ANGIOGRAPHY

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Is the general term that describes the radiologic examination of vascular structures within the body after the introduction of aniodinated contrast medium or gas
The first angiogram was performed only months after Roentgen's discovery.

**Which was when?**

Two physicians injected chalk or mercury salts into an amputated hand and created an image of the arteries.
ANGIOGRAPHY

- It is used to assess for diseases of the:
  - Arteries (these take blood to the brain, limbs and abdominal organs)
  - Veins (these carry blood back to the heart)

These diseases may include:

1. **Atherosclerosis:** causing them to narrow.
2. **Aneurysms:** blood vessels that become enlarged with a risk of rupture.
3. **Conditions causing internal bleeding**
TYPES OF ANGIOGRAPHIC PROCEDURES

- **Arteriography**: imaging arteries
- **Venography**: imaging veins
- **Angiography**: imaging heart and associated vessels
- **Lymphography**: imaging lymphatic vessels/nodes
OTHER TECHNOLOGIES/MODALITIES
which demonstrate the vasculature to a greater or less degree

- CT Angiography
- MR Angiography
- Ultrasound (particularly Doppler)
- Nuclear Medicine

All these are used to image vessels and each has its advantages and disadvantages
PERSONNEL IN THE ANGIO ROOM

- Radiologist/ Specialist
- Nurse
- 2-3 Radiologic Technologists
- Sometimes Anesthesiologist
INDICATIONS

- Verify the presence of tumors
  - Vascularity of tumors
- Internal bleeding
- Stenosis
  - Can be caused from atherosclerosis
- Occlusions
  - Clots
  - Thrombus
  - Embolus
- Aneurysms
- Heart disease
CONTRAINDICATIONS

- Previous severe reaction to contrast
- Impaired renal function
- Impaired blood clotting factors
- Inability to undergo surgical procedure
Iodinated contrast media is used

- Can produce nausea & an uncomfortable burning sensation

Allergic reactions

- Severe: anaphylactic shock
  - Shock, rapid shallow breathing, high pulse rate

- Mild: Hives or slight difficulty breathing
WHAT ARE THE RISKS OF CONVENTIONAL ANGIOGRAPHY?

- Conventional angiography is usually a very safe procedure but because it is more invasive than MRA or CTA, the risks of complications are greater. The risks include: minor bleeding/bruising and a small risk of damage to the vessels, but the risk of serious complications is rare.

- It is possible to suffer an allergic reaction due to the contrast medium required during the test. Thankfully, they are uncommon and usually minor (mild rash or itching). More severe reactions are possible (1 in 2500 patients) and very rarely can be life threatening (1 in 25,000).

- It is important to tell your Doctor or radiographer if you have had a previous reaction to contrast medium before your test commences.
PRESSURE INJECTORS

- In most angiographic studies contrast media must be administered at a constant speed.
- Faster administration is required as in abdominal angiography.
- Slower administration in lymphangiography.
WHAT IS THIS?

- Maintains flow rate
- Includes heating device
  (To reduce the viscosity of the contrast media by keeping it near body temperature)
ANGIOGRAPHY EQUIPMENT

General angiographic room with biplane C-arm digital imaging
DSA: Digital subtraction angiography is primarily used

- **Gold standard** of vessel imaging when other modalities are inconclusive

- Now *common practice* to be considered as an area needing advanced training for:

  1. Radiologist: Interventional
  2. R. T. (CIT, CV) etc ANGIO tech
ANGIOGRAPHIC EQUIPMENT

Technical innovations
- image intensification
- three-phase generators
- rapid film changers
- automatic pressure injectors
- advanced catheter technology
An important offshoot of angiographic imaging

- therapeutic implications including
- Embolization
- intra-arterial drug therapy
- transluminal angioplasty
- are among the procedures that have radically changed and broadened the scope of the diagnostic imaging department
EQUIPMENT NEEDED FOR **Angio**

- Biplane C-arm digital imaging
- Autoinjector
- Syringes, a heating device,
- A high-pressure mechanism
- A control panel
- Image Intensifying screen
- Sliding table

Rapid film changer (NOW DIGITAL*)
- Cut film 6 & Cassette changer / magazine
ANGIOGRAPHY EQUIPMENT

1. Puncture Needle
   Stylet and Cannula
   large cannula size (1.6mm)

2. Guide Wire
   --Soft flexible wire with the strength to pass through curved vessels (.6 – 1.0)
Vascular access needles

Size based on external diameter of needle

Allows for appropriate Guidewires matching

So internal diameter must also be known
GUIDEWIRES

- 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
- Mostly constructed on stainless steel & coated with Teflon
SHORT catheters used when multiple catheters will be used

Placed in lieu of a catheter
DIGITAL SUBTRACTION ANGIOGRAPHY (DSA)

Nonsubtracted carotid angiogram

Digital subtracted carotid angiogram
**DSA**

- A subtraction mask is taken before contrast injected
- Each of digitized image is from the mask
- Images acquired form
  - 1 image every 2-3 sec
  - Up to 30 images per sec
THREE DIMENSIONAL (3-D) INTRAARTERIAL ANGIOGRAPHY
CATHETERIZATION: SELINGER TECHNIQUE

- Method of vessel catheterization
- Six step process

1. Insertion of needle (with inner cannula)
2. Placement of needle in lumen of vessel (inner cannula removed)
3. Insertion of guide wire
4. Removal of needle
5. Threading of catheter to area of interest
6. Removal of guide wire

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SEILINGER TECHNIQUE
CATHETERS AND GUIDEWIRES
CIRCLE OF WILLIS

- Region of hypophysis (pituitary gland) and sella turcica
- Middle cerebral artery
- Anterior communicating artery
- Anterior cerebral artery
- Internal carotid artery
- Posterior communicating artery
- Basilar artery (rests on clivus)
- Posterior cerebral artery
- Vertebral artery
NECK AND BRAIN ARTERIES

A. Right internal carotid
B. Right external carotid
C. Right common carotid

Right vertebral artery
Right subclavian artery
Brachiocephalic artery

MIDDLE CEREBRAL AND INTERNAL CAROTID
DSA SHOWING EMBOLIZATION BEFORE AND AFTER PROCEDURE
CAROTID AND BRAIN
CAROTID ATHEROSCLEROSIS
POSTERIOR VERTEBRAL ARTERY

- Vertebral
- Anterior spinal
- Posterior spinal
- Post. inf. cerebellar
POSTERIOR VERTEBRAL ANGIOGRAM
ANEURYSMS
Thank You