SNS COLLEGE OF ALLIED HEALTH SCIENCES

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

DEPARTMENT OF RADIOGRAPHY AND IMAGING TECHNOLOGY

COURSE NAME: RADIOGRAPHY EQUIPMENT

I YEAR

UNIT X : ANGIOGRAPHY EQUIPMENT

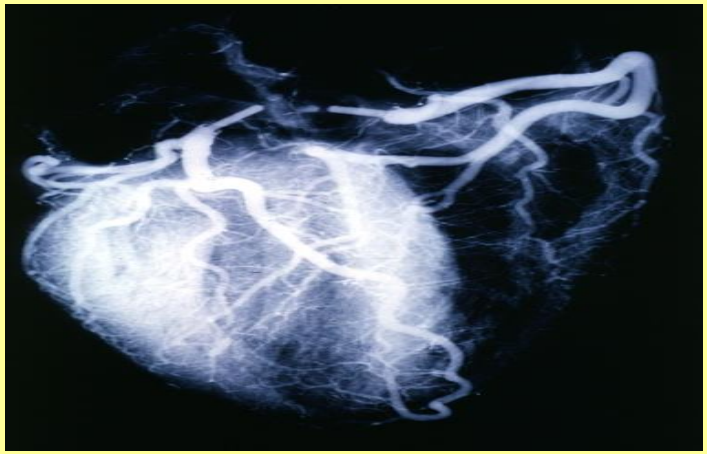
ANGIOGRAPHY

Introduction:

It is the study of **blood vessels** by injection of a contrast medium into the vessel.

This can be done in two ways:

- Direct injection of contrast with needle insitu
- Injection of contrast with catheter insitu (catheter angiography)



PATIENT PREPARATION AND PRECAUTIONS

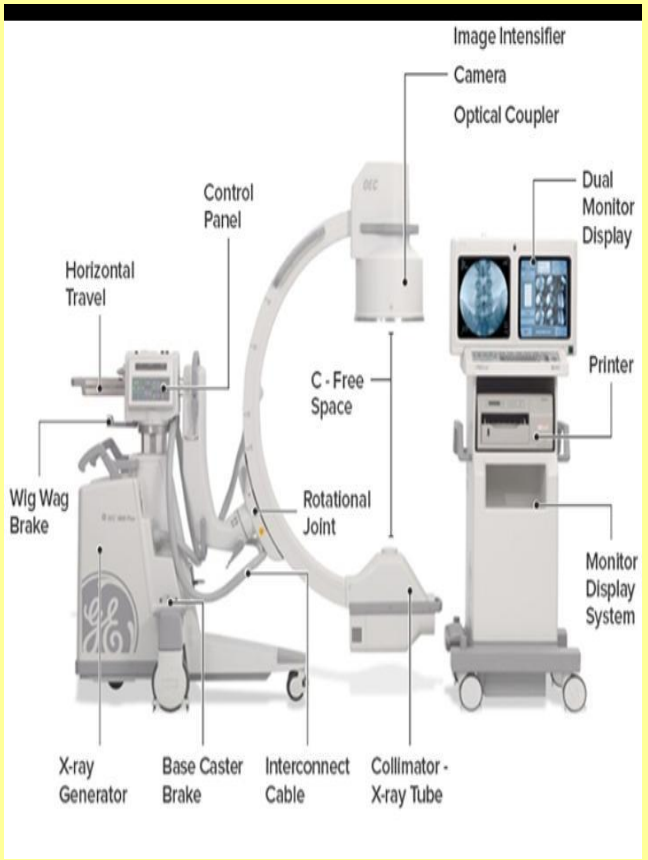
1. Careful history and clinical examination.
2. Informed consent.
3. Patient should be well hydrated.
4. Fasting 4 hours prior to procedure.
5. Shave and clean the arterial puncture
6. Xylocaine sensitivity test
7. Following investigations to be done :

- Hb% and Haematocrit and platelet count
- ESR
- HBsAg and HN
- Pulse chart
- General examination and bruits, if any, should be noted
- If patient is on Warfarin, it should be stopped 4-6 days before

- If any H/ o heparinization, heparin should be stopped 4-6 hours
- before procedure
- PTT 1.2 x control, is acceptable
- Any history of drug intake
- History of diabetes mellitus
- History of coronary heart disease

ANGIOGRAPHY EQUIPMENT

- Biplane C-arm digital imaging
- Autoinjector
- Syringes
- Control panel
- Image intensifying screen
- Sliding table
- Puncture needle, stillets and cannula
- Cruidevice
- Sheath
- catheter



X-ray tube:

Two ceiling tract mounted x-ray tubes along with a image intensified fluoroscope mounted on C-arm.

Large diameter massive anode disc (15 cm diameter, 5cm thick) to accommodate heat load.

Cathodes designed for magnification and serial radiography.

A large focal spot of 1mm for heat load.

Small focal spot(not more than 0.3mm) is necessary for good spatial resolution of small vessel magnification.

Collimators and filter for dose reduction

Pulsed fluoroscopy with a variety of frame rates for dose reduction.

Image enhancement and different image manipulations.

Generator:

High frequency and high voltage generator is used.

Couch:

Stationary couch with a floating , tilting or rotating table top.

Controls for couch positioning are located on side of table and also on a floor switch.

May also have a computer controlled stepping capability.

Image receptor:

Two types of image receptors are used they are:

Cine fluorographic camera-not used now-a-days.

Digital image receptor are used with a television camera pick up tube or CCD.

Needles:

Used for vascular access.

Its size is based on the external diameter of needle.

Allows for appropriate guidewire matching.

Guidewires:

It is used as a platform over which a catheter is to be advanced.

Once positioned guidewire is fixed and catheter is advanced until it meets the tip of the guidewire.

It is constructed with stainless steel and coated with Teflon. Usually 145cm long.

Sheath:

It is placed in line of a catheter.

it is used to introduce catheter to perform endoluminal procedure.

CATHETER:

Modern catheter are made of polyethylene, polyurethane, nylon or other plastic tubing to obtain better torque control and superior strength.

CLASSIFICATION:

Diagnostic angiographic catheter

Microcatheters

Drainage catheters

Balloon catheter

Central venous catheter

- **Uses of catheter**
- **Types of catheter**
- **Precaution**

Indications:

1. Primary vascular diseases like :
    (a) Vasa-occlusive deseases
    (b) Vasospastic disease.
    (c) Aneurysms.
2. Vascularity assessment of a tumour.
3. Investigating source of haemorrhage
4. Congenital vascular condition. E.g.: coarctation, abnormal origin of vessels etc.
5. Pre-operative definition of vascular anatomy. E.g. : Organ transplantation, Vascular tumour excision
6. Percutaneous interventional vascular procedures.

Contraindications:

1. Bleeding tendencies or anticoagulant therapy leading to a prothrombin time above 30% of the control values.
2. Pulse not palpable at the vascular access site.
3. Thrombogenic tendency.
4. Skin infections or swelling at site of entry. In case of this, alternate entry site is selected.
5. Abnormal renal function. If patient is in CRF then it is better to put the patient on dialysis after doing the angiogram.
6. Cardio Vascular diseases like recent MI, overt CCF. Contrast injection may exacerbate cardiac failure.
7. Hepatic failure.
8. History of allergy, skin rashes or asthma.
9. Pregnancy.
10. Residual barium from previous studies.

DIGITAL SUBTRACTION ANGIOGRAPHY

Digital subtraction angiography (DSA) is a special method of fluoroscopy, which gives image of the vessels that are filled with contrast

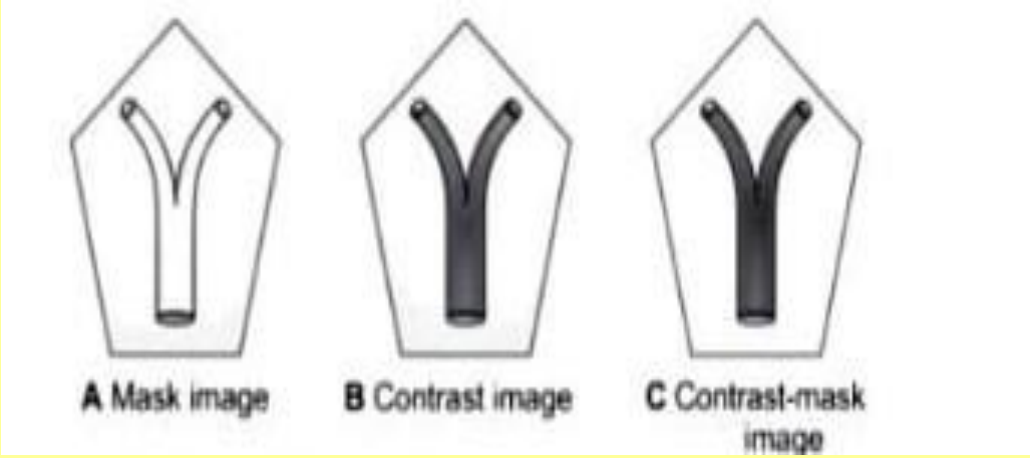
. Digital images are obtained before and after injection of contrast medium, to differentiate vascular pathology from surrounding anatomy.

THE PRINCIPLE OF DSA:

Step 1: Image of a particular anatomical region is recorded. This is called mask image (A), which shows normal anatomy of the region. It require 2 frames, the first is used to stabilize the system (technical factors) and the second frame is stored as mask image in the computer (Fig. 9.10).

Step 2: The patient is injected with contrast to fill the vessels and the image is taken. It is called contrast image (B), which shows contrast filled vessels, superimposed on the anatomy.

Step 3: The mask image is subtracted from the contrast image (B-A), by pixel by pixel basis and stored as contrast-mask image (C). This image reveals only vessels filled with contrast medium.

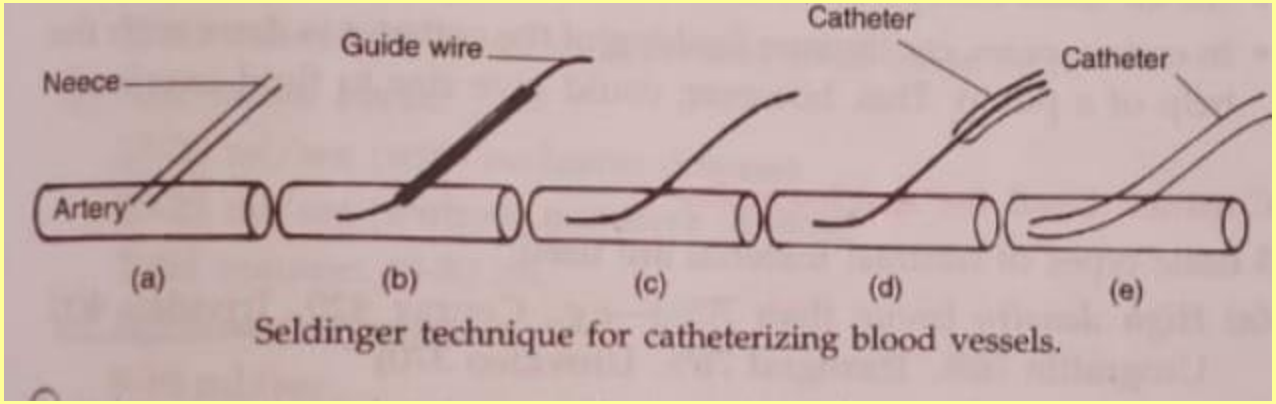


- The final image is viewed in real time. There should not be any movement of the patient during the above procedure and the images are obtained rapidly.

ANGIOGRAPHY PROCEDURE

Seldinger Needle for Arterial Puncture :

- The classic Seldinger's needle is a 3 piece needle, outer one is the 16G cannula, middle is the needle with a lumen inside which is a stillete.
- The length is 7 cms. This needle now is no longer in use.
- The recent needle consists 2 parts, outer is the lumen (18 gauge) inside is the stillete (diameter more than 1 mm).
- The needles of this type are modified COOK' s and modified POTT' s needles.



Seldinger technique for catheterizing blood vessels.

POST PROCEDURE CARE

- Bed rest
- Keep the puncture part without moving for atleast 6-8 hrs.
- Watch for any recurrence of bleeding.
- Peripheral pulses should be monitored/Vitals monitored.
- Hydrate the patient well.
- Deterioration of renal function should be watched for.


ASSESSMENT

THANK YOU