



ARTICLE OF THE MONTH

Time Elapsed After Ischemic Stroke and Risk of Adverse Cardiovascular Events and Mortality Following Elective Noncardiac Surgery

Jorgensen et al, *JAMA* 2014;312(3):269-277. Doi:10.1001/jama.2014.8165

In this November installment of the SNACC Article of the Month, we deal with an article that is of great interest to neuroanesthesiologists in particular and to the anesthesia community in general. This paper relates to a prior history of ischemic stroke and subsequent risk of perioperative cardiovascular morbidity. SNACC published a consensus statement in the October issue of the *Journal of Neurosurgical Anesthesiology (JNA)* relating to patients at risk for stroke undergoing elective non-cardiac non-neurologic surgery. As our expert this month (also an author of that consensus statement) points out, however, the risk to our patients may have been underestimated by that consensus statement. The current article by Jorgensen and colleagues is a warning to us all, and a call to manage elective patients with a recent history of stroke ever-vigilantly, perhaps questioning older dogmas regarding when it is safe to proceed with elective surgery. Our expert this month, Dr. Laurel Moore, is a SNACC Board member, sits on many committees within SNACC, and is Director of Neuroanesthesiology services at the University of Michigan. We hope you will enjoy this eye-opening discussion, expert insight, and will participate in the conversation by joining us on [SNACC LinkedIn Group](#).

~ John F. Bebawy, MD

Commentary

Reviewer: Laurel Moore, MD

Associate Professor
Director, Division of Neuroanesthesiology
University of Michigan

A prior history of stroke is recognized as an independent predictor of perioperative stroke. A history of stroke is also recognized as a risk factor for other major adverse cardiovascular events (MACE); for example stroke is a variable in the highly referenced revised cardiac risk index of Lee et al. The significance of these relationships, however, seems to have been underestimated until the publication of Jorgensen's work using the Danish National Patient Register. Even as recently as last month, while recognizing the paucity of available data the SNACC consensus statement on perioperative stroke (Mashour et al, *JNA* October 2014) recommended waiting four weeks after stroke before proceeding with elective noncardiac surgery. Jorgensen's manuscript provides strong evidence that this window of risk for MACE following stroke should be extended far beyond four weeks.

Using the Danish National Patient Register investigators included all elective noncardiac surgical patients age ≥ 20 years between 2005-2011. Patients with prior ischemic stroke were identified by ICD-10 codes; patients with TIA or hemorrhagic stroke were excluded. In total there were 475,000 surgeries in patients with no prior stroke and

7100 surgeries (1.5% of total) in patients with prior stroke. Surgical procedures were subdivided between low, intermediate and high risk cohorts. Primary outcomes were 30-day mortality and MACE (nonfatal acute myocardial infarction, nonfatal ischemic stroke and cardiovascular death).

Irrespective of time between ischemic stroke and surgery, patients with prior stroke had an adjusted 1.8-fold increase in 30-day mortality and 4.8-fold increase in 30-day MACE compared to patients with no history of prior stroke. Not surprisingly, patients with a history of prior stroke were older, were more often men and had a greater number of comorbidities. What is remarkable is the magnitude of the effect of *recent* stroke on perioperative outcomes: for example in patients with stroke within three months of surgery there was a *150-fold increase* in the risk of 30-day ischemic stroke postoperatively. Thirty-day all-cause mortality was increased 12.6 fold in this same population. Of clinical relevance, this effect was consistent whether the surgical procedure was categorized as low, intermediate or high risk. Cubic regression splines based on the patients with prior stroke found that these odd ratios leveled off between months nine and 12 post-stroke for MACE, all-cause mortality and ischemic stroke (figure 2 in the article). Also of clinical interest, patients with a prior stroke NOT related to atrial fibrillation had a greater risk of 30-day MACE compared to patients in whom the prior stroke was related to atrial fibrillation. Perioperative antithrombotic and statin therapy was protective for 30-day MACE.

The observational nature of this study and the homogenous patient population are potential weaknesses in this study. However, the enormous study population and the elegant statistical analysis are clear strengths. I think the magnitude of the effect of recent stroke on outcomes in patients undergoing elective surgery is a game changer for us clinically. Clearly we need to probe more carefully for a history of stroke in our preoperative evaluations and the timing of elective surgery given a history of stroke, particularly within nine months of the event, needs to be carefully considered.