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CASE REPORT

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Neuraxial anesthesia for non-neurological emergency surgery in a patient with acute ischemic stroke: a case report

Asish Subedi[1*] and Ashok Gautam[1]

Abstract

Background The recent guidelines recommend delaying elective non-neurological surgery after an index stroke, but there is a lack of consensus regarding emergency surgery in patients with a recent stroke. Impaired cerebral autoregulation and altered baroreceptor function elevate the risk of recurrent stroke in this group. Moreover, the impact of anesthesia type (general vs. regional) for non-cardiovascular, non-neurological surgery in patients with an index stroke remains inconclusive.

Case presentation A 67-year-old male with an acute mild ischemic stroke underwent emergency surgery for an obstructed right-sided direct inguinal hernia under combined spinal-epidural anesthesia. Pre-operative assessment showed stable hemodynamics, and perioperative measures were taken to ensure stable blood pressure. Neuraxial anesthesia was employed successfully, and the patient remained hemodynamically stable throughout the surgery and postoperative period. No neurological deficits were observed post-surgery, and follow-up up to 3 months revealed no cognitive impairment or neurological decline.

Conclusions Neuraxial anesthesia can be considered for patients with acute mild strokes requiring urgent non-neurological surgery, provided they are hemodynamically stable and without coagulopathy. However, the choice of anesthesia should be individualized based on factors such as neurological status, stroke severity, coagulation, and existing disabilities. This case highlights the importance of a personalized approach to anesthesia in emergency surgery for stroke patients.

Keywords Emergency surgery, Neuraxial anesthesia, Stroke

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Introduction

The recent guideline recommends that elective non-neurological surgery should be delayed for at least 9 months following a stroke [1]. However, there is no consensus regarding emergency surgery. Emergency surgeries in patients with a prior history of stroke are rising due to advancements in perioperative care, especially for elderly patients with co-existing comorbidities. However, there is a substantial increase in the risk of major adverse cardiovascular events (MACE) and mortality in patients with a recent stroke undergoing non-neurological surgery [2]. Moreover, due to disrupted cerebral autoregulation and altered baroreceptor function, the recurrence of stroke is high in this group of patients [3, 4]. Several factors have been identified as risk factors for perioperative stroke [5]. Regarding the mode of anesthesia (general versus regional anesthesia) and its impact on perioperative stroke risk for non-cardiovascular, non-neurological surgery, the results are inconclusive [1, 5, 6]. Nevertheless, whenever feasible, it is suggested that regional anesthesia should be considered as an alternative to general anesthesia [1]. In this case report, we describe a patient with an acute ischemic stroke who underwent emergency surgery under neuraxial anesthesia.

Case presentation

A 67-year-old male with no previously known health issues was hospitalized due to an ischemic infarct affecting the left fronto-temporo-parietal lobe with no midline shift. He exhibited speech fluency but struggled with repetition and comprehension. Motor examination revealed slightly heightened tone and a strength rating of 3/5 in the right upper and lower extremities. Reflexes were normal, and sensory assessment showed no abnormalities. The National Institutes of Health Stroke Scale (NIHSS) score was 3. Echocardiography revealed concentric left ventricular hypertrophy and moderate mitral regurgitation, with no dilated atrium, clots, and a left ventricular ejection fraction of 55–60%. On electrocardiogram, the heart rate (HR) was 48 beats/min with a regular rhythm. He was prescribed aspirin 75 mg orally. On the 4th day of admission, motor power was 5/5 in the upper extremities and 4/5 in the right lower extremity. On the 7th day of admission, an obstructed right-sided inguinal hernia was suspected, and emergency hernia repair was planned with combined spinal epidural anesthesia.

Pre-operative assessment revealed a regular heart rate (HR) of 50 beats/min and a blood pressure of 100/60 mmHg. Laboratory investigations were unremarkable. No signs or symptoms of increased intracranial pressure were observed. Ultrasound-guided right internal jugular vein catheterization and left radial artery cannulation were performed. Intraoperative monitoring included electrocardiography, pulse oximetry, heart rate, respiratory rate, invasive blood pressure, and temperature. The patient did not receive any premedication or sedation during the surgery. Noradrenaline infusion was initiated at 0.1 μg/kg/min and titrated to maintain mean arterial pressure within 20% of baseline. An epidural catheter was inserted at the L1-L2 interspace with an 18G Tuohy needle via the midline approach, and a test dose of 3 mL of lidocaine 1.5% with epinephrine 1:200000 was given. Spinal anesthesia was administered with a 25G pencil point spinal needle at the L3-L4 interspace via the midline approach with 0.5% heavy bupivacaine 1.5 mL after free flow of cerebrospinal fluid was confirmed. Later, 6 mL of 0.5% ropivacaine was given via the epidural catheter intraoperatively to maintain anesthesia. Hemodynamic parameters were stable during the intraoperative period. The surgery lasted for 1 h, and the patient received 1 L of crystalloid. Intraoperatively, the patient was kept normoglycemic, and measures were taken to avoid hypothermia.

Noradrenaline infusion was stopped post-surgery, and the patient was transferred to the intensive care unit (ICU). Postoperative pain management involved epidural morphine. The epidural catheter was removed on the 3rd postoperative day, and no new neurological issues were noted before ICU discharge. Follow-up up to 3 months indicated no neurological decline or cognitive deficits.

Discussion and conclusions

In recent times, there has been a noticeable increase in the occurrence of perioperative ischemic strokes during non-cardiac, non-neurologic surgeries. This rise can be attributed to various factors, including advancements in stroke diagnosis technology, the identification of clinically silent strokes (referred to as covert strokes), a broader time frame for defining perioperative stroke (extending up to 30 days after surgery), and the performance of surgeries on high-risk patients [1, 5, 6]. As a result, it is of utmost importance for perioperative physicians to identify the modifiable and non-modifiable risk factors for perioperative stroke preoperatively. Index stroke is one of the risk factors for perioperative stroke, and it has been recommended to postpone elective surgery until 9 months after the stroke. However, in cases of non-neurological emergency procedures, based on the risk-benefit assessment, the surgery cannot be postponed.

A study found that patients with a history of recent ischemic stroke undergoing emergency non-neurological surgeries faced higher risks of MACE and mortality [7]. This necessitates the importance of selecting the appropriate anesthesia technique for emergency surgeries. However, the existing body of evidence presents a mixed perspective regarding stroke risk in non-cardiac, non-neurological surgeries for patients with previous strokes

in relation to the choice of anesthesia method. In a recent study involving 36,149 patients with prior strokes, the use of neuraxial anesthesia was associated with reduced postoperative major complications and mortality rates compared to general anesthesia [8]. In contrast, Mia et al. revealed in their sensitivity analysis no differences in the risk of MACE between those who received general anesthesia and other anesthesia types (regional anesthesia, sedation, and monitoring only) [7].

After an index ischemic stroke, cerebral autoregulation is impaired, increasing the risk of secondary cerebral damage when cerebral blood flow is disrupted [9, 10]. Notably, research suggests that dynamic cerebral blood flow regulation is most affected during the very early stages after a stroke rather than in the later stages [3]. Interestingly, one study found that the occurrence of MACE following emergency surgery was lower in the initial phase (within 3 days) after a stroke compared to the later phase (4–14 days) [7].

Our patient had experienced a stroke 7 days before undergoing emergency surgery, placing him at a heightened risk of experiencing another stroke. As a result, we opted to avoid general anesthesia for several reasons. First, there is a potential risk, albeit not firmly established, of disrupting cerebral autoregulation and inducing hemodynamic instability with general anesthesia [3]. Second, our patient was hemodynamically stable prior to surgery, and during the procedure, we proactively administered a norepinephrine infusion adjusted to maintain mean arterial pressure within 20% of baseline. While there is a lack of clear evidence supporting specific hemodynamic targets for perioperative care in patients with recent strokes, our aim was to keep intraoperative mean arterial pressure within this range because both hypotension and hypertension can negatively impact organ perfusion after a stroke. Additionally, our patient experienced a mild stroke with a relatively low NIHSS score of 3, which did not result in severe neurological deficits or signs indicative of elevated intracranial pressure. Moreover, our patient was not taking oral anticoagulants because his CHA2DS2-VASc score was 2, and he did not have atrial fibrillation (AF). According to current guidelines, oral anticoagulants are recommended for men with AF and a CHA2DS2-VASc score of ≥2 [11]. Nonetheless, it's important to note that in cases of disabling stroke or in patients who have undergone intravenous thrombolysis or mechanical thrombectomy and are receiving dual antiplatelet therapy, immediate neuraxial anesthesia for emergency surgery should be avoided.

In conclusion, we propose considering neuraxial anesthesia for patients with acute mild strokes requiring urgent non-neurological surgery. However, the choice of anesthesia technique for emergency non-neurological procedures in acute ischemic stroke patients should be tailored to the individual, considering factors such as neurological and hemodynamic status, stroke severity, existing disabilities, and coagulation profile, until more data become available.

Abbreviations

MACE	Major adverse cardiovascular events
NIHSS	National Institutes of Health Stroke Scale
HR	Heart rate
ICU	Intensive care unit

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A.S. was a major contributor in writing the manuscript. A.G. managed the case and contributed to writing up of the first draft of the paper. All authors read and approved the final manuscript.

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Declarations

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Not applicable.

Consent for publication
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Competing interests
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