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### **Abstract:**

Cerebral aneurysms are abnormal, localized dilations of blood vessels in the brain, which, if left undiagnosed or untreated, can lead to life-threatening complications such as subarachnoid hemorrhage (SAH). This case report describes the clinical presentation, diagnostic evaluation, and management of a 55-year-old patient diagnosed with a ruptured cerebral aneurysm. The patient underwent timely surgical intervention, followed by a multidisciplinary recovery approach. The report highlights the importance of early detection, the role of advanced imaging techniques, and effective post-operative care in optimizing patient outcomes.

**Keywords:** cerebral aneurysm, subarachnoid hemorrhage, CT angiography, endovascular treatment, surgical clipping

### **I. INTRODUCTION**

#### **Introduction:**

Cerebral aneurysms are a significant cause of morbidity and mortality worldwide. The majority of patients with cerebral aneurysms are asymptomatic, and the aneurysm is often discovered incidentally. However, when rupture occurs, it can lead to subarachnoid hemorrhage (SAH), which is associated with a high rate of mortality and severe neurological deficits. The incidence of rupture is highest among individuals with aneurysms in the anterior circulation, particularly the internal carotid artery and the middle cerebral artery.

Early identification and intervention are crucial for improving outcomes. The primary management strategies for cerebral aneurysms include surgical clipping, endovascular coiling, and conservative management, depending on the size, location, and rupture status of the aneurysm. This case report discusses a patient diagnosed with a cerebral aneurysm following a sudden headache and loss of consciousness, which was managed through a combination of diagnostic imaging, surgical intervention, and post-operative care.

A multidisciplinary approach to cerebral aneurysm care, which incorporates the collaboration of multiple healthcare professionals, ensures that all aspects of patient needs are addressed. This model not only focuses on medical treatment but also provides a framework for education, psychological

support, and rehabilitation, aiming to improve the quality of life and long-term outcomes for individuals affected by cerebral aneurysms.

### Case presentation:

A 55-year-old male with no significant medical history presented to the emergency department with a sudden onset of severe headache, nausea, vomiting, and semi consciousness. He was a smoker and a habitual of alcoholism since 15 years and did not have a family history of aneurysms or genetic disorders. On examination, the patient was alert but exhibited signs of positive Romberg test, nystagmus, focal neurological deficits like weakness, numbness. The Glasgow Coma Scale (GCS) score was 11/15.

### Diagnostic evaluation:

Initial non-contrast computed tomography (CT) of the head revealed evidence of subarachnoid haemorrhage in the left temporal lobe. Subsequent CT angiography confirmed the presence of a 7mm saccular aneurysm located at the bifurcation of the left middle cerebral artery (MCA). The aneurysm was deemed to be ruptured, contributing to the haemorrhage.

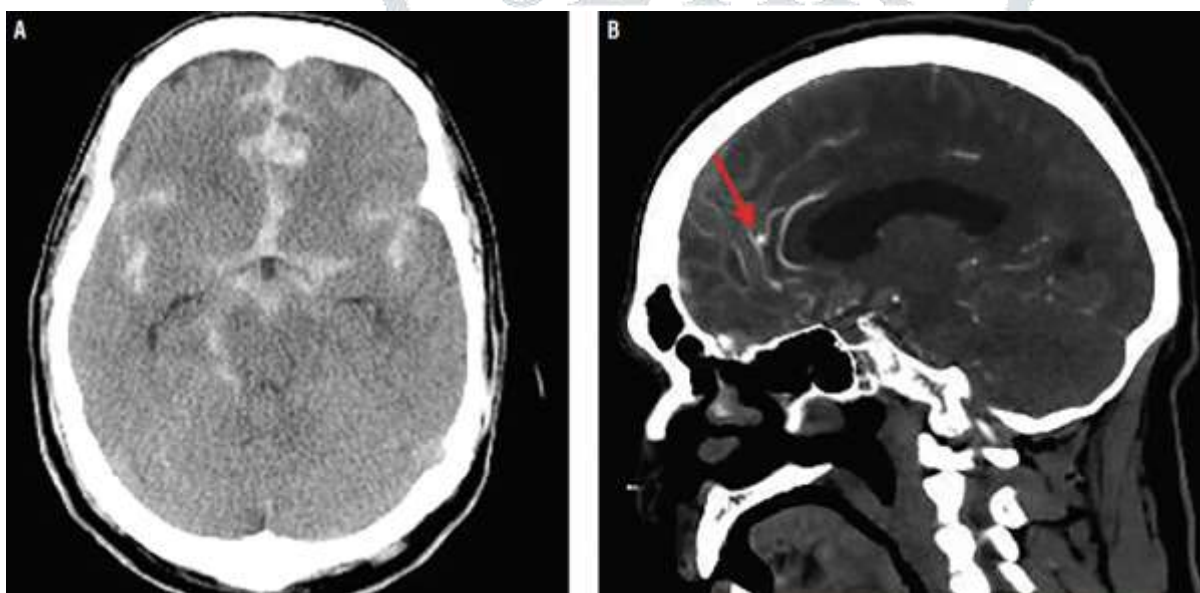


Figure 1: Head CT (A) demonstrates diffuse subarachnoid hemorrhage at the time of hospital admission with CT angiogram (B) showing a 5-mm ruptured pericallosal artery aneurysm (arrow).

Figure 2: Catheter cerebral angiogram shows no evidence of cerebral aneurysm, indicating interval thrombosis of the aneurysm after initiation of antifibrinolytic therapy.

### Treatment

Antifibrinolytic therapy with aminocaproic acid was initiated, and Mr Sekar was scheduled for a catheter cerebral angiogram the following morning. Catheter angiography, including 3D spin revealed normal caliber anterior and posterior circulation vasculature, with no evidence for aneurysm, suggesting aneurysmal thrombosis had occurred (Figure 2).

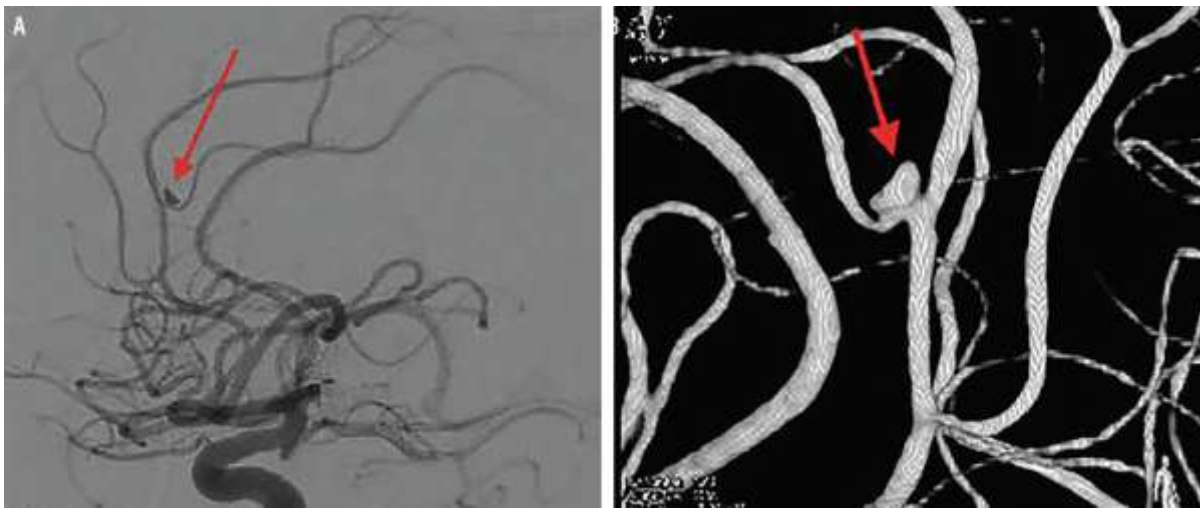


Figure 3: Repeat catheter cerebral angiogram shows recanalization of the pericallosal aneurysm in lateral projection (A) and 3D reconstruction (B).

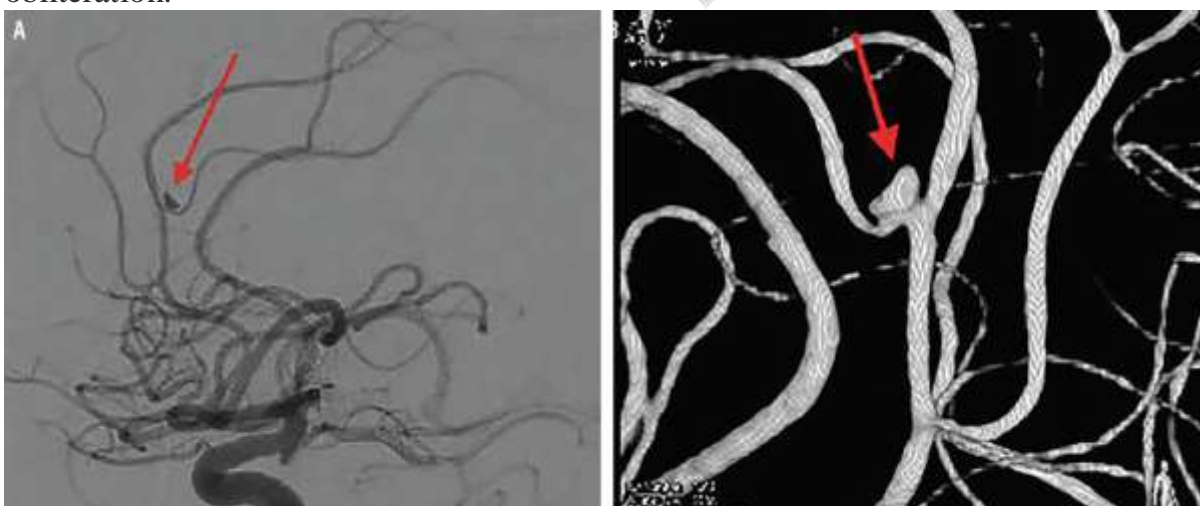
### Management and treatment:

The patient was immediately transferred to the neurovascular unit for further management. Given the aneurysm's location and the risk of re-bleeding, a decision was made to proceed with endovascular coiling. The procedure was carried out under general anaesthesia. During the coiling, the aneurysm was successfully obliterated, and no complications such as stent migration or perforation were noted.

Following the procedure, the patient was monitored in the intensive care unit (ICU) for 48 hours and then transferred to a regular ward. The post-operative course was uneventful, and the patient began rehabilitation therapy to address mild residual weakness on the right side of her body. On follow-up, the patient showed significant neurological recovery, with only mild cognitive impairment and no further neurological deficits.

### Follow-up Care

Mr Sekar was monitored for vasospasm and hydrocephalus during recovery in the neurology intensive care unit (neuroICU). He had a follow-up catheter angiogram 7 days later that demonstrated recanalization of the pericallosal artery aneurysm (Figure 3). Mr Johnson was taken to the operating room for open surgical aneurysmal clipping. Intraoperative visualization of the aneurysm confirmed the presence of persistent partial saccular thrombosis prior to permanent microsurgical clip obliteration.



(Figure 3). Mr Sekar was taken to the operating room for open surgical aneurysmal clipping. Intraoperative visualization of the aneurysm confirmed the presence of persistent partial saccular thrombosis prior to permanent microsurgical clip obliteration.

## Nursing Care and Education

Nurses play a central role in patient education, providing practical guidance on how to manage post-operative recovery, including wound care, pain management, and recognizing signs of complications. They also teach patients and their families how to monitor for warning signs such as increased headaches, changes in neurological status, or signs of infection.

Additionally, nurses assist in educating patients on lifestyle modifications that can reduce the risk of future aneurysms or re-rupture, such as controlling blood pressure, avoiding smoking, and maintaining a healthy diet.

Nursing care plan

**1. Ineffective CEREBRAL TISSUE PERFUSION** related to bleeding or vasospasm.

### NURSING INTERVENTION TO Improving Cerebral PERFUSION

- Monitor closely for neurologic deterioration, and maintain a neurologic flow record.
- Check BLOOD pulse, level of consciousness, pupillary responses, and motor function hourly; monitor respiratory status and report changes immediately.
- Implement aneurysm precautions (immediate and absolute BED REST in a quiet, no stressful setting; restrict visitors, except for family).
- Elevate the head of the bed 15 to 30 degrees or as ordered.
- Avoid any activity that suddenly increases blood pressure or obstructs venous return (eg, Valsalva maneuver, straining), instructs the patient to exhale during voiding or defecation to decrease strain, eliminate caffeine, administer all personal care, and minimize external stimuli.

**2. Disturbed sensory perception** related to medically imposed restrictions

#### Relieving Sensory Deprivation

- Keep sensory stimulation to a minimum.
- Explain restrictions to help reduce the patient's sense of isolation
- Relieving anxiety by proper explanation about the treatment & before any procedure.
- Inform patient of plan of care.
- Provide support and appropriate reassurance to patient and family.

**3. ANXIETY** related to illness and/or medically imposed restrictions (aneurysm precautions).

- Inform the patient about the treatment and outcome
- Provide support and appropriate reassurance to patient and family.
- Teach about the importance of restriction and why its needed for the purpose of avoiding increase in blood pressure
- Involve the family member in care .
- Encourage the patient to ask doubt and clarify the doubt

#### 4. Risk for Potential Complication

##### Managing Potential Complications

- Assess for and immediately report signs of possible vasospasm, which may occur several days after surgery or on the initiation of treatment (intensified headaches, decreased level of responsiveness, or evidence of aphasia or partial paralysis). Also, administer calcium channel blockers or fluid volume expander as prescribed.

- Maintain seizure precautions. Also, maintain airway and prevent injury if a seizure occurs. Administer antiseizure medications as prescribed phenytoin (dilatant) is the medicine of choice).
- Monitor for the onset of symptoms of hydrocephalus, which may be acute (first 24 hours after hemorrhage), subacute (days later), or delayed (several weeks later). Report symptoms immediately: acute hydrocephalus is characterized by sudden stupor or coma; subacute or delayed is characterized by gradual onset of drowsiness, behavioral changes, and ataxic gait.
- Monitor for and report symptoms of aneurysm rebleeding. Rebleeding occurs most often in the first 2 weeks.
- Symptoms include sudden severe headache, nausea, vomiting, decreased level of consciousness, and neurologic deficit.
- Administer medications as ordered.
- **Hyponatremia:** monitor laboratory data often because hyponatremia (serum sodium level under 135 mEq/L) affects up to 30% of patients. Report low levels persisting for 24 hours, as a syndrome of inappropriate antidiuretic hormone (SIADH) or cerebral salt wasting syndrome (kidneys cannot conserve sodium) may develop.

### Rehabilitation and Long-Term Support

Rehabilitation specialists, including physical therapists, occupational therapists, and speech therapists, play a crucial role in the recovery process, particularly for patients who experience neurological deficits after treatment. Rehabilitation programs focus on improving motor skills, cognitive function, and speech abilities, helping patients regain independence and quality of life.

The education process extends beyond the acute treatment phase, with rehabilitation specialists offering guidance on managing long-term physical or cognitive impairments. They also work with patients to set realistic goals for recovery and provide ongoing support throughout the rehabilitation process.

### Discussion

Cerebral aneurysms are abnormal, balloon-like expansions of the intracranial artery walls that result from prolonged hemodynamic and inflammatory stress, leading to endothelial remodeling.<sup>1-5</sup> Each cerebral aneurysm is unique and requires individualized assessment before determining the appropriate treatment approach. Aneurysms are generally classified based on size (small <10 mm, large 10-25 mm, giant >25 mm), anatomical location, and morphology. While most small unruptured aneurysms follow a benign course, there remains a small but significant risk of rupture and subsequent subarachnoid hemorrhage (SAH), both of which carry considerable risks for morbidity and mortality. Studies suggest that up to 15% of patients may die before receiving medical care, and 30% of those who survive can experience substantial disability.<sup>6-11</sup>

Spontaneous thrombosis of aneurysms is rare and typically occurs in large fusiform or giant aneurysms.<sup>12-14</sup> A review of existing literature indicates that complete spontaneous thrombosis is exceedingly rare in small, non-ruptured cerebral aneurysms, while it is estimated to occur in only 1% to 2% of ruptured aneurysms of a similar size.<sup>15</sup>

## Conclusion

The clinical presentation of a cerebral aneurysm, particularly when it ruptures, can involve a variety of positive signs and symptoms. Recognizing these early signs is crucial for initiating timely diagnosis and intervention to reduce the risk of permanent neurological damage or death. Prompt imaging and a multidisciplinary approach to management are key to improving patient outcomes.

A multidisciplinary approach to cerebral aneurysm education and support plays a critical role in improving patient outcomes, not only by facilitating early diagnosis and appropriate medical treatment but also by addressing the psychological, emotional, and rehabilitation needs of the patient. By fostering collaboration among neurologists, neurosurgeons, nurses, psychologists, and rehabilitation specialists, patients receive comprehensive care that enhances their chances of recovery and quality of life. This integrated model emphasizes the importance of communication, education, and support across all stages of care, ensuring that patients are equipped with the knowledge and resources they need to navigate their treatment journey effectively.

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