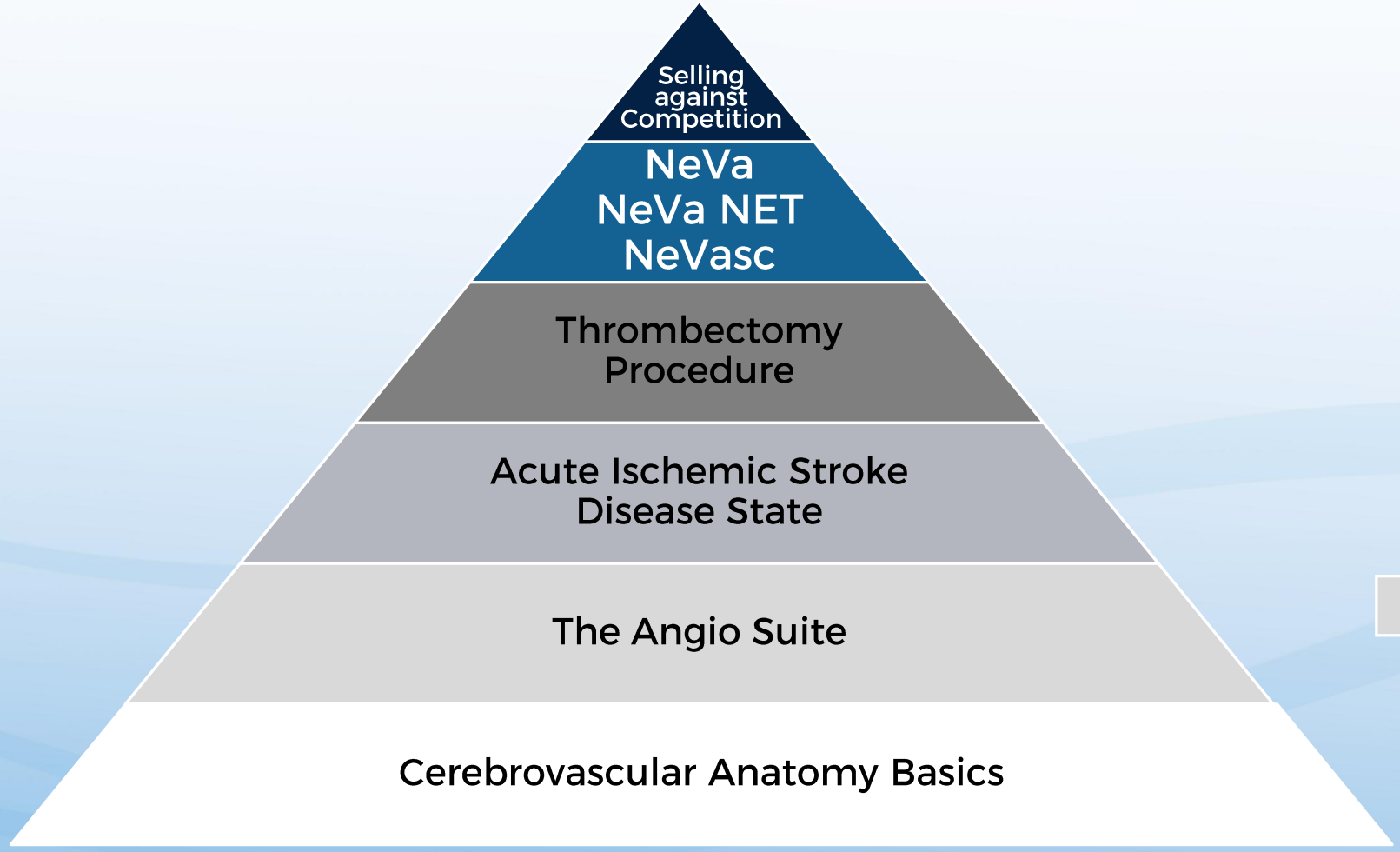
THE VESALIO AIS BASIC TRAINING PROGRAM

Designed to give you confidence & credibility in front of physicians



TODAY

THE VESALIO AIS BASIC TRAINING PROGRAM

Designed to give you confidence & credibility in front of physicians

The Angio Suite → **TODAY**

- What to expect in terms of products, people, and organization
- Basic information on imaging technologies
- Disease states that are treated in the cath lab
- Cath lab etiquette

INTRODUCTION THE ANGIO SUITE

2.1. What is an ANGIO SUITE or a CATH LAB	2.2. Imaging Basics	2.3. What happens in the CATH LAB	2.4. What gets treated in the CATH LAB	2.5. CATH LAB Etiquette
• Definition & organization of a CATH LAB • Who works in a CATH LAB • What equipment and products can be found in a CATH LAB	• A brief history of medical imaging • Anatomical position and directional terminology • CT & MRI based technologies • Angiography using fluoroscopy	• Diagnostic and interventional procedures done in the CATH LAB • What happens before, during, and after a Cerebral Angiography procedure	• Neuro Disease States • Procedures & Products	• Correct Behavior • Protection

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THE ANGIO SUITE → THE CATH LAB

is an examination room in a hospital or clinic with diagnostic imaging equipment used to visualize the arteries of the body and treat disease states related to the vascular system


Procedure room


Control Room

THE PROCEDURE ROOM

- Sterile tray
- C-arm and table
- Monitors
- Power injector
- Anesthesia equipment and cart
- Equipment storage cabinets, carts, etc.
- Radiation Shields (sometimes outside)

THE CONTROL ROOM

- Imaging control panels
- Hemodynamic monitors
- Phone
- Desk and chairs for staff

NEUROVASCULAR TEAM MEMBERS

- **Physician** (Attending, fellow, resident) does the procedure
- **Nurse** sets up the sterile field, circulates supplies, preps & monitors the patient
- **Neuro-anesthesiologist** administers anesthesia
- **Technician** operates the angio equipment
- Lab or Surgical **Assistant**

NEUROVASCULAR PHYSICIANS IN WW REGIONS

- Interventional Neuro-Radiologists – INRs
- Neurologists
- Neurosurgeons

THE STERILE TRAY

- Lead protection sterile covers
- Patient Drape
- Prep
- Scalpel
- Access kit
- Bowls
- Syringes, 1,3,10,20ml
- Flush tubing
- Needle Disposal
- Contrast material
- RHV (Rotating Hemostatic Valve), Touhy, Y-adapter
- Gauze
- Forceps
- Suture
- Catheters and wires
- Other products for the procedure

Click on image for demo video

C-ARM

An imaging device that provides high-resolution X-ray images in real time thanks to:

1. having an an image intensifier and an x-ray tube (or source) positioned directly opposite from each other
2. being capable of movement

XRII (Image Intensifier):

allows low intensity x-rays to be amplified, resulting in better images with a smaller fluoro doses to the patient

SINGLE PLANE

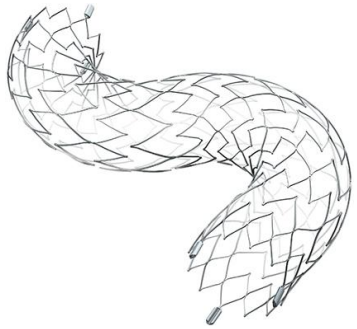
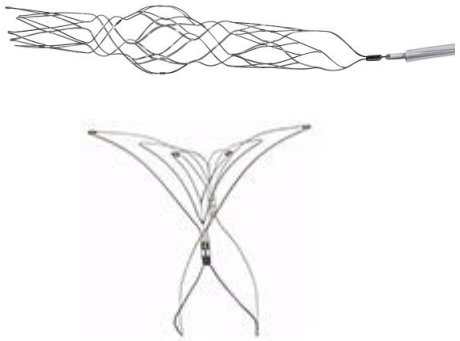
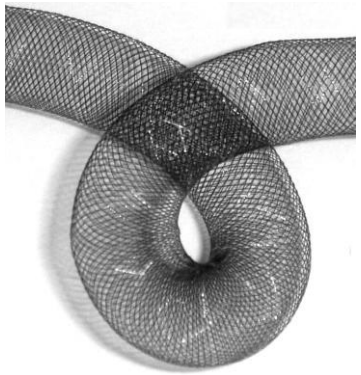
BI PLANE

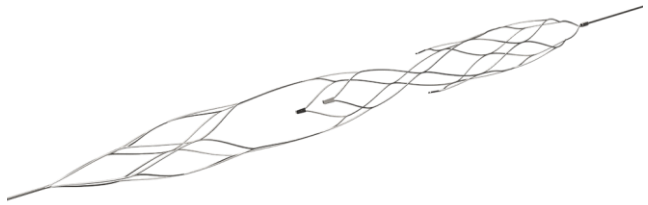
C-ARM

SINGLE PLANE
Imaging of different planes is done one at a time

BI PLANE
Multiple planes imaging simultaneously, decreases contrast load to patient.

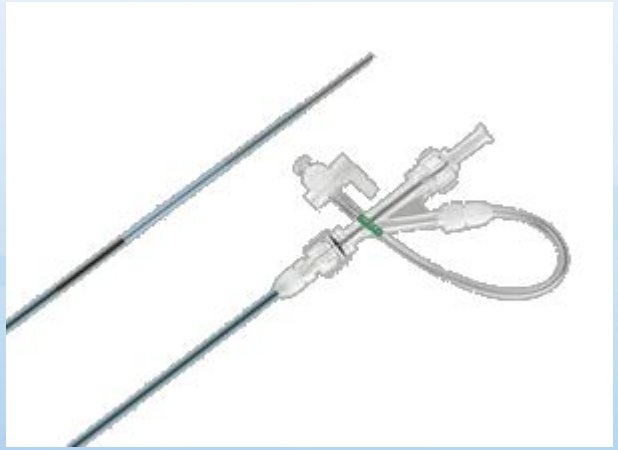
COMMONLY USED NEUROVASCULAR PRODUCTS

COIL	STENT	BIFURCATION STENT	INTRA-LUMINAL FLOW DIVERTER	INTRA-ANEURYSMAL FLOW DIVERTER
				

ONYX/ GLUE	STENT RETRIEVER	ASPIRATION CATHETER	BALLOON
			

NEUROVASCULAR ACCESS PRODUCTS

GUIDEWIRE	SHEATH	GUIDE CATHETER	INTERMEDIARY CATHETER	MICROCATHETER



RECAP

An **ANGIO SUITE** or a **CATH LAB** is an operating room with a structure including a **procedure** and a **control room** where advanced **X-Ray imaging technology** is used by **interventionalists** to diagnose and treat vascular disease states.

The main components of a procedure room that allow interventional procedures to take place are

1. The **C-Arm**, with the patient table and the monitors
2. The **sterile tray**, which carries the products relevant to the operation

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IMAGING TECHNIQUES

- CT = COMPUTED TOMOGRAPHY
- MRI = MAGNETIC RESONANCE IMAGING
- CTA = COMPUTED TOMOGRAPHY ANGIOGRAPHY
- MRA = MAGNETIC RESONANCE ANGIOGRAPHY

Non-invasive

Used for diagnosis and patient selection

- CA = CEREBRAL ANGIOGRAPHY
- DSA: DIGITALLY SUBTRACTED ANGIOGRAPHY
- ROADMAPS

Minimally-invasive

Used in the CATH LAB for both diagnostic and interventional procedures

BRIEF HISTORY OF IMAGING
FROM X-RAY TO INITIAL CEREBRAL ANGIOGRAPHY

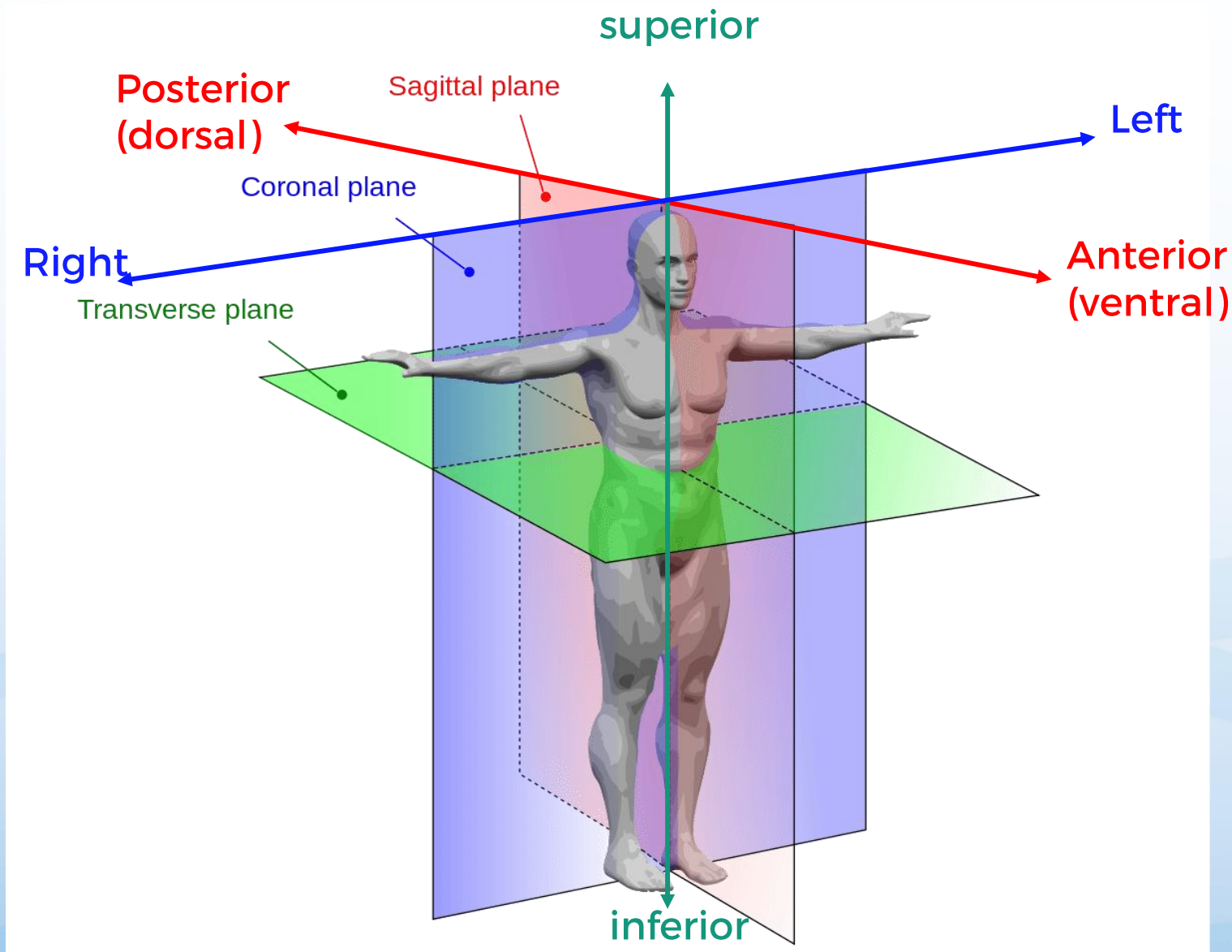
- **1895**: Wilhelm Röntgen discovered **X-rays**
- **1896**: Thomas Edison investigated materials' ability to fluoresce when exposed to X-rays, and developed **the fluoroscope** which became the standard for medical X-ray examinations
- **Skull radiographs** used in medicine but observed to cause tumors very frequently and there was difficulty in diagnosing soft-tissue changes via skull radiography
- **1918**: Dandy published on **Ventriculography using contrast agents**. Very invasive technique, but paved the way for better techniques using the same idea.
- **1921**: Guerbet developed **Lipiodol (iodized oil)**
- **1924-1927**: Neurologist Egas Moniz started practicing **Cerebral Angiography** which got accepted slowly due to its invasiveness, discomfort, and high rate of significant complications
- **1954**: Lindgren developed the **Seldinger technique** and the described **transfemoral catheterization** of the vertebral artery
- **The following decades saw the introduction of better contrast agents and equipment**

BRIEF HISTORY OF IMAGING
DEVELOPMENT OF CROSS-SECTION IMAGING

- **1961**: William Oldendorf described and built from household products a **prototype** to transmit a beam of x-rays through the head and reconstruct its image
- **1963 -1964**: physicist Alan Cormack described the **mathematic algorithm of tomographic reconstruction** without knowledge of Oldendorf's device
- **1971**: computer engineer Godfrey Hounsfield -also independently- began working on a technique to reconstruct the internal structure of a body from a number of x-ray transmission measurements resulting in development of his **"back-projection" technique**
- **1973**: **Introduction of CT** allowing direct visualization of the internal structure of the body noninvasively
- **1980s**: Introduction of **MRI**
- **1990s**: development of **multidetector CT scanners** resulted in the development of new CT applications, **CTA and CT perfusion**. Also more **rapid MR imaging**, better resolution and **3D images**

ANATOMICAL POSITION AND DIRECTIONAL TERMINOLOGY

- **Coronal Plane** → Anterior to posterior
- **Sagittal Plane** → Right to left
- **Axial Plane** → Transverse



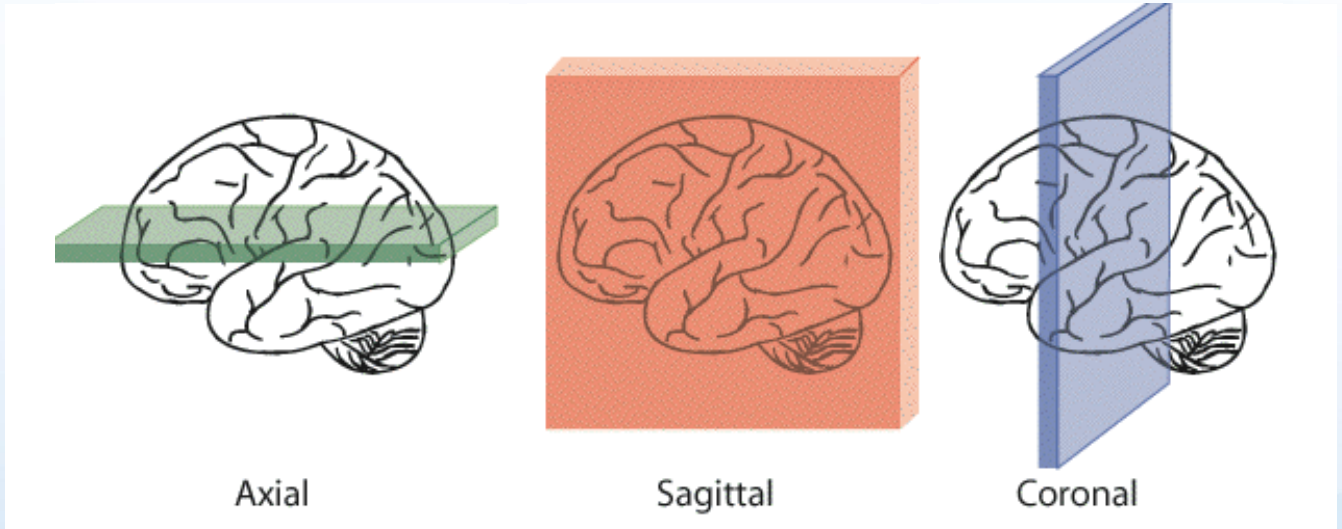
ANATOMICAL POSITION PLANES

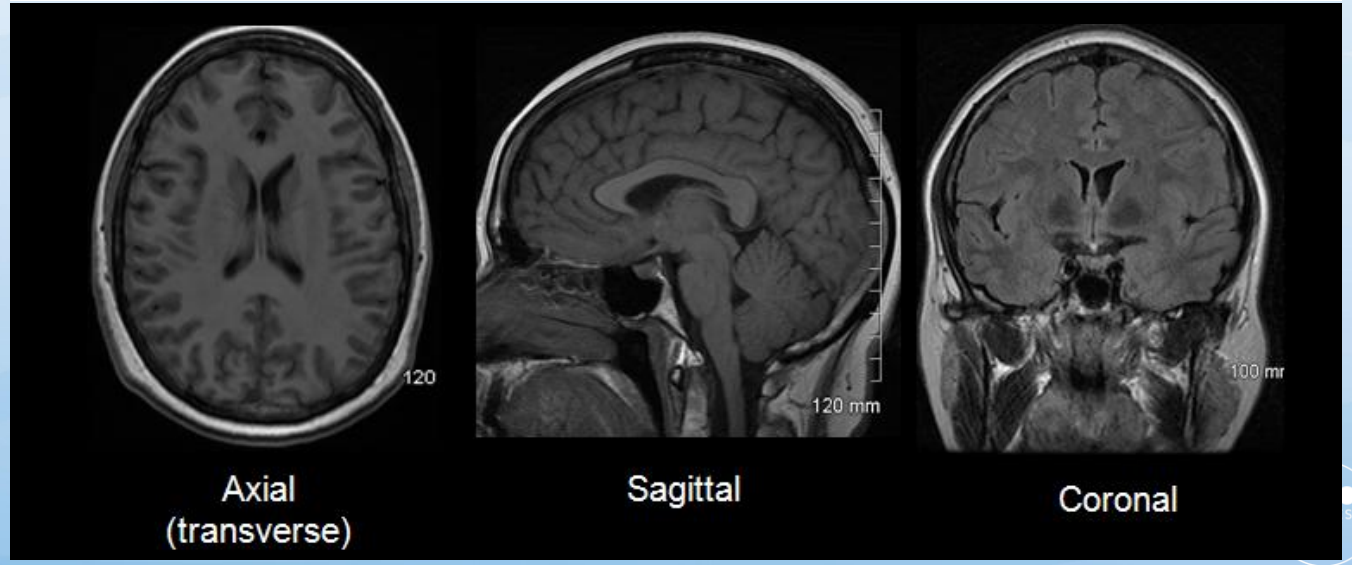
- “right” and “left” is always with regards to the patient
- In INR terminology “distal” is thought of as distal to the incision or the problem site

AXIAL
HORIZONTAL
TRANSVERSE
upper & lower

SAGITTAL
left & right

CORONAL
front & back





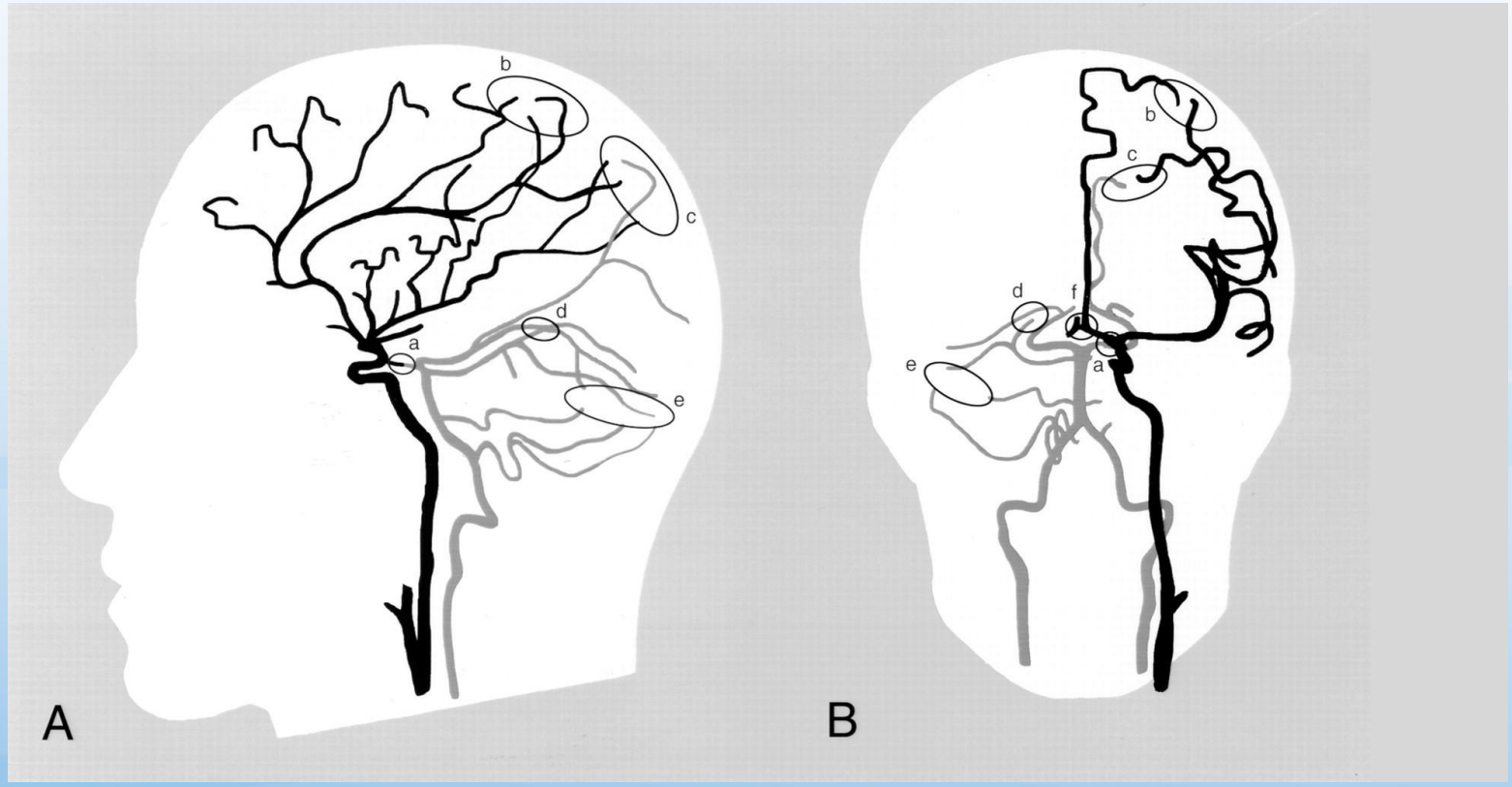
IMAGES ARE OFTEN DESCRIBED AS AP OR LATERAL

Lateral (Side to Side)

X-ray beam enters from one side of the face and exits from the other side

Anterior Posterior (AP)

X-ray beam enters anterior (front), exits posterior (back)



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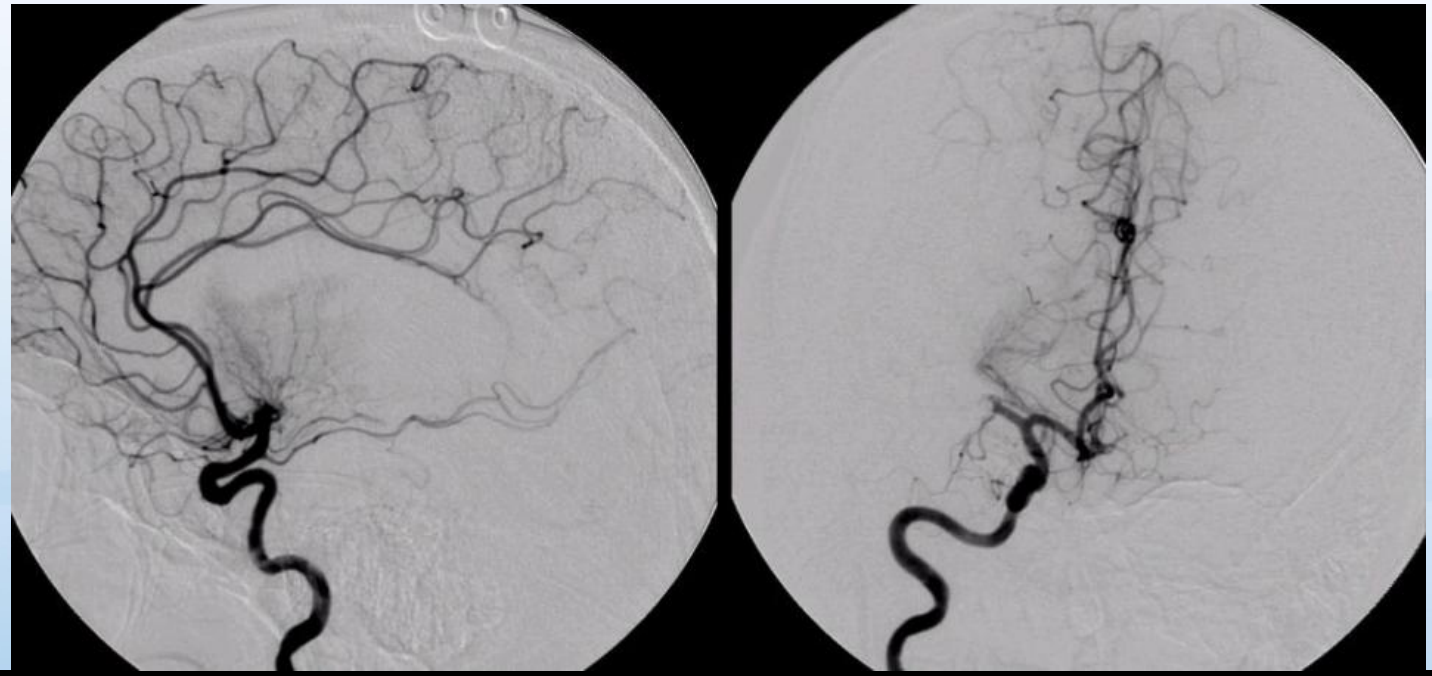


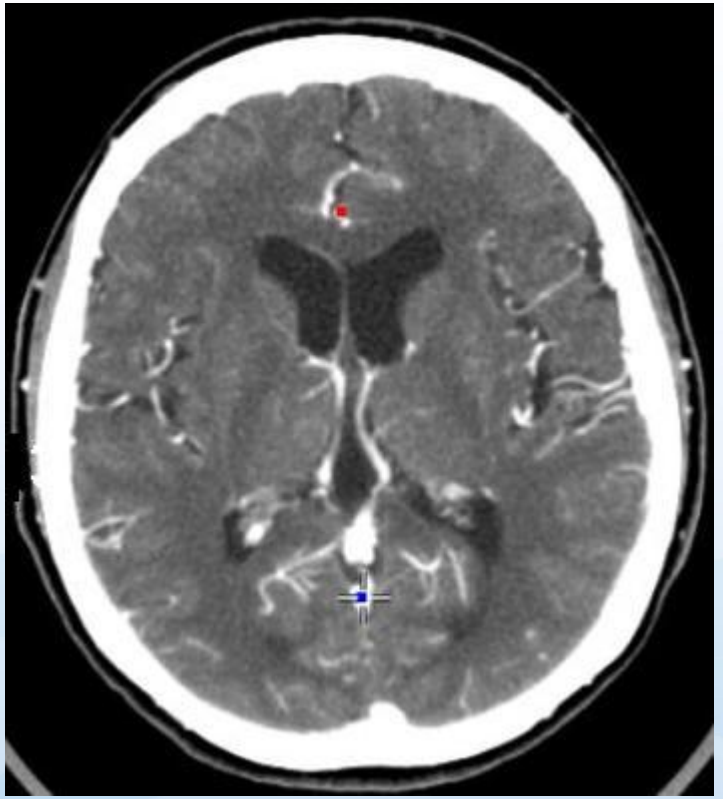
Cardiac Embolus: Cerebral Angiogram, Right Carotid
Note the complete absence of any branches off the right middle cerebral artery (MCA) and the abrupt cutoff of the distal stem of the right MCA. The lenticulostriate vessels are particularly well seen. On the AP view, the right middle cerebral artery is abruptly occluded. This is the angiographic picture of an embolus, in this case of cardiac origin from the atrial fibrillation. In the anterior circulation, emboli commonly go to the middle, posterior and anterior cerebral arteries. In the posterior circulation, they typically go to the top of the basilar or the posterior cerebral arteries. (ACA = anterior cerebral artery; ICA = internal carotid artery).

NON-INVASIVE IMAGING TECHNIQUES USED FOR DIAGNOSIS AND PATIENT SELECTION

- CT = COMPUTED TOMOGRAPHY
- MRI = MAGNETIC RESONANCE IMAGING
- CTA = COMPUTED TOMOGRAPHY ANGIOGRAPHY
- MRA = MAGNETIC RESONANCE ANGIOGRAPHY

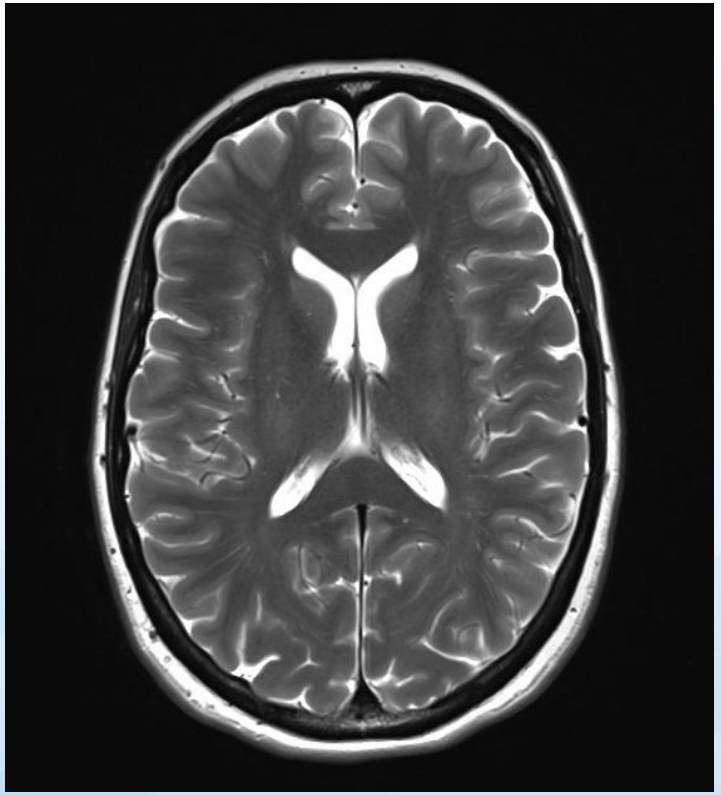
CT = COMPUTED TOMOGRAPHY

- An advanced diagnostic imaging technique that uses a computer and x-rays to produce clear cross-sectional images (slices) of the body
- Generates hundreds of x-ray images in a single go
- Gives images far more detailed than ordinary X-rays
- Less radiation than conventional x-ray procedures despite large number of images
- Several beams sent simultaneously from different angles and are detected after they have passed through the body. Their strength is measured to compute the images.
- Can be done with or without contrast (often not needed)

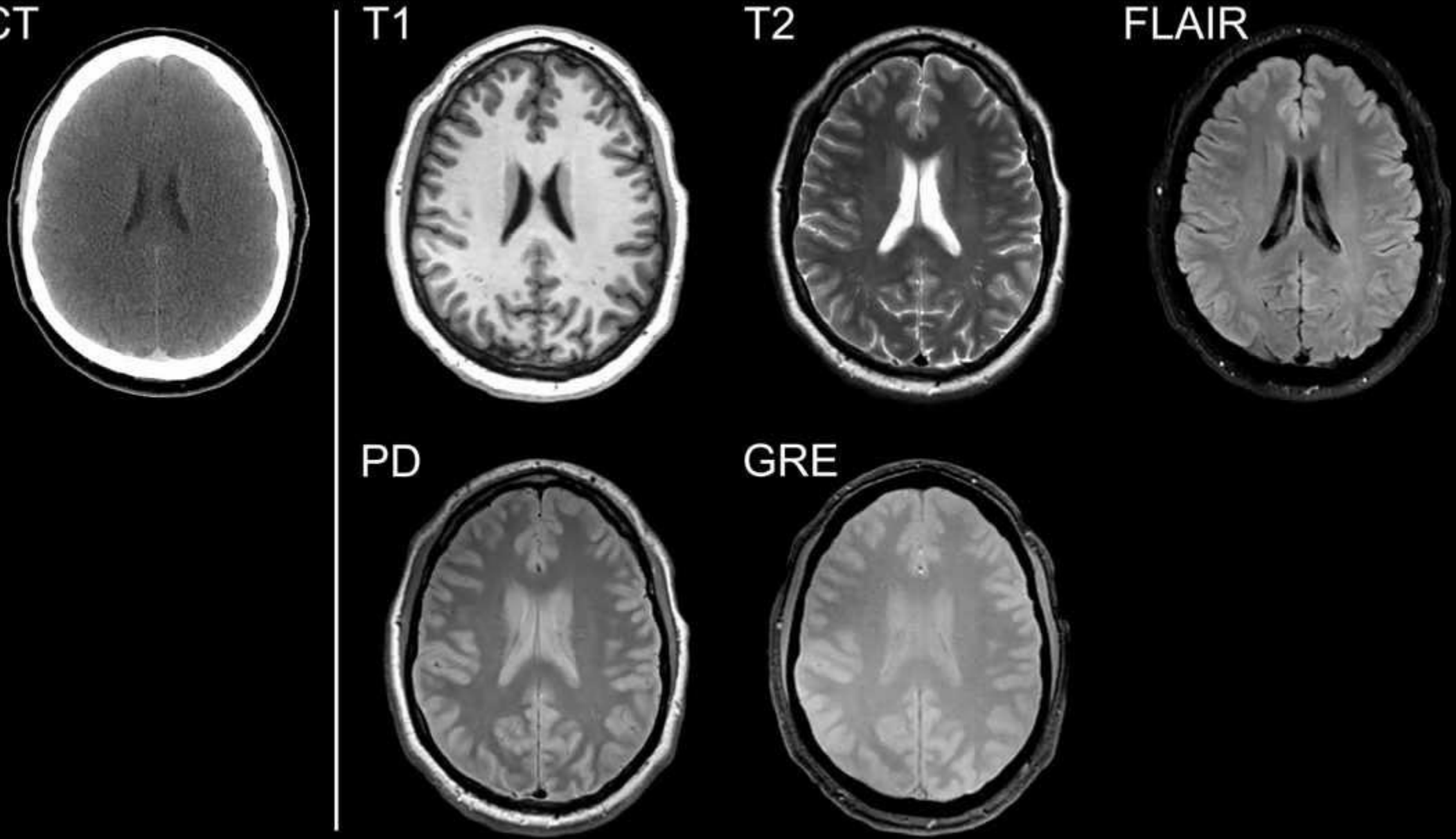


MRI = MAGNETIC RESONANCE IMAGING

- Uses a strong magnetic field and radio waves, not x-rays
  - No jewelry or other metal can be carried or worn during the exam because of the very strong magnetic field
  - Counter-indicated for patients with pacemakers and other metal implants
- MRI is especially useful in studying the brain
  - Shows distinct contrast between normal & abnormal tissues,
  - Sometimes considered superior to CT and other imaging methods in evaluating tumors, tissue damage, and blood flow
- Takes slightly longer

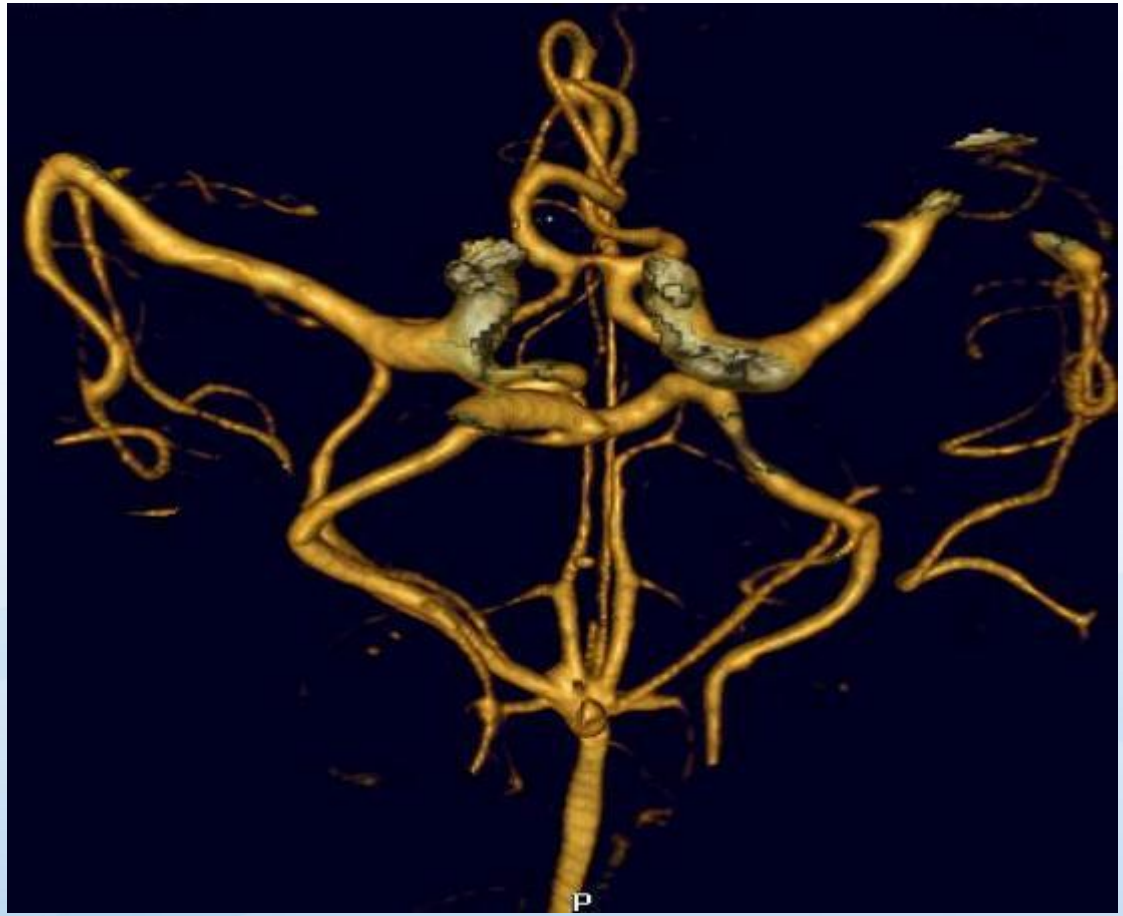


Axial view of co-registered normal CT and MRI scans



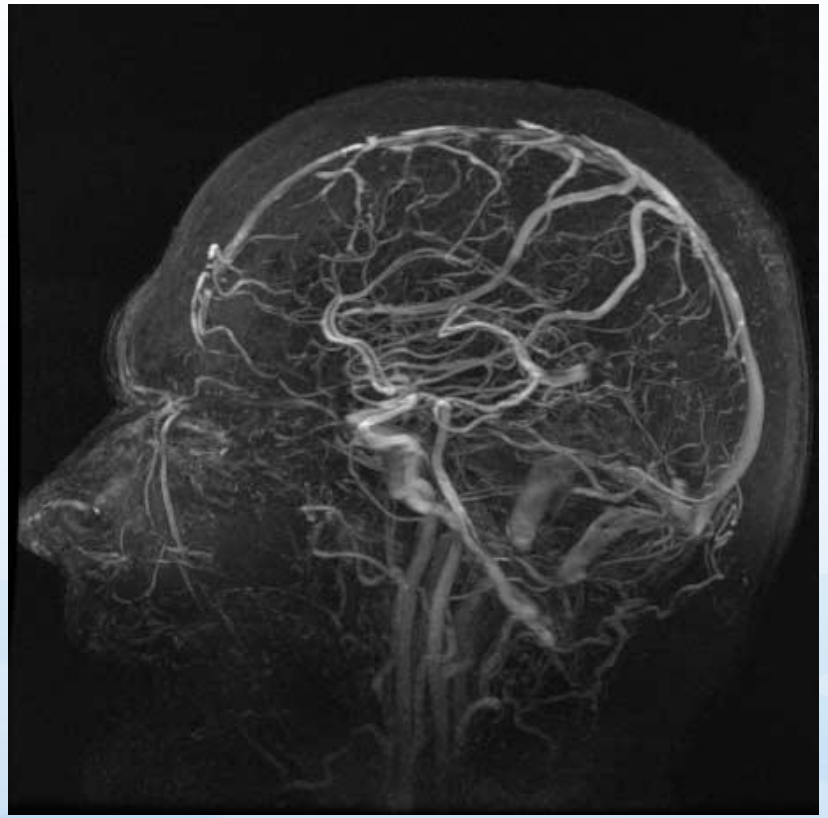
CTA = COMPUTED TOMOGRAPHY ANGIOGRAPHY

- Can be performed without the need for arterial catheterization
- Combines a regular CT scan with a contrast dye injected into a vein
- Dye travels to the brain arteries, and images are created
- Takes all the images and reconstructs them to a 3D format



MRA = MAGNETIC RESONANCE ANGIOGRAPHY

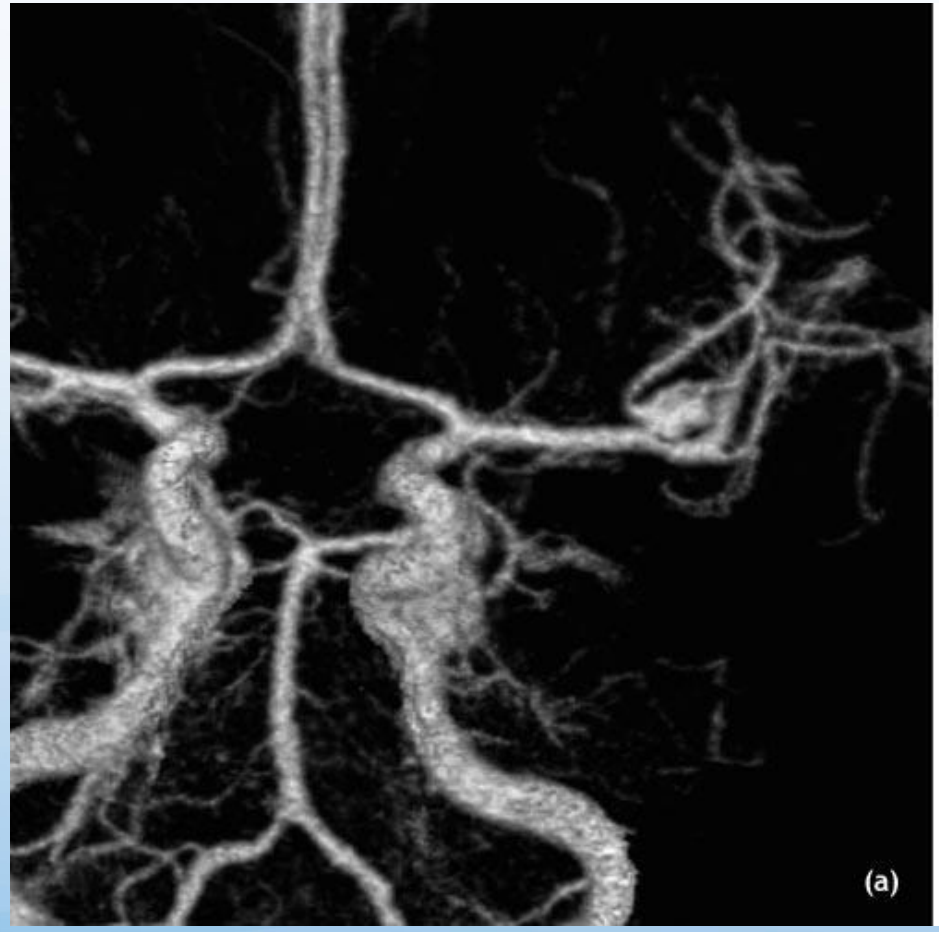
- Can be performed without the need for arterial catheterization
- Utilizes MRI technology therefore does not use iodine based contrast material, although a special form of contrast material (gadalidium) is often given to make the MRI images even clearer
- The procedure is painless, and the magnetic field is not known to cause tissue damage of any kind



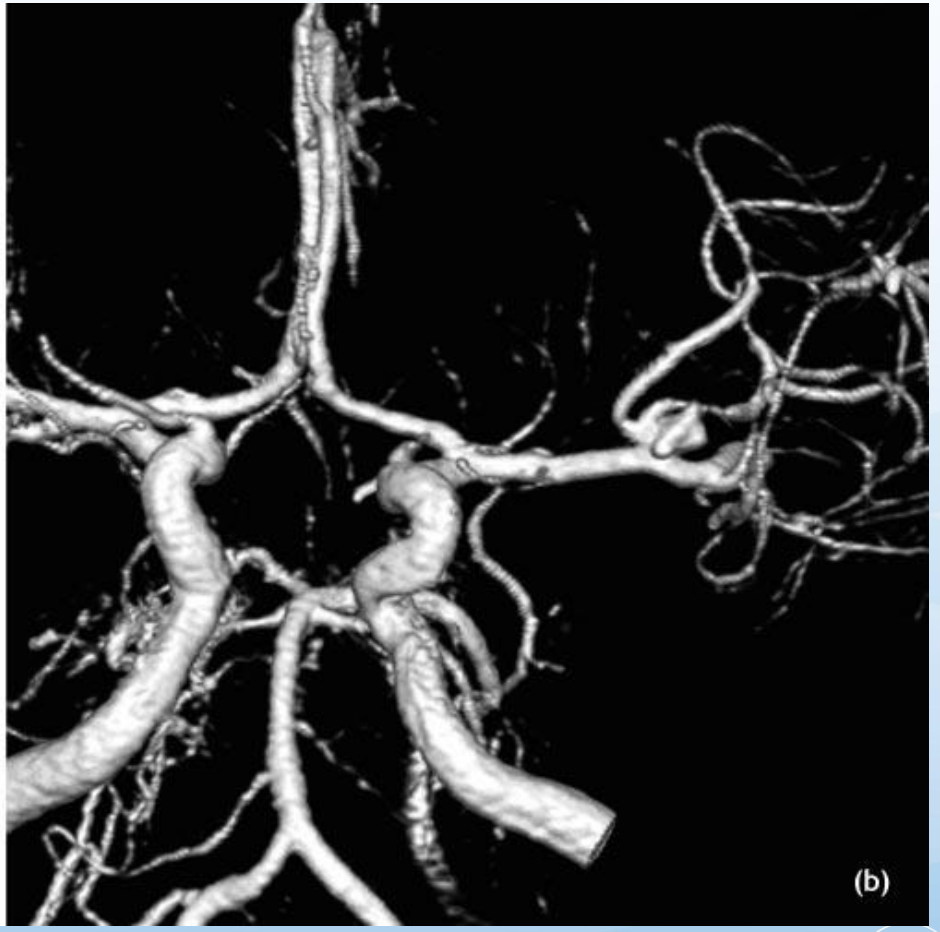
AP PROJECTION OF A VOLUME RENDERED RECONSTRUCTION – LEFT MCA ANEURYSM

The contrast enhanced MRA image is crisper but the article concludes that it does not appear to provide superior diagnostic performance compared to CTA

CTA scan



CEMRA scan

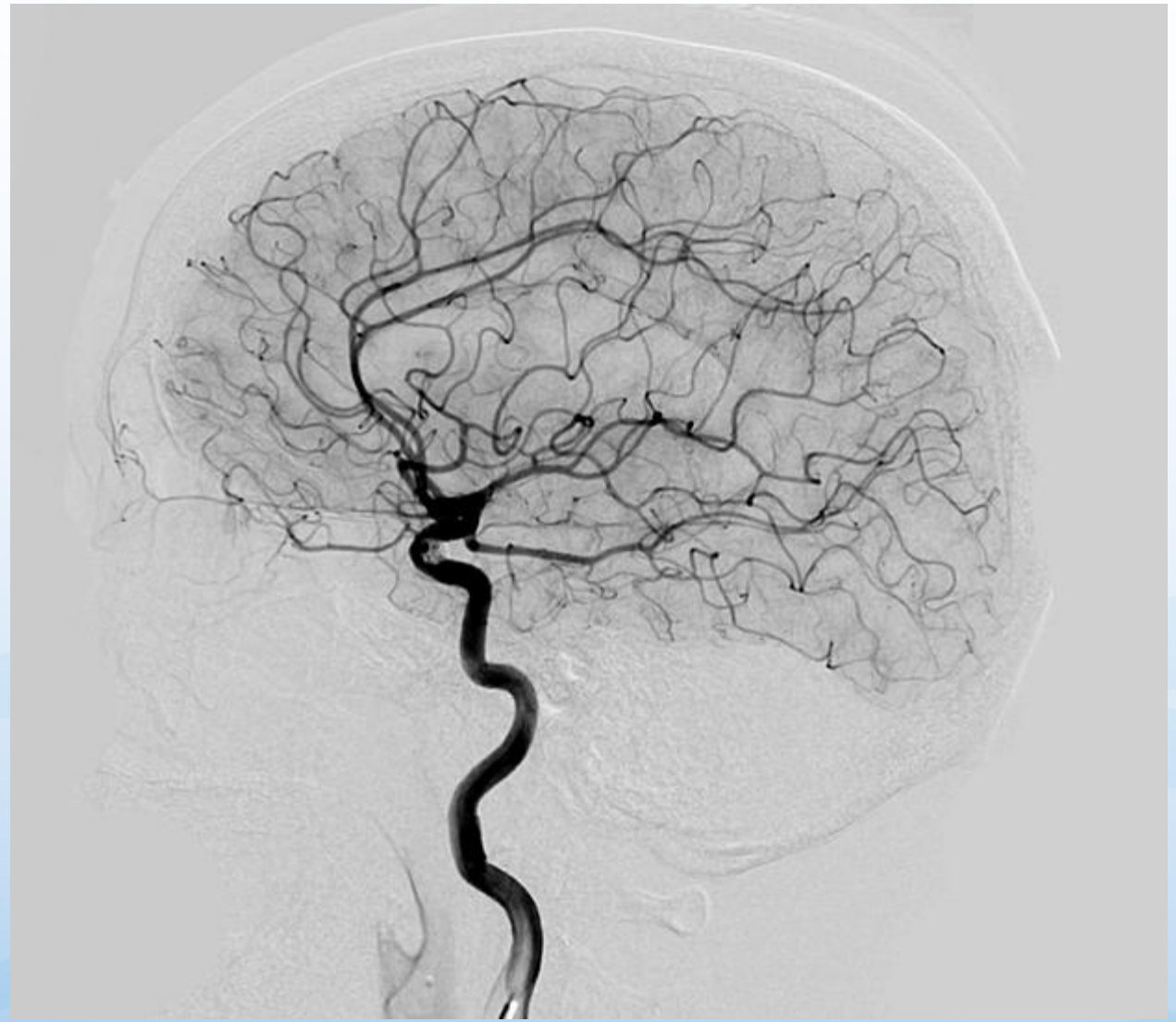


MINIMALLY INVASIVE IMAGING TECHNIQUES USED IN THE CATH LAB

- CA = CEREBRAL ANGIOGRAPHY
- DSA = DIGITALLY SUBTRACTED ANGIOGRAPHY
- ROADMAPS

CEREBRAL ANGIOGRAM

- Minimally invasive, non-surgical
- Small flexible catheters inserted through blood vessels, guided to pass through blood vessels & into the brain
- Contrast is injected through catheter to visualize anatomy
- Diagnosis and plan of care can be determined



FLUOROSCOPY (FLUORO)

- Imaging technique that uses X-rays and contrast material to obtain real-time moving images of the interior of an object, live x-ray image
- X-rays do not penetrate contrast as easily as surrounding tissue, leaving a “shadow” as the image

Contrast (X-ray dye)

Liquid medium used to visualize the inner lumen of vessels.

- Injected through a catheter by hand or power injector
- Suggested dose is 1ml per 4kg
- Nephrotoxic: Toxic to the kidneys
- Radiopaque, high atomic density

Power Injector:
allows injection of a large bolus of contrast

ANGIOGRAPHY

DA: Digital Angiography, a fluoroscopy technique
X-ray images in rapid sequence (1-6 frames/sec)
to visualize all anatomy and contrast flow

DSA: Digitally Subtracted Angiography
Same as DA however is utilized to “subtract”
background anatomy before contrast is injected
so only the blood vessels are visualized.

Cine: ultra rapid (15-30 frames/sec) DA

Conventional Angiography
Bone structure is visible

DSA
Bone structure is subtracted

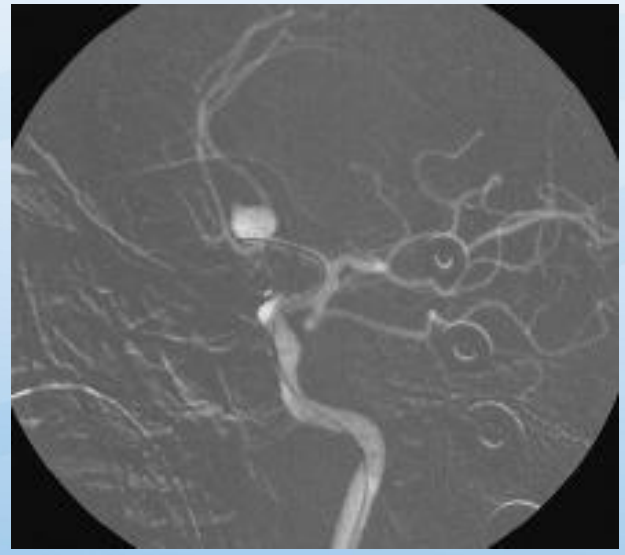
ROADMAPPING

- The overlaying of a stored angiographic image over a live fluoro image
- For viewing blood vessels in the background while using live fluoroscopic imaging of the intervention. This allows visualization of access and intervention products while steering against the vessel image
- Saves time and contrast medium, and reduces the radiation dose.

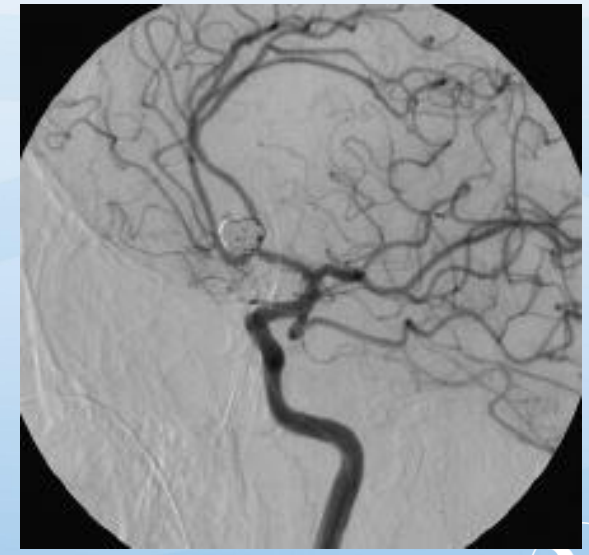
Live Fluoro Image

Stored Angiography Image

Roadmap

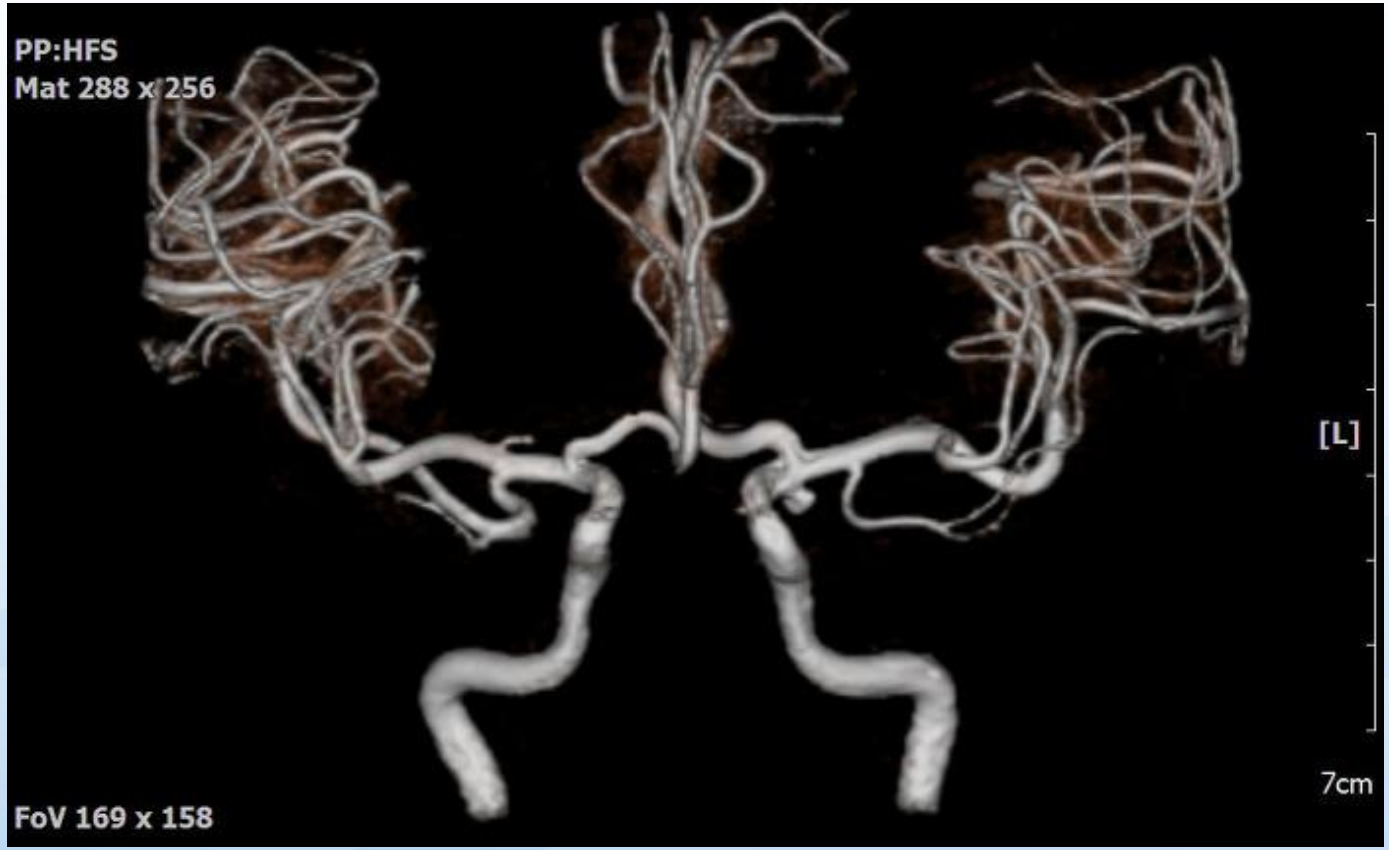


Post Procedure Angio



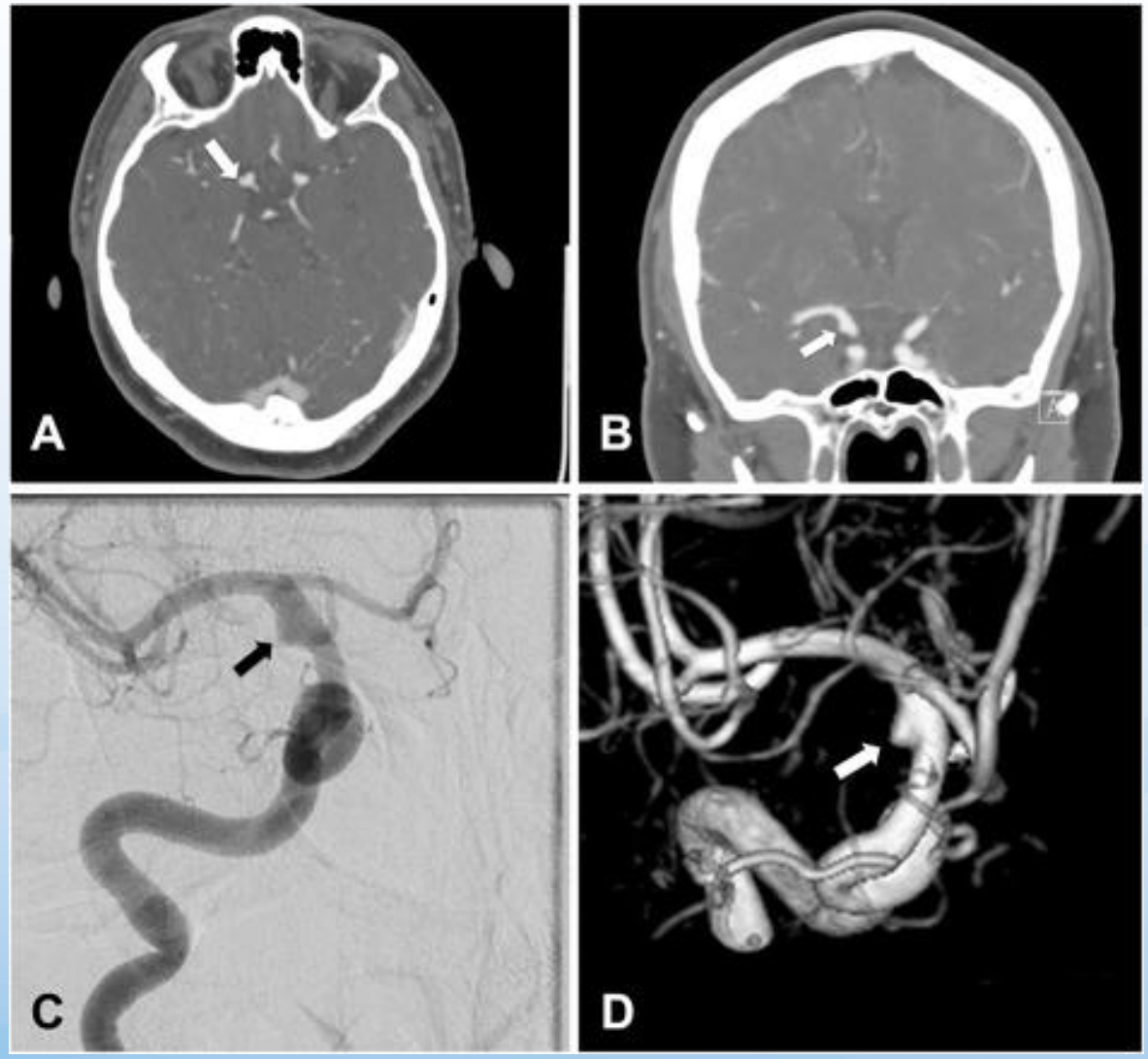
3D ANGIOGRAPHY

- A true technical revolution!
- Allows improvement in the quality and safety of diagnostic and endovascular treatment procedures
- Obtained by reconstruction of a rotational angiography
- Acquisition done on a single C-arm that is spinning.



UNRUPTURED RIGHT ICA ANEURYSM

A) Axial CT angiogram demonstrating 3-mm blister aneurysm (*arrow*).



B) Coronal CT angiogram reconstruction of the aneurysm (*arrow*).

C) Right internal carotid artery digital subtraction angiogram of the blister aneurysm (*arrow*).

D) 3D reconstruction during diagnostic cerebral angiogram of the aneurysm (*arrow*)

RECAP

The **fluoroscopy** imaging technique, using **contrast** and the flexible mobile **C-Arm,** provides real time images from almost any angle.

Digital subtraction angiography (DSA) is a fluoroscopy technique used in interventional radiology to clearly visualize blood vessels in a bony or dense soft tissue environment.

In interventional procedures DSA images are used to **roadmap** which allows visualization of the intervention live, against the vessel image in the background.

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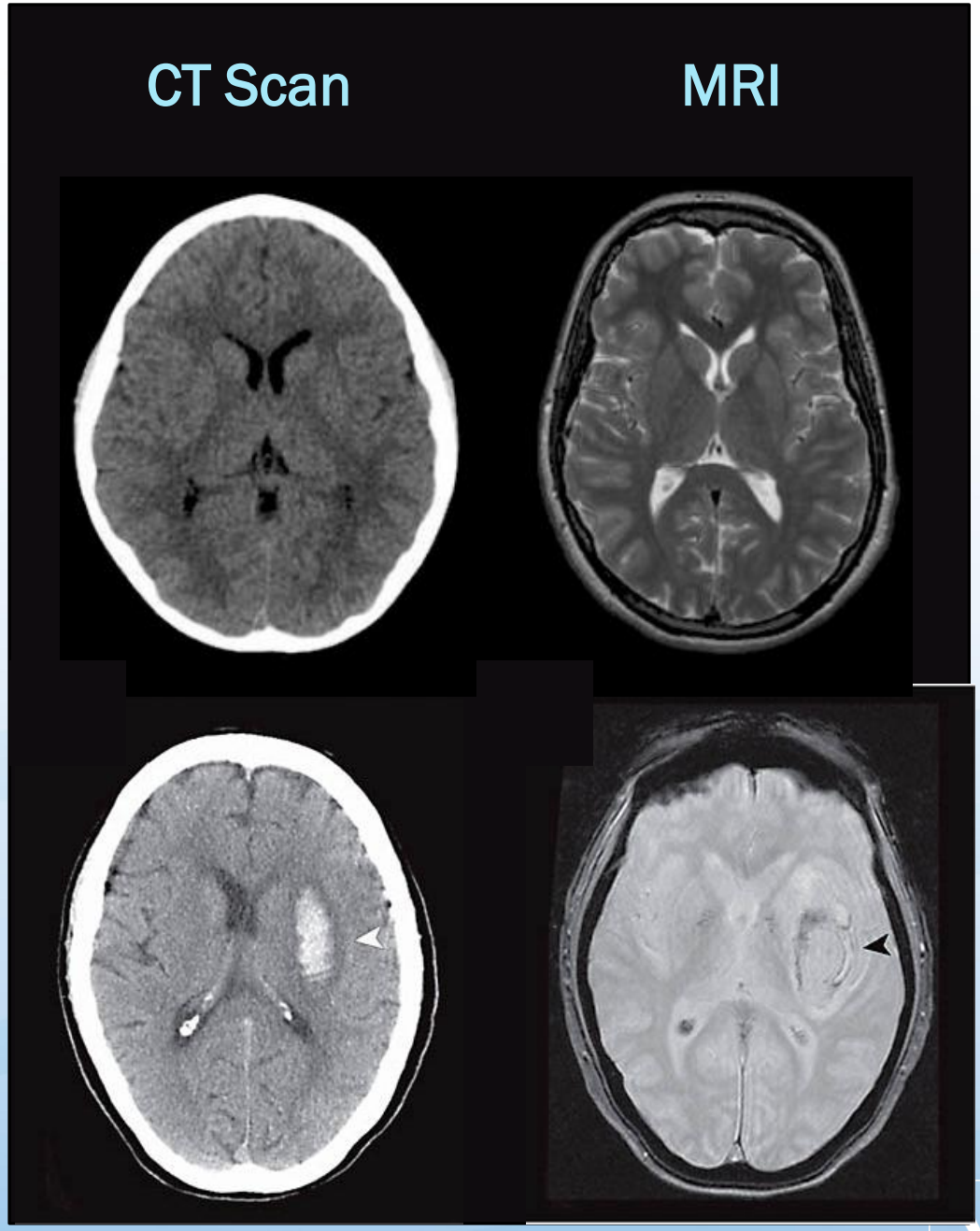
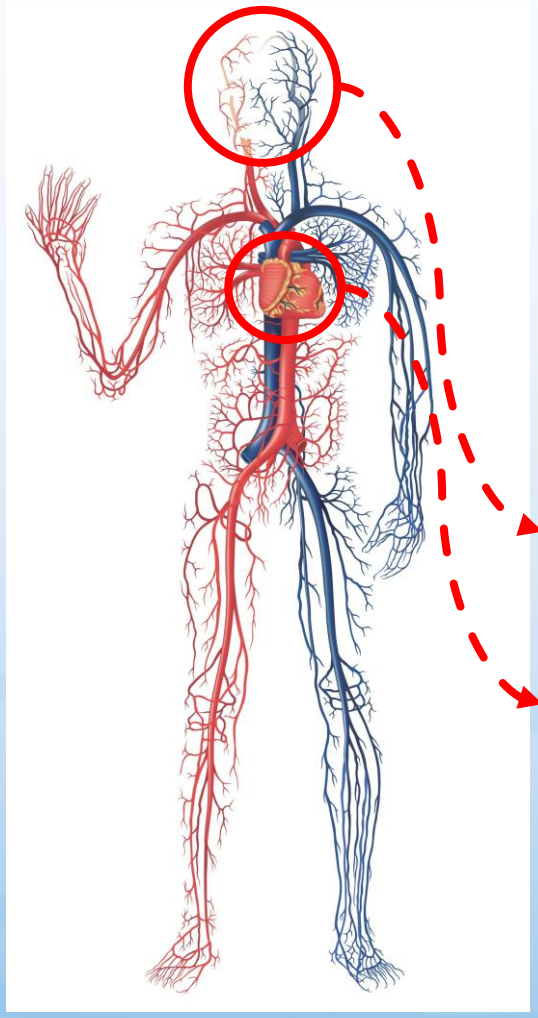
NON-INVASIVE TESTS ADMINISTERED TO PATIENTS BEFORE CATH LAB ADMISSION

- Health history and physical examination
- Patient symptoms
- Computerized Tomography (CT) Scan
  Uses x-rays to reveal the structure of the brain
- Magnetic Resonance Imaging
  Uses radio frequencies to create an image



WHAT HAPPENS IN THE NEURO CATH LAB: MINIMALLY INVASIVE ENDOVASCULAR PROCEDURES



ENDO-VASCULAR → from inside the vessel

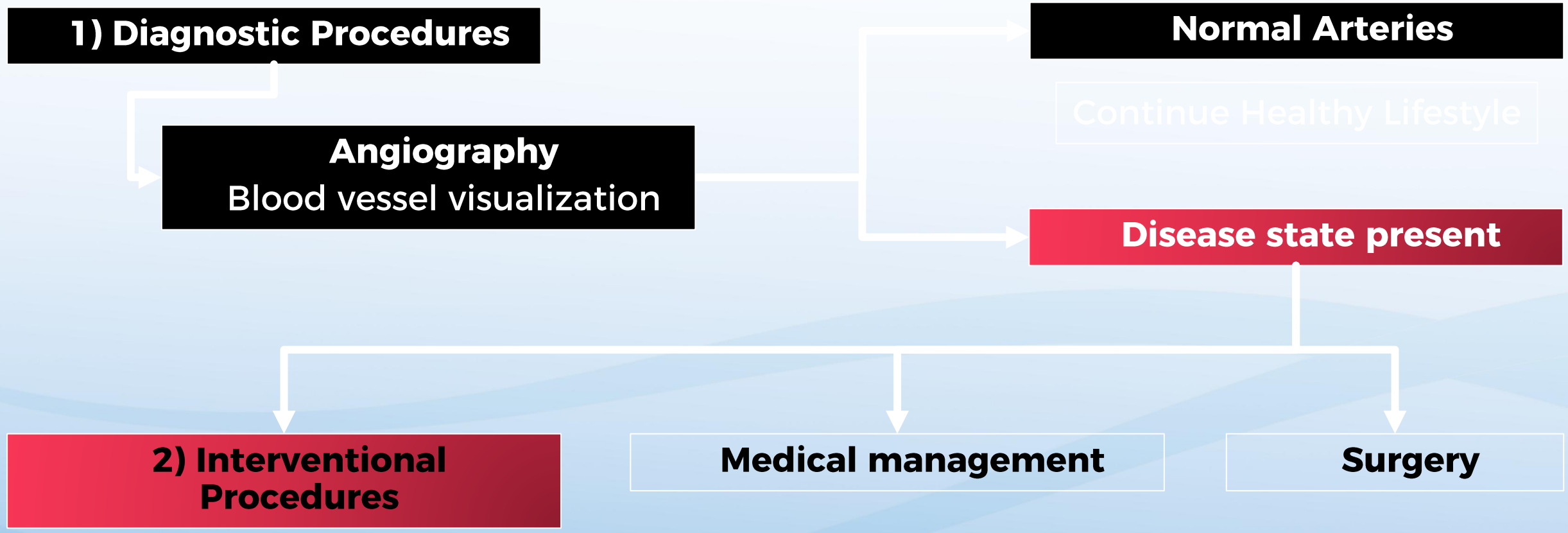
i.e. a catheter is directed through the blood vessels into the area of disease, x-ray pictures are taken and the site may be treated with the device of choice

NEUROVASCULAR → brain vessels

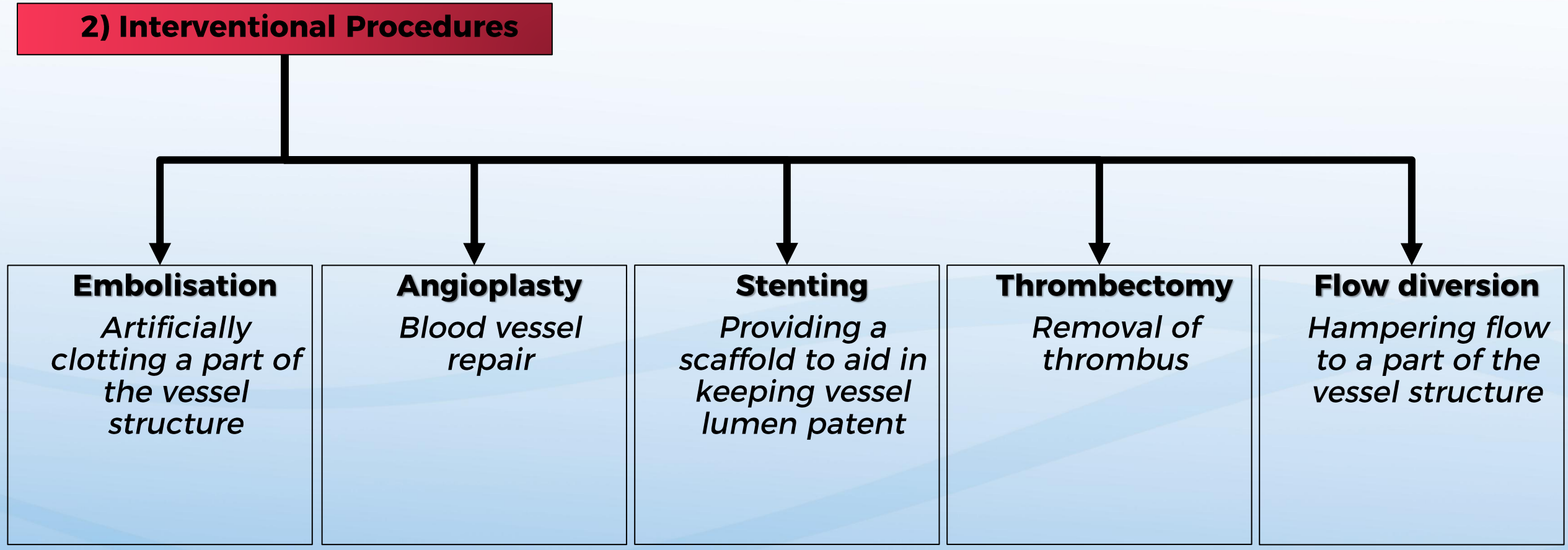
CARDIOVASCULAR → heart vessels

PERIPHERAL VASCULAR → all other vessels

WHAT HAPPENS IN THE NEURO CATH LAB: MINIMALLY INVASIVE ENDOVASCULAR PROCEDURES



WHAT HAPPENS IN THE NEURO CATH LAB: MINIMALLY INVASIVE ENDOVASCULAR PROCEDURES



WHAT IS AN ENDOVASCULAR PROCEDURE? SAMUEL HOU, MD – NEURO-INTERVENTIONAL SURGERY

BEFORE THE PROCEDURE

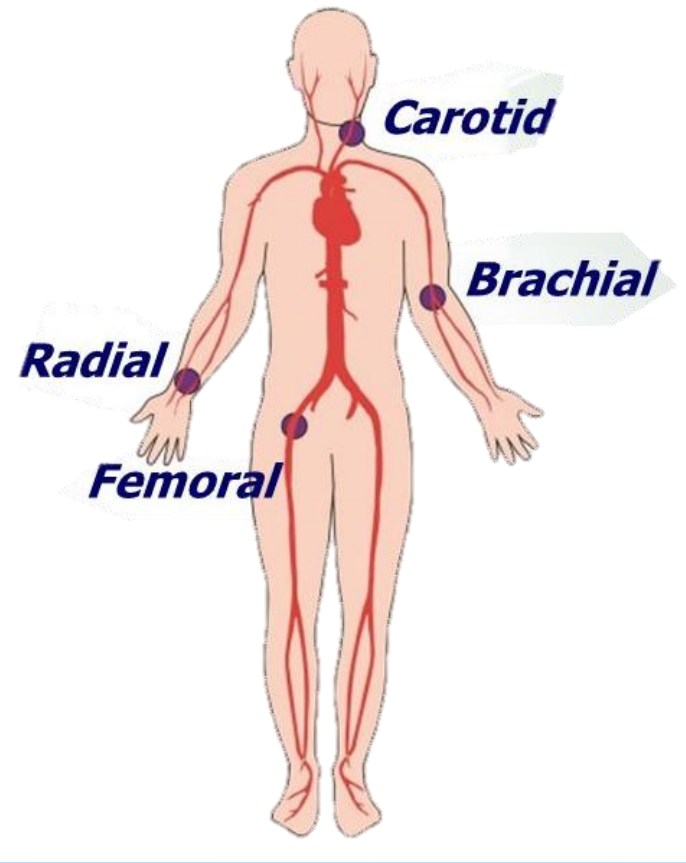
- Consent
- Health history and physical
- Lab tests
- EEG -Graphic recording of the electrical activity of the brain
- Intravenous and arterial lines are placed
- Pre-op meds
  - Prednisone or Benadryl– Iodine allergies
- Patient placed on the table, prepped & draped

Basic femoral setup and access demo from neuro-nurse

THE PROCEDURE – GETTING ARTERIAL ACCESS

1. Local anesthesia / General Anesthesia / Conscious sedation
2. Puncture of the femoral artery
3. IN: a needle
4. IN: a mini-guidewire through center of needle
5. OUT: the needle, leaving mini-guidewire in place
6. IN: a catheter sheath introducer (CSI) over mini-guidewire
7. OUT: the guidewire and CSI dilator
8. IN: diagnostic or other guidewire (.035” or .038”) through center of sheath
9. IN: diagnostic or other catheter to thread over the guidewire in place to go up over the aortic arch
10. OUT: the diagnostic or other guidewire

ACCESS SITES:



THE PROCEDURE - AFTER ARTERIAL ACCESS

- Baseline Activated Clotting Time (ACT) is drawn to monitor the effect of heparin
- Heparin bolus given (usually 5000u followed by 1000u every hour thereafter)
- ACT usually checked hourly

- Diagnostic or Guiding catheter positioned in the appropriate vessel near skull base
- Diagnostic or Therapeutic procedure is performed by cannulating appropriate artery and injecting contrast dye, driving up needed products, etc.

FINISHING THE PROCEDURE

1. All catheters are removed
2. Final ACT is checked
3. Femoral artery is assessed for insertion of a closure device or manual pressure
4. Sheath is removed, closure device placed or manual pressure is held
5. Vital signs monitored

AFTER THE PROCEDURE

- Patient is awoken from anesthesia / neurological status assessed
- Bedrest – femoral approach
- Recovery /24 Hr. ICU/ step-down
- Monitor vital signs
- Promote fluid intake
- Stable / No complications - discharged home within 1- 5 days

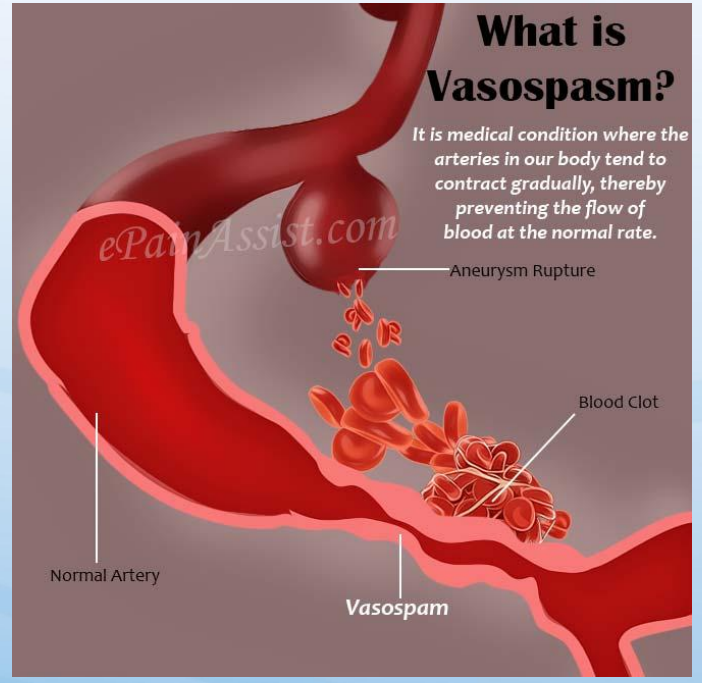
FOLLOW-UP

- Follow up with physician in 3-6 weeks
- Patients may be followed with angiograms at 6, 12 and 24 months post treatment

POSSIBLE COMPLICATIONS

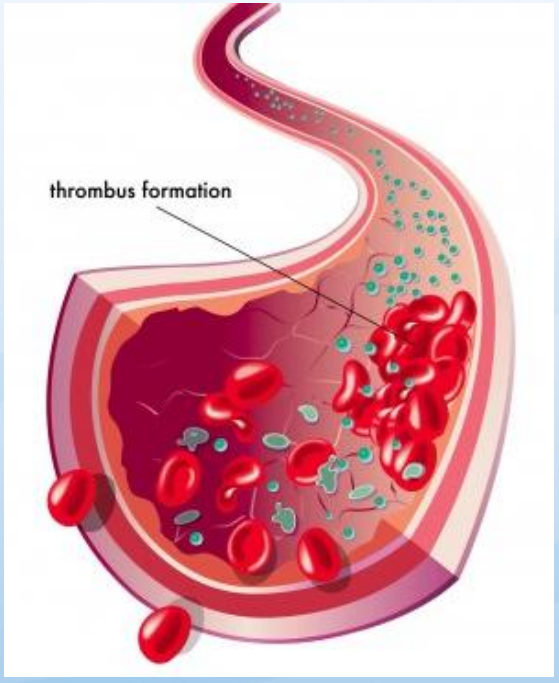
Vasospasm

- Papaverine / NTG on hand



Thrombus formation

- IIb IIIa inhibitors i.e. Reopro



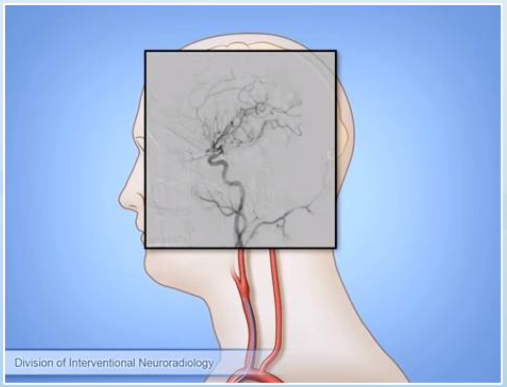
Vessel rupture

- protamine on hand

THE CEREBRAL ANGIOGRAPHY PROCEDURE - WATCH

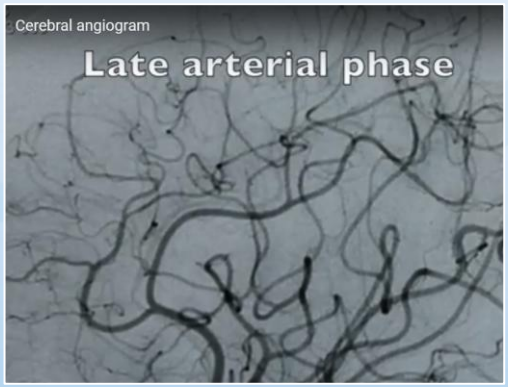
Diagnostic Cerebral Angiography Explained to Patients

by
Johns Hopkins Hospital



Elements of Cerebral Angiography

by
North Jersey Brain & Spine Center



Femoral access for cerebral angiography

by
Dr Bassam (France)

Femoral access for cerebral angiography in an AVM patient

by
Dr Edisham
Vanderbilt Neurovascular

RECAP

Neuro-vascular procedures are minimally invasive endovascular procedures where:

- with the **femoral artery** as the usual entry point, a series of **catheters** are directed through the blood vessels into the brain,
- and via real time **fluoroscopic imaging** of the vasculature, a diagnostic or therapeutic **intervention** may be done.

The diagnostic procedure is called an **angiography** which detects whether - and what type of- vessel disease is present.

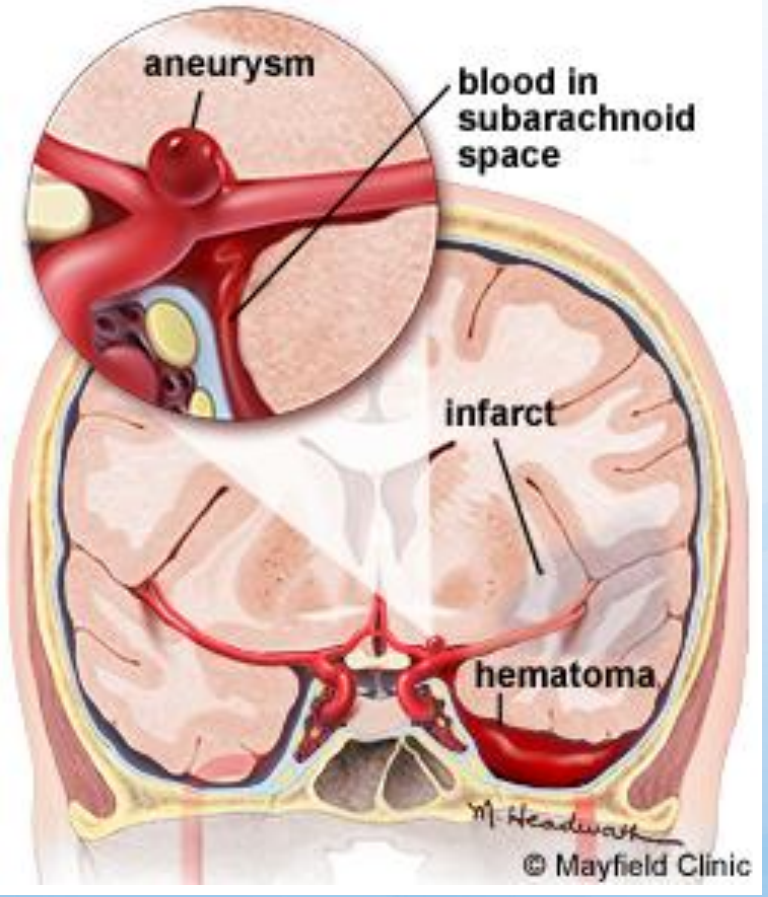
Common therapeutic interventions are **embolization**, **angioplasty**, **stenting**, **flow diversion** and **thrombectomy**.

INTRODUCTION THE ANGIO SUITE

2.1. What is an ANGIO SUITE or a CATH LAB	2.2. Imaging Basics	2.3. What happens in the CATH LAB	2.4. What gets treated in the CATH LAB	2.5. CATH LAB Etiquette
• Definition & organization of a CATH LAB • Who works in a CATH LAB • What equipment and products can be found in a CATH LAB	• A brief history of medical imaging • Anatomical position and directional terminology • CT & MRI based technologies • Angiography using fluoroscopy	• Diagnostic and interventional procedures done in the CATH LAB • What happens before, during, and after a Cerebral Angiography procedure	• Neuro Disease States • Procedures & Products	• Correct Behavior • Protection

HEMORRHAGIC STROKE – SUB ARACHNOID HEMORRHAGE

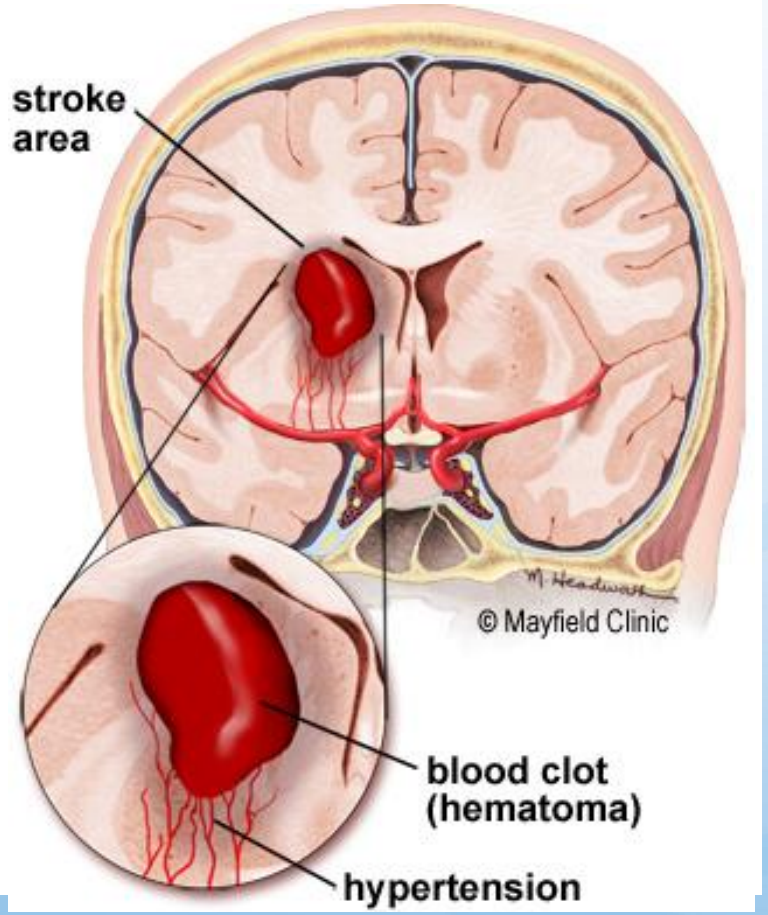
Bleeding within the space surrounding the brain



- About 5% of strokes are caused by SAH
  - 6 to 11 out of 100,000 people each year
- Causes:
  - Aneurysm rupture accounts for 50 to 80% of cases
  - AVMs & head injury
- Age, Gender, Race Related Risk Factors
  - slightly more common among women
  - average age is 50 years

HEMORRHAGIC STROKE – – INTRA CRANIAL HEMORRHAGE

Bleeding within the brain tissue



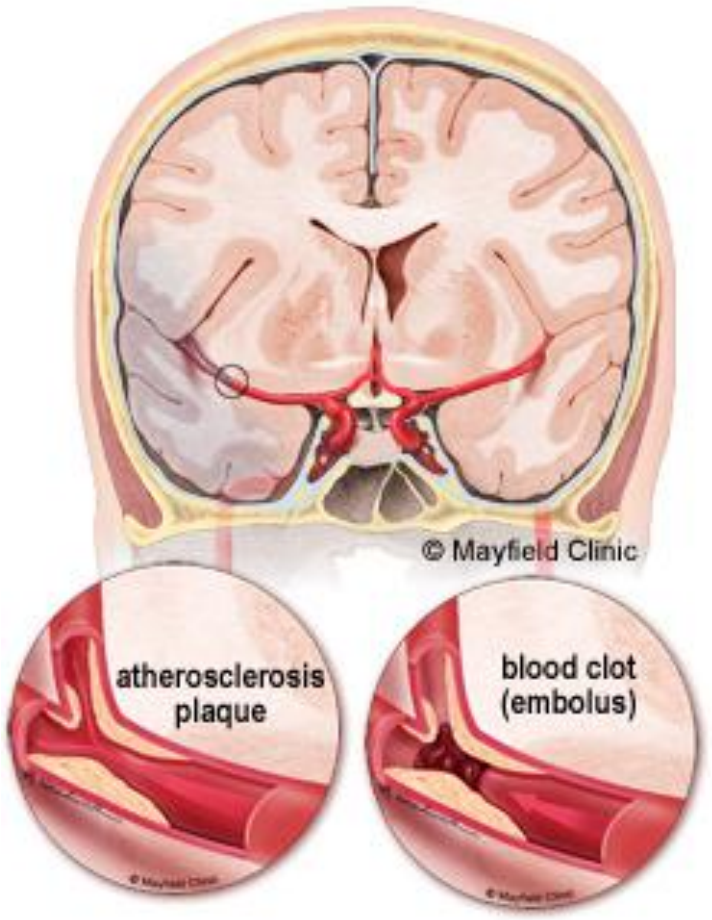
- About 10% of strokes are caused by ICH
- 40% risk of death

- Causes:
  - head trauma, tumors, bleeding disorders, other
  - AVMs and aneurysms

- Age, Gender, Race Related Risk Factors:
  - slightly more common among men
  - more common among young and middle-aged
  - more common among blacks and Asians

ISCHEMIC STROKE

Blockage of an artery in the brain



- 87% of strokes are ischemic
- Causes:
  - Atherosclerosis (hardening of the arteries)
  - Embolus
- Age, Gender, Race Related Risk Factors:
  - age increases risk
  - more common among men
  - more common among Blacks (x2 vs whites)
  - Hispanics are more likely to suffer a stroke at a younger age than non-Hispanic whites

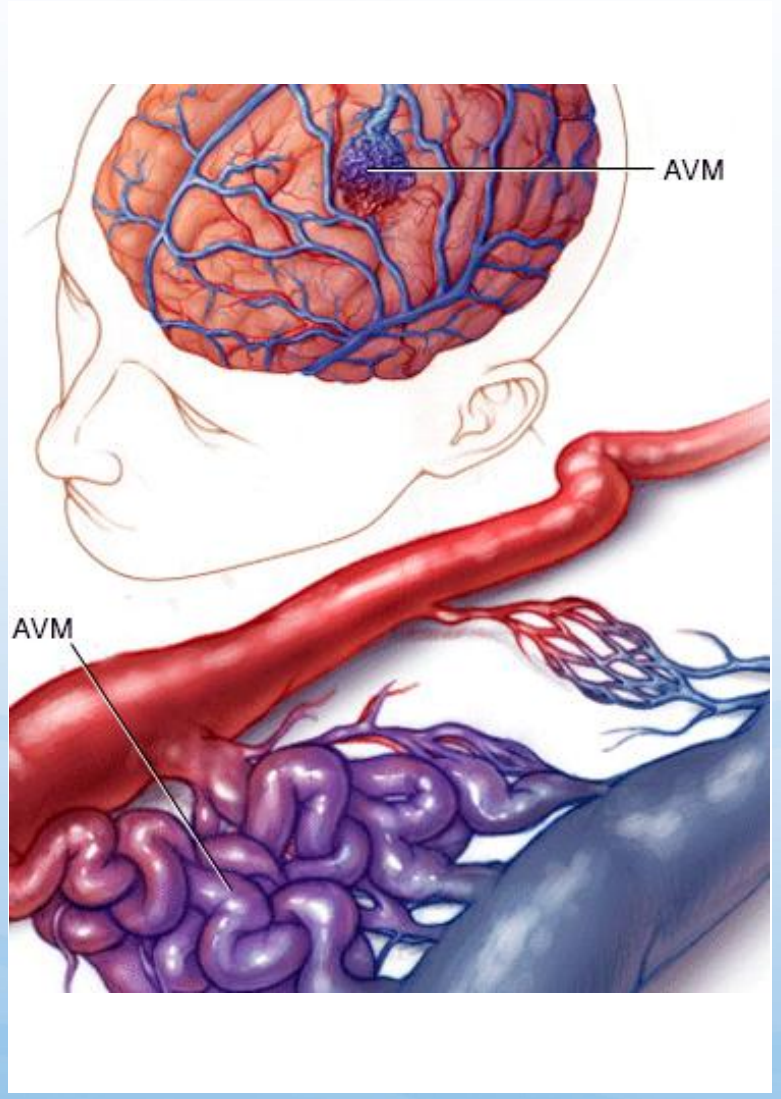
STROKE CAUSE TREATED BY NEURO-INTERVENTION

CEREBRAL ANEURYSMS

- A balloon-like bulge of an artery wall.
- As it grows it puts pressure on nearby structures and may eventually rupture.
- Most people find out they have an unruptured aneurysm by chance during a scan for some other problem.
- The risk of rupture varies depending on the aneurysm's location and size.
- A ruptured aneurysm causes SAH or ICH
- Treatment focuses on stopping the bleeding and repairing the aneurysm with clipping, coiling, or bypass

STROKE CAUSE TREATED BY NEURO-INTERVENTION

CEREBRAL AVMS



- Arterio-Venous Malformations are an abnormal tangle of blood vessels
- AVM arteries connect directly to veins without a capillary bed in between causing the vessels to stretch and sometimes rupture.
- Symptoms include stroke, seizures, headache, and other problems
- Treatment options include surgery, embolization, and radiosurgery

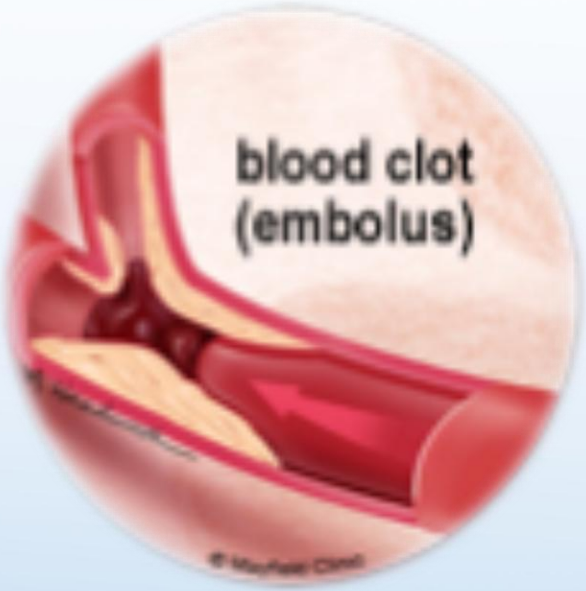
STROKE CAUSE TREATED BY NEURO-INTERVENTION

ATHEROSCLEROSIS

- Atherosclerosis (hardening of the arteries) - cholesterol plaques are deposited within the walls of the arteries, narrowing the inside diameter of the artery
- Blockage of blood flow leads to ischemia and brain death
- Treatment focuses on opening up the clogged artery with angioplasty with balloon or stenting

STROKE CAUSE TREATED BY NEURO-INTERVENTION

EMBOLIC STROKE



- Embolic stroke - a clot breaks off from the artery wall (becomes an embolus), and travels farther down the bloodstream to block a smaller artery. Usually come from the heart, where different diseases cause clot formation
- Blockage of blood flow leads to ischemia and brain death
- Treatment focuses on trying to lyse or eject the clot (thrombolysis & thrombectomy with aspiration or stent-retrievers)

WHICH DISEASE STATES DO THESE PROCEDURES TREAT?

Embolisation *Artificially clotting a part of the vessel structure*	**Angioplasty** *Blood vessel repair*	**Stenting** *Providing a scaffold to aid in keeping vessel lumen patent*	**Thrombectomy** *Removal of thrombus*	**Flow diversion** *Hampering flow to a part of the vessel structure*
· AVMs · Aneurysms	· Atherosclerosis	· Atherosclerosis · Wide-neck aneurysms	· Embolic Stroke	· Aneurysms
HEMORRHAGIC STROKE	ISCHEMIC STROKE	Could be both	ISCHEMIC STROKE	HEMORRHAGIC STROKE

WHICH NV PRODUCTS ARE NEEDED?

Embolisation	**Angioplasty**	**Stenting**	**Thrombectomy**	**Flow diversion**
Artificially clotting a part of the vessel structure	*Blood vessel repair*	*Providing a scaffold to aid in keeping vessel lumen patent*	*Removal of thrombus*	*Hampering flow to a part of the vessel structure*
· AVMs · Aneurysms	· Atherosclerosis	· Atherosclerosis · Wide-neck aneurysms	· Embolic Stroke	· Aneurysms
· Access products (guidewires, catheters)				
· Coils · Onyx / Glue	· Balloons	· Stents	· Stent-retrievers · Aspiration catheters · Balloon guides	· Flow diverters

HEMORRHAGIC STROKE

ISCHEMIC STROKE

AVMs

Aneurysms

Atherosclerosis

Embolic Stroke

Embolisation

Artificially clotting a part of the vessel structure

Flow diversion

Hampering flow to a part of the vessel structure

Stenting

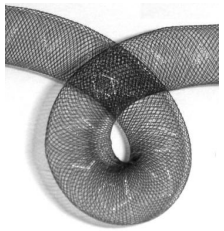
Providing a scaffold to aid in keeping vessel lumen patent

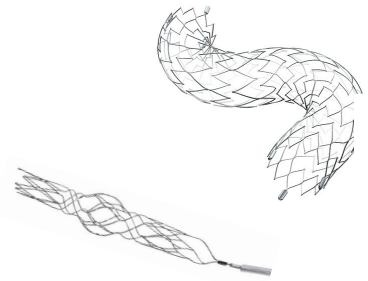
Angioplasty

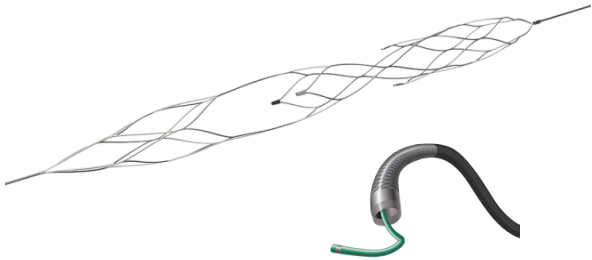
Blood vessel repair

Thrombectomy

Removal of thrombus







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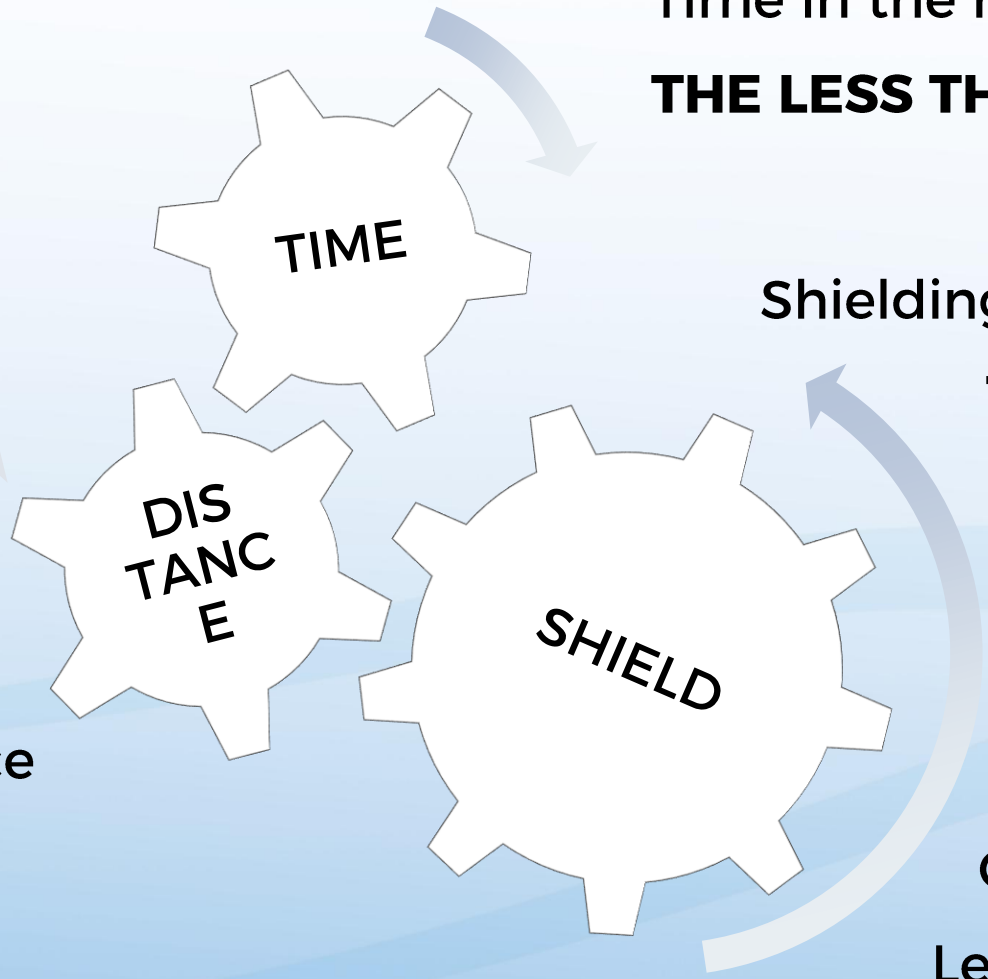
RADIATION SAFETY: 3 PRINCIPLES

Time in the room:

THE LESS THE BETTER



Distance from the source

Inverse square law:

The intensity is

inversely proportional

to the distance from source

i.e. **THE FURTHER THE BETTER**

Shielding yourself from radiation

THE MORE THE BETTER

Wear lead apron,

thyroid collar,

overhead shield,

roll shields,

Get behind other people

Leave the procedure room

HOW TO USE DOSIMETRY BADGES

- Badges are individual
- Follow institutional guidelines

Pregnancy/ Fetal badge

- Worn at the chest/waist level
- UNDER the lead

Dose monitoring badge

- Worn at collar level
- On the OUTSIDE, not under your lead

PRE-PERSONAL PROTECTIVE EQUIPMENT

PPE's are designed to protect personnel from infectious materials. They are provided by the lab and can usually be found near the entrance.

- Goggles
- Mask
- Face shield
- Shoe covers
- Gloves
- Hat or bouffant
- Gown if under infectious warnings

- Cover cuts, scratches and abrasions with a bandage before entering the lab.

CATH LAB APPROPRIATE ATTIRE

- Clean scrubs
  - Lab may ask you to change into their scrubs
- Clean and comfortable closed toe shoes
  - Can be wiped clean
  - Wear shoe covers – not all institutions require shoe covers, but it is strongly suggested you do if they are provided. Don't carry infectious material home
- Long hair should be tied back and up and completely tucked under the hat or bouffant. Style is not required in a lab setting

THE STERILE FIELD

- Is usually either blue or green
- Patient surgical drapes
- Sterile tray
- Scrubbed personnel
- Sterile gowns, hats, shoe covers and gloves

- Stay minimum 60 cm away from the field
- Wear a hat and mask at minimum when a sterile tray is open
- Do not reach over a sterile field
- Do not open packages

INTRODUCE YOURSELF TO:

- The Physician
- Fellows are your friends and future customers!
- Lab manager
- Lead tech
- Nursing staff

- Is there a rep tracking system? → Sign in
- Which lead apron & collar can I wear?
- Where do I stand?

- Cell phone usage: be discreet. Ask about hospital policies before the case starts
- Talking during the case
- Be aware of the work area/flow/space
- Be humble, helpful, engaged
- Watch body language

PATIENT PROTECTION

Anything that can identify a patient in written or electronic media

- Patient stickers
- Photos

GOOD CONDUCT

- Ask for permission before taking photos
- Verify photo is clear of PHI with a witness
- Conversations outside the lab

THE LAW

- In January 2012, the EU proposed a comprehensive **reform of data protection rules in the EU**. Applies from **25 May 2018**.
- Sanctions up to 20 million EUR or 4% of annual turnover (whichever is higher) – *see link*
- Not knowing does not relieve of responsibility

RECAP

In the CATH LAB you need to :

Protect yourself from radiation and bio-hazardous material

Respect hospital protocol, the patient and the operating team

Be mindful and savor the experience and the opportunity to learn.

Later we will talk about CASE FOLLOW UP and COMPLAINTS Procedures.