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Middle cerebral artery aneurysm

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Abstract: Intracranial aneurysm can be catastrophic. The events set in motion by aneurysmal rupture often preclude a successful neurological outcome despite the best medical and surgical management.

We report a case of a 36-year-old male presented with sudden spontaneous drop attack with disturbed conscious level. Within a short time the patient began to experience a Cushing reaction with CT brain demonstrating large temporal intracerebral haematoma. Urgent surgical evacuation of the haematoma is done. Postoperative 4-vessel angiography showed ruptured middle cerebral artery (MCA) aneurysm. Late surgery with clipping option is advocated with successful separation of the aneurysm from the general circulation. *(p62-65)*

Keywords: *Middle cerebral artery aneurysm, subarachnoid haemorrhage and pterional approach*

Introduction

Operative exposure of MCA aneurysm can be achieved either through transsylvian approach to get direct exposure to the aneurysm with the advantage of proximal vessel control. If the fissure cannot be identified easily, as in cases of recent haemorrhage, a superior temporal gyrus approach can be used.

Case Report

A 36-year-old male patient came to the Emergency Department with a history of sudden drop attack and loss of consciousness. On admission, he was semiconscious with moderate irritability, right-sided severe hemiparesis 2/5, localised to pain with his left upper limb, hardly opening his eyes to commands without verbal response. Both pupils are regular, 3-4 ml, with sluggish reaction. There was sutured recent scalp wound and periorbital haematoma. Relatives gave history of several drop attacks in previous days with severe headache and occasional cloudiness of consciousness. No history of diabetes mellitus or hypertension.

Vital signs: BP = 160/100 mmHg, which rapidly rose to 200/100 mmHg; respiration was regular but pulse rate was 100 b/min which rapidly dropped to 64 b/min, with deteriorating consciousness.

Computed tomography was done. Patient was intubated and admitted to ICU and placed on mechanical ventilation. PH = 7.4; PCO2 = 27; PO2 = 268; Hb = 10 gm %; Na = 131; K = 3.4. Computed tomography brain showed huge left temporoparietal intracerebral haemorrhage with midline shift and intraventricular extension.

Patient underwent urgent surgery for temporoparietal craniotomy and evacuation of intracerebral haematoma was done. Patient was managed in ICU for the next two weeks until conscious level improved and then was extubated. He was transferred to the neurosurgery ward after he became haemodynamically stable, but with residual expressive aphasia and right hemiplegia. At that time the patient had 4-vessel angiography which showed the source of bleeding in the form of saccular aneurysm arising from the first part of middle cerebral artery after carotid bifurcation. Patient was then prepared for elective late microvascular surgery for aneurysmal clipping using titanium clip.

Right pterional approach is used for proximal exposure of the middle cerebral artery in the Sylvian fissure. There were marked adhesions, after difficult dissection, the aneurysm is exposed with two vessels crossing its neck and dome. The 1st branch is carefully dissected and then the clip is put across the aneurysmal neck. Postoperatively, the patient was fully conscious. Postoperative radiographic picture showed the aneurysm in correct place with good function.

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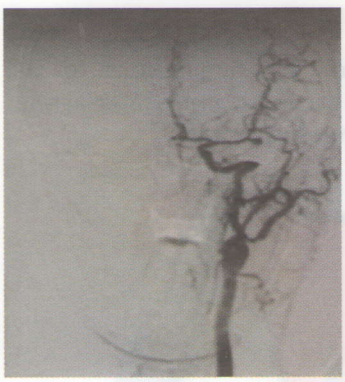

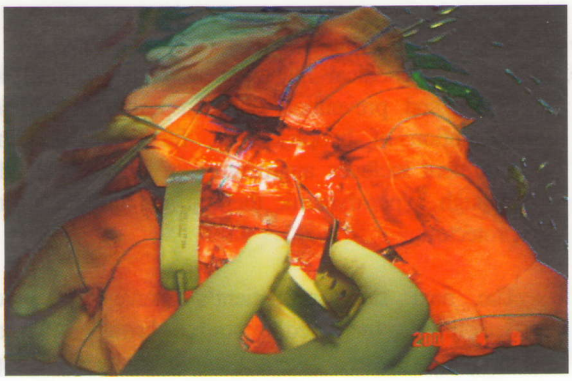

Figure 1 - Preoperative A-P 4-vessel angio-graphy showing M1, MCA aneurysm. **Figure 2** - Preoperative lateral view 4-vessel angiography showing the aneurysm. **Figure 3** - Intra-operative dissection through Sylvian fissure


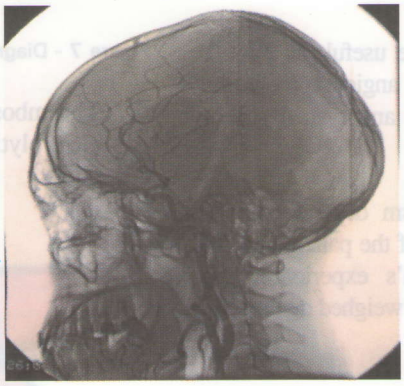


Figure 4 - Intra-operative with aneurysmal clip application . **Figure 5** - **a**) Post clipping lateral view 4-vessel angiography. **b**) Diagram showing aneurysmal formation

Patient had expressive aphasia and left hemiplegia that improved gradually in the following weeks postoperatively on medical treatment and physiotherapy.

Discussion

Cerebral aneurysm results from saccular or fusiform dilatation of arterial wall due to weakness (gapping) of lamina media. The aneurysm varies in size, from baby (< 2 mm) aneurysm to giant (> 2.5 cm) in diameter.[11]

Prevalence of aneurysm in different autopsy series ranged from 0.2 - 7.9%, roughly half of them rupture in adulthood.[4] There is definite congenital predisposition for aneurysmal formation. Other causes may play a role such as, trauma, infection (mycotic aneurysm), hypertension, atherosclerosis and embolisation as in atrial myxoma.

Saccular (Berry) aneurysms usually arise from a major artery near the branching point, they affect MCA in about 20% of cases and 30-50% of them may be multiple.[8]

Cerebral aneurysm may be symptomatic or discovered accidentally on radiographic imaging of brain. Symptoms occur due to aneurysmal expansion, rupture or local mass effect, as it may compress brain stem, optic 3rd nerve, chiasm, etc. Major aneurysmal rupture is the most frequent presentation, mostly causing subarachnoid haemorraghe (SAH) which may be accompanied with intracerebral haemorrhage in 20 - 40% of cases (more common with aneurysm distal to circle of Willis) as MCA. Aneurysmal SAH may also be accompanied with SDH or intraventricular haemorrhage.[14]

Minor haemorrhage may occur as a warning sign; this group has the shortest latency period (10 days) before major aneurysmal ruptures. Fits may occur with aneurysmal rupture; also severe headache, possibly without aneurysmal rupture. When cerebral aneurysm is discovered, it should raise attention to any other medical diseases, such as polycystic kidney, fibromuscular dysplasia, aortic coarctation, connective tissue disorders, and cerebral AVM. Medical management of aneurysm is mainly attributed to treatment of sequelae of aneurysmal rupture, mainly SAH.

Management

Goals of medical management relate to neurological injury and prevention of vasospasm. In addition to prevention of hyponatremia, fits, delayed ischemia, treatment includes augmenting of cerebral blood flow through hyper-dynamic therapy and the use of neuro-protectors.

The next step in patient's management includes determining the bleeding source through radiographic imaging; mainly 4-vessel angiography, with special consideration to patient's condition and timing of surgery, either early within the first two days post rupture or later after two weeks.[9]

Other radiological modalities can be useful, as 3D-CT angiography or MRA but 4-vessel angiography is the most sensitive in demonstrating the aneurysmal site as well as vasospasm.

The best treatment for an aneurysm depends on the general and neurological condition of the patient and the aneurysmal anatomy; the surgeon's experience, the availability of facilities, and must be weighed against the natural history of the condition.

When surgical treatment is indicated, the goal is to place a clip across the aneurysmal neck to exclude the aneurysm from the circulation without occluding normal vessels.[12] Alternatives to surgical clipping are:

1. Wrapping aneurysm with plastic resin, gauze or muscles.[1]
2. Proximal (Hunterian) ligation of the feeding vessels with the possibility of spontaneous clotting of the sac also with incidence of distal refilling.[3]
3. Trapping aneurysm by proximal and distal ligation of feeding supply especially with giant aneurysm. This is considered a modification of Hunterian ligation.
4. Balloon embolisation through placement of detachable balloon in the aneurysmal neck or lumen, by interventional neuroradiologist.[6]

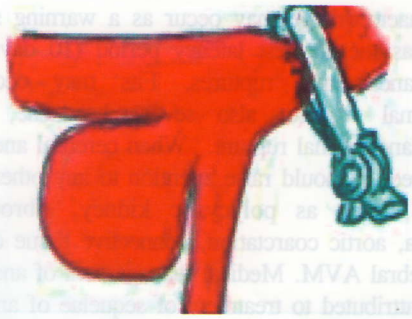

Figure 6 - Diagram showing Hunterian ligation

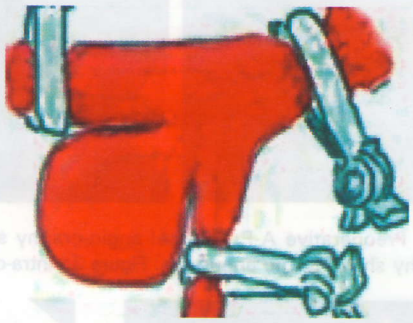

Figure 7 - Diagram showing aneurysmal trapping

5. Thrombosing the aneurysm by placement of electrolytically detachable platinum (Guglielmi) coils.[7]

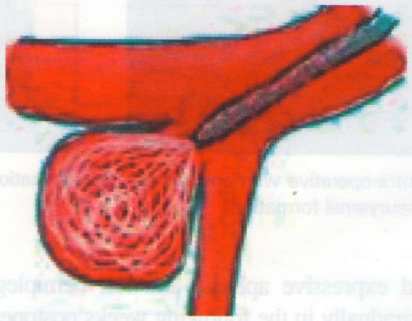

Figure 8 - Diagram showing Gugleilmi coils

Conclusion

Microsurgical technology, with the development of a variety of temporary and permanent clips has revolutionised treatment of these lesions.

Intimate familiarity with the unique aspects of the microsurgical anatomy at the aneurysm site together with the development of microsurgical techniques is the cornerstone in the surgical treatment of these aneurysms.

There is little evidence that less than definitive and precise clipping of intracranial aneurysms provides significant long-term patient protection.[10]

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Commentary

We reviewed the above case and commend the authors for their successful management of this patient. We were requested to provide some general comments regarding these middle cerebral aneurysms (MCA) for publication.

For patients who present with temporal lobe haematoma requiring emergent evacuation, with suspicion for a ruptured MCA aneurysm, without the ability to perform preoperative formal angiography due to the patient's neurological status, as in the present case, we would suggest the performance of CT angiography preoperatively or intra-operative catheter angiography so that aneurysmal clipping is performed in the same setting as the haematoma evacuation. The trans-superior temporal gyrus approach, in our opinion, ought only be reserved for very limited situations, as in the presented case, namely the presence of a large temporal haematoma abutting the pia.

For MCA aneurysms, we recommend wide microsurgical splitting of the Sylvian fissure. We suggest that the trajectory of this splitting is based on the course of the M1 segment and the projection of the aneurysm. An anteriorly directed M1 with an anteriorly projected aneurysm would be best approached by splitting the fissure in a distal-to-proximal direction. An obliquely coursing M1 with a posteriorly projecting aneurysm would ideally be approached by splitting the fissure in a proximal-to-distal direction. An M1 that is posteriorly directed with an inferiorly projected aneurysm would be approached by splitting the fissure both proximally and distally, therefore obtaining control of the M1 and M2 branches before completely exposing the aneurysm in the middle. To achieve wider exposure without retraction, we recommend the placement of cotton sponges approximately 1-2 cm posterior to the convergence point and also in the proximal part over the internal carotid artery bifurcation. We recommend the complete avoidance of minimization of the use of the self retaining retractors.[1,2]

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