SUMMARY AND CONCLUSION

The most useful imaging modalities available to assess the degree of carotid artery affection are Duplex ultrasound, MRA and angiography.

Doppler ultrasound among other vascular modalities is characterized by its ability to detect early a therosclerotic changes by measuring the increased intima-media thickness. It's also considered unique in determination of the composition of the atherosclerotic plaque by comparing its echogenicity to the sternomastoid mused, but, it's not useful in assessment of the gross surface charactersitcs of the plaque.

For accurate determination of carotid artery stenosis by ultrasound both color Doppler image and Doppler spectral analysis should be used, where color Doppler image detect the severity of stenosis by measuring the areas of residual lumen as seen in transverse diameter and Doppler spectral analysis detect the velocity changes and flow abnormalities in the pre-stenotic, stenotic, and post-stenotic region of the diseased vessel.

Four Doppler parameters are performed routinely in the stenotic region which are:

-Peak systolic velocity -End diastolic velocity

-Systolic velocity ratio -Diastolic velocity ratio

There is a wide range of velocity level used to identify carotid artery stenosis so each ultrasound department should develop its own Doppler parameters.

Carotid occlusion is easily diagnosed by ultrasound through the abscnce of flow and the presence of the occluding thrombus but, care, should be taken, to differentiate between the developing collaterals and the occulded carotid vessels, in addation, occlusion of ICA leads to

internalization of E.CA that may be confused with the occluded ICA, giving a mistaken impression of patent I.C.A.

Carotid aneurysm are diagnosed by ultrasound but they should be diffentiated from other masses that may transmit pulsations, in addition the risk of rupture of aneurysm correlates with its absolute diameter that can be optimally measured with three dimensional ultrasound.

Ultrasound finding in carotid dissection is variable, but the presence of intimal flap with a double lumen is diagnostic.

Carotid body tumor is diagnosed by ultrasound through the presence of hypo-echoic mass at the bifurcation of the common carotid spreading its two branches a part (wine glass deformity).

Now in addition ultrasound is used in diagnosis of other rare conditions as arterio-venous fistula and fibromuscular dysplasia of the carotid artery.

It has traditionally been stated that carotid ultrasound is highly accurate in sensitivity and specificity exceeding 90% for high-grade stenosis (70% or greater diameter reduction).

However it is highly examiner dependent and areas of stenosis may be completely obscured by dense calcified plaques.

It also provides no information on the common carotid artery origin. In addition, errors in angle determination can lead to under estimation of the disease.

MRA as a vascular modality is unique because its non invasiveness, high flow sensitivity, no radiation burden and multiplanar nature. It is not a stand – alone imaging modality. It has to be integrated

into the whole work-up. MRA is helpful to guide subsequent invasive vascular investigation.

MRA is actually a collection of techniques. Each of them has its strength and also limitations. None of these techniques is absolutely superior to others. It is necessary to properly select and interpret the available imaging sequence in order to evaluate the suspected pathology.

MRA demonstrates stenotic and/ or ulcerated atherosclerotic plaques with their spatial distribution as well as the severity of stenotic lesions.

The need for conventional angiography in the assessment of carotid stenosis decreases when combining either 3D TOF or 3D gadolinium enhanced MRA with Duplex sonography. Although signal loss induced by slow and turbulent flow causes overestimation of carotid stenosis the use of gadolinium based contrast material overcomes this problem. Regarding the accuracy in the evaluation of carotid artery stenosis, 3D TOF MRA is better than 2D TOF MRA & 3D PC MRA and CE MRA is the most superior one.

Although MRA may demonstrate the pathognomonic string of beads appearance of fibromuscular dysplasia, confirmatory conventional angiography is recommended because signal / noise artifacts and sensitivity to motion and metallic mimic this contour irregularity.

As regarding Moyamoya disease, there is no need for conventional angiography if MRA demonstrates stenosis or occlusion of the terminal portion of the internal carotid artery of the proximal portion of the anterior and middle cerebral arteries, the abnormal vascular network nearby the stenotic or occlusive areas or bilaterality of the for mentioned findings.

MRA precludes the use of Conventional angiography in cases with Carotid artery dissection if it indicates a mural haematoma or double lumen.

The advantages of MRA over conventional angiography in demonstration of aneurysms are 3D evaluation of aneurysm morphology and the multiplanar nature. These advantages result in better differentiation of aneurismal neck. PC MRA is preferred for large aneurysms while TOF MRA techniques are preferable for small aneurysms.

In cases of AVM, Gadolinium enhanced MRA is better than 3D TOF because of the following advantages, which are derived from the use of gadolinium based material; background suppression including fat and methaemoglobin, reduced susceptibility artifacts and the acquisition of transverse, coronal and sagittal orientation.

Both MRA findings and the dramatic onset of presentation confirm the diagnosis of direct carotid cavernous fistula. On the other hand, subtle findings or even normal MRA study is obtained in patients with indirect carotid cavernous fistula.

MRA shows splaying of the internal and external carotid arteries in cases of carotid body tumours. Also it detects the tumour vascularity.

The use of MRA in Takayasu arteritis is of value particularly in pediatric age because of higher angiographic complications. Gadolinium enhanced MRA shows arterial wall thickening with in distinct outlines.