Rescue M2-A2 Bypass for a Large Complex Recurrent Anterior Communicating Artery Aneurysm

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Abstract

Some complex aneurysms, despite multiple previous endovascular and bypass strategies, require further rescue bypass due to repeat rupture and aneurysm recurrence. We present the case of a 17-year-old male with two aneurysmal subarachnoid hemorrhages from a large complex anterior communicating artery aneurysm. Despite multiple previous attempted endovascular treatments and a previous A3-A3 bypass, his aneurysm recurred ultimately requiring an A2-M2 high flow bypass using a radial artery graft with complete aneurysmal occlusion.

Introduction

Complex aneurysms include fusiform aneurysms, giant aneurysms, and intracranial carotid dissections.[1] About half of these complex aneurysms are not amenable to treatment by direct surgical or endovascular methods requiring multidisciplinary approaches.[2] High flow bypass with parent vessel occlusion has been shown to be a safe and durable option for treating complex aneurysms.[3] We present the case of a 17-year-old male with a history of subarachnoid hemorrhage from a large complex anterior communicating artery aneurysm who ultimately required a complex high flow bypass.

The patient originally presented to the hospital with a SAH secondary to a giant ACoA aneurysm at 10 years old. He underwent partial primary coiling at that time. On follow up surveillance imaging one year later, the aneurysm was noted to have increased in size. Stent assisted coiling was proposed but required an A3-A3 bypass as the repeat coiling would occlude the left A2. Despite aggressive treatment, the aneurysm recurred, and the patient suffered another SAH at 14 years old. The complex nature of this aneurysm prompted the multidisciplinary team to proceed with a high flow A2-M2 bypass using an autologous radial artery graft to divert flow from the aneurysm.

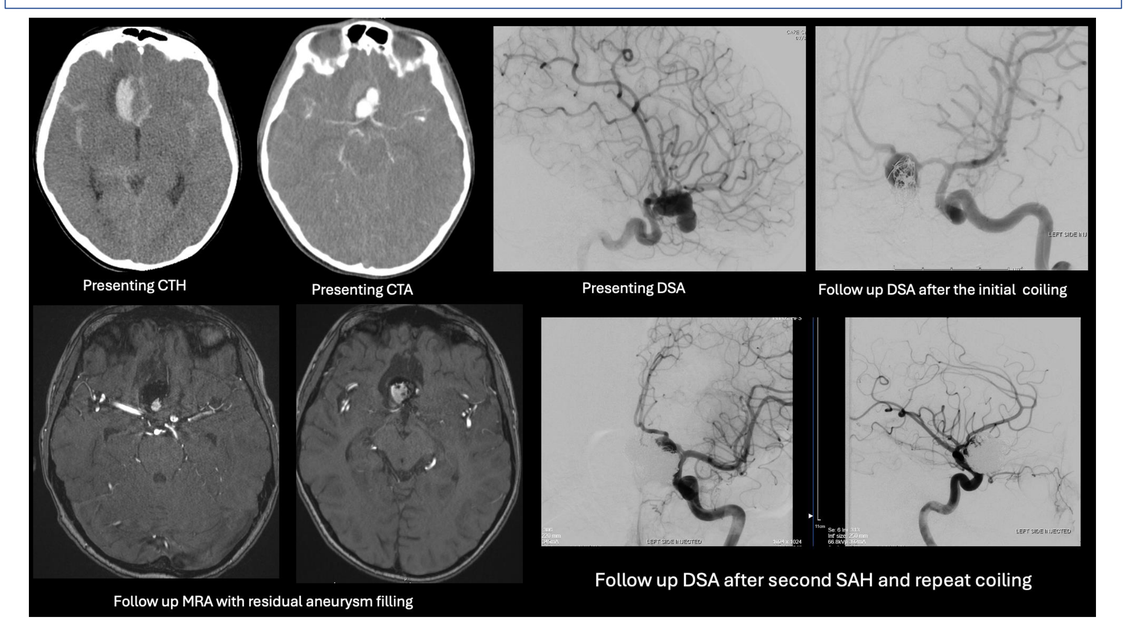

Figure 1. Preoperative Imaging

Methods and Materials

An autologous RAG was harvested from the patient's left forearm. A large extended pterional craniotomy was performed to expose both the anterior interhemispheric fissure as well as the sylvian fissure. A segment of the right A2 and the left M2 were selected and prepared. An arteriotomy was made in the right A2 and the proximal end of the RAG was anastomosed. The other end of the RAG was then anastomosed to the left M2 in a similar fashion. Patency was confirmed with indocyanine green (ICG) angiography and doppler.

Results

The patient recovered well postoperatively without new neurologic deficits. The 3-month postoperative, digitally subtracted angiogram revealed complete occlusion of the ACoA aneurysm with continued patency of the radial artery graft.

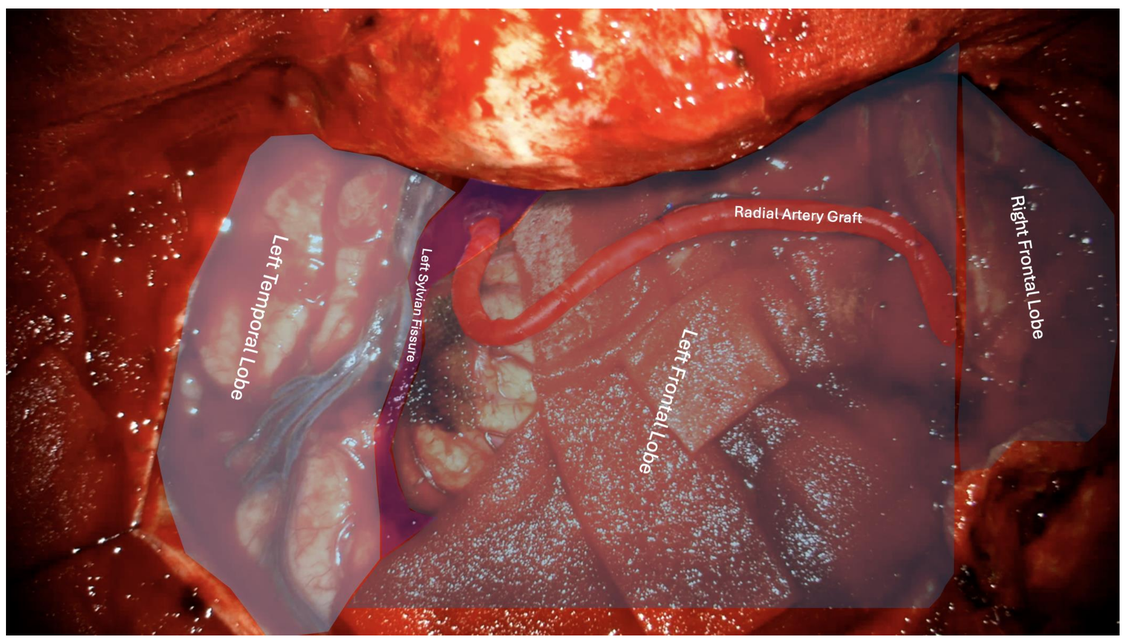

Figure 2. Left M2-A2 High Flow Bypass with an Autologous Radial Artery Graft.

Discussion

The ISAT trial and the BRAT trial have investigated medical management, endovascular embolization, and microsurgical clipping.[4,5] While these studies hint at the appropriate treatments for certain simple aneurysms, the treatment for complex intracranial aneurysms often requires a combination of endovascular and microsurgical treatments.[6] The complex ACoA aneurysm presented in this case illustrates that high flow bypass remains a safe and efficacious option to treat complex intracranial artery aneurysms. Importantly, flow attenuation with high flow bypass does not require the aneurysm to be directly accessed microsurgically. Given that complex aneurysms have often been treated previously, either with endovascular techniques or previous microsurgery, significant scarring and dense adhesions are often encountered with aneurysm neck dissection.[7] High flow bypass offers a dynamic solution for complex aneurysms while decreasing the risks of brain transgression, intraoperative rupture, and adjacent artery injury associated with direct aneurysm dissection and clipping.

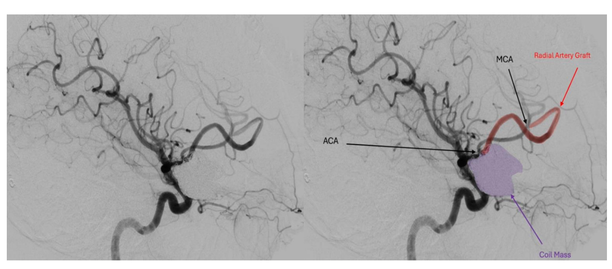

Figure 3. Postop Lateral L ICA Injection.

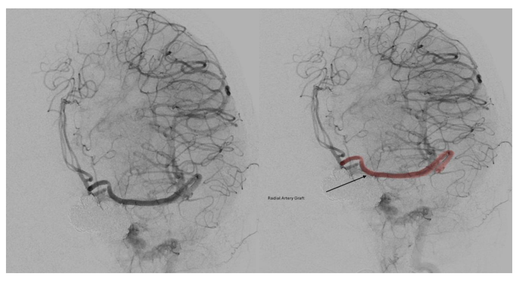

Figure 4. Postop AP L ICA Injection.

Conclusions

High flow intracranial bypass remains a safe and efficacious option to treat complex intracranial artery aneurysms. In select cases, flow attenuation with remote high flow bypass can decrease surgical risks while resulting in complete obliteration of the complex aneurysm.

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Operative Video Link

https://drive.google.com/file/d/1E2fwzIMnMnWCmeGcgQZiaUXwivLXsP8J/view?usp=sharing

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