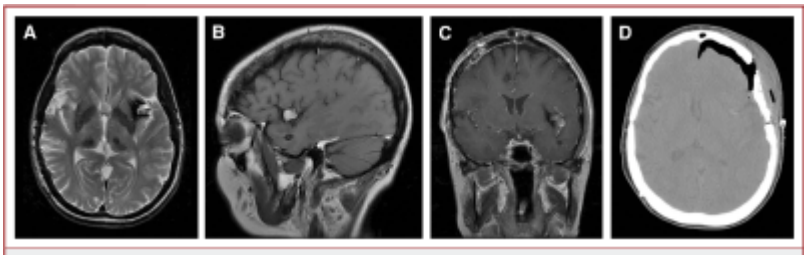
Insular Cavernous Malformation



Surgical management of cavernous malformation (CM) of the insula consists of total resection of the lesion and the surrounding gliosis to avoid or reduce seizures. When located in the dominant hemisphere, an awake craniotomy with intraoperative mapping reduces the risk of functional damage. The insula is covered by the operculum and has a relationship with the middle cerebral artery and its branches that run along its lateral cortical surface. Therefore high expertise is required to manage the exposure of the insula and its complex anatomy.

Classification

Insular Cavernous Malformation Classification.

Videos

https://www.neurosurgicalatlas.com/cases/insular-cavernous-malformation

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A video of Burkhardt et al. demonstrated the microsurgical resection of a de novo CM adjacent to a previously treated high-grade AVM and clipping of a middle cerebral artery (MCA) aneurysm. A 70-yr-old male with history of radiosurgery for AVM presented with aphasia and confusion. Preoperative angiography showed complete occlusion of the AVM. MRI showed multiple cystic lesions suspicious for radiation-induced necrosis and CM. IRB approval and patient consent was obtained. A pterional craniotomy was performed with transsylvian exposure of the insula. The radiated feeding arteries were followed to the occluded AVM nidus. A CM was noted deep to this candelabra of the MCA vessels, which were mobilized to access and resect the CM. A small incision was made in this insular cortex underneath the malformation circumferentially freeing it of adhesions. The sclerotic AVM nidus was circumferentially dissected and removed en bloc. Thorough exploration of the resection cavity revealed no residual CM or AVM nidus. Attention was then turned to the M2-MCA bifurcation aneurysm, which was occluded with a straight clip. Postoperative imaging confirmed complete CM resection. The patient recovered from his aphasia. This case demonstrates the management of a radiation-induced de novo CM following treatment of a high-grade AVM. Radiographic follow-up for radiosurgically treated AVM is needed to rule out long-term complications. Bleeding from a de novo CM mimics bleeding from residual AVM nidus, requiring careful angiographic evaluation [1)].

A video of Norat et al. illustrated the use of a trans-Sylvian, trans-sulcal approach to resect a deep insular/basal ganglia cavernous malformation in a young patient. The use of the neuronavigation is essential for success in these types of operation as this tool limits the surgeon's footprint in eloquent

brain. Unlike superficial lesions where the removal of hemosiderin stained brain is possible and often safe, resection of deep-seated lesions requires the surgeon to distinguish between hemosiderin-stained brain and residual cavernous malformation. This task is not simple, and residual cavernous malformation is the most common reason for re-bleed in patients who have undergone surgery. Resection of symptomatic cavernous malformations in deep locations can be performed safely, but outcomes are heavily influenced by proper patient selection and surgeon experience. In patients with multiple cerebral cavernous malformations, such as the one in this case, genetic testing should be performed [2)].

A video of Vigo et al. demonstrated the surgical management of a large left insular CM. A 29-year-old female with multiple CM and 7 years of partial seizures and recent onset of short memory loss. Neuroimaging showed a large left insular and planum polare CM with important mass effect and hemorrhage signs. The patient consented to surgery, and an awake pretemporal craniotomy was carried out with continuous motor evoked potential monitoring. No language function was localized in the superior temporal gyrus; therefore corticectomy of the middle portion was performed to expand the operative corridor. The vessel manipulation during wide opening of the sylvian fissure increased the risk of postoperative vasospasm and blood drain into the surgical field. The CM was exposed and completely removed without functional damage. The patient recovered from surgery without complications, and no seizures occurred at 2 months' follow-up. Postoperative imaging showed complete removal of the CM [3)].

Case series

A study included patients affected by iCMs and referred to the Senior Author (FA). All cases were divided in 2 groups, according to a mainly pial growth pattern (exophytic group) or a subcortical one (endophytic group). Endophytic iCM was further subdivided in 3 subgroups, based on the insular gyri involved. According to this classification, each patient underwent a specific additional neuroimaging investigation and surgical evaluation.

Results: A total of 24 patients were included. In the surgical group, trans-sylvian (TS) approach was used in 6 patients with exophytic or Zone I endophytic iCMs. The transcortical (TC) approach with awake monitoring was used in 6 cases of Zone II endophytic vascular lesions. Both TS and trans-intraparietal sulcal (TIS) approach were used for 3 cases of Zone III endophytic iCM. At follow-up, 3 patients were fully recovered from a transient speech impairment while a permanent morbidity was observed in one case.

Conclusions: ICMs represent a single entity with peculiar clinical and surgical aspects. The proposed iCM classification focuses on anatomical and functional concerns, aiming to suggest the best pre-operative work-up and the surgical evaluation [4)].

Case reports

A 25-yr-old female presented with an acute-onset right homonymous hemianopsia. Neuroimaging revealed a large left insular CM, adjacent to the posterior limb of IC. After obtaining IRB approval and patient consent, a left pterional craniotomy with a wide distal Sylvian fissure split was completed.

Using neuronavigation, an insular entry point was chosen for corticectomy. The CM was opened with subsequent hematoma evacuation and intracapsular resection technique. Inspection of the cavity revealed remnants anteromedially near the IC, which were removed meticulously, mobilizing the CM away from the IC. Postoperative MRI demonstrated gross total resection of the CM. The patient was discharged home on postoperative day 5 with persistent homonymous hemianopia.This case describes the use of a transsylvian-transinsular approach to access deep lesions with the shortest surgical distance and minimal cortical transgression. A wide Sylvian fissure split exposes the M2 MCA and accesses a safe insular zone, keeping the most eloquent structures deep to the lesion in the surgical corridor. This approach can safely expose vascular pathologies in the insular region without the risk of injury to overlying eloquent frontal and temporal lobes, even in the dominant hemisphere [5].

References

1)

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