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## Perioperative Stroke In A Patient Undergoing Non Cardiac, Non-Neurosurgical Procedure: A Case-Based Review Article.

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### ABSTRACT

Perioperative stroke is a focal or global neurological deficit lasting more than 24 hours, which occurs during surgery or within 30 days following surgery. Early diagnosis of classical stroke presentations can be missed in the perioperative period because anaesthetic drugs can mask its symptoms. Factors like postoperative endothelial dysfunction and surgery-induced hypercoagulable state can contribute to perioperative stroke. This case report describes a case of perioperative stroke in a patient with an unremarkable intraoperative course following Frey's procedure, this being a non-neurological pancreatic procedure. Even though perioperative stroke after non-cardiac, non-neurological surgery is infrequent, it is associated with considerable morbidity and mortality, and its prevalence could be rising. Previous studies have identified a number of patient and procedural risk factors, such as older age and a history of stroke. In our case, we managed with supportive and care and a conservative approach and a successful outcome was the result. Perioperative risk-factor modification, like optimisation of systemic illness like diabetes, hypertension and quitting of smoking could well improve results in young patients. Early diagnosis involving physical examination, the NIHSS, and CT imaging of the brain combined with a multidisciplinary team approach towards treatment generally improve neurological outcomes in this patient population. Vigilant monitoring, early diagnosis and prompt treatment plays a vital role in the management and improving patient outcomes.

**Keywords:** anaesthesia, stroke, perioperative period, non-neurosurgical procedure

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## INTRODUCTION

Stroke is a devastating post-operative complication and a major cause of morbidity and mortality, especially in older population. It puts a substantial strain on the healthcare system and reduces patients' quality of life. The mortality rate after a stroke caused by general surgery is approximated to be 26%, rising to 87% in patients who have previously had a stroke. Stroke occurs in approximately 0.1-1.9% of patients undergoing non-cardiac, non-neurologic, and non-major surgeries [1] and is approximated to be as high as 10% in patients undergoing cardiac or neurosurgery [2]. The most common cause of ischemic stroke presentations in general surgery symptoms that are associated with embolic events is thrombosis. We discuss our experience with perioperative stroke in this paper, along with evidence-based short review.

### Case capsule

A 62-year-old male patient with a history of diabetes, hypertension and an old CVA on dual antiplatelets with no residual weakness was categorised as American Society of Anesthesiologists (ASA) physical status 2 [3] after risk stratification underwent Frey's procedure under general anaesthesia. Preoperative investigations were within normal limits and EKG showed normal sinus rhythm (NSR). At the time of extubation, following an unremarkable general anaesthesia course with good hemodynamic stability, the patient was drowsy, and found to have a flat affect, left-sided weakness, and left-sided facial droop. The acute stroke team was consulted and, after a quick neurological assessment, the patient was taken for an emergency CT scan of the brain. A non-contrast CT of the brain showed evidence of early right middle cerebral artery (MCA) territory hyper acute infarct M2-M3 junction (figure 1), and MRI with MRA Brain showed hyper intensities noted in the right fronto-parietal-temporal regions (figure 2). His calculated National Institute of Health Stroke Score (NIHSS) was 31. The patient was initiated on dual platelets, adequate doses of phenytoin and mannitol. The blood pressure control was very vigilant with maintenance around 130/ 85 mm Hg. The random blood sugar level was kept around 140 – 160 mg %. The patient recovered completely and oral drugs were started after surgical conditions improved on the third to fourth days. The patient was discharged on dual antiplatelets, antiepileptics and antibiotics for the abdominal wound.

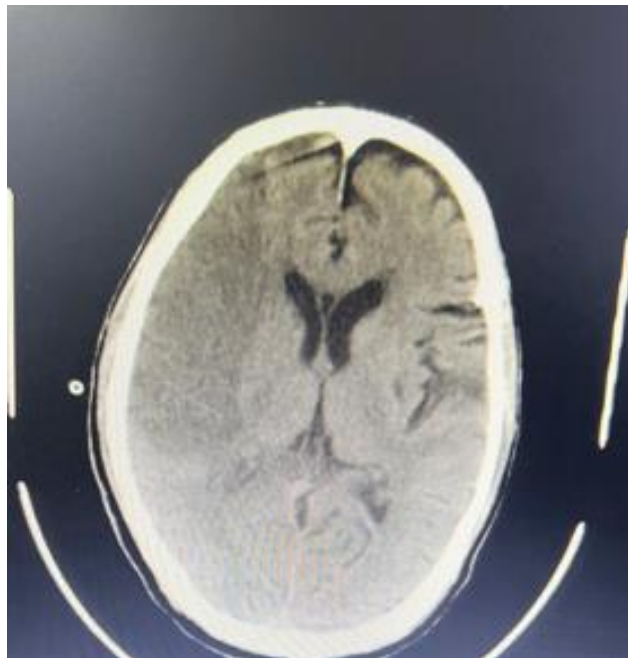
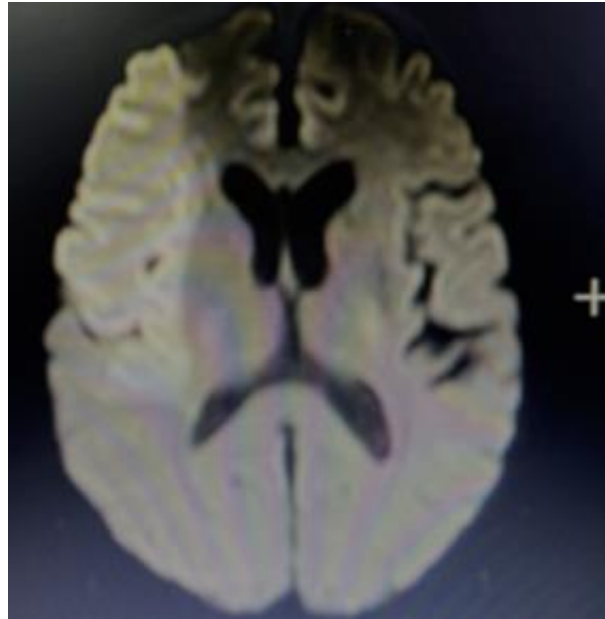


Figure 1: Non contrast CT brain



**Figure 2: MRI Brain**

**DISCUSSION**

The case presented here describes unexpected complications of major stroke peri operatively after Frey's procedure. No screening tool to detect the incidence of perioperative stroke in patients undergoing anaesthesia can be found in the current literature. Perioperative stroke can be catastrophic, and these patients fare poorly, with a greater rate of disability and death . Although perioperative stroke is understudied in comparison to postoperative complications of comparable frequency and severity, emerging data has provided so much insight into how we can avoid, recognise, and manage this complication.

**Preoperative strategies to mitigate the risk of stroke**

Timing of Elective Surgery After an Acute Stroke

Cerebral autoregulation is impaired following acute stroke, making the brain more vulnerable to hypotension. Patients with prior stroke are at increased risk of subsequent stroke for nine months following the initial stroke (Table 1) [1].

Table 1	
PERIOPERATIVE RISK FACTORS	INDEPENDENT RISK FACTORS
Advanced age	Atrial fibrillation
Previous history of stroke/ renal disease	hypertension
Unstable hemodynamics	smoking
Pain /diabetes	Congestive heart failure
Hypercoagulable state	
vascular disease	
Blood loss	

Patients may be predisposed to thrombosis due to postoperative endothelial dysfunction that results in plaque rupture, reactive vasospasm, and thrombus formation [4-6]. Antiplatelet and anticoagulant withholdings during the perioperative period may aggravate surgery-induced hypercoagulability, increasing the risk of stroke events. Furthermore, 14% of strokes after general surgery are associated with atrial fibrillations, emphasising the importance of embolism and a hypercoagulable state. Thromboembolism is uncommon in both bridged and non-bridged patients. [7,8]; The decision to start anticoagulation after surgery is influenced by the type of surgery, adequate haemostasis, and personal risk factors. Perioperative aspirin was associated with a lower risk of stroke

but was associated with major bleeding in the Perioperative Ischemic Evaluation (POISE)-2 trial, but this benefit was not seen in patients who had previously been on aspirin therapy [9]. To reduce the risk of neurological deterioration or death, statin therapy is usually continued in the perioperative setting in patients with acute stroke or initiated two weeks prior to surgery [10]. Statins provide protection by acting as anti-inflammatory agents [10].

### Intraoperative considerations

The POISE-1 trial found that perioperative beta-blocker (metoprolol) use increased the risk of perioperative stroke in non-cardiac surgical patients [11]. There is no agreement on perioperative blood pressure targets because there is no blood pressure threshold for stroke. Maintaining mean or systolic blood pressures within 20% of preoperative blood pressure is recommended in patients at high risk for perioperative strokes. Neurophysiological monitoring, during anaesthesia like EEG, cerebral oximetry, and evoked potential monitoring, has been studied as a method for detecting and preventing cerebral ischaemia during non-cardiac surgery. Despite the fact that these methodologies have been proven to detect neurological morbidities like stroke during carotid endarterectomy, there is presently no strong evidence that by using monitors such as cerebral oximetry precludes perioperative stroke or mortality after non-cardiac surgery. [12,13]. To improve neurological outcome following cerebral ischemia in patients at high risk for stroke, keep perioperative glucose less than 180 mg/dl [14].

### Postoperative considerations

Postoperative stroke diagnosis and time of onset can be difficult because residual anaesthetic effects can mask neurologic deficits caused by a stroke. A non-contrast CT scan of the brain is used to quickly diagnose and differentiate the type of stroke and to begin immediate treatment. In selected patients who received thrombolysis for postoperative stroke, there was a low risk of surgical site bleeding. Perioperative stroke is most common 1-2 days after surgery, with just 10% presenting on the day of surgery. Only 15% of stroke patients presented with only mental status changes and no discernible deficit, and residual anaesthesia makes the identification of deficits tricky. When surgery was recent and major, there was more bleeding at the surgical site. Before using recombinant tPA, an individual risk assessment is required.

## CONCLUSIONS

Perioperative stroke is an uncommon complication in non-cardiac and non-neurological surgeries. In our case, we managed with supportive and care and a conservative approach and a successful outcome was the result. Perioperative risk-factor modification, like optimisation of systemic illness like diabetes, hypertension and quitting of smoking could well improve results in young patients. Perioperative stroke after non-cardiac surgery occurs at a rate of 0.1-1.9%. All high risk. Patients should be screened for perioperative stroke risks. Elective and planned surgeries should be postponed for at least nine months after a previous stroke; No emergency surgery should be postponed. Perioperative strokes are under-recognized and have a high death and morbidity rate. Early diagnosis involving physical examination, the NIHSS, and CT imaging of the brain combined with a multidisciplinary team approach towards treatment generally improve neurological outcomes in this patient population.

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