

Perioperative stroke: a question of timing?

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Perioperative stroke is a potentially devastating complication with an incidence of 0.1–0.6% in non-cardiac surgery. Although rare, stroke in the perioperative setting is associated with an adjusted 8-fold increase in mortality, thus developing preventive strategies is of paramount importance. The recent consensus statement on the prevention of perioperative stroke from the Society for Neuroscience in Anesthesiology and Critical Care (SNACC) is a step in this direction.¹ A history of ischaemic stroke is a strong predictor of perioperative stroke and important recent data from Jørgensen and colleagues² have added further information regarding the optimal interval between the stroke event and elective surgery. In this editorial, the preoperative approach to a patient at high risk of stroke is reviewed based on the SNACC consensus statement, with additional discussion of the crucial question of when to schedule surgery in patients with a history of stroke.

Consensus statement on perioperative stroke from SNACC

The SNACC Perioperative Stroke Task Force recently published a consensus statement regarding the perioperative care of non-cardiac, non-neurological surgery patients at high risk for stroke.¹ Here we describe the preoperative recommendations, which focused on the (1) identification of risk factors, (2) role of β -adrenergic receptor blockers, (3) role of anticoagulants and antiplatelet drugs, and (4) timing of elective surgery after recent stroke. Consistent independent predictors of perioperative stroke across multiple epidemiological studies include older age, history of cerebrovascular disease (such as past stroke or transient ischaemic attack), kidney failure, atrial fibrillation, and valvular disease.^{1,3,4} In non-cardiac patients with five or more risk factors, the incidence of stroke approaches 1 in 50. In terms of beta blockade, the POISE-1 trial demonstrated that the administration of perioperative metoprolol to non-cardiac surgical patients with cardiovascular risk factors was associated with a significantly higher incidence of stroke and mortality;⁵ a recent Cochrane database review supports this interpretation.⁶ One of the central questions in response to this seminal trial was whether the increased risk of stroke was attributable to the study methodology—in particular, the starting dose and titration period in beta blocker-naïve patients—rather than the pharmacology of the drug itself. Recent observational studies in large non-cardiac surgical populations suggest that even clinically routine administration of metoprolol is associated with a higher risk of stroke compared with other beta blockers with more selectivity for the β_1 adrenergic receptor (such as atenolol or bisoprolol), even when controlling for potential confounders.^{7–9} In terms of perioperative aspirin and stroke, the recent POISE-2 trial found that

continuation of aspirin in the perioperative period for non-cardiac surgical patients with cardiovascular risk factors did not reduce stroke risk, but increased clinically significant bleeding.¹⁰ In contrast, the initiation of aspirin was associated with a lower risk of stroke, but the authors themselves questioned the validity of this finding.¹⁰ Finally, the SNACC consensus statement addressed the timing of elective surgery after recent stroke. Although the recommendations suggested a delay of at least 1 month between stroke and elective surgery, despite prior studies suggesting no increased risk of adverse events,^{11,12} there were virtually no data to support this recommendation.¹ The recent epidemiological study by Jørgensen and colleagues² provides much needed guidance in this aspect of perioperative stroke prevention.

Timing of surgery following stroke: does it impact mortality and perioperative stroke?

An elusive question in preoperative assessment and risk modification has been when to operate on patients with recent major vascular events. For example, the timing of surgery in patients with recent acute coronary syndrome is well investigated^{11,13,14} (if not solved), whereas the timing of surgery in patients with a history of stroke has been inadequately addressed. This is clearly important, as prior cerebrovascular disease is an important risk factor for perioperative stroke. Since publication of the consensus statement, new data have been published on the timing of non-cardiac surgery following ischaemic stroke.² While previous studies did not find an association of surgical timing after preoperative stroke with adverse outcomes (such as mortality) following elective surgery,^{11,12} this recent analysis showed a plausible association between operating within 6–9 months of a stroke and increased risks of perioperative mortality, stroke, and major adverse cardiac events.² Jørgensen and colleagues included a greater number of surgeries occurring less than 6 months following the stroke compared with previous studies,^{11,12} with a consequent increase in statistical power to identify an effect of the timing of surgery on stroke. Although observational, the data suggest that, if possible, elective surgery should be deferred until 6 months after a stroke. Given that contemporary data show that non-cardiac surgery is associated with higher risk for 6 months–1 year following an acute coronary syndrome,^{7,9} it seems unsurprising that stroke may exert a similar effect. Importantly, even minor surgeries after ischaemic stroke were associated with adverse outcomes.

In a previous analysis of data from England and Wales, Sanders and colleagues¹¹ included 414 985 patients having elective major joint arthroplasty, but only 118 patients (0.02%) had a stroke in the prior 6 months. This led the authors to speculate

that clinicians avoid elective surgery shortly after a stroke because they consider this a higher-risk period. The data from Jorgensen and colleagues focusing on a diverse non-cardiac, non-neurological surgery population support the clinical decision making inferred based on data from major joint arthroplasty, clarifying the situation greatly.

The unanswered questions for patients with prior stroke at risk of perioperative stroke

When to conduct emergency surgery, such as hip fracture repair, following a stroke remains unclear. Here the pressure to treat an emergent or urgent condition leads to a clinical dilemma. These decisions must be a compromise between the cerebrovascular vulnerability (or other medical issues) and treatment of the surgical pathology. Indeed, delaying surgery in certain high-risk situations may be associated with greater harm than conducting early surgery.¹⁵ At present there are incomplete data to guide clinical practice in patients with acute surgical pathology and co-existent acute stroke.

Regarding time-sensitive surgery (such as for cancer), it may still be prudent to delay surgery since increasing time elapsed following a stroke is associated with a reduced risk of postoperative mortality and perioperative stroke. However, we should recognize that the absolute mortality and morbidity rate for some cancer operations remains low and clinical judgment remains the key determinant. A prudent approach should include discussion with the patient of the timing of surgery following a vascular event, and consideration should be given to delaying surgery if possible to reduce perioperative risk. Further details of this consent process are mentioned in the consensus statement.¹

Other unanswered questions remain about the heterogeneity of the stroke diagnosis (including severity, clinical symptoms and signs, and cerebrovascular territories involved) and the relative impacts on further perioperative stroke, the management of ischaemic vs haemorrhagic preoperative stroke, the impact of covert stroke on surgical outcomes, how to manage patients with prior transient ischaemic attacks, and the management of perioperative pharmacological agents such as the relative benefit of more highly selective β_1 adrenergic agonists.^{7 8 9} Further information is still needed on perioperative risk factors such as haemodynamic control and arrhythmias. Although patients at risk of perioperative stroke, including those with preoperative stroke and other vascular risk factors, can have impaired cerebral autoregulation,¹⁶ evidence is lacking for optimal management of their blood pressure in the perioperative period.¹ Furthermore, as preoperative atrial fibrillation is a risk factor for perioperative stroke,¹ it would seem highly plausible that new-onset perioperative atrial fibrillation may predispose to perioperative stroke. Recent data show that perioperative atrial fibrillation increases the risk of long-term stroke.¹⁷ Given the issues over perioperative beta blockade, the prevention and management of perioperative atrial fibrillation in non-cardiac surgery requires further attention.

In conclusion, stroke remains a potentially disastrous complication of modern perioperative care; as such, the SNACC consensus statement provides important guidance and highlights the numerous gaps in our current clinical understanding.¹ Given the rarity of this condition in the non-cardiac surgical population, outcomes research probing large datasets offers an important opportunity to inform clinical care of patients at risk of stroke. In this regard, we are optimistic that further modifiable non-cardiac surgical^{12 11} and cardiac surgical risk¹⁸ factors for perioperative stroke will be identified.

Declaration of interest

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Perioperative medicine- the second round will need a change of tactics

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Implementation of the concept of 'perioperative medicine' is by definition – and as emphasised many years ago¹ – a multidisciplinary effort involving anaesthetists, surgeons, nurses and physiotherapists where appropriate. Going back in history, 'perioperative medicine' has been around for more than a decade, but the name of a thing itself may not be as important as to how we identify it and document its relevance. In this context, the recent editorial by Cannesson and colleagues² reemphasises the importance of 'perioperative medicine', but with a major emphasis on the role of anaesthetists. The arguments include that 'new delivery of care models all have in common that it is anaesthetists that often are leading them', that 'the nature of anaesthetists' training and practice make them natural candidates to become leaders of the perioperative environment' and that anaesthetists are 'system thinkers' arguing for an expanded role to secure 'the position as leaders in the hospitals'. They also argue that innovative models such as Enhanced Recovery After Surgery (ERAS) and The Perioperative Surgical Home (PSH)² are important. It is noteworthy that throughout the editorial, there is no mention of the word 'surgeon' or 'surgical care principles'.

In order to secure progress in perioperative outcomes, we would reiterate that these efforts should be based on a multidisciplinary basis, as emphasised from the beginning,¹ later³ and more recently.^{4, 5} In this context, it has been surgeons who most often have been involved in the development and documentation of the value of enhanced recovery programs/the fast-track methodology.^{1, 3, 6–8} Thus, a key point to improve outcome, has always been that initial optimised interventions pre- or intraoperatively, will not automatically translate to an improved outcome, unless the surgeons and surgical nurses integrate these evidence-based components of care into the overall postoperative surgical care package, and especially that provided during the days in hospital, after the stay in the postoperative care unit.⁹

That a multidisciplinary approach is a prerequisite for optimising recovery, has been clearly demonstrated by the problems of interpreting the many studies on unimodal interventions with optimised analgesia. For example epidural analgesia,^{10, 11} different interventions for fluid management,¹² or minimal access surgery,^{6, 9, 13} where progress and clinical relevant recommendations have been delayed, or perhaps inappropriately been introduced because the specific intervention was not investigated, in the context of an otherwise updated evidence-based optimised care program.

Consequently, future strategies to improve perioperative outcome, within the context of anaesthesiology, surgery, nursing care and perioperative medicine, require a change of tactics going beyond politically and profession-specific approaches, but instead incorporating a multidisciplinary effort to achieve optimal outcomes.^{1, 14} Leadership should be based on those persons/professions in individual institutions, that have demonstrated expertise to optimise outcomes, rather than be the sole responsibility of a single profession.¹⁵ As emphasised by Mencken many years ago: 'For every complex problem there is an answer that is clear, simple, and wrong'. Hopefully, the professionals involved in organisation of perioperative care will react carefully and appropriately, as history has shown that otherwise the 'knowing-doing gap' between scientific evidence and clinical perioperative practice will not be reduced.¹⁶

Declaration of interest

None declared.

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