

# Use of Middle Meningeal Artery as a Novel Donor to Revascularize Upper Posterior Circulation: An Anatomic Feasibility Study

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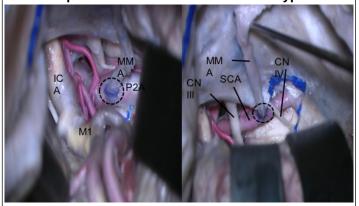
#### Introduction

Complex aneurysms of the vertebrobasilar system and the upper posterior circulation (UPC) could necessitate a flow-preserving revascularization strategy alongside clipping owing to their fusiform/dolichoectatic morphology. Commonly used donors for UPC revascularization include the superficial temporal artery, occipital artery or intracranial (IC) donors such as anterior temporal artery and middle cerebral artery. This study tested the feasibility of using the middle meningeal artery (MMA) as an alternative donor for a bypass to the UPC via a pretemporal approach for the posterior cerebral artery (PCA) and subtemporal approach for the superior cerebellar artery (SCA).

#### **Methods**

Twelve cadaveric specimens were used for surgically simulating a MMA-PCA and a MMA-SCA bypass. A pretemporal MMA-preserving craniotomy was performed, to avoid injury to the anterior and common trunk of MMA. After harvesting the MMA from the dura, the P2-PCA was exposed in the ambient cistern and an MMA-P2 end-to-side anastomosis was performed. Thereafter, a subtemporal corridor was used for tentorial incision and exposure of S2-SCA. An end-to-side MMA-S2 bypass was completed. The measurements recorded included the donor and recipient vessel calibers and the length of MMA required for the bypasses.

#### Completed MMA-PCA and MMA-SCA Bypass



MMA: Middle Meningeal Artery
P2A: Second segment of the posterior cerebral artery
SCA: Superior Cerebellar Artery
ICA: Internal Carotid Artery

### **Results**

The MMA-UPC bypass was performed in all specimens. The diameter of PCA was 2.7 (SD=0.4) mm and that of SCA was 1.9 (SD=0.3) mm at the anastomotic site. The mean diameter of MMA was 2.08 (SD=0.24) mm at the FS and 1.7 (SD=0.22) mm at the anastomotic site. The MMA length required was 38 (SD=2.98) mm for MMA-P2 and 33.5 (SD=3.2) mm for MMA-S2 bypass.

#### **Conclusions**

This study confirms the anatomic feasibility of using the MMA as a donor for revascularization of the PCA and SCA. The MMA is an excellent donor protected by the cranial vault against trauma and demonstrates a good caliber match with the recipients (PCA and SCA). This procedure is technically simpler than an IC-IC bypass and avoids the risk of compromise of an IC donor.

## **Learning Objectives**

- 1.To understand the potential of MMA as a donor for revascularization of the upper posterior circulation
- 2.To discuss the technical nuances of the MMA-UPC bypass and to understand the advantages of using the MMA over other native donors.