



SNACC

SOCIETY FOR NEUROSCIENCE
IN ANESTHESIOLOGY AND CRITICAL CARE

ARTICLE OF THE MONTH

Periprocedure Management of Blood Pressure After Acute Ischemic Stroke

Sharma D. Periprocedure Management of Blood Pressure After Acute Ischemic Stroke. *J Neurosurg Anesthesiol.* 2023 Jan 1;35(1):4-9. doi: 10.1097/ANA.0000000000000891. Epub 2022 Nov 1. PMID: 36441847.

Reviewer: Leslie C Jameson, MD, University of Colorado, School of Medicine, Aurora CO.

Welcome Spring and the April 2023 SNACC article of the month. This month we will be discussing an article by Dr. Deepak Sharma titled "Periprocedure Management of Blood Pressure After Acute Ischemic Stroke." Our commentary is from Dr. Leslie Jameson from the University of Colorado School of Medicine.

Dr. Leslie Jameson is a long-time member of SNACC. Her career in Neuroanesthesiology at the Universities of Wisconsin and Colorado, has focused on clinical education. She has been innovative in the realm of IONM, creating programs that are both educational and sustainably managed by clinicians within the department of anesthesia. These programs are supported by many IONM publications. Further, physicians from South America and Europe studied the IONM program and then returned home to develop their own IONM programs. Current Colorado and Harvard faculty have continued this work in Africa. To further expand international neuroanesthesiology, Dr. Jameson contributes to ICPNT and served on the ICPNT board. Her educational reach includes ASA CME products and being the CME editor for Anesthesiology. Representing the University of Colorado, she is a founding member of the *Multicenter Perioperative Outcomes Group*, which is a research organization that works to improve individual clinicians' practice and discover real results in clinical management.

As always, we encourage our readers' input on this topic on the SNACC [Twitter](#) feed, or on [Facebook](#).

Amie Hoefnagel, MD, Oana Maties, MD, Shilpa Rao, MD

Commentary:

The publication provides a comprehensive overview of the evidence supporting the current recommended BP management protocols in patients undergoing mechanical embolectomy and intravenous tissue plasminogen activator (t-PA).

Specific hemodynamic management for embolectomy are derived from t-PA studies. Reestablishing cerebral arterial blood flow using embolectomy is the most effective therapy for ischemic stroke, with number needed to treat of 2.6 for better neurologic outcomes and decreased mortality. Since cerebral autoregulation is impaired, maintenance of stable cerebral blood flow is compromised. Anesthesia management focuses on maintaining appropriate cerebral perfusion, nearly exclusively through increasing collateral flow via causing systemic hypertension. Hypotension equals hypoperfusion and ischemia, particularly when it occurs prior to embolectomy. Hypertension improves perfusion by increasing collateral blood flow, but it can also create hyperemia, cerebral edema, and hemorrhage (hematoma).

There are two distinct physiologic periods. First, prior to recanalization or mechanical thrombectomy, hypertension is necessary to increase collateral perfusion. Even short periods with a mean arterial pressure (MAP) <70 mmHg represent significant hypotension. In patients with large vessel occlusion, hypotension is associated with increased cerebral infarct size and worse functional patient outcomes. The hypotension prior to treatment can lead to “no-reflow” or persistent capillary dysfunction with microvascular occlusion further increasing injury. There is evidence that an elevated transcranial doppler pulsatile index may be a clinical marker for this problem. Systolic BP (SBP) <120 mmHg and > 180mm Hg is associated with poor patient outcome when compared to SBP of 150 mm Hg. Control of BP remains an important factor in determining patient outcomes. Unfortunately, phenylephrine, by far the most used vasopressor to elevate BP, is associated with an increase infarct size. Other vasopressors and inotropes cannot be evaluated due to inadequate data.

After mechanical embolectomy, systolic BP (SBP) goals need modification to prevent hyperperfusion syndrome/cerebral edema or hemorrhage. One study reported increases in SBP of ≥ 10 mmHg post thrombectomy reduced functional recovery and increased mortality. Some data suggests that changes in SBP to between 100 and 140 mm Hg are associated with decreased intraparenchymal hemorrhage and potentially better outcomes. The current SNACC SBP guidelines recommend values between 140-180 mm Hg and are DBP values below 110 mmHg(1). Without further convincing evidence, these guidelines should be respected. Current guidelines are based on intravenous tissue plasminogen activator (t-PA) trials and retrospective analysis.

Optimal BP management determined by individual patient’s measured cerebral autoregulation and other characteristics may become possible. A small single center trial using near-infrared spectroscopy (NIRS) reported that autoregulation is not constant but fluctuating and ideally BP changes should be made accordingly. Patients who maintained BP within the limits of their autoregulation had better 90-day outcomes(2). A very small randomized controlled trial using Transcranial Doppler (TCD) to identify intracranial hypertension reported reduced mortality when management decisions were directed by TCD(3). Studies with patient derived BP targets are very limited. Consideration of these techniques is reasonable and might improve outcomes.

Many questions remain on best hemodynamic management. Expansion of monitoring tools will hopefully make individualized BP management possible for all patients and therefore lead to improved outcomes after

embolectomy. This excellent focused review reminds the anesthesiology community of our limitations in knowledge and consequently current practices.

References:a

1. Sharma D, Rasmussen M, Han R, et al. Anesthetic management of endovascular treatment of acute ischemic stroke during COVID-19 Pandemic: consensus statement from Society for Neuroscience in Anesthesiology & Critical Care (SNACC): endorsed by Society of Vascular & Interventional Neurology (SVIN), Society of NeuroInterventional Surgery (SNIS), Neurocritical Care Society (NCS), European Society of Minimally Invasive Neurological Therapy (ESMINT) and American Association of Neurological Surgeons (AANS) and Congress of Neurological Surgeons (CNS) cerebrovascular section. *J Neurosurg Anesthesiol.* 2020;32:193–201.
2. Petersen NH, Silverman A, Strander SM, et al. Fixed compared with autoregulation-oriented blood pressure thresholds after mechanical thrombectomy for ischemic stroke. *Stroke.* 2020;51:914–921.
3. Chen H, Su Y, He Y, et al. Controlling blood pressure under transcranial doppler guidance after endovascular treatment in patients with acute ischemic stroke. *Cerebrovasc Dis.* 2020;49:160–169.