



ARTICLE OF THE MONTH

Association of General Anesthesia vs Procedural Sedation with Functional Outcome Among Patients with Acute Ischemic Stroke Undergoing Thrombectomy: A Systematic Review and Meta-analysis

Schönenberger S, Hendén PL, Simonsen CZ, Uhlmann L, Klose C, Pfaff JAR, Yoo AJ, Sørensen LH, Ringleb PA, Wick W, Kieser M, Möhlenbruch MA, Rasmussen M, Rentzos A, Bösel J
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Welcome to the February 2020 installment of SNACC's Article of the Month. This month we are presenting the AOTM in a new format; one of the authors of the selected article will be providing the commentary. You will see this new format interspersed with the original format going forward. This month we are highlighting a new systemic review and meta-analysis on anesthetic management for stroke thrombectomy. Commentary is provided by Dr. Mads Rasmussen from Aarhus University Hospital in Denmark.

Dr. Rasmussen is an Associate Professor in the Department of Anesthesia, Section of Neuroanesthesia, Aarhus University Hospital, Denmark. He is the head of Neuroanesthesia Research and responsible for the anesthetic service in interventional neuroradiology. His current research interests include anesthetic and hemodynamic management in endovascular stroke therapy, and effects of vasopressors on cerebral blood flow, microcirculation, and metabolism in acute neurovascular disorders and space occupying lesions.

As always, readers are welcome to join us for further discussion on the [Twitter](#) feed or on [Facebook](#).

~ Amie Hoefnagel, MD, Oana Maties, MD, Shilpa Rao, MD, and Nina Schloemerkerper, MD

Commentary

By Mads Rasmussen MD, PhD

In 2015, five randomized studies convincingly demonstrated that endovascular therapy (EVT) was associated with improved functional outcome in patients with acute ischemic stroke (AIS) due to large vessel occlusion in the anterior circulation. Since then, intense research has focused on the question whether EVT is best performed under local anesthesia (LA) alone, procedural sedation (PS) with or without local anesthesia or under general anesthesia (GA).

In the early days of EVT for ischemic stroke, most interventionalists preferred to perform EVT under GA due to concern for patient movement and associated procedural complications.¹ However, from approximately 2010 to present an increasing number of non-randomized studies indicated that EVT performed under GA was associated with worse functional outcome and increased mortality compared to patients who received local anesthesia and/or procedural sedation.^{2,3} Increased recognition of the potential influence of anesthetic strategy on functional outcome and the realization that EVT could be safely performed under PS, led to a change in anesthetic strategy favoring PS. Recent surveys indicate a preference for PS in European centers and equipoise between GA and PS as the preferred method in North American Centers.^{4,5} Retrospective studies may have been confounded by selection bias because patients with more severe stroke and poorer clinical presentation were more likely to receive GA. Randomized trials were needed. Three single center randomized controlled trials (SIESTA, ANSTROKE and GOLIATH) with almost similar inclusion criteria and hemodynamic protocols could not demonstrate an advantage of PS over GA and reported equivalent primary outcomes between the two anesthesia regimens.⁶⁻⁸ However, as secondary outcomes both the SIESTA and GOLIATH trials indicated improved 90-day functional outcome in the GA group. To further assess the impact of anesthetic strategy on functional outcome, the SAGA (SIESTA-ANSTROKE-GOLIATH Association) collaboration was established.

The study is an individual patient data (IPD) meta-analysis of 368 patients primarily included in the SIESTA, ANSTROKE and GOLIATH trials. Using a fixed effect model, the study demonstrated that GA was associated with improved outcome compared with procedural sedation (common odds ratio: 1.58[95% CI, 1.09-2.29]). The most likely explanation for this finding may be related to the significantly higher rates of reperfusion observed in the GA group (85 % vs. 76 %) which indicates that GA may enhance mechanical instrumentation. Other explanations include strict hemodynamic protocols and

the reduction in cerebral oxygen metabolism associated with general anesthesia. It has been suggested that GA is associated with longer time to reperfusion. We found that the median (IQR) time from stroke onset to groin puncture was significantly longer in the GA group (180[136-255] min vs 170[133-240] min, $P = 0.04$). However, time from stroke onset to reperfusion and duration of intervention was not different between the groups. This difference is possibly a consequence of the shorter, albeit nonsignificant, median (IQR) time interval from groin puncture to reperfusion in the GA group (52 [31-90] min vs 71[34-105] min, $p = 0.15$ in the CS group).

Twenty-one patients initially randomized to PS were converted to GA. Interestingly, the association of GA with improved outcome was absent when these patients were analyzed according to the group they were converted to. This finding indicates severe ischemic strokes and poor clinical presentation of the converted patients. In addition, the emergent conversion with potential hypotension, hypoxia and prolonged time to reperfusion may add to the poor outcome in the converted patients. Thus, identification of predictors for the risk of conversion from PS to GA may be important and deserves more attention. The meta-analysis is associated with several limitations. First, 90-day functional outcome was the primary outcome parameter in only one of the trials (ANSTROKE). Both SIESTA and GOLIATH used surrogate parameters for functional outcome. Second, the sample size is relatively small and significant differences may have gone undetected.

What is the clinical consequence of this study? In my own institution, GA is now considered the "default" anesthetic strategy of choice for EVT procedures. If the patient, however, presents with severe co-morbidity or an expected difficult airway the attending anesthesiologist may decide that the procedure is performed under PS. The final decision regarding anesthetic strategy is always taken in collaboration with the neurointerventionalist. The workflow from admission to arrival at our neurointerventional suite is minimized to reduce time delay⁹ and procedural systolic- and mean arterial blood pressure is rigorously targeted above 140 mmHg and 70 mmHg, respectively.¹⁰

Thus, the pendulum has swung from one way to the other in this field, with the trend in outcomes associated with choice of anesthetic strategy has shifted from better outcomes associated with CS/LA to better outcomes associated with GA. I am looking so much forward to the results of the ongoing multicenter randomized clinical trials. The pendulum may then swing again.

References

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