

Subarachnoid hemorrhage after STA-MCA bypass for the treatment of an M2 dissecting aneurysm: A case report

Mark Kusah Nyanzu ^{1,*}, Andreas Karamitros ¹, Jonathan Lee ², Ronald Boon Hoe Tan ¹, Robert. Iorga ¹ and Pawanjit. Minhas ¹

¹ St George's University Hospital, Neuroscience, London, UK.

² Houston Methodist Hospital, Department of Neurosurgery, Houston, TX, USA.

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Abstract

The treatment of middle cerebral artery aneurysms poses unique challenges, especially aneurysms at the bifurcation. Whilst historically these had been preferentially clipped, the progressively increasing sophistication of endovascular occlusive methods is tilting the balance in favour of coiling. However, for certain situations, where neither coiling nor clipping alone provides suitable aneurysm occlusion, bypass, in addition to clipping provides viable options for treatment. Of these, Superficial temporal artery to middle cerebral artery (STA-MCA) bypass remains the most common and most versatile EC-IC bypass with applications to aneurysms, Moya-Moya disease, and carotid occlusion.

Subarachnoid haemorrhage (SAH) is a potential complication after a surgical bypass for aneurysms; however, the incidence, timing, prognosis, possible mechanism, and prevention are not well known. ⁴ Combined surgical cerebrovascular reconstruction of the STA-MCA bypass offers the opportunity to downregulate the hemodynamic stress within an aneurysm by diverting flow from the parent vessel and reducing the risk of aneurysm rupture. ⁵

Keywords: Subarachnoid Haemorrhage; M2 Aneurysm; Anastomosis; Bypass

1. Introduction

The treatment of intracranial aneurysms has been an evolving field since the 20th century especially after the development of the "hybrid" approach, which is micro-neurosurgery followed by endovascular treatment. STA-MCA bypass remains the most common, simplest and most versatile EC-IC bypass with applications to aneurysms, Moya Moya disease and therapeutic carotid occlusion.

Subarachnoid haemorrhage (SAH) is a potential complication after a surgical bypass for aneurysms; however, the incidence, timing, prognosis, possible mechanism, and prevention are not well known. ⁴ Combined surgical cerebrovascular reconstruction of the STA-MCA bypass offers a chance to downregulate the hemodynamic stress of aneurysm rupture. ⁵

2. Case

A patient in their 30s was admitted to our department with a 3-month history of right-sided tinnitus and hearing loss which was initially assessed by our ENT colleagues. In addition, our patient complained of right-sided headaches and episodes of vacant spells. Physical and neurological examinations at the time of admission were non-contributory in that the patient had no lateralizing neurology. Diagnostic CT Angiogram (CTA) and digital subtraction angiography

* Corresponding author: Mark Kusah Nyanzu

(DSA) revealed a large dissecting aneurysm arising from the right inferior M2 division and a smaller one at the M2/M3 junction (Fig1). Our patient's presentation was discussed in our multidisciplinary meeting to ascertain appropriate treatment modalities. We rely on patient and aneurysm characteristics to devise the optimal treatment for patients, taking into consideration their preference – without a clip first or coil first bias. Because of the location of the aneurysm at the bifurcation endo-vascular treatment was high risk for coil prolapse and branch occlusion. Given the dissection, clipping alone may not have curtailed the risk of continued aneurysm growth or may precipitate progressive dissection and occlusion, or daughter aneurysms from altered parent vessel haemodynamics. Thus, by consensus, initial by-pass and followed by occlusion was deemed most suitable for the most robust reduction in haemorrhage risk.

The patient underwent a right mini craniotomy and STA-MCA bypass. The posterior STA branch was harvested. Distal cortical MCA vessel (M4- angular artery) was localized using intra operative navigation. The craniotomy and durotomy was performed in a standard fashion. Arachnoid dissection was performed with combination of blunt and sharp techniques. An arteriotomy was made in the M4 vessel with micro-scissors and the harvested STA was brought into the field. The MCA vessel was then anastomosed with the STA with 10-0 ethilon sutures. Indocyanine green (ICG) was used to confirm patency and flow through the bypass and into the angular artery. IV heparin was given immediately after the anastomosis was completed.

The patient developed a right-sided weakness at postoperative day 1. CTA and MRI showed patent anastomoses with no features of acute ischaemia nor haemorrhage to explain her ipsilateral weakness hence Clopidogrel was started with resolution of her weakness.

Postoperative Day 3, our patient developed sudden severe headaches with no loss of consciousness. CT of the head demonstrated focal subarachnoid blood within the sylvian fissure with a localized clot around the dome of the aneurysm, and thrombus formation within the right MCA aneurysm sac (Fig 2). Rupture of the thrombosed aneurysm was the likely culprit.

DSA showed patent STA-MCA anastomosis; we followed up with endo-vascular occlusion (fig 4) of the right inferior M2 trunk leading to the aneurysm on postop day 4. Intraoperative DSA (fig 3) shows complete occlusion of M2 vessel with good flow distally, and no filling the aneurysmal sac. Post-occlusion, our patient developed a new mild left-sided weakness, which was managed with fluid boluses and inotropic support to maintain a mean arterial pressure (MAP) of greater than 90mmHg. Our patient's neurological deficits resolved the following morning. Postoperative CTA confirmed a patent bypass with the aneurysm not filling, it also demonstrated moderate vasospasm and mild vasogenic oedema; and hence nimodipine (SAH protocol) and low dose dexamethasone(3-day-course) were started, and systolic blood pressure target of 120-140 mmHg was maintained. Patient was subsequently discharged well with no neurological deficits. She was reviewed in clinic 2 months later and remains asymptomatic.



Figure 1 3D view of the thrombose MCA aneurysm



Figure 2 Post operative ct scaning showing subarachnoid blood

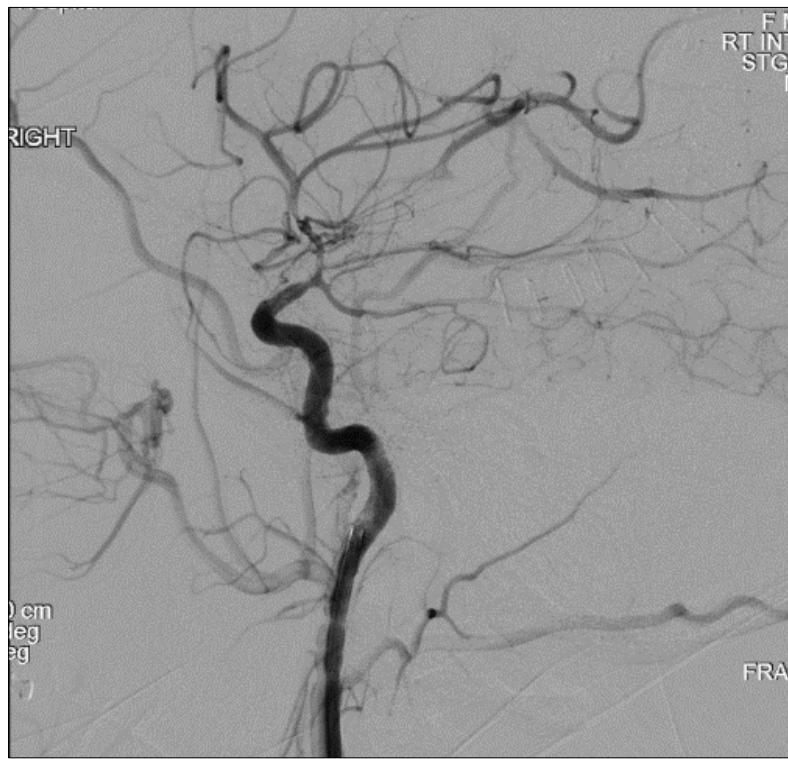


Figure 3 DSA indicating the aneurysm completely obliterated from circulation with no filling

3. Conclusion

We present a case of an unusual complication of SAH following a STA-MCA bypass surgery for a thrombotic M2 aneurysm that required an early occlusion procedure. The mechanism of the post-operative SAH may be due to hyper-

perfusion or the possibility that the thrombotic aneurysm was at a pre-rupture state before the bypass hence early occlusion after bypass maybe a potential approach to reduce the risk of rupture of a thrombotic aneurysm.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to declare

Statement of informed consent

Informed consent was obtained from all individual participants included in the study. Yes

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