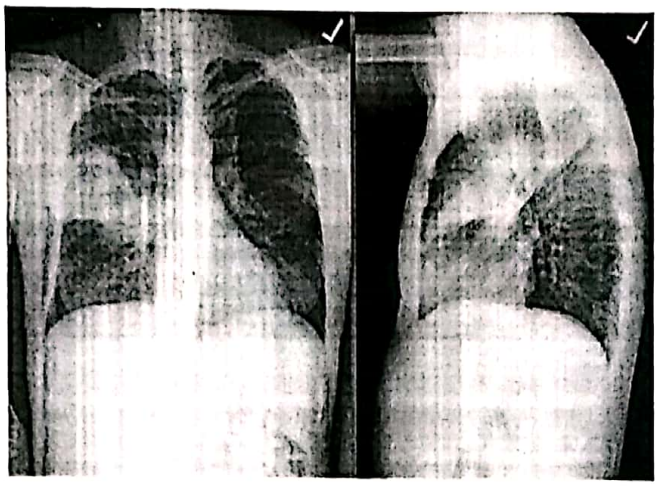
2.5.3

Radiodiagnosis department Reforms

Dr. Vasantrao Pawar Medical College, Hospital & Research Centre, Adgaon, Nashik-03

DEPARTMENT OF RADIODIAGNOSIS

OSCE IMAGE 1 **Student name:** _____



A 25 year old male has had a cough and malaise for the past 3 days. He has a fever and had shaking chills last night. He comes to the clinic looking pale and shaky. He works as a clerk at a CVS, has a pet bird, does rock climbing for recreation. He had a hernia repair at age 20, and an appendectomy at age 17. He has no known allergies. He takes vitamins and protein supplements. He weighs 140 pounds and is 5 ft 10 inches in height. His blood pressure is 100/65, his pulse is 98 and his temperature is 102. You draw a blood sample and send a sputum sample for culture. You order a chest radiograph.

1. WHAT will you list as the clinical indication?

2. DESCRIBE the findings including pertinent positives and negatives on the images.

3. WHAT diagnoses would you consider (list as many as seem appropriate)?
Circle the diagnosis you think is most likely

4. WHAT would you do next in terms of imaging (the answer may be "nothing")?

5. If there was concern for pulmonary embolus in this patient WHAT 2 possible studies could be ordered for diagnosis and circle the study which is most sensitive and specific as well as easier to obtain.

OSCE SCORE SHEET: CASE NUMBER- 1					Student:				
QUESTION 1- (MAX 5)					QUESTION 2- (MAX 9)				
Pertinent History(1)		**Extraneous Hx (-1)**		**0 - 5**	**Appropriate Terms**		**Incorrect Terms(-1)**		**0- 4**
25 year old		Occupation			Opacity(4)		consolidation		
male		Rockclimbing			Airspace disease(2)		GGO		
Fever		Hernia repair			Fluffy(2)		interstitial		
Chills		Appy							
Pet bird		Height			**Accurate location/ Pertinent negatives(1)**		**Incorrect Location (-1)**		**0- 4**
		Weight			Adjacent to minor fissure(1)		Left lung(-1)		
					Adjacent to major fissure(1)				
					Right upper lobe(2)				
					no effusion(1)				

QUESTION 3- (MAX 5)					QUESTION 4- (MAX 3)				
Appropriate DDX		**Unlikely DDX (-1)**		**0- 5**	**Appropriate rec (2 pts each)**		**Inappropriate rec (-1)**		**0-4**
Best - Pneumonia(3)		Lung cancer			No further imaging(3)		CT		
Tumor(1)		PE			f/u cxr if sxs don't resolve		f/u CXR soon after		
Hemorrhage(1)		CHF							
selected best?(1)									

QUESTION 5 – (MAX 3)		
Future Possible Studies (1)		**0- 3**
CTPA (1)+(1) if circled		
V/Q scan(1)		
CT with Contrast (0.5)		

GRAND TOTAL SCORE

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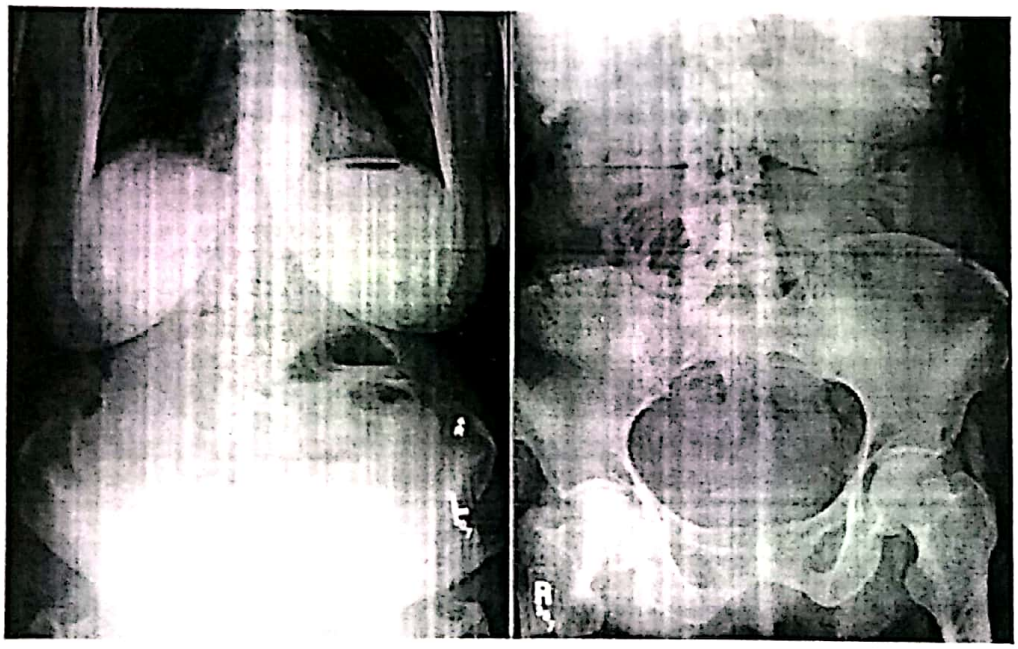
DEPARTMENT OF RADIODIAGNOSIS

OSCE IMAGE 2 **Student name: _____**

A 75 year old woman has had severe abdominal pain, getting worse over the past week, with nausea and vomiting. She has never had surgery other than removal of skin moles. She has 4 children and had a normal menopause at age 53. She is a former office worker and still helps out with filing in her husband's business. She does ceramics in her spare time. She has also noticed swelling and pain in her right groin since her other abdominal symptoms began. She is allergic to sulfa. She follows a vegetarian diet. She weighs 198 pounds and is 5 ft 4 inches in height. Her blood pressure is 150/90, her pulse is 98 and her temperature is 99. She does not exercise regularly. You order abdominal radiographs.



1. WHAT will you list as the clinical indication?

_____

2. DESCRIBE the findings including pertinent positives and negatives on the images.

_____

_____

_____

3. WHAT diagnoses would you consider (list as many as seem appropriate)?
Circle the diagnosis you think is most likely

_____

_____

4. WHAT would you do next in terms of imaging (the answer may be "nothing")?

_____

5. If this patient had massive free intraperitoneal air on this exam, what would your recommendation include?

_____

OSCE SCORE SHEET: CASE NUMBER- 2					Student:				
QUESTION 1- (MAX 5)					QUESTION 2- (MAX 9)				
Pertinent Hx(1)		**Extraneous Hx(-1)**		**0-5**	**Appropriate Terms(1)**		**Incorrect Terms (-1)**		**0-5**
75		Ceramics			Bowel dil(3)		Large bowel		
Female		Vegetarian			Valvulae/plicae		Free air		
Abd pain		Skin moles			Proximal				
Nausea		Sulfa allergy			No free air				
					Air fluid levels				
Swelling in groin		Pulse			**Accurate location/ Pertinent negatives(1)**		**incorrect location (-1)**		**0-4**
Vomiting		Temp			Small bowel(2)		Large bowel		
No prior surgery		BP			No calcifications				
		obese			No organomegaly				
					No rectal gas/air				

QUESTION 3- (MAX 5)					QUESTION 4- (MAX 4)				
Appropriate DDX		**Unlikely DDX(-1)**		**0-5**	**Appropriate rec (2 pts each)**		**Inappropriate rec (neg 1 pt each)**		**0-4**
Best – small bowel obstruction (SBO) (2)		Adhesions			Abdominal ct		Ultrasound		
Hernia (1)		infection			Upper GI/SBFT		No follow-up		
Mass (1)									
Ileus(1)									
Intussusception (1)									
selected best? (1)									

Question 5 – (MAX 2)				
Appropriate reccomendation		**Inappropriate reccomendation**		**0-2**
Surgery Consult(2)		Any other study (-1)		

GRAND TOTAL SCORE

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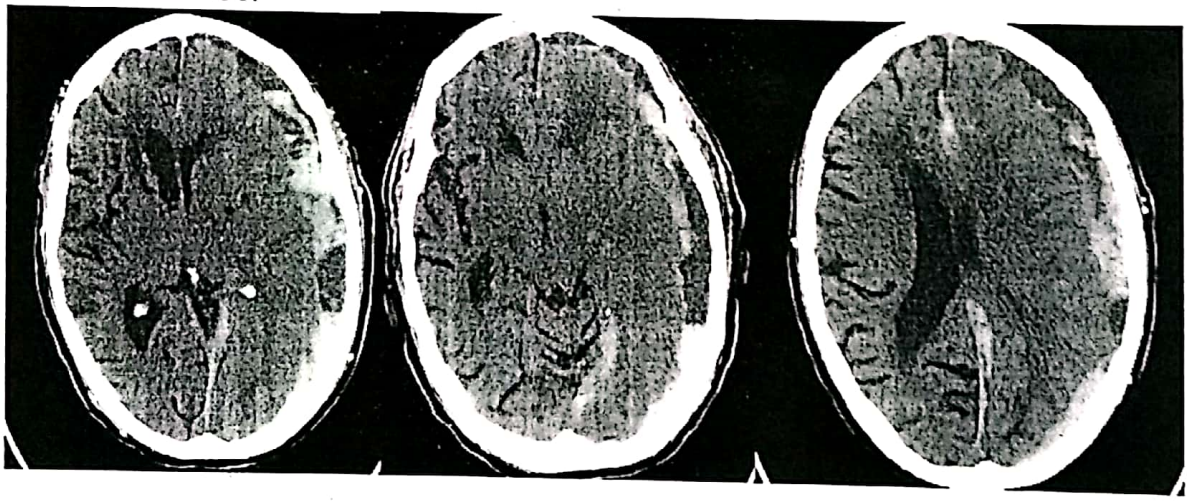
DEPARTMENT OF RADIODIAGNOSIS

OSCE IMAGE 3 **Student name: _____**

A 79 year old nursing home resident with symptoms of urinary obstruction was transferred to the hospital for evaluation for possible trans-urethral prostatectomy. He fell in his room and had altered mental status. Past medical history includes hypertension, atrial fibrillation, multiple prior TIA's, depression, hypercholesterolemia and diabetes. Medications include a beta-blocker, coumadin, an anti-depressant, a statin, and insulin. Past surgical history includes appendectomy, cholecystectomy and inguinal hernia repair. His blood pressure is 200/110, his pulse is 85 and his temperature is 98.6. You order a head CT.



1. WHAT will you list as the clinical indication?

_____

2. DESCRIBE the findings including pertinent positives and negatives on the images.

_____

_____

_____

3. WHAT diagnoses would you consider (list as many as seem appropriate)?
Circle the diagnosis you think is most likely

_____

_____

4. WHAT would you do next in terms of imaging (the answer may be "nothing")?

_____
_____

5. What is the benefit of getting a CT over an MRI as an initial test from the Emergency room in a patient with a neurologic complaint such as headache.

_____
_____

OSCE SCORE SHEET: CASE NUMBER-3	Student:

QUESTION 1- (MAX 5)

Pertinent history (1)		**Extraneous Hx (-1)**		**0-5**
79		Depression		
male		Cholesterol		
Altered mental status		Meds except Coumadin		
Fall		Pulse		
Coumadin		temp		
BP/HTN		Surgeries		
DM				
AFIB				
TIA's				

QUESTION 2- (MAX 9)

Appropriate terms(1)		**Incorrect terms (-1)**		**0-5**
Intracranial hem(2)		Mass		
Acute blood		infarct		
Chronic blood		No mention of midline shift		
Midline shift				
possible herniation				
Accurate Location/ Pertinent negatives(1)		**Incorrect Location (-1)**		**0-4**
Subdural (2)		Epidural		
No intracerebral hem		Subarach		
No obvious infarct				

QUESTION 3- (MAX 5)

Appropriate ddx		**unlikely ddx (-1)**		**0-5**
Best - Acute on chronic Subdural hem.(4)		Tumor/mass		
Subdural hemmorhage(3)		Infection		
hemmorhage(2)		edema		
selected best(1)				

QUESTION 4- (MAX 4)

Appropriate recc. (2)	**Inappropriate recc. (-1)**	**0-4**
Nothing(3)	MRI	
f/u CT after surgery/ evacuation of blood		

Question 5 – (MAX 3)

Benefits (1)		**Incorrect (-1)**		**0-3**
Quicker		Identify early stroke		
Cheaper				
Sensitive for small amount of blood				
Asses for increased ICP				

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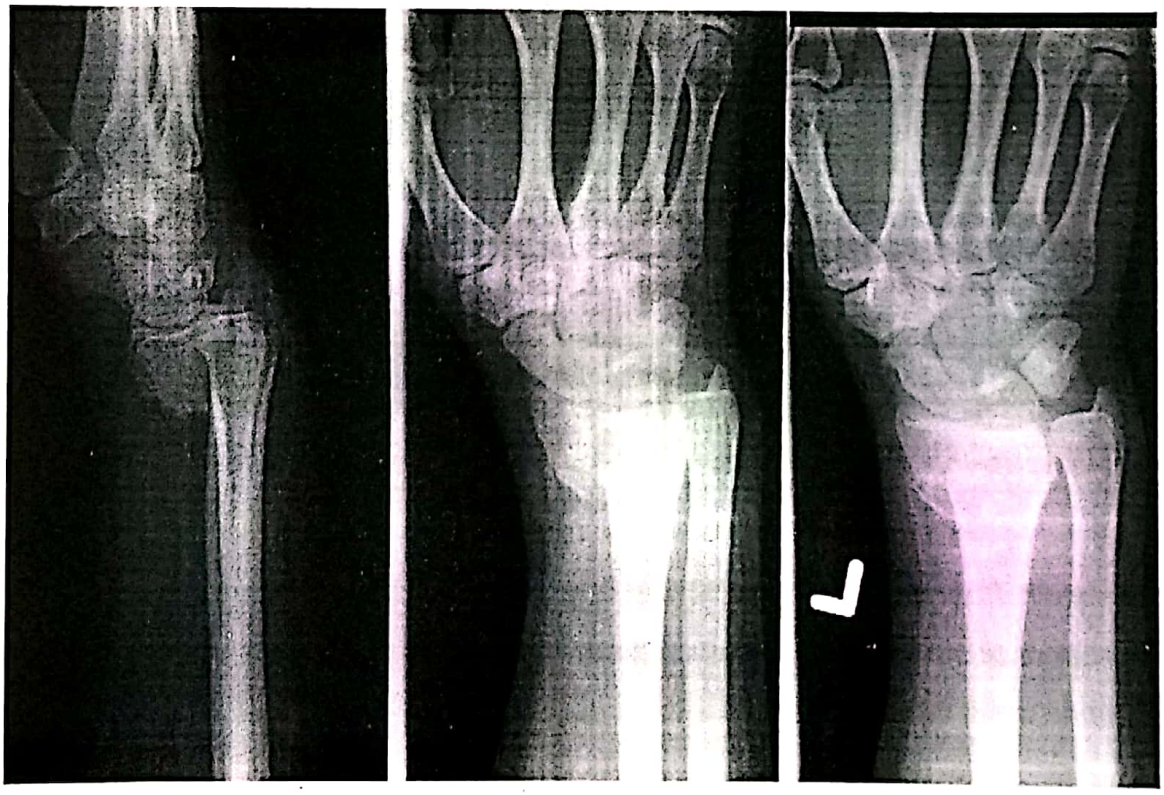
DEPARTMENT OF RADIODIAGNOSIS

OSCE IMAGE 4 **Student name: _____**

A 55 year old woman was in an altercation and cannot move her left wrist. She was inebriated at the time of the incident, which was about 1 hour before she presented to the emergency room. She cannot give a very clear history of what happened, but she has bruises on her arms and legs. Her past medical history is significant for cocaine abuse and alcoholism, for which she has been in rehabilitation on several occasions. She has hypertension and hypercholesterolemia for which she is not on any medications. Her BP is 160/90 and her pulse is 88. She is afebrile. Her past surgical history includes cholecystectomy and ventral hernia repair. You order wrist radiographs.



1. WHAT will you list as the clinical indication?

_____

2. DESCRIBE the findings including pertinent positives and negatives on the images.

_____

_____

_____

3. WHAT diagnoses would you consider (list as many as seem appropriate)?
Circle the diagnosis you think is most likely

_____

_____

4. WHAT would you do next in terms of imaging (the answer may be "nothing")?

_____

5. WHICH test would be best If this patient needed more advanced imaging for better evaluation of ligamentous structures. What is the relative cost of this type of imaging in comparison to an x – ray.

OSCE SCORE SHEET: CASE NUMBER-4	Student:

QUESTION 1- (MAX 5)					QUESTION 2- (MAX 8)				
pertinent history(1)		**extraneous hx(-1)**		**0-5**	**appropriate terms(1)**		**incorrect terms (-1)**		**0-5**
55		Htn			Fracture(3)		Comminuted		
female		Surgeries			Transverse		Intraarticular		
Immobility		Etoh			Displaced				
Bruising		Cocaine			Volar disp distal fragment				
Time of injury					palmar				
					angulated				
					accurate location/ pertinent negatives(1)		**incorrect location (-1)**		**0-3**
					Distal radius		Ulna		
					Not intrarticular		Proximal		
					Not comminuted		dorsal		

QUESTION 3- (MAX 5)					QUESTION 4- (MAX 4)				
appropriate ddx		**unlikely ddx(-1)**		**0-5**	**appropriate rec (2)**		**inappropriate rec (-1)**		**0-4**
Smith fx(4)		Anything but fx			Post reduc x-ray		MRI		
Distal radial fx(3)		Ligamentous injury			Imaging for abuse				
					nothing				
selected best (1)									

QUESTION 5 - (MAX 3)

TEST/ COST		**0-3**
MRI (2)		
Arthrogram(2)		
High cost (1)		

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DEPARTMENT OF RADIODIAGNOSIS

OSCE IMAGE 5 **Student name: _____**

A 95 year old male is in the hospital for fever of unknown origin, admitted from an assisted living facility. He pulled his NG tube out on the way to the hospital. He has a history of prostate cancer, s/p prostatectomy 4 years ago. He has a history of CHF and several past myocardial infarctions. He has hypertension and mild chronic renal failure. He is allergic to latex. On physical exam, he has crackles at the right lung base and normal bowel sounds. His temperature on admission was 101 and he was mildly tachycardic with low BP. Initial labs suggest dehydration and urinary tract infection. A Dobhoff tube was placed for planned tube feeds. You order a portable KUB to check the tube.

1. WHAT will you list as the clinical indication?

_____

2. DESCRIBE the findings including pertinent positives and negatives on the images.

_____

_____

_____

3. WHAT diagnoses would you consider (list as many as seem appropriate)?
Circle the diagnosis you think is most likely

_____

_____

4. WHAT would you do next in terms of imaging (the answer may be "nothing")?

_____

5. What procedures done in an icu setting should always be followed up with a chest x-ray?

_____

OSCE SCORE SHEET: CASE NUMBER- 5					Student:				
QUESTION 1- (MAX 5)					QUESTION 2- (MAX 9)				
pertinent history (1)		**extraneous hx(-1)**		**0-5**	**appropriate terms(1)**		**incorrect terms (-1)**		**0-5**
95 yo		CHF			Malpositioned NGT(3)		dilated bowel		
male		past MIs			RLL opacity		other lines		
FUO		HTN			limited penetration		interstitial		
NH resident		CRF			telemetry/EKG				
recent NTG lost		dehydration							
rt base crackles									
normal BS					**accurate location/ pertinent negatives**		**incorrect location**		**0-4**
temp 101					NGT/ feeding tube right mainstem (2)		NGT/ feeding tube OK(-2)		
prostate CA					no free air				
prostatectomy					no organomegaly				
UTI									

QUESTION 3- (MAX 5)					QUESTION 4- (MAX 4)				
appropriate ddx (1)		**unlikely ddx(-1)**		**0-5**	**appropriate rec (2)**		**inappropriate rec (-1)**		**0-4**
FT R mainstem		SBO			call MD		US		
RLL pneumonia		LBO			f/up KUB		MR		
rt pl effusion		enlarged liver			f/up CXR		no f/u		
selected best?		enlarged spleen			chest CT				

Question 5 – (MAX 3)

Lines that need follow up with Chest x ray(1)		**0-3**
Intra-aortic balloon pump		
IJ/subclavian Central venous line		
Picc line		
SWAN ganz catheter		

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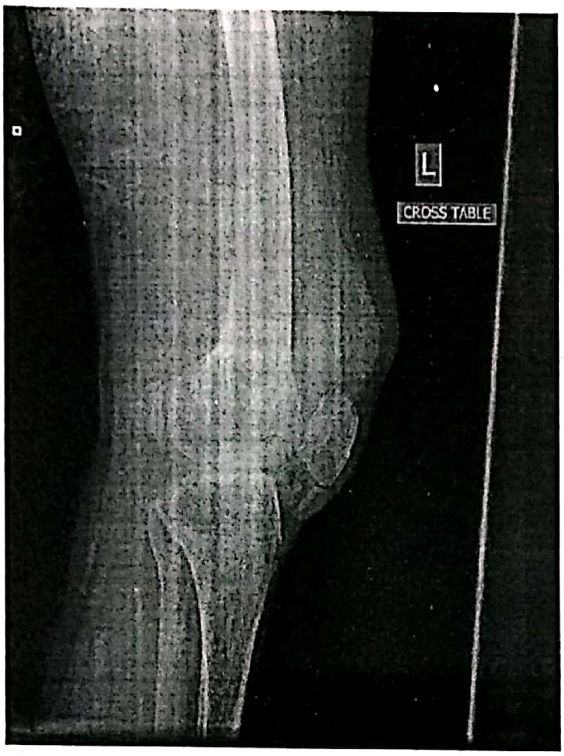
DEPARTMENT OF RADIODIAGNOSIS

OSCE IMAGE 6 **Student name: _____**

A 98 year old woman has left knee pain after falling from her walker to the floor. She has dementia and hit her head in the fall. At an outside institution, a frontal knee film was reportedly negative and she had a head CT showing atrophy but no acute bleed or other injury. She was transferred for further evaluation. She has past surgical history including appendectomy and hysterectomy and past medical history of hypertension and COPD. She smoked 2 packs per day for 35 years. She lives with a daughter at home. On physical exam her vitals are normal and she has tenderness and limited range of motion of the left knee with superficial ecchymoses. You order knee radiographs.



1. WHAT will you list as the clinical indication?

_____

2. DESCRIBE the findings including pertinent positives and negatives on the images.

_____

_____

_____

3. WHAT diagnoses would you consider (list as many as seem appropriate)?
Circle the diagnosis you think is most likely

_____

_____

4. WHAT would you do next in terms of imaging (the answer may be "nothing")?

_____

5. You are suspicious that your next elderly patient has a hip fracture, but has a negative x-ray. What are your possible next steps with imaging(the answer may be nothing)?

OSCE SCORE SHEET: CASE NUMBER- 6	Student:

QUESTION 1- (MAX 5)					QUESTION 2- (MAX 9)				
pertinent history(1)		**extraneous hx(-1)**		**0-5**	**appropriate terms**		**incorrect terms(-1)**		**0-5**
98 yo		dementia			Osteopenia(2)		fracture		
female		hit head			fat fluid level(2)		displacement		
NH rez		neg head CT			knee jt effusion(2)		angulation		
lim ROM		COPD			**accurate location/ pertinent negatives(1)**		**incorrect location(-1)**		**0-4**
ecchymoses		smoking			Suprapatellar eff		Soft tissue mass		
fall		appendect			Intraarticular fx				
prior neg xray		hysterect			no Fracture visible				
tenderness		HTN			no foreign bodies				

QUESTION 3- (MAX 4)					QUESTION 4- (MAX 4)				
appropriate ddx		**unlikely ddx(-1)**		**0-4**	**appropriate rec (2 pts each)**		**inappropriate rec (neg 1 pt each)**		**0-4**
fx left knee(3)		tumor			additional views		MR		
Intra-articular location(1)		infection			CT		US		
		hematoma							

QUESTION 5 – (MAX 3)				
Appropriate next test (1)		**Inappropriate (-1)**		**0-3**
MRI		nothing		
CT				
Bone Scan				

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Department of Radio-Diagnosis

Barium Swallow

Introduction
Barium swallow is the contrast study from oral cavity upto the fundus of the stomach.

Objectives
By the completion of this module, the student will be able to:
Indications and complications of barium swallow
Communicate to the patient about the procedure
Know the correct technique of barium swallow

INDICATIONS
1. Dysphagia and obstruction.
2. Pain during swallowing.
3. Assessment of mediastinal masses.
4. Assessment of left atrial enlargement.
5. Pre-op assessment of carcinoma bronchus and oesophagus.
6. Motility disorders of oesophagus, E.g.: Achalasia and diffuse oesophageal spasm, scleroderma.
7. Assessment of site of perforation.
8. Zenker's diverticulum and cricoid webs. In these cases water soluble contrast media are used. E.g. : Gastrografin or dionosil aqueous.

RELATIVE CONTRAINDICATIONS
• Tracheo oesophageal fistula. • Perforation.

CONTRAST
• 100% Barium sulphate paste.
• 80% Barium sulphate suspension.
• 30% Barium sulphate suspension for high kV technique.
• 200-250% high density, low viscosity for double contrast study.

Equipment required
Ba suspension
Sterile gloves
White coat/uniform
Blue sheet under the patient

Procedure

Explain procedure to patient

Obtain required equipment

TECHNIQUE Pharynx

One mouthful (about 10-15 ml) of contrast media (Barium sulphate paste) is given and fluoroscopic observation of the act of deglutition is observed in frontal and lateral view with the patient erect. To get optimum distension of the pharynx, exposure is triggered at the time when the hyoid bone is at the highest point during swallowing. For this, a string is tied just above the level of the larynx. The rotor is kept running and patient is asked to swallow. Exposure is released when the larynx comes above the string. Lateral film is taken in erect and frontal film in supine position.

To Get Optimum Mucosal Coating

One mouthful of contrast media (Barium sulphate paste) is given to the patient and the patient is instructed to swallow once and stop swallowing there after. Spot films are taken in frontal and lateral projections (better way is to ask patient to keep mouth open or say eee.... eee.... after one swallow) or patient performs valsalva maneuver in erect position with nose closed. Frontal and lateral spots are taken to show distended pyriform sinuses and valecullae.

Oesophagus

Single Contrast

Multiple mouthfuls of 80% w/v Barium suspension are given. Follow the barium bolus down the oesophagus and observe the peristalsis always in supine position. Films are exposed in erect position RAO, LAO, frontal and lateral views when the oesophagus is well distended. In RAO position esophagus is projected clear of the spine.

The escape of contrast at the level of the diaphragmatic hiatus should not be confused for reflux. Mucosal film is taken in RAO after the oesophagus is empty. Then the fundus of the stomach, & G-0 junction are assessed with spot films in different obliquities in erect and recumbent positions.

Double Contrast

Barium contrast should be high density, low viscosity (200 to 250%). 15-20 ml Barium is given in the mouth and the patient is asked to swallow. Then effervescent powder is given with another mouthful of barium. In erect position, gas tends to stay up, resulting in adequate distension which stays for longer time as compared to supine position. Prone position also retains more gas within the oesophagus and gives adequate distension.

Hypotonia using Buscopan or Glucagon keeps the esophagus distended for a longer time (Inj. Buscopan 2ml LV. given just before the procedure). Filming is done in frontal, lateral, RAO and LAO. Introduction of gas for double contrast studies can also be done through a tube passed into the upper oesophagus.

COMPLICATION

1. Leakage of barium from an unsuspected perforation-granuloma formation.
2. Aspiration.

Skill assessment:

i. Formative: Demonstration of successful procedure in a mannequin with demonstration of all precautions (5 times).

ii. Summative: Demonstration in patients (5 times each)

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Department of Radio-diagnosis

Dacrocystography

Introduction

Dacrocystography is a procedure by which nasolacrimal duct system is opacified by injecting contrast media into it.

Objectives

By the completion of this module, the student will be able to:
Indications and complications of dacrocystography.
Communicate to the patient about the procedure
Know the correct technique of dacrocystography.

INDICATIONS

1. Epiphoria

2. Obstruction-Canalicular, Nasolacrimal duct

3. Chronic dacrocystitis

4. Fistula

5. Tumors

6. Diverticula

7. Dacrolith

8. Before any intervention to nasolacrimal tract

Contraindication

Acute infection.

Equipment required

- Lacrimal canula or 18G blunt needle with polythene catheter. [outside diametre 0.63 mm]
- Contrast

- Lipiodol (Better opacification but more chances of granuloma formation)

- Ionic/Non-ionic contrast media.

• 2cc syringe

• Local anaesthetic drops-Lignocaine 4%

• Punctum dilator (Nettleship dilator)

• Cotton tipped applicator

Procedure

TECHNIQUE

Preliminary anteroposterior, lateral and oblique views are obtained to exclude radio-opacities that might interfere with interpretation. Local anaesthetic drops are instilled. Lower end of lid is everted to locate lower canaliculus at the medial end of lid. Inferior punctum is dilated and inferior canaliculus canulated with lacrimal canula. Upper punctum is occluded with cotton tipped applicator. 2-3ml of contrast is gently injected to opacify the entire nasolacrimal apparatus.

It is essential not to advance the catheter more than 3-4 mm into the canaliculus.

COMPLICATIONS

• Contrast extravasation
• Granuloma formation (with lipiodol) • Injury to canaliculus (perforation)
• Infection

Skill assessment:
i. Formative: Demonstration of successful procedure in a mannequin with demonstration of all precautions (5 times).
ii. Summative: Demonstration in patients (5 times each).

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Hysterosalpingography

It is the procedure in which the contrast is injected into the uterus to study the uterine cavity and fallopian tubes.

INDICATIONS

1. Infertility:

• To demonstrate patency of the fallopian tubes and their communication with the peritoneal cavity. The causes of tubal blockage are obstruction following tubal infection, fimbrial adhesions, tubal pregnancy, tumour and sterilization procedures. Poor operative technique and tubal spasm may give false appearance of tubal blockage.

• Prior to artificial insemination.

2. Recurrent abortions: To demonstrate congenital abnormalities of the uterus or incompetence of the internal os of the uterus.

3. Following tubal surgery: To monitor the effect of tubal surgery. For example, to confirm tubal occlusion in a sterilization procedure or to demonstrate patency and length of falloplan tubes after surgical intervention to restore patency of pathologically obstructed tubes.

4. Migrated IUCD.

5. Uterine and tubal lesions like tuberculosis, submucous fibroids, polyps, synechiae.

CONTRAINDICATIONS

• Active Pelvic Sepsis.

• Sensitivity to contrast media.

• Recent dilatation and currettage.

• Pregnancy.

• The week prior to and the week following onset of menstruation.

• Severe renal or cardiac disease.

• Cervicitis/purulent vaginal discharge.

EQUIPMENT

Contrast Media: Water soluble. For example, Urograffin 60%, Conray 280, Trivideo 280. Volume 10-20 ml. (Average volume 5-6 ml, in nulliparous women 3-4 ml, if there is hydrosalphyx > 10 ml).

20 cc syringe.

Canula: Leech Wilkinson, Jarcho type, Spackman. Uterine sound and dilator.
Sims speculum.

Tenaculum: Trauma is less, so ideal for nulliparous women. (Vulsellum forceps can also be used but trauma is more). Fluoroscopy unit with spot film devices.

PROCEDURE

Ideal Time of Procedure: Between 8th and 10th day of menstrual cycle, i.e., 2-3 days after stoppage of menstruation so that menstruation tissue or fluid is not carried either into the oviduct or the peritoneal cavity and the incidence of intravasation of contrast is low. Done before 12th day because oocyte undergoes meiosis during this time and is radiosensitive. Thus radiation exposure during this time should be avoided.

Patient Preparation: The patient should be advised to abstain from intercourse between booking the appointment and the time of examination unless a reliable method of contraception is used to avoid the possibility of irradiating an early pregnancy. Patient should be fasting 4 hours prior to the procedure.

Premedication: Premedication is not required in majority of the cases. When the patient is very anxious, 5-10 mg of I.V. diazeparn 30 minutes before procedure is helpful to prevent the tubal spasm which can be provoked by anxiety. Morphine and Pethidine should not be given as they stimulate the contraction of the fallopian tubes. However Baralgan, which contains analgin and pitafemone HCl in 2 ml ampoule or 0.6 mg atropine sulphate in 1 ml ampoule can be given I.V. 10 to 15 minutes before starting the procedure.

The bladder should be emptied prior to HSG. A full bladder will elevate the fallopian tubes and may cause apparent tubal blockage with the spurious radiological appearance of a hydrosalpinx.

TECHNIQUE

- Using a canula.
- Using Foley's catheter.

Using a Canula

The patient is placed in lithotomy position at the edge of the X-ray table. A speculum is introduced into the vagina and the anterior lip of the cervix is held with tenaculurn and gentle traction is applied. The canula is inserted into the cervical canal under direct vision. The speculum is then removed and patient is carefully moved up the X-ray table in supine position. Care must be taken to remove all the air bubbles from the syringe and canula before injecting, as these may mimic polyps or fibroids.

Under fluoroscopic control, 2 ml of the contrast media is injected to outline the uterine cavity. To prevent leak from the cervix, a downward traction should be kept on the tenaculurn while keeping an upward pressure to the canula.

The injection is then continued slowly governed by the patient's tolerance until the oviducts have been outlined and free intraperitoneal spill of the dye is visualised.

Filming:

- As the tubes begin to fill.
- When peritoneal spill has occurred.

Maximum X-ray screening time must not exceed 30 seconds using an image intensifier and only two X-ray plate exposures are permitted in order to minimize radiation to female gonads. (70-90 kV range)

Using Foley's Catheter

Cameron et al have described a method using 8 F Foley's catheter. The cervix is exposed with a vaginal speculum and swabbed with an antiseptic solution with the patient in lithotomy position. After the lumen of the catheter is filled with the contrast (to prevent air bubbles) the catheter is inserted through the cervical os using a cervical forceps to guide it when the ballon lies within the uterine cavity, it is gently inflated with water (2-3 ml). Before the injection of contrast, the ballon is pulled downwards against the internal os. The speculum is withdrawn and the catheter is attached to the syringe. The patient assumes a more relaxed supine position. Contrast injection and filming is same as with using a canula.

Advantages

1. No need for tenaculum thus avoiding possible cervical trauma and bleeding.
2. Ability of a single operator to control both the injection and exposure of spot films on a conventional fluoroscopic machine.
3. Much easier to obtain spot radiographs because the patient is in more comfortable position and there is no chance of obscuring anatomy with metal artefacts.
4. A "drainage" radiograph can be obtained at the end of the procedure to demonstrate the uterine cavity without the catheter creating artefacts.
5. Avoids false passage formation.

6. Avoids potential uterine perforation.

Disadvantages

1. The tip of the catheter sometimes blocks the tube on one side. This can be avoided by applying downward traction on the catheter while injecting the contrast.
2. The part of the uterus adjacent to the bulb cannot be studied. For visualization of the lower uterine segment and the cervical canal which are obliterated by balloon catheter, the balloon may be deflated gradually while simultaneously injecting the radioopaque dye.

   False positive result is seen in hydrosalpinx. False negative result is due to tubal spasm. Tubal spasm is seen in response to anxiety or injecting the contrast with pressure. To eliminate tubal spasm, sublingual nitroglycerine, general anaesthesia, narcotics, tranquillizers and adrenalin or glucagons may be given.

For peritubal adhesions HSG has high false positive rates.
Note: Lack of tubal fitting in a patient with no known tubal

surgery (or) infection is a non-specific finding on HSG. Differential Diagnosis
- Anatomic obstruction
- Technical problem

- Cornual spasm.

- Possibly mucosal plugging.

Contrast may loculate around fimbrial adhesions and mimic a hydrosalphinx.

AFTER CARE

• It must be ensured that patient is in no serious discomfort before she leaves.

• She must be cautioned that there may be mild bleeding per vagina for 1-2 days.

• For mild pain analgesics may be given.

COMPLICATIONS

1. Pain may occur at the following times :

• Using the vulsellum forceps.
• During insertion of canula.
• With tubal distension and distension of uterus.
• Generalised lower abdominal pain due to peritoneal irritation

by the contrast media.
2. Venous intravasation due to: (0.6 to 3.7%)

- Excessive injection pressure.
- Traumatization of the endometrium by the tip of the cannula.
- The examination performed when the endometrium is deficient as after curettage (or) menstruation.

3. Trauma to the uterus due to canula causing perforation.

4. Exacerbation of Pelvic Infection. [over all infection rate 0.25 to 3% after procedure]

FALLOPOSCOPY

Falloposcopy is a recent development, pioneered by Dr. Kerin of USA. In this method, a very fine flexible fiberoptic tube is guided through the cervix and uterus into each fallopian tube, thus allowing the visualization of the inner lining of the entire length of the fallopian tube. This can provide useful information about the extent of tubal damage, and the possibility for successful repair.

SONO SALPINGOGRAPHY (Sion test)
Premedication - same as above
Technique
Foley's catheter (SF) is introduced into uterine cavity with the patient

in supine position. The bulb of the catheter is inflated with 2 ml of normal saline. Transvaginal sonography of uterus with catheter insitu is performed in sagittal and coronal planes. After scanning the uterus and ovaries, the area between the comua of uterus and the ovary on one side is focused upon. A mixture of normal saline and air is pushed with moderate force into uterine cavity using a 20 cc syringe fixed to the metallic adaptor. A slight traction is given to the catheter while injecting to occlude internal os with the bulb. If the fallopian tube is patent the flow can be seen as a gush of fluid cascading past the 'surprised' ovary and this phenomenon is called the 'Water Fall Sign'. Then the same procedure is repeated with the other side focussed. When the tubes are blocked, the patient complains of acute pain in the suprapubic region and , the reflux of fluid and air is seen in the stem of the catheter. Also uterine cavity can be seen distending in case of tubal block.

Advantages

• Can demonstrate the tubal block, its site and extent with higher

accuracy and reliability. • No radiation exposure.

Disadvantages

• Individual tube evaluation sometimes become difficult.

Other Techniques

1. Harris uterine injector (HUI)
2. Angiodilator techniques
3. Jarcho type canula
4. Sheath needle catheters
5. Malmstrom vaccum apparatus
6. Spackman canula

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Intravenous Urogram-I.V.U.

Introduction

It is the radiographic examination of urinary tract including renal parenchyma, calyces and pelvis after intravenous injection of contrast media.

Objectives

By the completion of this module, the student will be able to:
Indications and complications of IVU
Communicate to the patient about the procedure
Know the correct technique of IVU.

INDICATIONS

Screening of entire urinary tract especially in cases of haematuria or pyuria.
Diseases of renal collecting system and renal pelvis.
Differentiation of function of both kidneys.
Abnormalities of the ureter.
Obstructive uropathy-IVU is the gold standard.
TB of the urinary tract.
Renal colic or flank pain.
Calculus disease.
Potential Renal Donors.
Malformation of urinary tract, e.g., polycystic disease, PUJ obstruction etc.
Neurological disorders affecting urinary tract.
Malformation of genitalia like bilateral cryptorchidism, III degree hypospadiasis, family history of urinary tract anomalies, urinary tract infection.
In girls with constant or intermittent dampness which suggests an ectopically inserted ureter, IVU is mandatory.
Anorectal anomalies.
Prior to endo-urological procedures and surgery of urinary tract.

CONTRAINDICATIONS

Iodine sensitivity.

Pregnancy.

Severe history of anaphylaxis previously carries 30% risk of similar reaction on a subsequent occasion. The risk is lower with low osmolar contrast media.

Equipment required
Iodine dye (urograffin)
Syringes 20 ml
Non sterile gloves
Iv canula
White coat/uniform
Blue sheet under the patient

PROCEDURE

- Patient is placed in supine position with pelvis at cathode side of the tube.
- A support is placed under patient's knees to reduce lordotic curvature of lumbosacral spine and provide comfort.
- A scout film is taken including the kidneys, ureters, bladder and urethral regions on a large size film.

Contrast media is injected intravenously into a prominent vein in the arm. Test injection of 1ml of contrast is given and patient is observed for 1 min to look for any contrast reactions. Then the rest of the contrast is rapidly injected within 30-60 seconds.

Cortical nephrogram is seen within 20 seconds of contrast injection. This depicts the renal parenchyma opacified by contrast. The nephrogram is made up of cortical phase due to vascular filling and a tubular phase due to contrast within the lumen of renal tubule. Density of the nephrogram depends on the dose of contrast and the peak plasma level.

The appearance of pyelogram (contrast in calyces) is seen 2 minutes after contrast injection. During its transit, it may be concentrated as much as 50 times producing a dense pyelogram.

If a kidney fails to excrete detectable amount of contrast media into collecting system, it is termed as non-visualising kidney. This does not necessarily mean that the kidney is not functioning.

COMPLICATIONS

Due to Contrast

- Minor reactions (5%): Nausea, vomiting, mild rash, light headache, mild dyspnoea.
- Intermediate reactions (1%): Extensive urticaria, facial oedema, bronchospasm, laryngeal oedema, dyspnoea, hypotension.
- Severe reactions (0.05%): Circulatory collapse, pulmonary oedema, severe angina, myocardial infarction, convulsions, coma, cardiac or respiratory arrest.

Due to Technique

- Upper arm or shoulder pain.

- Extravasation of contrast at the injection site.

Skill assessment:
i. Formative: Demonstration of successful procedure in a mannequin with demonstration of all precautions (5 times).
ii. Summative: Demonstration in patients (5 times each).

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Retrograde Pyeloureterography

It is the roentgenographic demonstration of the renal pelvis and ureter by the retrograde injection of radio-opaque material through the ureters.

INDICATIONS

1. Absent or unsatisfactory visualisation of the collecting system on IVU.
2. Unexplainedhematuria,whentheuretershavenotbeencompletely visualised by IVU.
3. Evaluating persistent intraureteral or intrapelvic filling defects on IVU.
4. Demonstrating the exact site of ureteral fistula.
5. Brushing and/or biopsy of suspected lesions.
6. Evaluating the collecting system in patients who cannot receive intravenous contrast medium

OBJECTIVES

By the completion of this module, the student will be able to:
Indications and complications of RGU
Communicate to the patient about the procedure
Know the correct technique of RGU

CONTRAINDICATIONS

• Acute urinary tract infection. ...::.....-

CONTRAST MEDIUM

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

Equipment required

- Lubricant
- Infant feeding tube
- Sterile gloves
- Iodine dye
- White coat/uniform
- Blue sheet under the patient

PROCEDURE

In the Operation theatre

• The surgeon catheterizes the ureter via a cystoscope and advances the ureteric catheter to the desired level. Contrast medium is injected under fluoroscopic control and spot films are exposed.

In the X-Ray Department

- With ureteric catheter(s) in situ, the patient is transferred from the operation theatre to the X-ray department if necessary.
- 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 loin.

Films

Using the undercouch tube

(a) Supine PA film of the kidney

(b) Both 35° anterior obliques of the kidneys. Low kVp (65-75 kVp) technique is used to visualise calculi and contrast medium.

(c) If there is pelvi-ureteric junction obstruction, the contrast medium in the pelvis is aspirated. The films are examined and if satisfactory, the catheter is withdrawn, first to 10 cm below the renal pelvis and then to lie above the ureteric orifice. About 2ml of contrast medium is injected at each of these levels and films taken.

COMPLICATIONS

1. Due to anaesthetic

• Complications of general anaesthesia.

2. Due to the contrast medium

- Contrast medium can be absorbed from the renal pelvis, giving rise to adverse reactions. However, the risks are much less than with excretory urography.
- Chemical pyelitis-if there is stasis of contrast medium.
- Extravasation due to overdistension of the pelvis.

3. Due to technique

• Introduction of infection

• Mucosal damage to the ureter

• Perforation of the ureter or pelvis by the catheter

Skill assessment:

i. Formative: Demonstration of successful procedure in a mannequin with demonstration of all precautions (5 times).
ii. Summative: Demonstration in patients (5 times each).

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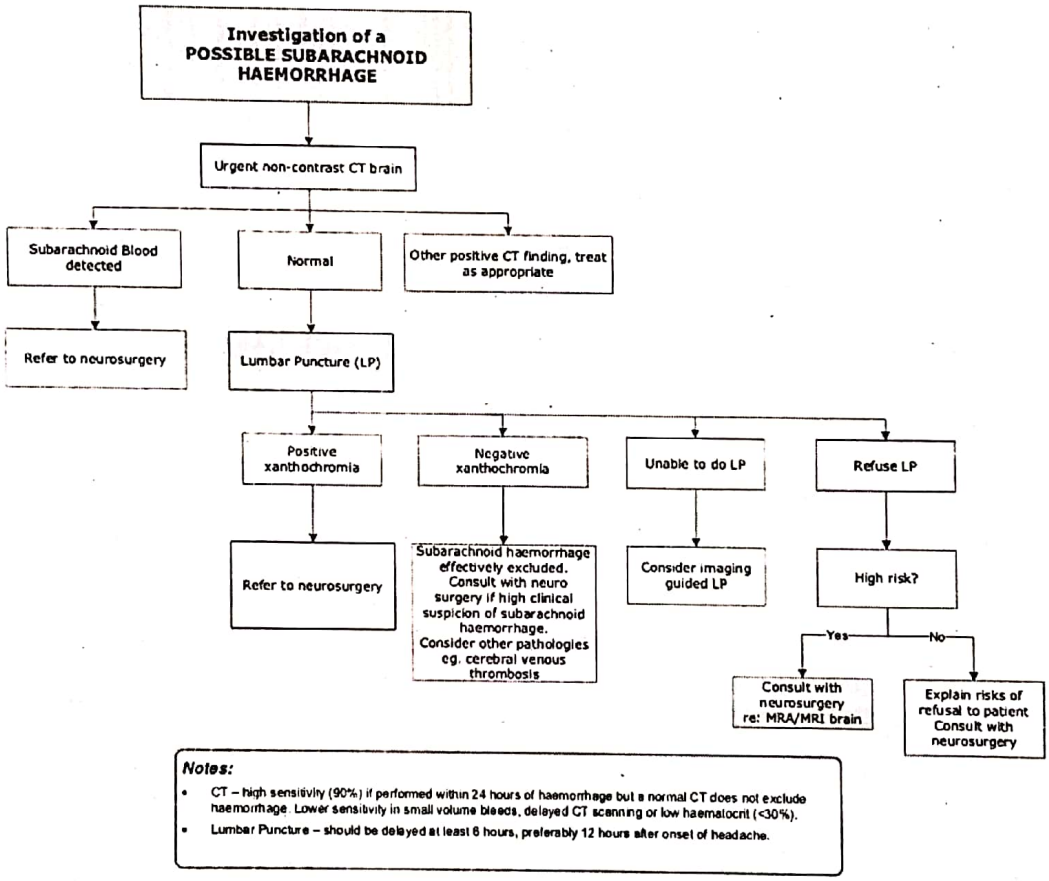
2.10 Investigation of a possible subarachnoid haemorrhage



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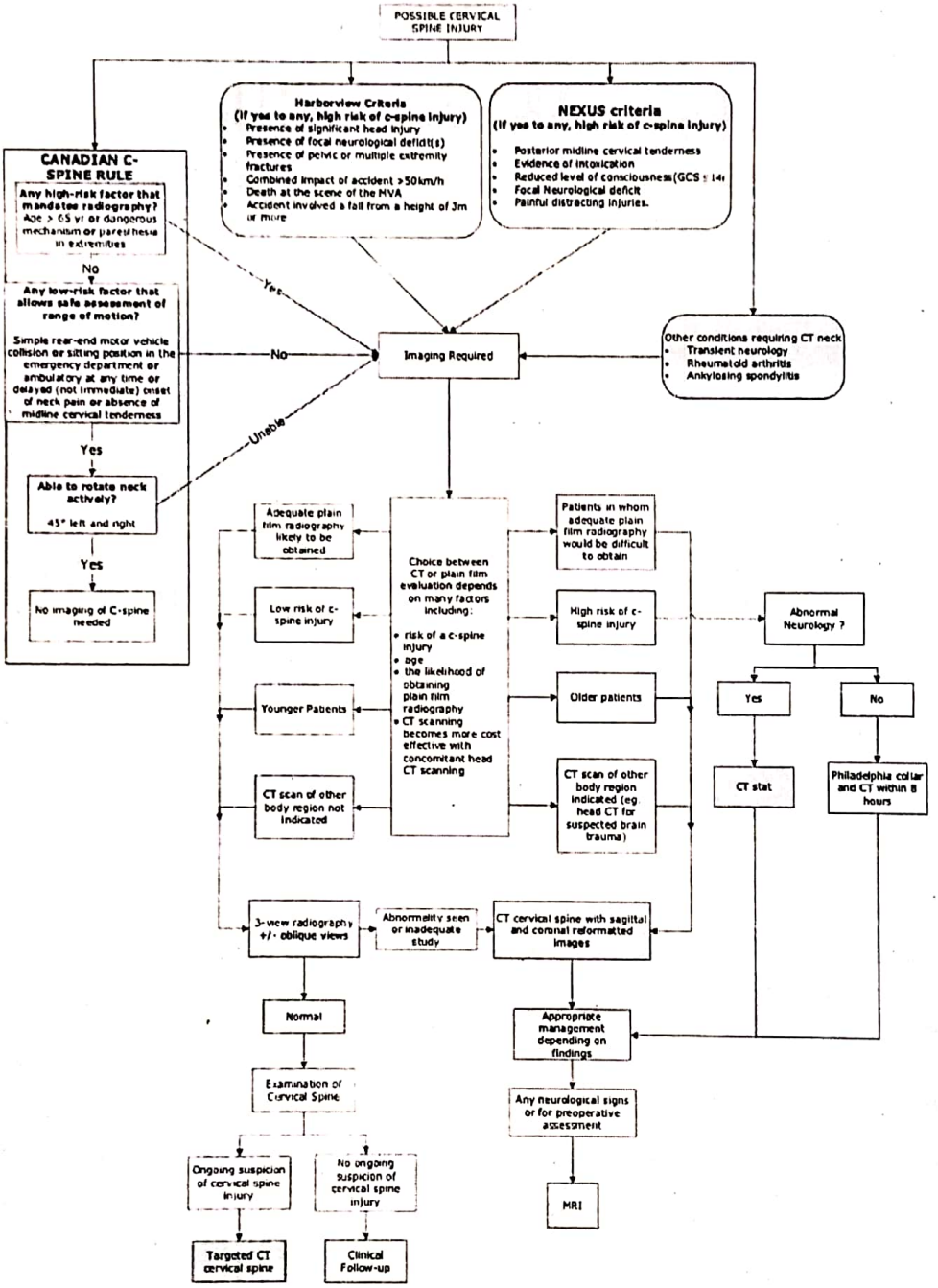
2.4 Possible cervical spine injury



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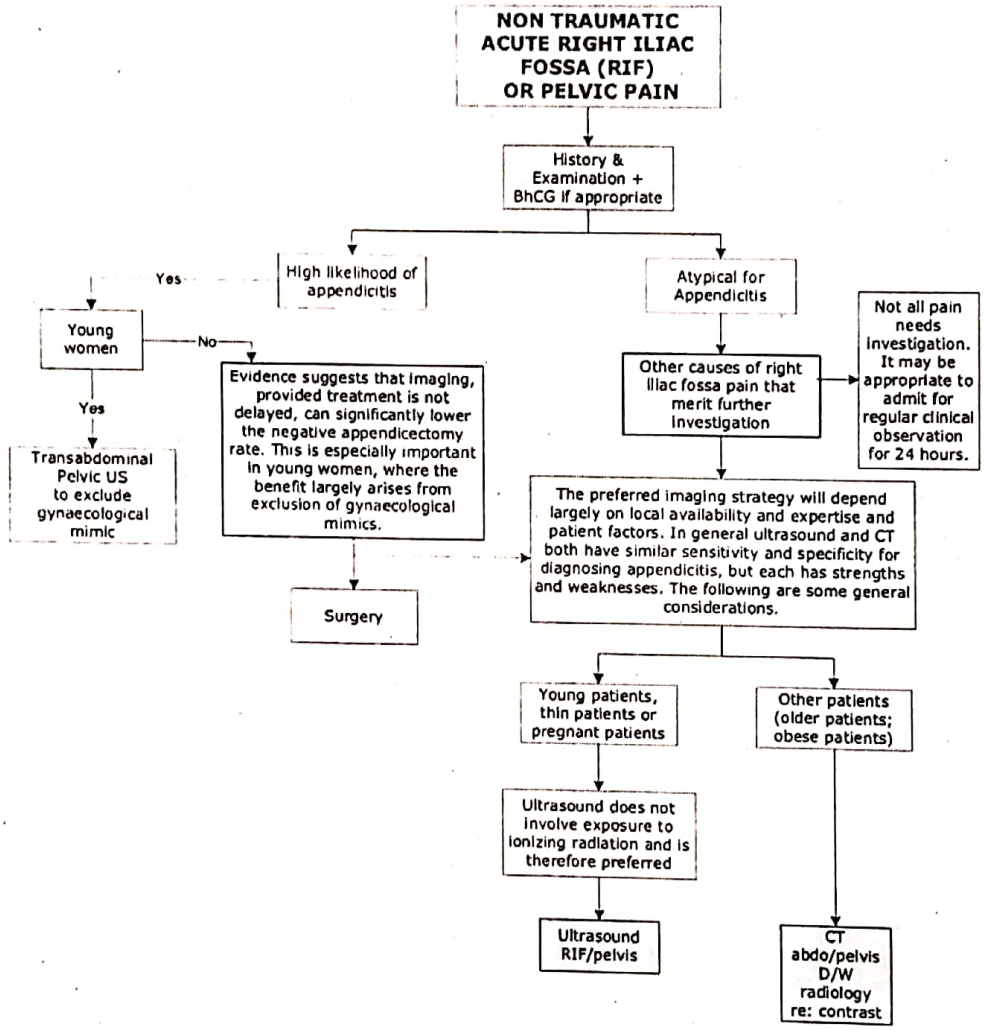
2.2 Non traumatic acute right iliac fossa (RIF) or pelvis pain



Notes:

- Males 16-40 and females < 16 may not need imaging, but advise early surgical referral.
- Early surgical review is best practice – imaging should not be used as a substitute for review nor used to delay review.
- Causes of acute RIF pain include appendicitis, mesenteric adenitis, inflammatory bowel disease, right sided diverticulitis, omental torsion/infarction, renal colic
- Causes of acute RIF pain in women include ectopic pregnancy, pelvic inflammatory disease (PID), ovarian or ovarian cyst complication, rupture/haemorrhage, and endometriosis.
- US – sensitivity: 75-90%, specificity: 78-100% for appendicitis. No radiation. Good for gynae pathology. Operator dependent. Reduced value in larger patients.
- CT – sensitivity: 76-100%, specificity: 83-97% for appendicitis. Good for obese patients and for identifying alternate diagnoses. May require intravenous and/or oral contrast. Reasonably high radiation dose.

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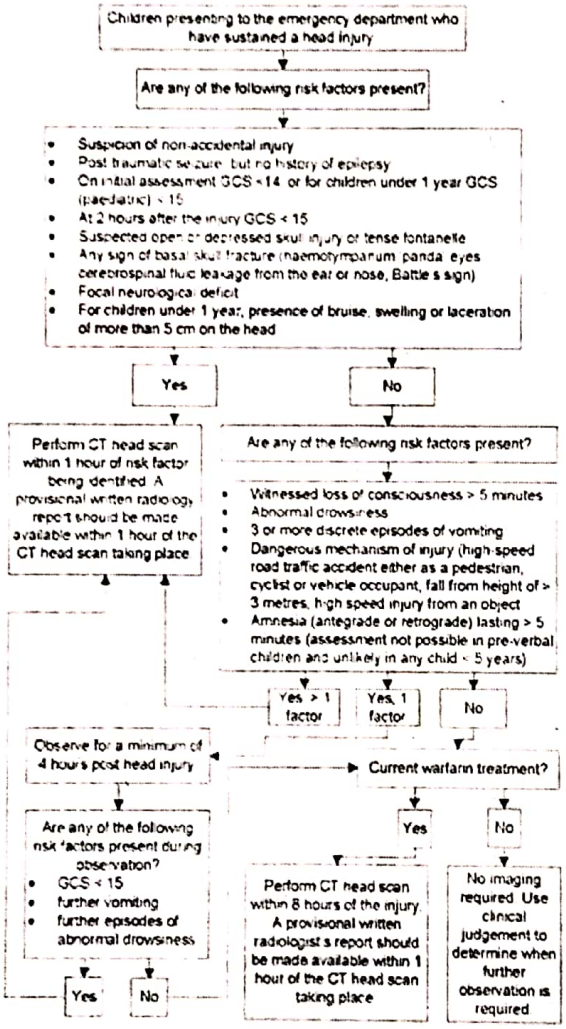
Figure 4. Selection of children for a CT head scan[15]



National Institute for Health and Care Excellence. *CG 176 Head Injury: Triage, assessment, investigation and early management of head injury in children, young people and adults*. London: NICE, 2014. Reproduced with permission.

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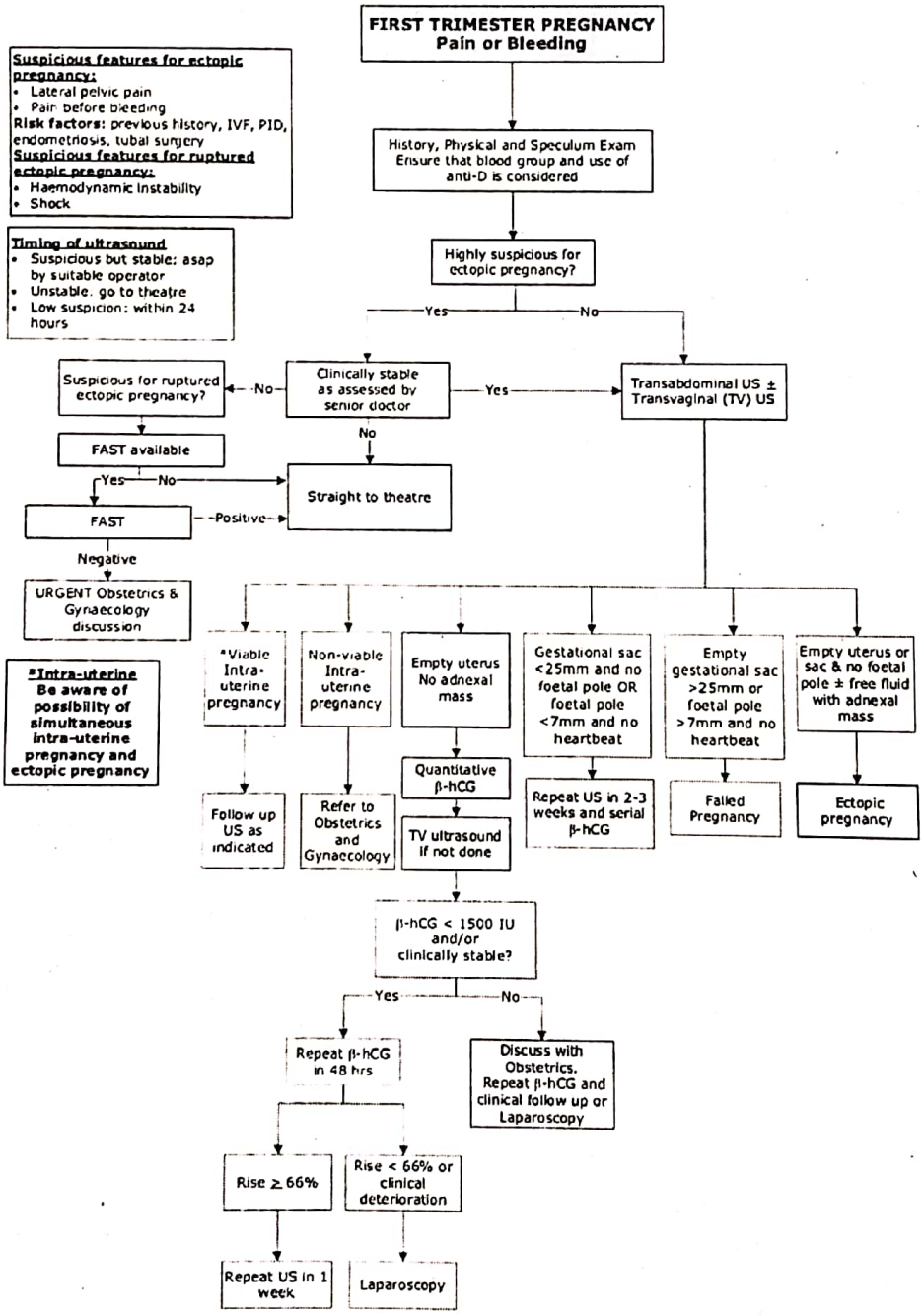
2.5 First trimester pregnancy – pain or bleeding



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