

INTRODUCTION

The utilization of a Balloon-guide catheter (BGC) or a focal aspiration during the mechanical thrombectomy continues to be areas of discussion.

The aim of this study was to compare the effects of these two techniques on middle cerebral artery (MCA) blood flow.

METHODS

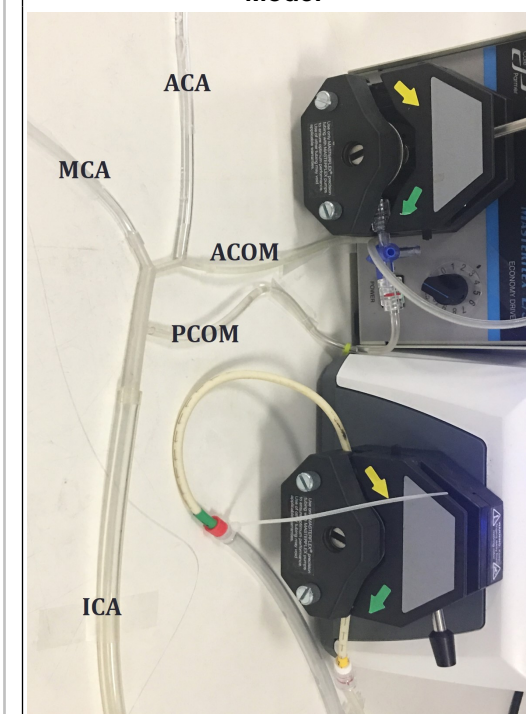
In this study, utilizing the bench top anterior circulation flow model, the effects of a balloon-guide catheter and the focal aspiration catheter on flow were determined. Models were constructed with two different MCA diameters, 3mm and 4mm, respectively. The baseline flow rates were established in 3mm and 4mm MCA vessels to be 152ml/min, with 15ml/min originating from the posterior communicating artery (PCOM); 50 mL/min from the anterior communicating artery (ACOM); and 85 mL/min from the internal carotid artery (ICA).

The MCA flow was then measured with a Penumbra ACE68 reperfusion catheter placed in the MCA and attached to the Penumbra Pump MAX or a Stryker Flowgate balloon guide catheter inflated within the ICA.

Results

Utilization of the BGC inflation resulted in flow arrest in an isolated internal carotid artery. However, the use of a BGC had little impact on the collateral flow from the PCOM and/or ACOM. The flow within the MCA measured 16ml/min with a patent PCOM and ICA; 50ml/min with ACOM and ICA flow; 65ml/min with PCOM, ACOM, and ICA flow. In the highest flow condition when all the vessels (PCOM + ACOM + ICA) are patent, the ACE68 reperfusion catheter with Penumbra pump aspiration system provided a complete flow reversal.

Bench Top Anterior Circulation Flow Model

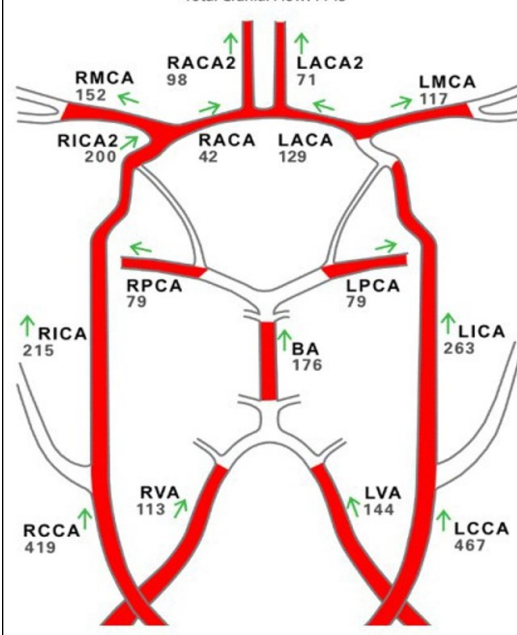


Conclusions

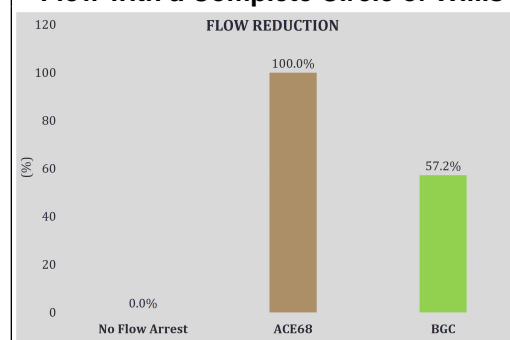
In the presence of a complete or partial Circle-of-Willis, focal aspiration provides a greater reduction in flow and theoretically a reduced risk of distal emboli compared to BGC. These results may shed light on the future directions for techniques aimed at reducing distal emboli.

Volumetric Flow Rates

Volumetric Flow Rate (mL/min)
Total Cranial Flow: 1143



Comparison of ACE68 and BGC on MCA Flow with a Complete Circle of Willis



% Reduction In MCS Flow

Patent Conditions	ACE68	Flowgate
PCOM + ACOM + ICA	100%	57.2%
ACOM + ICA	100%	67.1%
PCOM + ICA	100%	89.5%
ICA only	100%	100%