Middle meningeal artery-sphenoparietal sinus iatrogenic arteriovenous fistula following pterional craniotomy and aneurysm clipping

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DISCLOSURE

• I do not have any financial relationships with any commercial interest.

• Conflict of interest- None.

• The approval for conducting the study has been obtained from the Institute Ethics committee board.
INTRODUCTION

• The pterional [frontotemporal] craniotomy is a well-described surgical corridor for accessing the middle cerebral artery (MCA) and its branches to clip MCA aneurysms.

• During this process, the greater wing of sphenoid bone must be removed and the middle meningeal artery [MMA] is often sacrificed.

• The authors present a case report on the formation of an arteriovenous fistula [AVF] between MMA and sphenoparietal sinus [SPS] after pterional craniotomy and MCA aneurysm clipping.

• The fistula arose due to an anatomical variant, in which the MMA originated from the ophthalmic artery instead of maxillary artery.
CASE DESCRIPTION

• 33 year old female presented with an episode of acute onset headache with subsequent seizure and loss of consciousness.

• CT scan of the brain revealed intraparenchymal hematoma of size 2.2×3.6 centimeters in the right temporal lobe with adjacent edema and Fischer Grade 4 subarachnoid hemorrhage.

• CT angiography revealed a right MCA bifurcation aneurysm (Fig A,B,C).
• DSA showed a bilobed MCA aneurysm, measuring 9×4 millimeters with aneurysmal neck size of 3 millimeters. [Fig D,E]

• Based on imaging and clinical scenario, it was determined that craniotomy, clipping of the aneurysm and evacuation of the hematoma would be the best surgical treatment option for this patient.

• A right pterional [frontotemporal] craniotomy was performed.
• The greater sphenoid wing was then drilled until the frontal and middle fossa was flush with one another.

• MMA was coagulated and divided.

• The aneurysm was accessed, identified, and clipped successfully.

• However, on post-operative day 1, the patient was found to have developed right oculomotor nerve palsy, including dilated pupil and extraocular muscle palsy.
• DSA demonstrated a right middle meningeal artery to sphenoparietal sinus (MMA-SPS) fistula. [Fig F]

• CNIII palsy was thought to be secondary to increased pressure within the cavernous sinus, the direct draining reservoir of the SPS.

• Endovascular embolization was planned once the patient recovers from surgery, if her CNIII palsy would not resolve.

• However the patient was lost to follow up.
DISCUSSION

• Isolated oculomotor nerve palsy due to MMA-SPS fistula following pterional craniotomy is not common.

• The possible complications of the fistula include arterialization of veins with consequent rupture of venous aneurysm, venous engorgement with compression of optic nerve, vision loss from injury to the ophthalmic artery and even death.

• The isolated ophthalmoplegia in this case is likely due to the lower output of MMA.

• Treatment options of MMA-SPS fistulas include open clipping, sinus ablation and endovascular techniques.
SUMMARY

• MMA-SPS fistula is a potential operative complication of frontotemporal craniotomy.

• The possible complications can range from mild to severe including death and the methods of treatment are still not standardized.

• Understanding the patient’s vascular anatomy prior to craniotomy may help reduce the risk of these complications.

• Treatment should be based on new-onset neurologic deficit, as some fistulas may resolve spontaneously.