) Tumor.
v) Chronic Pneumonia or Bronchitis.
vi) Asthma.
vii) Emphysema.

Contra-Indication – i) Acute Respiratory infection.
ii) Contrast hyper sensitivity.
iii) Poor respiratory reserve.
iv) Massive haemoptysis.

Contrast media – Recently non ionic dimers eg – Iotrolan 300 have been used.
2-3 ml iotrolan 300 per lung segment, maximum 25 ml per patient.
Iohexol can be used.

Equipment – i) Fluoroscopy unit with IITV.
ii) Spot film device.
iii) Radiographic cassette.
iv) Catheter or Bronchoscope.

Patient preparation –i) Chest physiotherapy.
ii) ask to patient Not Eat or drink 6 hour prior the procedure.
iii) Sedatives may given to the patient.
iv) Premedication with Atropine 0.6 mg & Morphine 10 mg.

Procedure – Patient is asked, to remove clothing & Wear a Patient Gown.

- Patient is asked, Lie supine on the table.
- An IV Line is inserted into the hand for emergency medication.
- Anesthesia medication is applied as spray into back of throat.
- A Bronchoscope or catheter may insert into trachea via nose or mouth.
- Instillation of contrast is commence under fluoroscopic supervision.
- After the instillation of contrast media spot films are taken –
- Chest PA ,Lateral & Oblique.

After care – chest Physiotherapy.

- Patient is taken in the recovery room and vital signs are monitored in the room.
- A chest x ray may be taken 1 to 2 days after the procedure, to assess the removal of

contrast dye from airways.

Arthrography

Introduction – It is a Radiological Examination of internal structure of Joints, Following introduction of Contrast media.
Contrast media can be Injected direct into Joint or injected into blood stream & then absorbed by joint.
Usually done for the Hip, Knee, Shoulder, Elbow, Ankle and wrist joint.

Indication –i) Find abnormal Growth or Fluid filled cyst.
ii) Loss of motion or difficulty in movement.
iii) Loose bodies.
iv) Tears in soft Tissue of the joint.
v) For the assessment of the joint Disease.
Ex – Arthritis, Osteoporosis.

Contra-Indication – i) Local sepsis.
ii) Reflex sympathetic Dystrophy – A Group of Symptom including Pain, tenderness, warmth or coolness, Discoloration.
iii) Avascular Necrosis of bones, of the Joint.

Contrast media – water soluble contrast media Like Iohexol or Ioxaglate.

- LOCM ex – Iohexol.
- Air is used for Double contrast.
- Conray 280, Urograffin 60% w/v (4-10 ml) is used.

Equipment – i) Fluroscopic unit with IITV System.
ii) Spot film device.
iii) Radiographic cassette.
iv) Long thin catheter.

Patient preparation – Patient is asked, to sign consent form that says patient understand the risk of the Examination & Agree to have done it.

- Tell the doctor about the patient history such as the patient's medications.

Procedure – Patient is asked to remove clothing and wear a patient Gown & Positioned on table.

- An x ray of joint may be taken before the injection of contrast media.
- Skin around the joint is cleansed by antiseptic solution.
- If there is fluid in the joint, the fluid will be removed.
- Contrast is injected into the joint using a long thin neddle.
- Patient is asked to move the joint, which allows the spread of contrast throughout the joint.
- A Number of x ray films are taken in various positions such as AP, Lateral.

After care – Patients is warned that there may be some discomfort in the joint for 1-2 days after the procedure.

Myelography

Introduction – Myelography is radiological procedure, to evaluate the disorder of spinal cord including spinal cord, nerve roots and other tissues, following the injection of contrast media.

Indication – i) Spinal stenosis.
ii) Herniated disc.
iii) Spinal cord, brain Tumor.
iv) Ankylosing Spondylitis.
v) Arthritis disc.
vi) Archnoiditis.
vii) Scoliosis (Curvature of the spine).
viii) Injury.

Contra-indication – i) Blood in Cerebro spinal fluid.
ii) Severe Archnoiditis.
iii) Increased intracranial pressure.
iv) allergy to contrast media.
v) Recent lumbar puncture.

Contrast media – Non ionic, Water soluble, Iodine based contrast media.

- Iohexol.
- Iotrolan.
- Dose range b/w 9 to 15ml.

Equipment – Fluoroscopy unit with IITV system.

- Radiographic cassette.
- Spot film device.
- Puncture needle.
- Sringe.

Patient preparation – Not eat or drink for 3 hours prior the exam.

- Patient should be well hydrated before the exam.
- Some drugs should be stopped one or two days prior the exams.
  Example –Anticoagulant, anti-depressive.
- Sedatives is given to the patient prior to the investigation.

Procedure – patient is asked to remove clothing and lies prone on stomach.

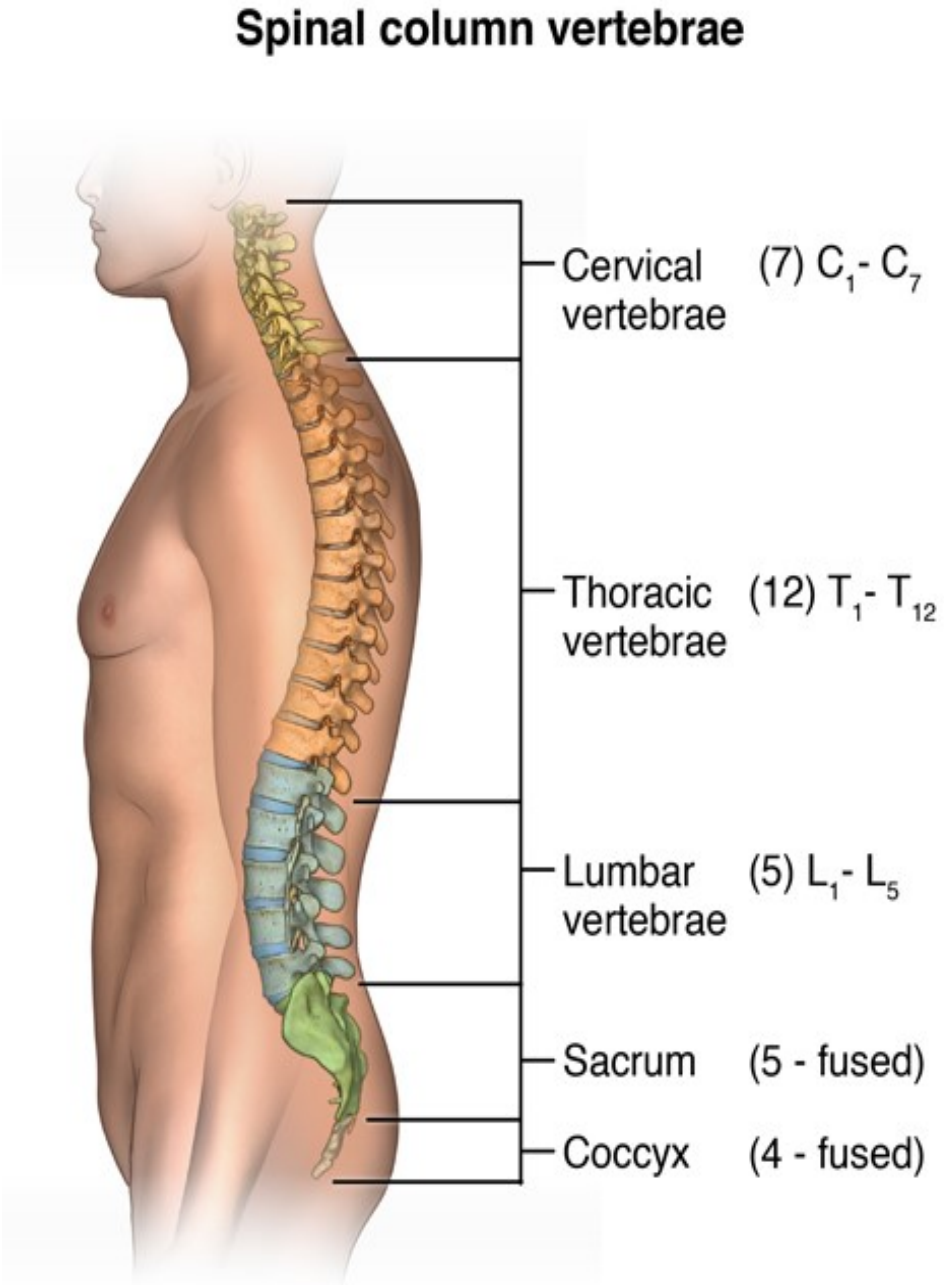
- Introduction of contrast media for myelography is accomplished via puncture of sub-arachnoids space.
- Generally two locations are best suitable for puncture
  Lumbar (L_1-L_2 or L_2-L_3 or L_3-L_4)
  Cervical (C_1-C_2)
- Lumbar area is safer & oftenly used.
- Lumbar site is cleansed with antiseptic solution & Local anesthesia is applied.
- Lumbar puncture needle inserted at the level of L_3-L_4 Into sub-arachnoid space.
- Neddle is slowly advance until the spinal fluid flow from the lumen of the needle.
- Small amount of fluid is withdrawn, to maintain stasis & contrast media is injected under fluoroscopic Guidence.

Spot films are taken in different view ex – PA, Lateral.

- Prone decubitus spine.
- Lateral flexion & Extension.

After care – Patients should be on the bed rest for 8-24 hours.

- Patients should drink plenty of fluid.
- Patients should be maintain with vital signs.



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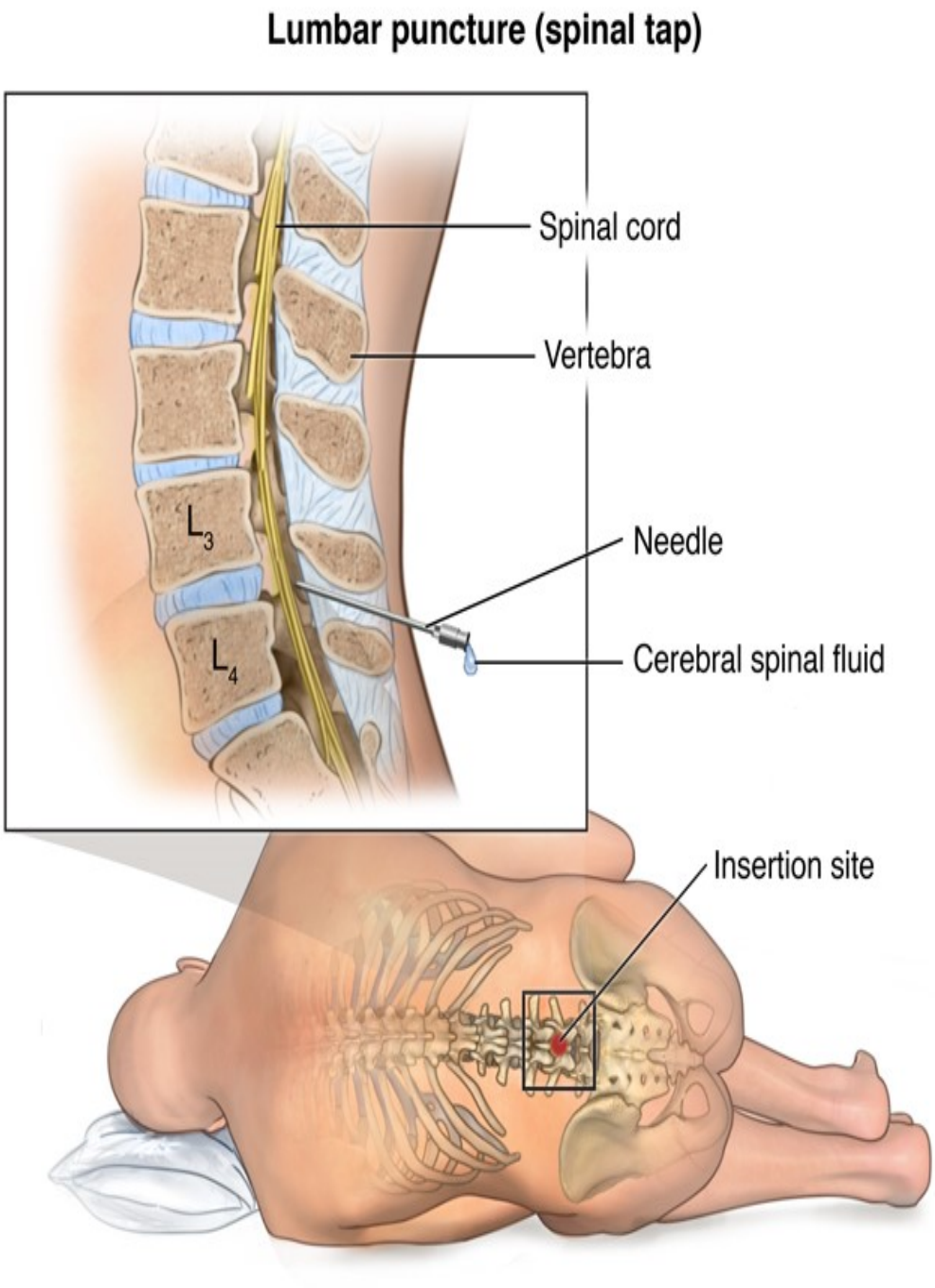

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