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Determining the optimal target blood pressure after thrombectomy: High or low?

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Determining the optimal target blood pressure after thrombectomy

High or low?

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The management of patients with acute ischemic stroke has changed dramatically with modern mechanical thrombectomy (MT) techniques and improved patient selection using CT angiography.[1] Although the benefit of early recanalization in large vessel occlusion (LVO) seems clear, the optimal periprocedural management remains uncertain. Unresolved issues include the method of analgesia and sedation, reversal and application of adjunctive periprocedural anticoagulation, glycemic control, ventilatory management, and perhaps most important, blood pressure (BP) control.

Current guidelines inadequately address BP management after MT, given the lack of randomized controlled trials.[2,3] Observational studies indicate higher mortality and greater frequency of neurologic deterioration with extremely high or low admission BP, as compared to when BP falls in a middle range or "sweet spot."[4] Retrospective analyses have linked larger anesthesia-related reductions in BP during the MT procedure with poor outcome, whether general anesthesia[5,6] or conscious sedation.[7] Another study found an association between intraprocedural anesthesia-related hypotension treated with IV norepinephrine and poor functional outcome after MT.[8] Data regarding BP management after MT are even more scant.

In this issue of *Neurology*®, Goyal et al.[9] report the relationship of maximum BP levels after MT and long-term functional independence in 217 patients with acute ischemic stroke due to LVO in the anterior or posterior circulation. All patients underwent mechanical recanalization through a combination of stent retriever deployment with or without distal aspiration, first pass direct aspiration, or angioplasty and stenting within 8 hours of symptom onset. Sixty-five percent of patients received systemic thrombolysis prior to intervention. All data were collected prospectively, including hourly BP values.

Sixty-five percent of patients achieved complete recanalization (Thrombolysis in Cerebral Infarction [TICI] score of 2B or 3). The authors evaluated 3 groups according to the BP goal and thrombolysis status: (1) permissive hypertension (220/120 mm Hg without systemic thrombolysis or <180/90 mm Hg with systemic thrombolysis); (2) moderate BP control (<160/90 mm Hg); and (3) intensive BP control (<140/90 mm Hg) based on American Heart Association guidelines,[2] institutional practice standards, and physician preference. They constructed multivariable models to determine the relationship between minimum, maximum, and mean systolic and diastolic BP levels during the first 24 hours after MT and functional independence (defined as a modified Rankin Scale score of 0–2) and mortality at 3 months.

Overall, 45% of patients achieved functional independence at 3 months, 26% died, and 6.5% experienced a symptomatic intracranial hemorrhage. In a univariate analysis, those with lower maximum systolic and diastolic BP levels 24 hours after the intervention—163 ± 20 vs 179 ± 23 mm Hg systolic, and 90 ± 15 vs 97 ± 14 mm Hg diastolic—had greater likelihood of 3-month functional independence. Similarly, those with higher postprocedure maximum systolic and diastolic BP levels had higher mortality. Despite the perceived risk of reperfusion injury after recanalization, there was no association between maximum systolic and diastolic BP levels and symptomatic intracranial hemorrhage. Mean and minimum BP levels did not have an effect on any of the outcomes. In multivariable analysis, an increment of 10 mm Hg in maximum systolic BP was independently associated with a lower likelihood of functional independence and a higher mortality rate at 3 months. Among the 140 patients with complete reperfusion, those undergoing permissive hypertension as a BP target had a higher 3-month mortality rate and lower frequency of functional independence. The moderate BP goal of <160/90 mm Hg was independently linked to lower mortality at 3 months compared to permissive hypertension.

In contrast to the cited previous data suggesting that higher BP levels are desirable during the MT procedure, the data presented by Goyal et al.[9] suggest that lower BP targets are desirable during the first

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24 hours after established reperfusion. Accounting for the available data, given the choice of targeting systolic BP <180, <160, or <140 mm Hg for the first 24 hours after a successful MT procedure, taking the middle road with an order to maintain systolic BP <160 mm Hg using a continuous infusion calcium channel blocker such as nicardipine or clevidipine seems a prudent default strategy until higher-quality data are available.

The reader must understand that these data, although provocative, are far from definitive and may actually prove misleading. As a retrospective analysis of prospectively collected data at a single institution with its own standards and treatment protocols, the data have a substantial risk for confounding due to treatment allocation bias: the possibility that an unmeasured variable explained both the decision to select a higher BP target and the poor outcomes that occurred. In this case, the relative extent of incomplete downstream hypoperfusion on the postthrombectomy angiogram is the most likely confounding variable. Full recanalization has consistently demonstrated better outcomes after LVO.[1] Similarly, based on our experience, the most common rationale for selecting a higher BP target after MT is the presence of persistent primary or distal vessel occlusion with dependence on collaterals. Both subtle and overt degrees of incomplete downstream microvascular reperfusion, not captured by the TICI scale by the treating team, may lead to overrepresentation in the permissive hypertension group. Only a prospective randomized trial can truly resolve this issue and determine the optimal target BP after MT.

The mechanism of death among the 29% of patients treated with permissive hypertension who died (compared to 0% and 8% in the intensive and moderate BP target groups) needs clarification. Hemorrhagic transformation does not explain the excess mortality: the intensive BP-lowering group had the highest rate of hemorrhagic transformation and the lowest zero mortality. We encourage the authors to follow up on this in a secondary analysis.

These new data from Goyal et al. add helpful preliminary information to a previously evidence-free zone. Given the available data, treating severe hypertension after MT with a target of maintaining SBP <160 mm Hg seems prudent. This target may require adjustment after accounting for the final degree of downstream recanalization and quality of collaterals, baseline BP, use of thrombolytic therapy, and cardiac and renal function. Future research focusing on assessment of autoregulation and the effect of BP variability (as opposed to the mean value) may help. Ultimately, however, a prospective, randomized trial will need to determine the optimal BP management strategy.

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