

STA-MCA Bypass for the Treatment of Large Right MCA Bifurcation Aneurysm

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Abstract

We present a case of a female in her forties with a history of hypertension and tobacco use who was found to have an enlarging right Middle cerebral artery (MCA) bifurcation aneurysm. Angiography demonstrated a large aneurysm with the superior M2 arising near the neck and the inferior M2 from the dome, precluding simple clip reconstruction or endovascular therapy. She underwent right pterional craniotomy with STA (superficial temporal artery)-MCA bypass to the inferior M2 followed by aneurysm clipping. Postoperative angiography confirmed complete exclusion and a patent bypass. She was discharged neurologically intact.

Introduction

Clinical History

Female in her fifth decade of life with a past medical history of hypertension presented to her primary care physician with headaches. Outpatient imaging revealed a large right middle cerebral artery bifurcation aneurysm that increased in size on serial imaging. She does actively smoke. No family history of aneurysm.

Exam:

Neurologically intact

Diagnosis:

Giant MCA bifurcation aneurysm measures ≥ 25 mm in diameter, and due to its size they are prone to wide necks, incorporated branch vessels, and possible thrombus formation that make treatment technically challenging.¹ These complex features increase surgical and endovascular risk and may necessitate advanced reconstructive or bypass strategies to safely secure the lesion and preserve cerebral blood flow.¹

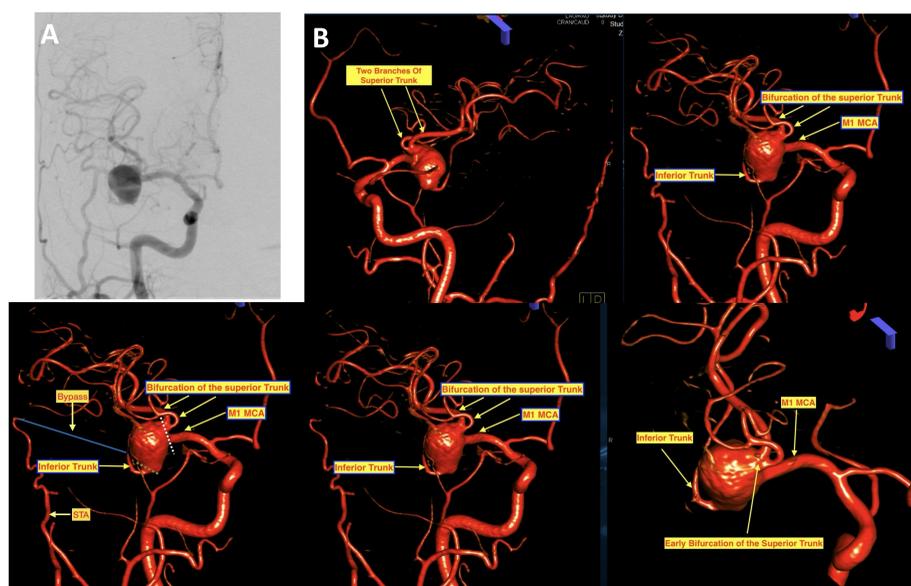


Figure 1. Cerebral Angiogram (A) of Right CCA injection demonstrating large right MCA bifurcation aneurysm with complex features. 3D Reconstructions (B) reveal branches of the superior MCA trunk take off near the trunk of the aneurysm. The inferior trunk takes off from the inferior dome of the aneurysm. The STA is identified in close proximity.

Operative Plan

Operative Decision Making:

Patient has a large growing right MCA bifurcation aneurysm from which the inferior MCA trunk takes off from the dome and is at risk if treated endovascularly or if directly clipped. The patient was planned for STA to inferior trunk bypass followed by aneurysm clipping. This would allow for complete occlusion of the aneurysm while maintaining blood supply to the the inferior trunk.

Approach:

Right sided craniotomy for STA to inferior M2 bypass followed by complex aneurysm clipping with intraoperative ICG angiography.

Operation

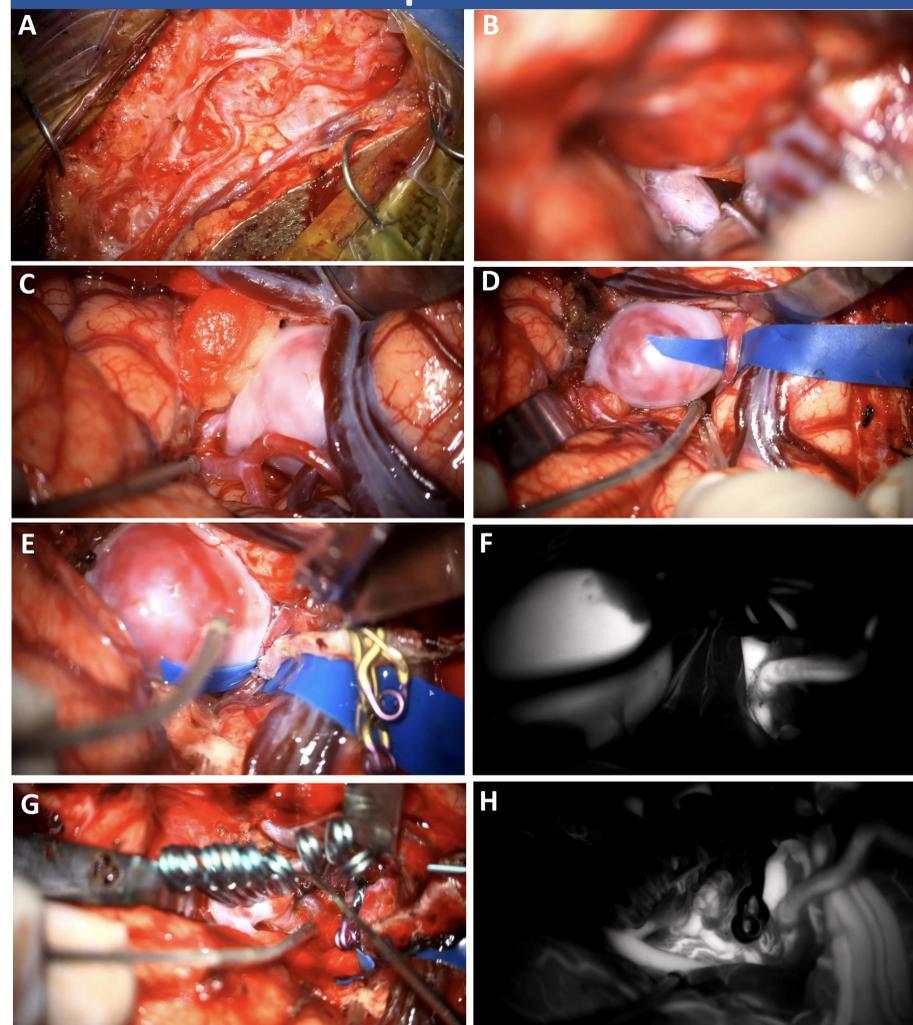


Figure 2. A | Right STA harvest. B | M1 exposure for proximal control. C | Exposure of aneurysm and branches. The superior trunk is dissected and exposed. D | The inferior trunk is isolated. E | STA to inferior trunk bypass is performed. F | Intraoperative ICG angiography demonstrates patent bypass and filling of giant aneurysm. G | Serial aneurysm clips applied for complete aneurysm occlusion. H | Intraoperative ICG angiography demonstrates complete occlusion of the aneurysm with patent bypass and superior trunk branches.



Figure 3. A | Preoperative 3D Reconstruction of cerebral angiogram demonstrating large right MCA bifurcation aneurysm. B | Postoperative 3D Reconstruction of cerebral angiogram demonstrating complete occlusion of aneurysm with serial clips and patent STA-inferior trunk bypass and patent superior trunk.

Post Operative Course

Postoperatively, the patient had an uncomplicated course and did well.

She was discharged home postoperative day 3.

Exam at the time of discharge was neurologically intact.

Conclusions

In summary, this case highlights the role of STA-MCA bypass in the treatment of complex MCA bifurcation aneurysms where direct clipping risks compromise of a critical branch. Careful preoperative angiographic analysis, meticulous microsurgical technique, and staged reconstruction with bypass protection allowed for definitive aneurysm exclusion with preservation of distal MCA circulation. This combined strategy resulted in complete cure and an excellent clinical outcome for the patient.

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