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CASE REPORT

A Hybrid Microsurgical and Endovascular Approach in treatment of Multiple Intracranial Aneurysm

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ABSTRACT
Treatment of multiple intracranial aneurysms is challenging. Neurologic status, aneurysm morphology, location, ruptured/unruptured status, availability of equipment, and patient preference are among the factors influencing the choice of treatment modality. The prevalence of intracranial aneurysms (IAs) may range between 5 and 8% , and up to 11%. We hereby report a case of 60 year old male patient multiple Intracranial Aneurysm treated with Hybrid Approach. We concluded that microsurgical and endovascular therapies should work as complementary, rather than competing techniques for managing complex aneurysms.
Keywords: intracranial aneurysms, intracranial arteries, subarachnoid hemorrhage.

INTRODUCTION

Multiple intracranial aneurysms refers to the presence of two or more aneurysms in intracranial arteries. The prevalence of intracranial aneurysms (IAs) may range between 5 and 8%, and up to 11%. Incidence of multiple intracranial aneurysm is 7-15 % of all aneurysms. IAs are the leading cause of hemorrhagic stroke, accounting for 70–85% of non-traumatic subarachnoid hemorrhages (SAH).[1]

The first surgical treatment of an IA was performed in 1933 by Norman Dott, who wrapped a ruptured IA. While the first obliterative clipping of an IA was performed in 1938 by Walter Dandy.[2] In 1975, Yasargil and Fox described the classical microscopic assisted open approaches for IA clipping.

The more recent advance in IA treatment has been the advent of safe and effective endovascular techniques for the treatment of IAs, particularly for the posterior circulation.[3]

Although both surgical and endovascular IA occlusion technologies are effective for appropriately selected patients, improved technology for endovascular devices and techniques has shifted the balance towards these less invasive techniques with the benefit of reduced operative time, patient preference and tolerability in less healthy patients, and decreased length of in-hospital stay.[4-6] Nonetheless, open surgical techniques including complex IA treatment with bypass techniques remain vital in the cerebrovascular neurosurgeon's armamentarium for IAs that cannot be treated by endovascular means. The treatment techniques and management guidelines for IAs have thus continued to evolve in recent years, and these rapid developments have forced clinicians to adapt their surgical decision-making.

CASE REPORT

A 60 year old male patient came with complaint of sudden onset of severe headache (experienced never before) with multiple episodes vomiting since One Day, Patient went to a local hospital in West Bengal where NCCT Head was done s/o diffuse Subarachnoid Hemorrhage when patient developed altered sensorium, patient shifted to KIMS Bhubaneshwar for further management With (GCS E4V4M5).

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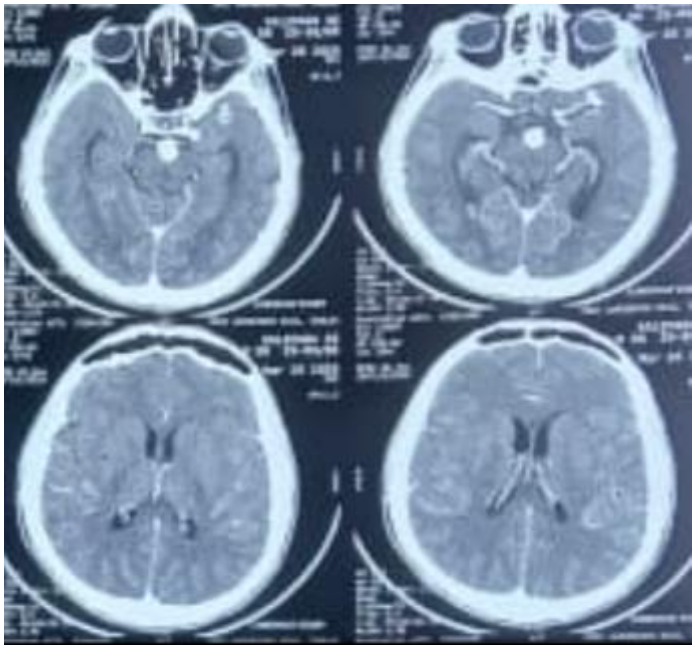

FIGURE 1: CECT HEAD: Diffuse SAH

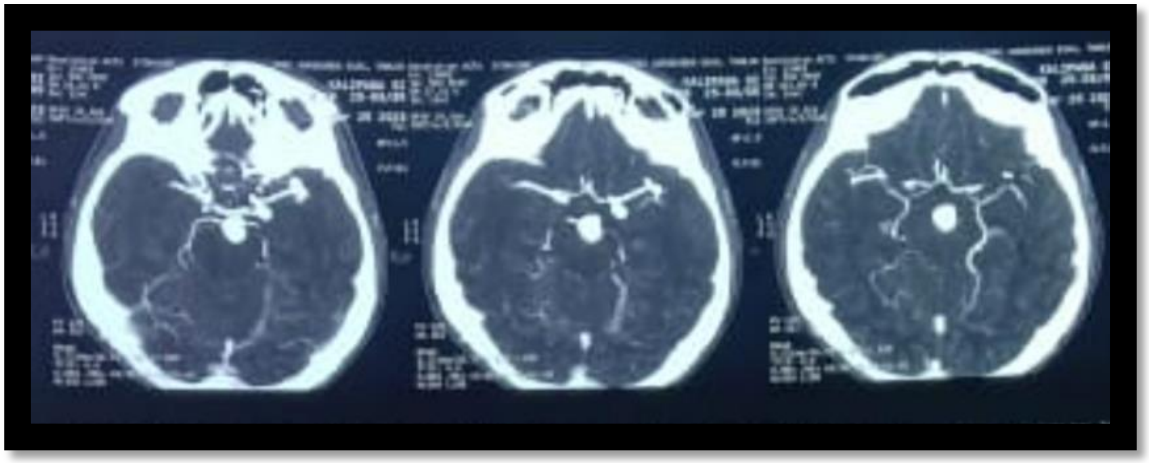

FIGURE 2: 3D Reconstruction of CT Angio Brain

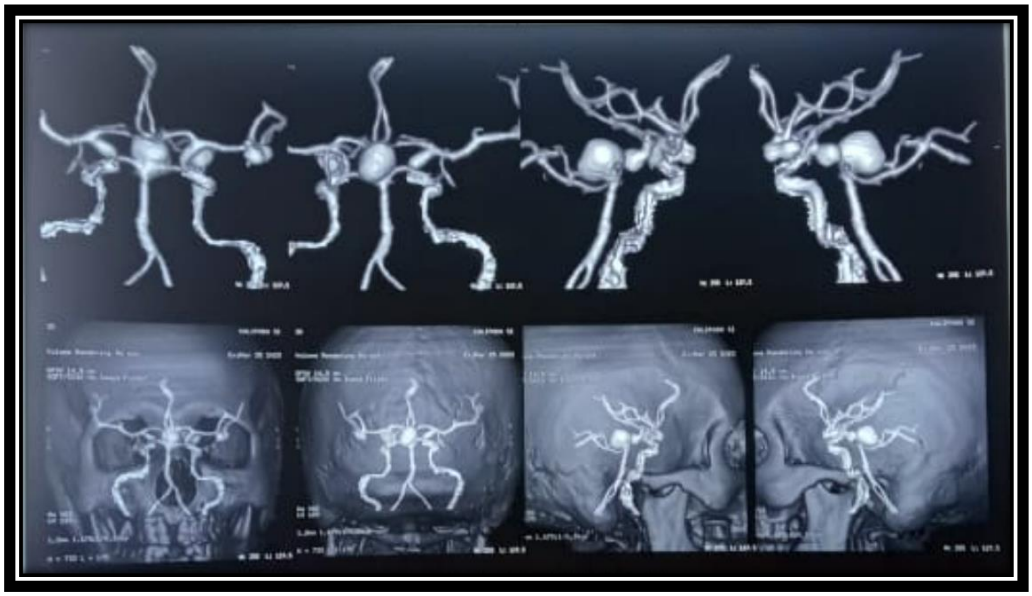

FIGURE 3: 3D Reconstruction of CT Angio Brain

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Patient was then planned for **DSA for further evaluation of aneurysm:**
Multiple Aneurysms seen : Largest arising from top of the basilar artery directed postero-inferiorly(measuring 13x10x10mm with neck 3.3mm),Another posterolaterally directed aneurysm seen arising from Left Supraclinoid ICA just before the bifurcation(measuring appox 7.5 x 5.8x 6.4mm,neck measuring 2.1mm).Another bilobed aneursm seen at Left MCA Bfurcation measuring appox 10 x 5.8 x 4.6mm ,neck measuring 2mm.

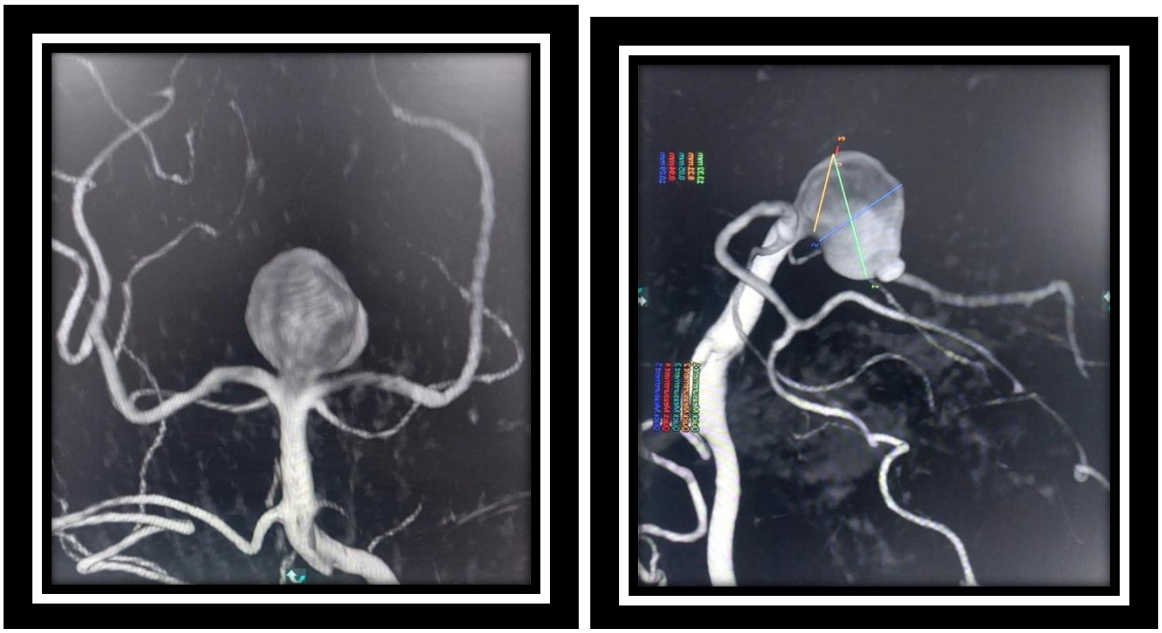

FIGURE 4: BASILAR TOP ANEURYSM

Patient was planned for posterior circulation aneurysm(Basilar top Aneurysm) coiling due to high risk of rupture of posterior circulation anuersyms.

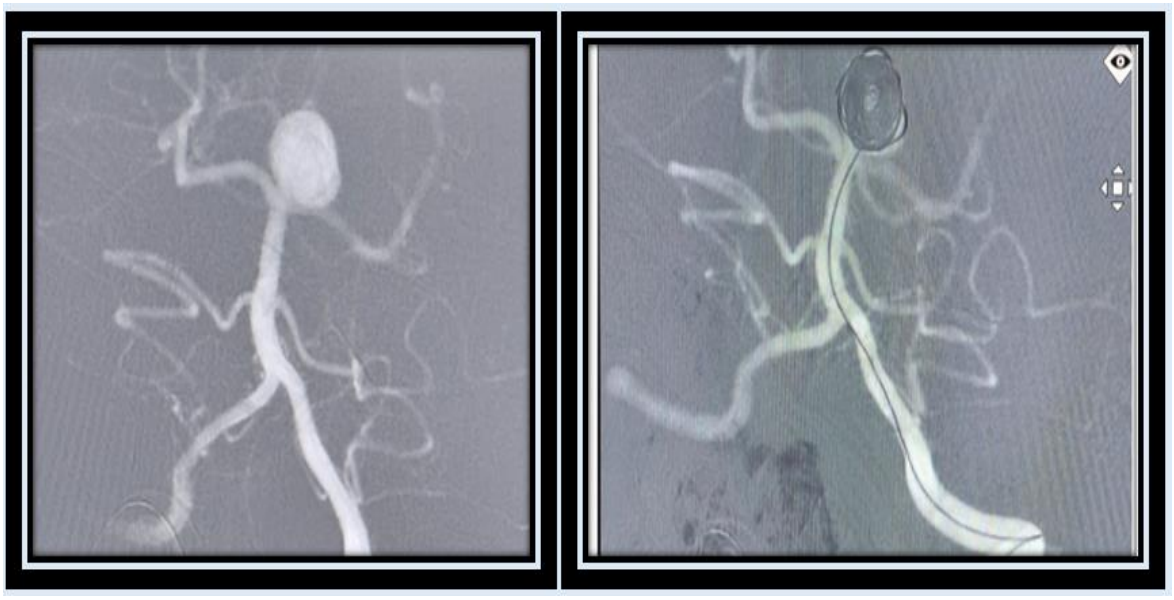

FIGURE 5: PRE AND POST BASILAR TOP ANEYRYSM COILING

After 2 weeks of coiling patient was planned for surgery. **Surgical Procedure**: LEFT PTERIONAL CRANIOTOMY WITH CLIPPING OF ANEURYSM (LEFT ICA AND LEFT MCA).

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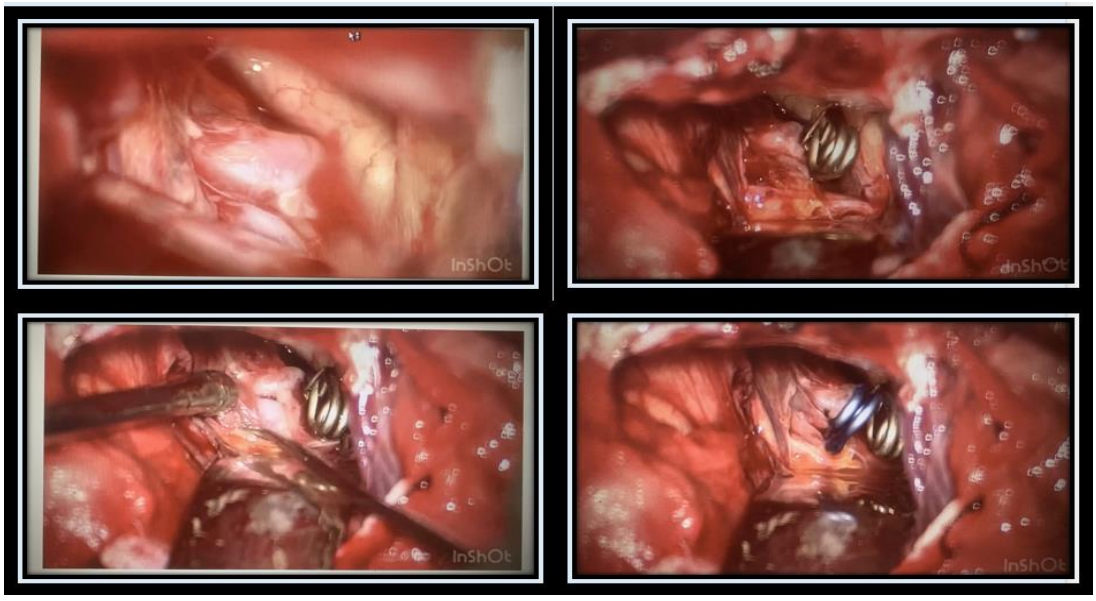

FIGURE 6: INTRA OP IMAGES OF CLIPPING

Post-Op recovery was uneventful, Patient was discharged on POD 6 with GCS E4V5M6,Patient was regularly followed at 3 month interval with no significant abnormality and with Modified Rankin Score =1.

DISCUSSION

The need for a Hybrid Approach for IA treatment is rare and limited to highly selective cases. Hybrid Approach have been most valuable in an emergency setting concerning ruptured IAs. Furthermore, HAs may also be considered in patients with multiple aneurysms in different vascular territories.[7]

Previous studies reported numerous advantages of hybrid procedures for IA treatment, such as the option to perform direct intraoperative control angiography after clipping , to detect remnants, to perform intraoperative intravasal spasmolysis if needed, or for proximal control with a temporary balloon occlusion during clipping procedures. However, the combination of endovascular and open surgical treatment combined in a single session using a hybrid approach (HA) in a hybrid operation room has only very rarely been described5.

Patients who have an aneurysmal subarachnoid hemorrhage have a small risk of aneurysm recurrence and new aneurysm formation. The Dutch ASTRA group reported follow-up CT angiography on 610 patients 1–15 years after surgical clipping of a ruptured aneurysm and found an incidence of 16% of new aneurysms. In 24 patients, aneurysms were present at the site of the previous clipping and in three of these, the postoperative angiogram had shown complete aneurysm occlusion.[8]

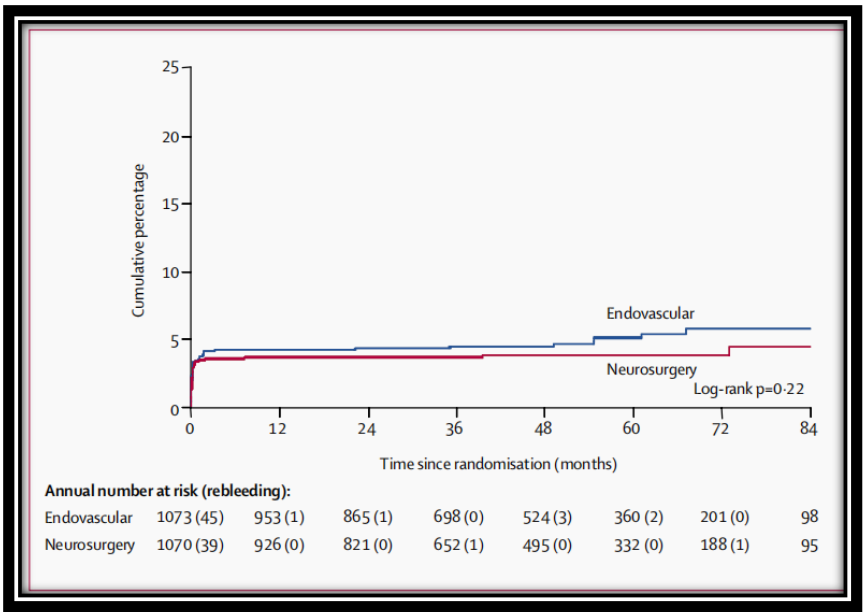

FIGURE 7: RISK OF REBLEEDING

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A "hybrid approach" for aneurysm clipping refers to a surgical strategy that combines traditional microsurgical clipping with endovascular techniques, often utilizing a hybrid operating room where both open surgery and advanced imaging capabilities are available, allowing the surgeon to access and treat complex aneurysms that might be challenging with either method alone; essentially, using both open surgical clipping and intravascular coiling to fully address the aneurysm depending on its location and anatomy[8].

This approach is particularly beneficial for treating challenging aneurysms where the anatomy makes either a purely open surgical or purely endovascular approach difficult, such as large or giant aneurysms with complex branching patterns.[9]

By combining the advantages of both surgical clipping and endovascular coiling, a hybrid approach can potentially lead to better surgical outcomes and reduced complications for complex aneurysms.[10]

In our case patient was having multiple aneurysm in both anterior and posterior circulation of brain arterial system.

As posterior aneurysm are more susceptible for rupture , we opt for basilar top coiling first followed by clipping of ICA and MCA bifurcation aneurysm.

CONCLUSION

Surgery is the procedure of choice especially in anterior circulation aneurysm as it has least chance of rebleeding, and it is also very cost effective in developing country like India as compared to other endovascular procedure. Among all this accessibility of endovascular setup is also a major concern in India.

Improved surgical navigation systems, and technological advancements in endovascular neurosurgery like use of balloons, catheters, and stents, which effectively treat aneurysms with complex morphologies.

Microsurgical and endovascular therapies should work as complementary, rather than competing techniques for managing complex aneurysms.

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