

**WELCOME**

# Role of MRA & MRV in clinical practice

Presented

By

**Dr (Lt Col) Md Anisur Rahman**  
Medicine SPL Combine Military  
Hospital (CMH)  
Dhaka Cantonment

# Background



## 5 Nobel Laureates for MRI

---

Rabi (1944)



Bloch, Purcell (1952)



Lauterbur,  
Mansfield (2003)



- Dr Isador Isaac Rabi (1938): detected Nuclear Magnetic Resonance (NMR) absorption in a molecular beam
- Edward Purcell (1945): detected NMR absorption in paraffin
- Felix Bloch (1945): detected nuclear induction signal in water
- Prof Peter Mansfield and Lauterbur discovered MRI and was awarded with the Nobel Prize in 2003

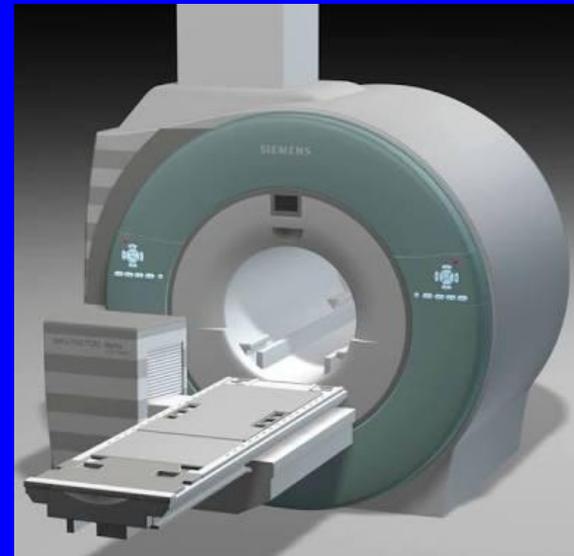
# Types of MRI Machine

- Close MRI – more field strength, claustrophobic
- Open MRI- less field strength, less claustrophobic
- Standing or sitting MRI
- Magnetic field strength for MRI : 0.3- 7.0 Tesla(T), average 1.5 T

**Open MRI, less field strength , less claustrophobic**



**Closed MRI, less field strength , less claustrophobic**



# There are various types of images done by MRI technique:

- T1WI
- T2WI
- PD
- WI
- DWI
- ADC
- GE
- Perfusion images
- f MRI
- BOLD images
- **MRA**
- **MRV**
- Post-Gd images
- Volumetric images
- MR arthrography
- FLAIR
- STIR

# Techniques of MRA and MRV

- Flow dependant
- Non-flow dependant
- Contrast-enhanced magnetic resonance angiography

# MRA and MRV in medical practice

- Magnetic resonance angiography (MRA) is a noninvasive technique of imaging based on magnetic resonance imaging (MRI) technology
- MRA is used to generate images of arteries and MRV is used to generate images of veins.

# Clinical implication of MRA

- MRA has been used successfully in studying many arteries in the body, including:
  - Cerebral and other vessels in the head and neck
  - The aorta and its major branches in the thorax and abdomen
  - The renal arteries, and
  - The arteries in the lower limbs.

# MRA of the head and neck is considered for:

- Stenotic /occlusive disease (e.g, atherosclerotic, thromboembolic)
- Intracranial and spinal hemorrhage
- Vertebrobasilar insufficiency
- Injury to the carotid artery
- Arterial dissection
- Vascular supply to tumors
- Dural sinus thrombosis and intracranial venouocclusive diseases

# The major clinical use of abdominal MRA include imaging of:

- The renal vasculature
- Aorta
- Portal venous system
- Mesenteric arteries, and
- Renal artery stenosis (causing hypertension)
- Abdominal MRA is also used for the diagnosis and preoperative evaluation of abdominal aortic aneurysms, aortic stenoses, aortic occlusions and dissections, and chronic mesenteric ischemia

# Clinical applications of peripheral MRA include:

- The diagnosis of peripheral vascular disease specifically, arteriosclerotic stenoses and occlusions
- Detection of runoff vessels prior to medical or surgical treatment

# Clinical implication of MRV

- MRI combined with MRV has largely replaced invasive cerebral angiography and conventional computed tomography (CT scan)
- MRV in conjunction with conventional MRI can accurately diagnose cerebral **venous sinus thrombosis** and is reliable as the **sole** examination for this condition

- MRV is currently considered to be the noninvasive test of choice for evaluation of the dural sinus
- Evaluation of venous thrombosis or occlusion in the:
  - large systemic veins
  - in the portal and/or hepatic venous system (Budd-Chiari syndrome)

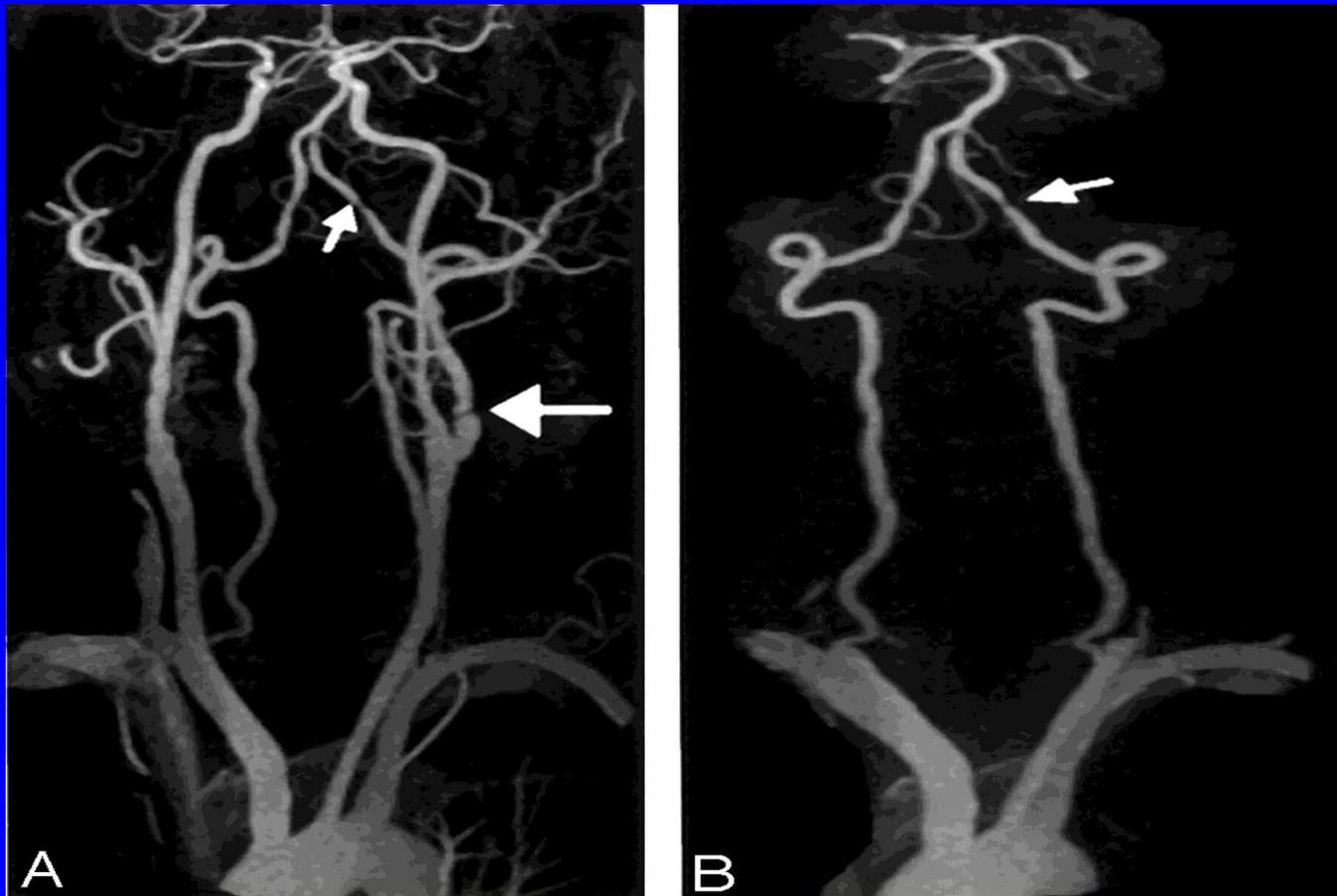
# Advantages of MRA & MRV

- The use of non-ionizing radiation, free from biological hazards
- Direct multiplanar imaging in transverse, coronal ,and sagittal or any desired plane
- Images are more clear detailed than other imaging method

- It can enables the detection of abnormalities that might be obscured by bone with the other imaging method
- Relatively less toxicity of MRI contrast agent (Gadolinium vs Iodine)
- Can be used in Renal impairment also

# Limitations of MRA & MRV

- The greatest drawbacks of the method are:
  - Comparatively high cost
  - Limited spatial resolution
  - Cannot be used in patients with cardiac pacemaker, **metallic implant** and metallic artificial life support due to strong magnetic field
  - The length of time the scans take can also be an issue
  - Patient's Movements degrades image

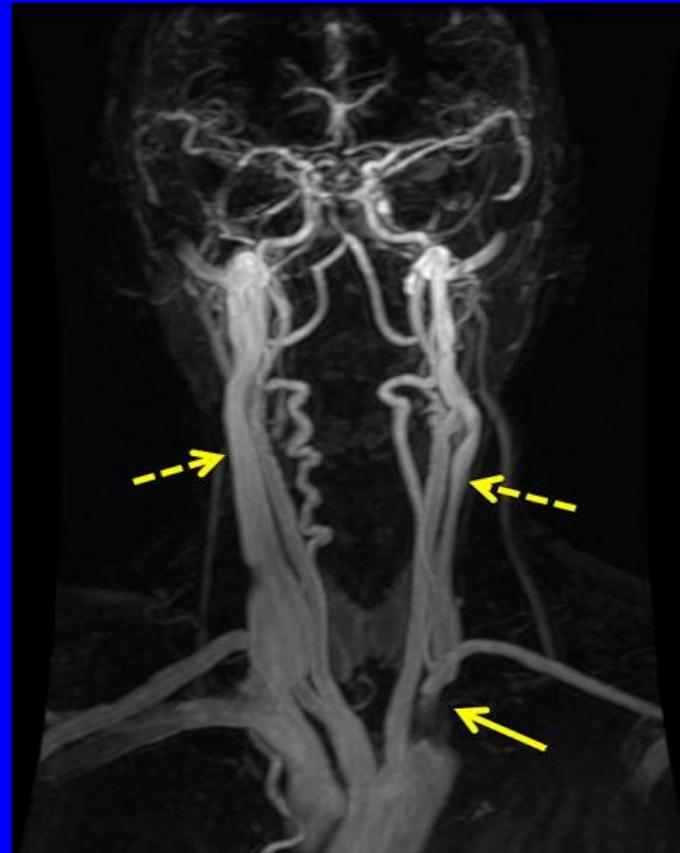
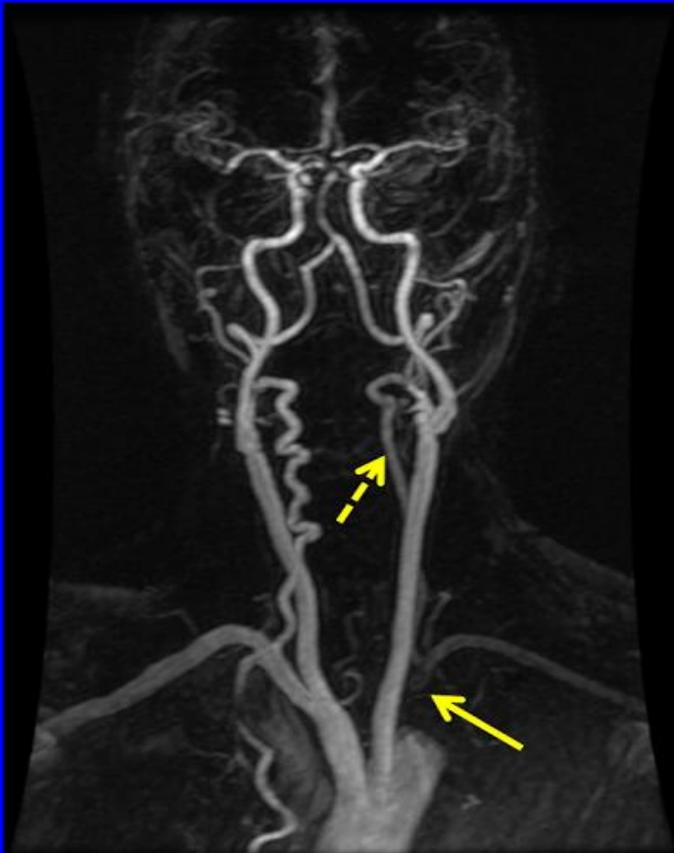


A 72-years –old man with carotid artery disease:

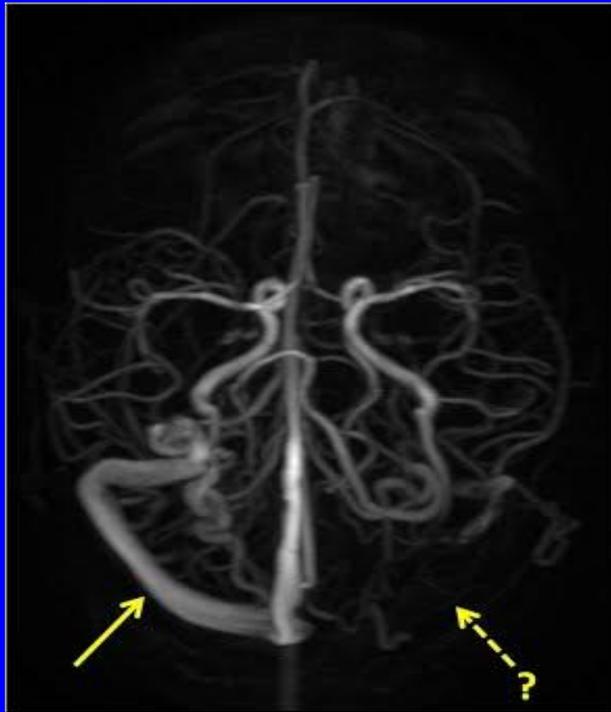
A, CE MRA of the carotid and vertebrobasilar circulations shows stenoses in proximal left internal carotid artery and distal left vertebral artery

B, CE MRA MIP image , with carotid vessels edited out, more clearly shows the left vertebral artery stenosis

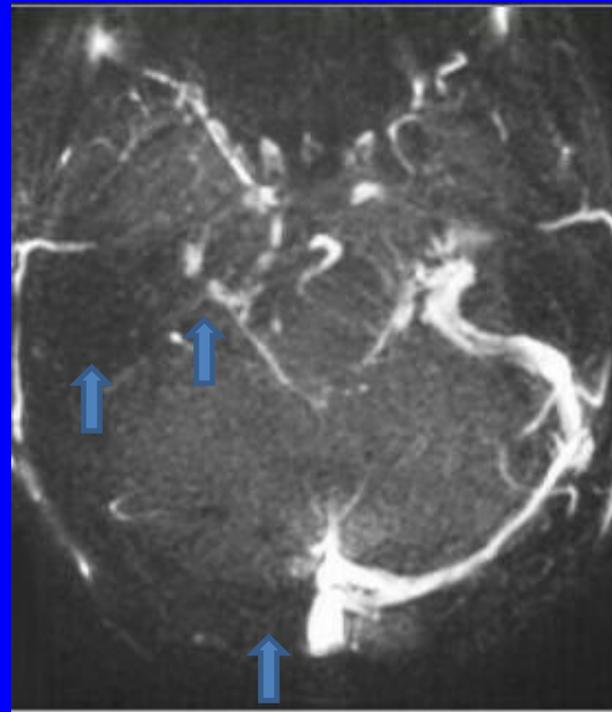
MRA with contrast using the TRICKS –  
contrast filling arteries (Lt), contrast  
filling of venous drainage (Rt) ,  
**Subclavian steal**



Reconstruction of  
MRV with thrombosis  
& occlusion of the lt  
**transverse sinus**

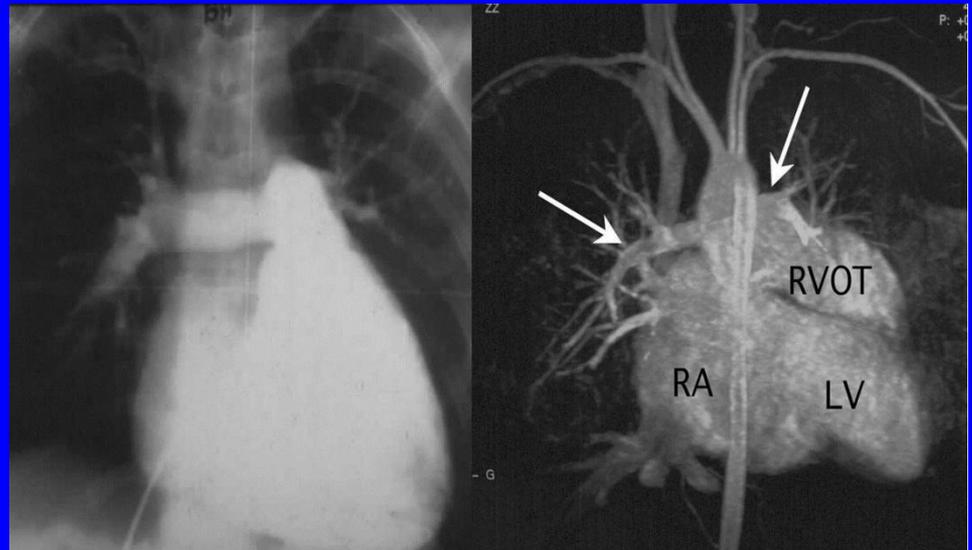
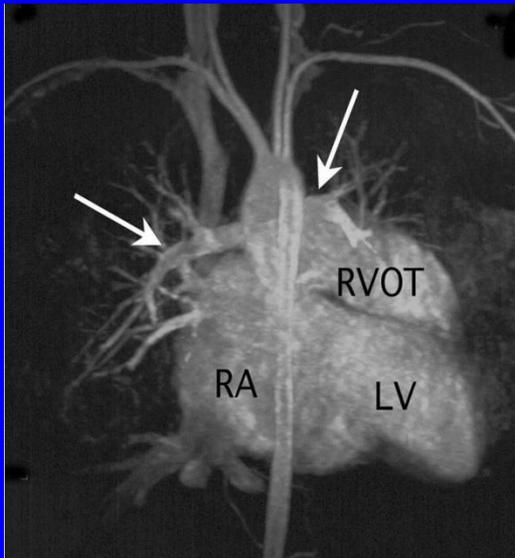


MRV : absent flow in  
the **rt transverse**  
**sinus, sigmoid sinus**  
and **internal jugular**  
vein



Coronal 3D MRA  
in **Ebstein's**  
anomaly

RV angiogram  
compared with 3D  
MRA in **Ebstein's**  
anomaly



# Conclusion

- MRA and MRV are very important diagnostic tool now a days
- Can be used in suspected vascular abnormalities in any sites of body
- Using this modality of investigation we can avoid radiation related hazards
- Judicious use of the modality is important



**THANK YOU**