ORIGINAL RESEARCH PAPER

Radio-Diagnosis

"ROLE OF MAGNETIC RESONANCE IMAGING AND MRA IN INTRACRANIAL ANEURYSMS"

KEY ANEURYSMS, MRI, MRA, CTA.WORDS:

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ABSTRACT

Intracranial aneurysms, also called cerebral aneurysms, are aneurysms of intracranial arteries. Most intracranial aneurysms occur in 5-6% of the general population. Patients with intracranial aneurysms either present catastrophically with rupture of the aneurysm or have aneurysms that are incidentally discovered. The prognosis is drastically different in each case, with a greater than 50% incidence of death if the aneurysm ruptures. On the other hand, the surgical or endovascular mortality following treatment of an unruptured aneurysm is minimal. In the appropriate clinical setting, it is important to find a screening study to detect a cerebral aneurysm so that definitive cerebral angiography can be performed. Magnetic resonance imaging (MRI) and magnetic resonance angiogram (MRA) can detect an aneurysm in 60-85% of cases. Magnetic resonance angiography techniques continue to improve with better gradients, enhanced sequences to detect flow and reduce flow-related artefacts, shorter echo times with possible use of echo-planar (short scanning time) techniques, and improved imaging matrix, and they may, in conjunction with computed tomographic angiography (CTA), become a reliable noninvasive technique for detection of intracranial aneurysm.

INTRODUCTION

Intracranial aneurysms confer the risk of subarachnoid haemorrhage (SAH) and intraparenchymal haemorrhage, a potentially devastating condition, though most aneurysms remain asymptomatic for the lifetime of the patient.

Imaging is crucial to all stages of patient care for those who harbour an unruptured intracranial aneurysm (UIA), including establishing the diagnosis, determining therapeutic options, undertaking surveillance in patients who elect not to undergo treatment or whose aneurysm(s) portends such a low risk that treatment is not indicated, and to perform follow-up after treatment.

Neuroimaging is equally as important in patients who suffer a SAH. DSA remains the reference standard for imaging intracranial aneurysms due to its high spatial and temporal resolution.

Aims & Objectives of The Study

The Role of MRI and MRI in identifying the location and size of unruptured and ruptured cerebral aneurysms.

METHODOLOGY

A retrospective study of 15 intracranial aneurysm patients who presented with symptoms of stroke and headache clinically were referred for MRI brain to the department of radiology, Kurnool medical college, Kurnool in a period of 1year. MRI of the brain and MRA without iv contrast was done in Philips ingenia 1.5T MRI machine.

PROTOCOL

Field strength: 1.5T MRI
Planes of imaging: axial ,sagittal and coronal planes
Sequences: fast spin echo sequences with T1W, FLAIR , S.W.I.,TOF MRA
Slice thickness: 2-3 mm

RESULTS

1. Of total 15 patients examined in last 1 year(n=12) 80 % had aneurysms in anterior circulation and(n=3) 20% had aneurysms in posterior circulation .

TABLE 1: Location of intracranial aneurysms

LOCATION OF ANEURYSM	NUMBER OF PATIENTS	PERCENTAGE
ANTERIOR CIRCULATION	12	80%
POSTERIOR CIRCULATION	3	20%

2. (n=7) 47% had MCA aneurysm ,(n=3) 20% had ACOM aneurysm ,(n=2) 13% had ICA aneurysm and (n=3) 20% had basilar artery aneurysm.

Table 2: Locations of Intracranial Aneurysms

LOCATION OF ANEURYSM	NUMBER OF PATIENTS	PERCENTAGE
CAVERNOUS ICA SUPRACLINOID ICA	1 1	6.66% 6.66%
RT MCA BIFURCATION M1 SEG , RT MCA LT MCA BIFURCATION	3 3 1	20% 20% 6.66%
ACOM	3	20%
BASILAR ARTERY	3	20%

3. Total (n=8) 53% of aneurysms were ruptured, of which (n=7) 47% are of anterior circulation and (n= 1) 6% are of the posterior circulation.

4. Subarchanoid haemorrhage is observed in all (n=8) 100% of patients with a ruptured aneurysm. Intraparenchymal haemorrhage is observed in only (n=4)50% of patients with a ruptured aneurysm.

TABLE 3: SAH and Intraparenchymal haemorrhage in patients with ruptured aneurysms

PATTERN	NUMBER OF PATIENTS(N=8)	PERCENTAG E
SUBARACHNOID HAEMORRHAGE	8	100
INTRA PARENCHYMAL HAEMORRHAGE	4	50

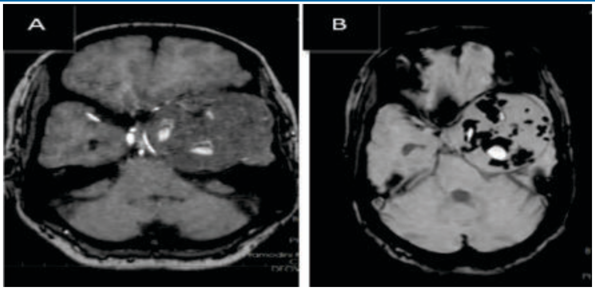

Fig 1:GAINT THROMBOSED ANEURYSM(A) MRA showing a large hypointense lesion with multiple foci of blooming on swi. (B) S.W.I. image showing large lesion with multiple foci of blooming indicating a gain thrombosed aneurysm arising from the M1 seg of left M.C.A. causing compression of ipsilateral ICA

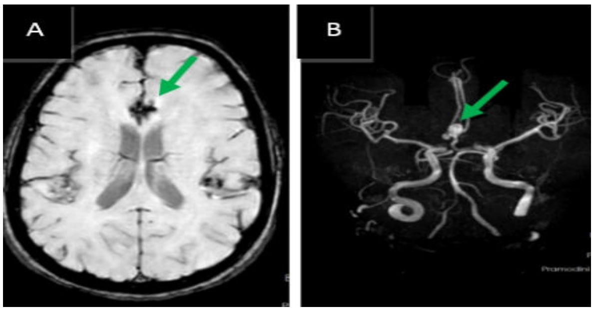

Fig 2: ACOM ANEURYSM (A) SWI axial image showing blooming focus in the midline at the location of anterior cerebral arteries. (B) MR angiography shows a saccular ACOM aneurysm.

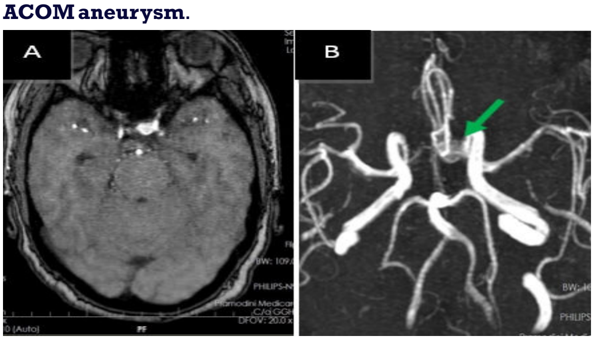

Fig 3:LEFT ACA ANEURYSM, which was incidentally detected in a 43years old female (A) & (B) MRA, showed saccular outpouching from the left anterior cerebral artery.The green arrow shows the aneurysm.

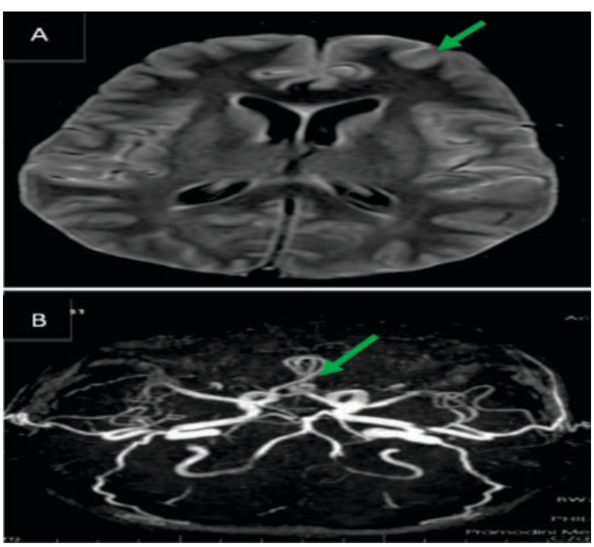

Fig4: RUPTURE OF BERRY ANEURYSM, 35yrs female who is a known case of LEFT ACA aneurysm now presented with severe sudden, excruciating headache "thunderclap" headache (A) FLAIR axial image showing multiple linear sulcal hyperintensities in bilateral cerebral hemispheres indicating subarachnoid haemorrhage (B) MRA image showed a decrease in size of aneurysm indicating aneurysmal rupture.

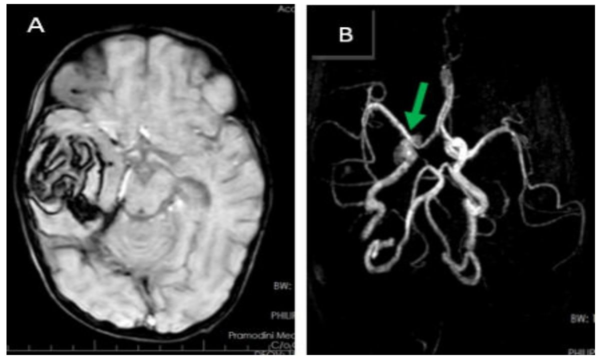

Fig 5: CAVERNOUS PART OF RT ICA ANEURYSM (A) SWI image showing multiple areas of blooming in right temporal lobe. (B) MRA image shows fusiform dilatation of cavernous part of right ICA.

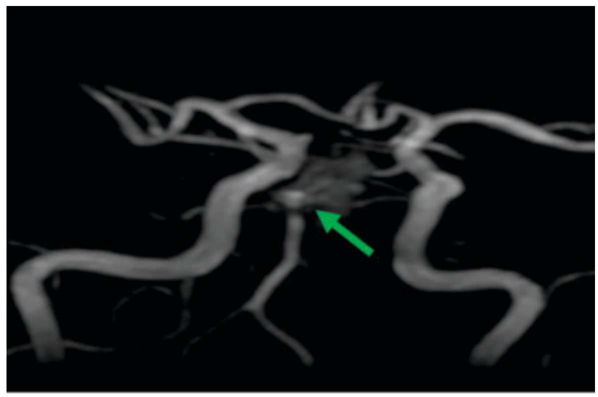

Fig 6: BASILAR TIP ANEURYSM, MRA shows an outpouching arising from the basilar artery tip.

DISCUSSION

The MRA has emerged as the noninvasive imaging modality for non-emergent detection and surveillance of intracranial aneurysms in a high-risk population. This is because MRA does not require contrast and does not depend on ionizing radiation. The classic most common intracranial aneurysm, the so-called "berry" aneurysm describes a saccular outpouching of the otherwise healthy parent vessel, are usually at the origin of a branch or bifurcation.

Each aneurysm arises from the branching site of a large artery. Most are located on or near the circle of Willis. More than 90% are located at one of the following five sites: (a) the internal carotid artery at the level of the posterior communicating artery; (b) the junction of the anterior cerebral and anterior communicating arteries; (c) the proximal bifurcation of the middle cerebral artery; (d) the junction of the posterior cerebral and basilar arteries, and (e) the bifurcation of the carotid artery into the anterior cerebral and middle cerebral arteries. Other aneurysm sites on the carotid artery are at the origins of the ophthalmic, superior hypophyseal, and anterior choroidal arteries. Other sites on the vertebral and basilar arteries include the sites of origin of the anteroinferior cerebellar, posteroinferior cerebellar, and the superior cerebellar arteries and the junction of the basilar and vertebral arteries.

The most common presenting symptoms are due to occlusion or distal thromboembolism, mass effect, and arterial rupture).

A fusiform aneurysm can be simple without branches or complex with one or more side branches. Atherosclerosis, dissection, and collagen disease are the main proposed mechanisms.

CONCLUSION

Thus, it is critically important to accurately characterize aneurysmal morphology to guide treatment, making neuroimaging a critical element in evaluating and treating patients with cerebral aneurysms.

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