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Paper:- MRI procedure

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Q2 Indication and Contraindication for MRI Liver and Liver anatomy (diagram)?

Answers

Indication:

- > Evaluation of diffuse liver disease such as haemochromatosis, haemosiderosis, fatty infiltration.
- > Detection of focal hepatic lesions: metastasis, focal nodular hyperplasia, hepatic adenoma.
- > Lesion characterization, e.g. cyst, focal fat, haemangioma, hepatocellular carcinoma.
- > Clarification of findings from other imaging studies or laboratory abnormalities.
- > Evaluation of tumor response to treatment, e.g. post-chemotherapy or surgery.
- > Evaluation of known or suspected congenital abnormalities.
- > Evaluation for known or suspected metastasis.
- > Liver iron content determination.
- > Potential liver donor evaluation.
- > Evaluation of vascular patency.
- > Evaluation of cirrhotic liver.

Contraindication:

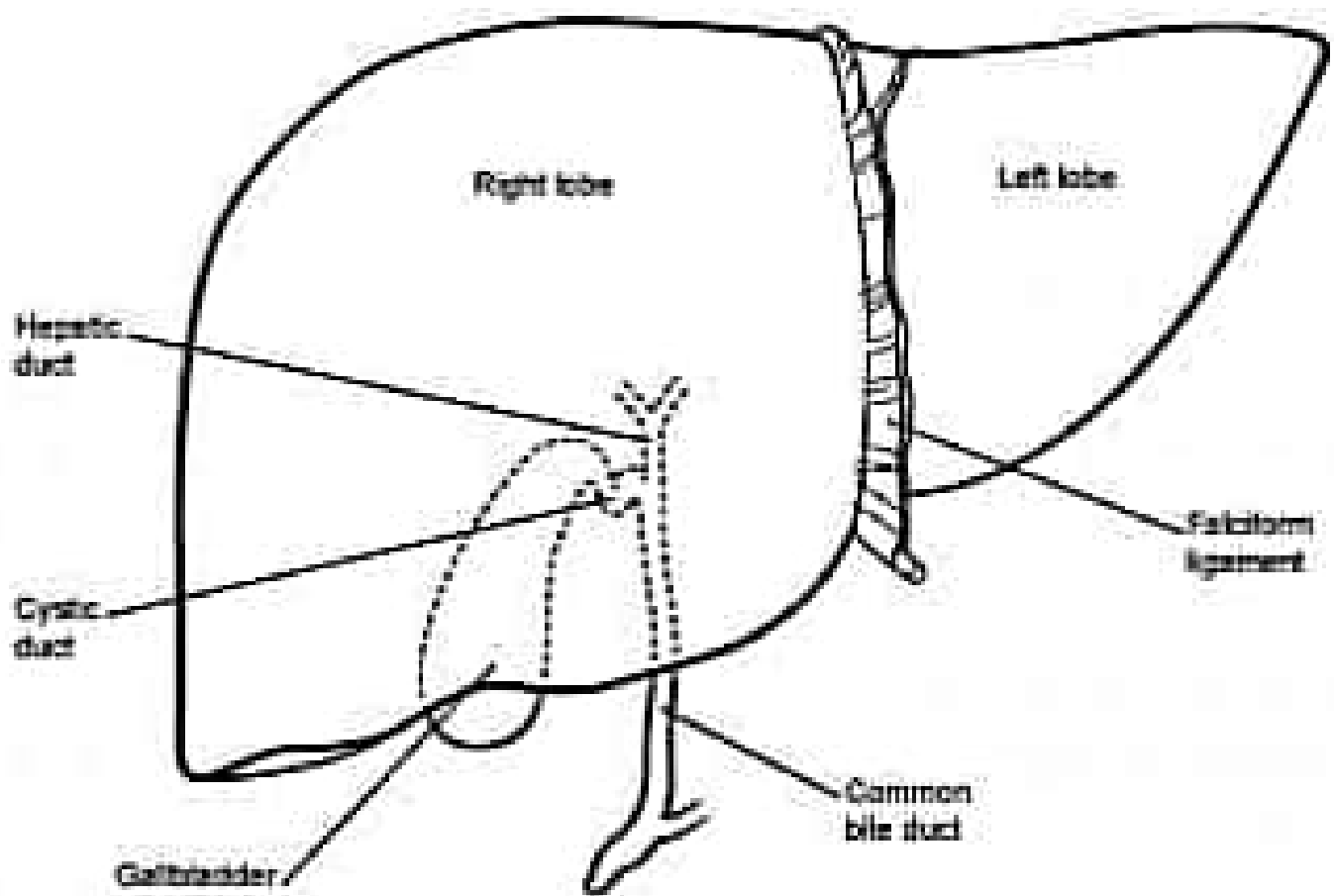
- > Any electrically, magnetically or mechanically activated implant (e.g. cardiac pacemaker, insulin pump, biostimulator, neurostimulator).

important

- cochlear implant and hearing aids)
- Intracranial aneurysm clips (unless made of titanium)
 - Pregnancy (risk vs benefit ratio to be assessed)
 - Ferromagnetic surgical clips or staples.
 - metallic foreign body in the eye.
 - metal shrapnel or bullet.

Diagram of Liver

 Liver and Gallbladder - Anterior View



Anatomy of Liver:

The liver is a large, meaty organ that sits on the right side of the abdomen. Weighing about 3 pounds, the liver is reddish-brown in color and feels rubbery to the touch.

Liver Segments and Lobules:

The liver has two large sections, called the right and left lobes.

The first segment is the caudate.

→ The right contain 4 segments.

→ The left are 3 segments.

Q1 what do you know about MRI brain, important sequences and procedure.

Answer:

Magnetic resonance imaging of the brain uses magnetic resonance imaging to produce high quality two dimensional or three dimensional images of the brain and brain stem without the use of ionizing radiation or radioactive tracers.

Important Sequences:

- 1) Localize - 3 plane
- 2) T₂-tse-tra (1) Sagittal
- 3) T₂-flair-tra (2) Coronal
- 4) T₁-se-cor (3) Axial
- 5) T₂-tse-sag
- 6) Dwi-epi trace-tra
- 7) Contrast enhancement
- 7) T₁-se-cor-post gd
- 8) T₁-se-tra-post gd.

MRI brain Procedure:

Indication of MRI brain:

- > Transient ischaemic attack (TIA), cerebrovascular attack (CVA)
- > Infection, inflammation, meningitis, encephalitis, HIV, AIDS, TB

- Cognitive decline, neurodegenerative disorders, dementia.
- Demyelinating disease, multiple sclerosis.
- Loss of consciousness, seizures, epilepsy.
- Brain tumor, metastasis, abscess.
- Cerebellar lesion, brainstem lesion.
- Congenital abnormalities.
- Post-operative follow-up.
- Vascular pathologies.
- Headaches.
- Haemorrhage.
- Trauma.
- Ataxia.

Contraindication:

- Any electrically, magnetically or mechanically activated implant (e.g. cardiac pacemaker).
- Intracranial aneurysm clips.
- Pregnancy.
- Ferromagnetic surgical clips or staples.
- Metallic foreign body in the eye.
- Metal sharpnel or bullet.

Patient preparation for MRI brain:

- A ~~star~~ Satisfactory written consent form must be taken from the patient before entering the scanner room.

→ Ask the patient to remove all metallic objects such as key, coins, wallet etc.

→ If possible provide a chaperone for claustrophobic patient.

→ Contrast injection risk and benefits must be explained to the patient before the scan.

→ Gadolinium should only be given to the patient if $GFR > 30$.

→ Offer earplugs or headphones, possibly music for extra comfort.

→ Explain the procedure to the patient.

→ Note the weight of the patient.

Positioning for MRI brains:

→ Head first supine.

→ Position the head in the head coil and immobilise with cushions.

→ Give cushions under the leg for extra comfort.

→ Centre the laser beam localizer over the labella.

Indications for Contrast enhancement brain scans:

→ Tumour, metastasis, Cranial nerve lesion, ~~inter~~ indeterminate intracranial lesion, IAC mass.

→ Cavernous ~~angiomatous~~ angioma, Amyloid angiopathy, Neurocysticercosis

→ Meningitis, Encephalitis, Leptomeningeal spread.

→ Multiple sclerosis, AVM, HIV, infection abscess.

→ Syringomyelia (Syrinx).

Q 3 How will you explain the MRI Spine. (Standard Spine Sequences and nomenclature). Draw a diagram for the disc slipcase and explain it.

Answer:

MRI Uses a magnetic field, radio waves and a computer to create images soft tissues, bones, and internal body structures. MRI of the spine allows physicians to examine the spine anatomy to rule out any structural abnormalities.

An MRI Scan provides a different kind of image from other imaging test like x-rays, ultrasound, or CT scans. An MRI of the lumbar spine shows the bones, discs, spinal cord and the spaces between the vertebral bones where nerves pass through.

→ The entire exam is usually completed within 30 to 60 minutes.

→ If contrast material is used, more images will be taken after the injection.

Standard spine sequence:-

- T₂ - weighted. Axial and Sagittal
- T₁ - weighted. Sagittal +/- axial
- STIR or T₂w fat sat. Sagittal.

Additional Sequence:-

- Axial Gradient Echo, Standard for Cervical spine.
- Trauma.
- Coronal STIR
- Axial T₁ fat Saturation for dissection.
- CSF flow imaging: cervical junction obstruction.

Disc Pathology Nomenclature:-

→ Standardization nomenclature approved in 2001

(A) Protrusion

(B) Extrusion

(C) Extrusion

- Agreed upon definition of
- Bulge
 - Protrusion
 - Extrusion.

Dis Nomenclature Summary:-

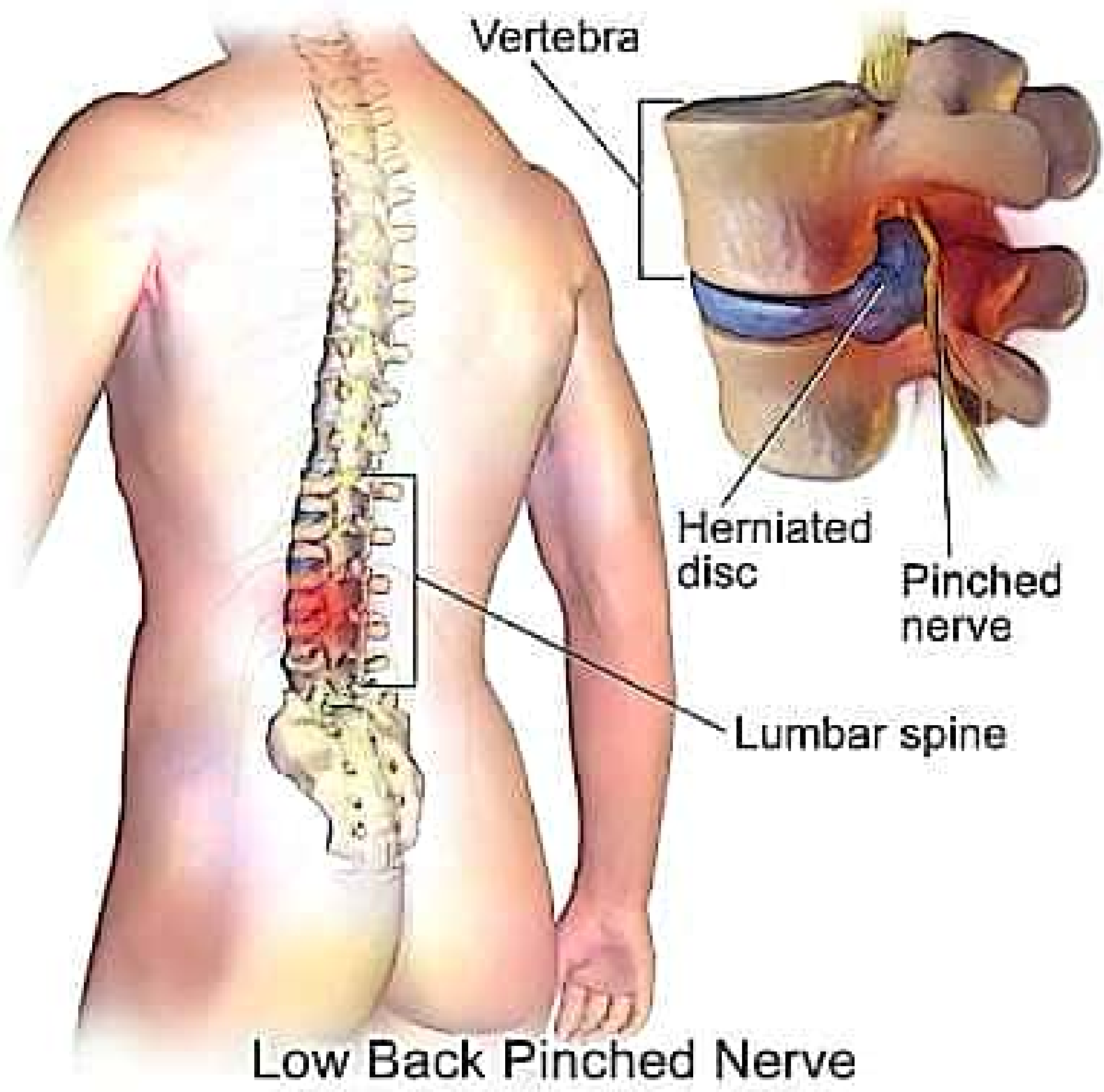
- Bulge: $> 180^\circ$ of the circumference
- Herniation: $< 180^\circ$
 - Protrusion: wide neck
 - Broad: between 90° and 180°
 - Focal: $< 90^\circ$ degree.

- Extusion: Narrow Neck.
- Migration: remain in continuity
- Sequestration: fragment no longer in continuity.

Exp Explain disc slip cases.

Injury or weakness can cause the inner portion of the disc to protrude through the outer ring. This is known as a slipped, herniated or prolapsed disc. This cause pain and discomfort. If the slipped disc compresses one of your spinal nerves, you may also experience numbness and pain along the affected nerve.

A slipped disc is when a soft cushion of tissue between the bones in your spine pushes out. It is painful if it presses on nerves.



4) What is MRA and MRU (diagram/flowchart)

Magnetic resonance arteriography and venography are minimally invasive imaging techniques that use a scanner which projects magnetic field radio waves in order to create images of the arteries and veins. These images assist in diagnosing vascular abnormalities without the use of x-ray technology. No radiation is required.

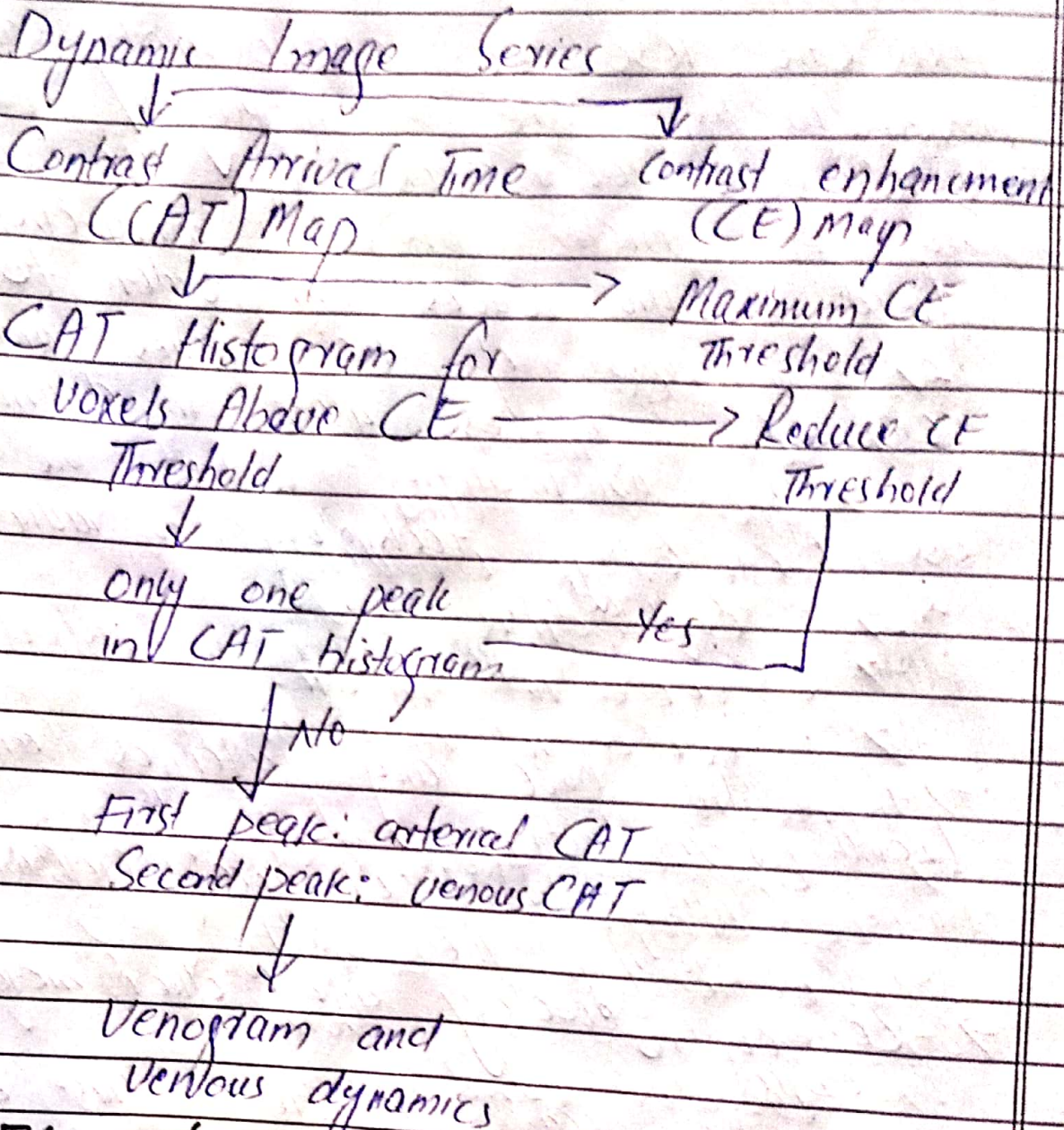
How to prepare for an MRA/MRU scan:

- If you have any allergies or are taking medication, blood thinners, have claustrophobia, or are pregnant please notify the staff.
- Remove jewelry and other metal objects.
- If the scan requires contrast dye you should not 4-6 hours before the procedure. The dye is injected through an IV.
- Coils are placed around the area that needs imaging.

What is Expect?

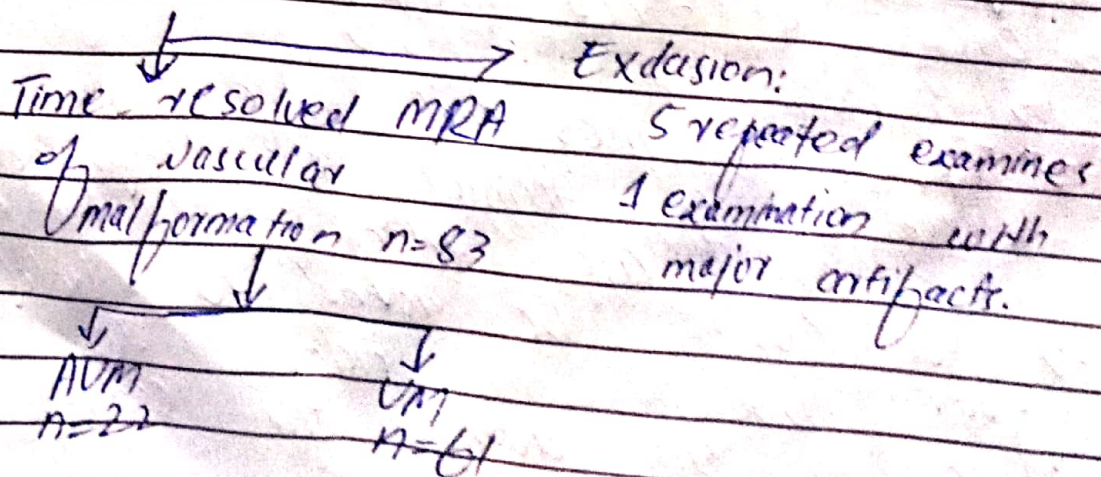
- The bed rises and moves you through the tunnel shaped machine. As images are taken.
- You may be asked to hold your breath in order to remain still during the scan.

Flow chart: MRV



Flow Chart of MRA

Time resolved MRA of vascular malformation n=89



Q 5: How you will prepare a patient for MRI knee and procedure.

Answer

Indication for knee MRI Scan:-

- > Fractures
- > Acute trauma
 - > chondromalacia
 - > Degenerative chondrosis
 - > Osteochondritis
 - > Osteochondral fracture.
- > osteochondral and articular cartilage fracture.
- > Ligaments tears, cruciate, collateral, retinacular
- > infection of bone, joints or soft tissue
- > Neoplasm of bone.
- > vascular condition

Contraindications

- > Any electrically, magnetically or mechanically activated implant.
- > Intracranial aneurysm.
- > Pregnancy.
- > Ferromagnetic Surgical clip.
- > Metallic foreign body in the eye.
- > metal bullet.

Patient Preparation:

- A Satisfactory written & Consent form must be taken from the patient before entering the scanner room.
- Ask the patient to remove all the metal objects.
- If possible provide a chaperone for claustrophobic patient.
- Explain the procedure to the patient.
- Instruct the patient to keep still.
- Note the weight of the patient.

Positioning:

- Feet first supine
- Position the knee in the knee coil and immobilise with cushions.
- Give cushions under the ankle for extra comfort.
- Centre the laser beam localizer over the lower border of patella.