

บทบาทของพยาบาลห้องผ่าตัดในการบริหารจัดการ และการป้องกันโรคหลอดเลือดสมอง Perioperative Nursing Roles in Stroke Prevention and Management

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บทคัดย่อ

บทความนี้ได้กล่าวถึงบทบาทของพยาบาลห้องผ่าตัดในด้านการบริหารจัดการและการป้องกันเกี่ยวกับโรคหลอดเลือดสมอง เริ่มต้นด้วยการแบ่งประเภท อุบัติการณ์ และทบทวนปัจจัยเสี่ยงของโรคหลอดเลือดสมองในช่วงการผ่าตัด ตลอดจนอาการแสดงที่สามารถตรวจพบได้ในห้องฟักฟื้น โดยยกประเด็นความสำคัญของการประเมินและการค้นหารอยโรคแต่เนิ่นๆ นอกจากนี้บทความได้เน้นถึงความร่วมมือกับสหวิชาชีพ ในเรื่องเกณฑ์การปฏิบัติและกลยุทธ์ในการดูแลพยาบาลผู้ป่วยโรคหลอดเลือดสมอง เพื่อเสริมให้ผลลัพธ์ของการรักษาดียิ่งขึ้น โดยอ้างถึงความจำเป็นในการเรียนรู้อย่างต่อเนื่อง ความตระหนักรู้ และการมีส่วนร่วมในเชิงรุกเพื่อการดูแลให้พยาบาลผู้ป่วย ประกอบกับยังได้คำนึงถึงกระแสและแนวโน้มทางเทคโนโลยีในการจัดการที่เกี่ยวข้องกับโรคหลอดเลือดสมองในช่วงการผ่าตัด ควบคู่ไปกับการเผชิญความท้าทายและโอกาสในการปรับปรุงการดูแลผู้ป่วยศัลยกรรม

คำสำคัญ: พยาบาลห้องผ่าตัด, โรคหลอดเลือดสมองในช่วงการผ่าตัด, การบริหารจัดการโรคหลอดเลือดสมอง, การป้องกันโรคหลอดเลือดสมอง

Abstract

This review explores the multifaceted aspects of perioperative stroke management, focusing on the critical role of perioperative nurses in stroke prevention and intervention. Beginning with an overview of stroke types, incidence, and risk factors in the perioperative period, the review delves into the identification of stroke symptoms in the PACU, emphasizing the importance of early detection and assessment. Furthermore, it delves into existing stroke protocols, interventions, and management strategies, emphasizing the pivotal role of interdisciplinary collaboration in enhancing patient outcomes. Underscoring the necessity for ongoing education, awareness, and proactive involvement in stroke care initiatives within perioperative nursing practice. Additionally, emerging trends and technologies in perioperative stroke management are examined, alongside challenges and opportunities for enhancing the care of surgical patients. This comprehensive review provides insights, recommendations, and a call to action for advancing perioperative stroke care.

Keywords: Perioperative nursing, Perioperative stroke, Stroke prevention, Stroke management

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Introduction

The postoperative phase stands as a pivotal stage in patient care, symbolizing the shift from surgery to the PACU. In this critical setting, often referred to as the post-anesthesia care unit (PACU), patients undergo close monitoring as they awaken from anesthesia and regain consciousness. Despite remarkable strides in surgical techniques, complications such as stroke can still arise during this delicate period.¹ Stroke, marked by the sudden cessation of blood flow to the brain, presents significant risks in such circumstances. Factors contributing to these risks include postoperative hypoxemia, especially prevalent in respiratory-compromised patients, and hemodynamic instability, typified by fluctuating blood pressure and heart rate, particularly concerning in patients with underlying cardiovascular disease. Additionally, patients with a hypercoagulable state are predisposed to increased likelihood of cerebral artery blockage. Moreover, imbalances in fluid and electrolytes can further exacerbate these risks by affecting blood viscosity and heightening thromboembolic potential.²

This article aims to summarize current evidence and practices related to the perioperative nursing role in stroke patient care and to underscore the significance of understanding stroke protocols and interventions, particularly given stroke's potential as a complication in the PACU. Perioperative nurses, specializing in the care of surgical patients across the perioperative continuum, play a crucial role in ensuring patient safety and well-being. Their responsibilities span from preoperative preparation to intraoperative assistance and extend into the postoperative phase. In this critical period, perioperative nurses pivot their focus to vigilant monitoring of patients' vital signs, encompassing parameters such as blood pressure, heart rate, respiratory rate, and oxygen saturation. This meticulous

observation aims to promptly detect any signs of complications or deterioration as patients recover from anesthesia and surgical interventions, highlighting the pivotal role of perioperative nurses in optimizing patient outcomes.

Understanding Stroke in the Perioperative Setting

Definition and Types of Strokes

A stroke, also known as a cerebrovascular accident (CVA), occurs when there is a sudden disruption of blood flow to the brain, resulting in damage to brain tissue. Strokes can be broadly categorized into two main types:²

1) Ischemic Stroke: This type of stroke occurs when a blood vessel supplying the brain becomes blocked or narrowed, leading to a reduction or cessation of blood flow to a specific area of the brain. Ischemic strokes account for the majority of stroke cases and can result from thrombotic or embolic occlusions of cerebral arteries.

2) Hemorrhagic Stroke: Hemorrhagic stroke occurs when a weakened blood vessel in the brain ruptures, causing intracerebral hemorrhage or subarachnoid hemorrhage. Hemorrhagic strokes are less common but tend to be more severe and associated with higher mortality rates.

Incidence and Prevalence of Stroke

While stroke is relatively rare in the immediate postoperative period, its incidence increases significantly in the days and weeks following surgery. Postoperative stroke can occur in patients undergoing various surgical procedures, including cardiac surgery, vascular surgery, neurosurgery, and major non-cardiac surgery.² The exact incidence and prevalence of postoperative stroke vary depending on factors such as patient demographics, comorbidities, surgical characteristics, and the type of anesthesia used. However, studies

have reported incidence rates ranging from 0.1% to 5% following major surgeries, with higher rates observed in specific patient populations, such as older adults and those with preexisting cardiovascular risk factors.² Postoperative stroke is associated with increased morbidity, mortality, and healthcare resource utilization, emphasizing the importance of early recognition and management in perioperative care.

Risk Factors for Stroke

Advanced Age: Older adults are at increased risk of stroke due to age-related changes in vascular structure and function, as well as a higher prevalence of comorbidities such as hypertension, diabetes, and atrial fibrillation.³

Cardiovascular Disease: Patients with a history of coronary artery disease, heart failure, valvular heart disease, and atrial fibrillation, are at an elevated risk of stroke due to underlying vascular pathology and prothrombotic states. Additionally, the presence of a patent foramen ovale (PFO) is associated with cryptogenic stroke and may also be linked to perioperative stroke. PFO could potentially serve as a mechanism for stroke following intraoperative venous air embolism or perioperative thrombosis.³

Hypertension: Elevated blood pressure is a significant risk factor for stroke, as it contributes to arterial wall damage, atherosclerosis, and increased susceptibility to thromboembolic events.³

Diabetes Mellitus: Diabetes is associated with endothelial dysfunction, accelerated atherosclerosis, and hypercoagulability, all of which increase the risk of stroke.³

Smoking: Tobacco use can promote vascular inflammation, endothelial dysfunction, and thrombosis, predisposing patients to atherosclerotic plaque formation and rupture.³

History of Prior Stroke: A history of stroke or transient ischemic attack (TIA) is consistently identified as a significant risk factor for perioperative stroke. The risk is highest within the first three months following a prior stroke, then gradually decreases, stabilizing around nine months post-stroke.¹

Hyperlipidemia: Elevated levels of cholesterol and triglycerides contribute to atherosclerosis and plaque formation in cerebral arteries, increasing the risk of ischemic stroke.

Obstructive Sleep Apnea: These patients have an increased risk of stroke due to intermittent hypoxemia, hypercapnia, sympathetic activation, and endothelial dysfunction associated with sleep-disordered breathing.¹

Coagulation Disorders: Inherited or acquired coagulation disorders, such as thrombophilia or anticoagulant therapy, can predispose patients to thromboembolic events, including ischemic stroke or hemorrhage.¹

Surgical Factors: Certain surgical characteristics, such as prolonged operative duration, large blood loss, use of cardiopulmonary bypass, and positioning-related vascular compression, can increase the risk of perioperative stroke.¹

Anesthesia-related Factors: Anesthetic agents and techniques may influence stroke risk by affecting cerebral blood flow, blood pressure regulation, and coagulation pathways. For example, hypotension, hypoxemia, hypercarbia, and cerebral vasodilation during anesthesia induction and maintenance can exacerbate cerebral ischemia or hemorrhage in vulnerable patients.¹

Identifying Stroke in the PACU

Importance of Early Detection and Assessment

Early detection and assessment play a crucial role in stroke management. Prompt initiation of interventions, including neuroimaging

and consultation, can minimize brain damage and optimize outcomes. Early management in the PACU can mitigate complications such as recurrent ischemia and cerebral edema. Initiating rehabilitation interventions early aids in promoting recovery and maximizing functional outcomes. Implementing safety measures ensures patient safety, while timely communication and collaboration among healthcare team members coordinate comprehensive care and optimize patient outcomes.^{1,2}

Signs and Symptoms of Stroke

Sudden Weakness or Paralysis: Patients may experience weakness or paralysis, typically on one side of the body, affecting the face, arm, or leg. This unilateral motor deficit is a hallmark feature of stroke.¹

Speech Difficulties: Stroke can impair speech and language function, leading to slurred speech, difficulty finding words (aphasia), or inability to comprehend spoken language (receptive aphasia).¹

Facial Droop: One side of the face may droop or appear asymmetrical, particularly when smiling or attempting to raise the eyebrows.¹

Visual Disturbances: Stroke can cause visual disturbances, such as blurred vision, diplopia, or loss of vision in one or both eyes (amaurosis fugax).¹

Altered Mental Status: Patients may exhibit confusion, disorientation, agitation, or loss of consciousness, indicating a disturbance in cognitive function.¹

Severe Headache: A sudden, severe headache, often described as the worst headache of one's life, can occur in hemorrhagic strokes due to intracranial bleeding.¹

Balance and Coordination Problems: Stroke-related deficits in balance and coordination may cause dizziness, vertigo, unsteady gait, or difficulty maintaining posture.¹

Changes in Sensation: Patients may

experience numbness, tingling, or loss of sensation in the face, arm, leg, or hemiparesis.¹

Loss of Bladder or Bowel Control: In severe cases of stroke, patients may experience urinary or fecal incontinence due to impaired neurological control.¹

Challenges in Diagnosing Stroke

Effects of Anesthesia: Residual effects of anesthesia, such as sedation, altered mental status, and impaired cognition, can mask or mimic stroke symptoms, making it difficult to differentiate between neurological deficits and drug-induced effects.^{1,2}

Postoperative Confusion: Postoperative patients may experience confusion, agitation, or delirium as a result of anesthesia, pain medications, or surgical stress, complicating the assessment of neurological function and symptom interpretation.^{1,2}

Limited Patient Interaction: Patients in the immediate postoperative period may be drowsy, disoriented, or unresponsive, limiting their ability to communicate symptoms or participate in neurological assessments effectively.^{1,2}

Incomplete Medical History: Inadequate preoperative assessment or incomplete medical history may obscure preexisting neurological deficits or risk factors for stroke, leading to delayed recognition and diagnosis of stroke in the PACU.^{1,2}

Time Sensitivity: Stroke is a time-sensitive emergency, and delays in diagnosis and intervention can have detrimental consequences for patient outcomes. The limited time window for administering thrombolytic therapy or performing endovascular interventions underscores the importance of early detection and assessment in the PACU. Thrombolytic therapy is typically recommended within four and a half hours from symptom onset, while endovascular interventions are recommended within six hours from symptom onset. However, certain patients may be

eligible for these interventions up to 24 hours after they were last known to be well.^{1,2}

Preventive Strategies

Preoperative Assessment and Risk Stratification for Stroke

Medical History Review: Conduct a thorough review of the patient's medical history, encompassing cardiovascular risk factors such as hypertension, diabetes, and hyperlipidemia, alongside any prior history of stroke or TIA, atrial fibrillation, smoking habits, and other pertinent comorbidities.¹

Medication Review: Scrutinize the patient's medication regimen for reconciliation, paying special attention to anticoagulants, antiplatelet agents, antihypertensives, and medications addressing comorbidities. Identify potential drug interactions or contraindications to specific perioperative interventions.²

Neurological Assessment: Perform a comprehensive evaluation of cognitive, motor, sensory, and speech/language functions, as well as cranial nerve integrity. This aims to uncover preexisting neurological deficits or risk factors for perioperative stroke.¹

Cardiovascular Assessment: Evaluate cardiac rhythm (e.g., atrial fibrillation), presence of structural heart disease (e.g., valvular heart disease), history of myocardial infarction, congestive heart failure, or arrhythmias to gauge stroke risk and guide perioperative management.¹

Imaging Studies: Consider obtaining brain computed tomography (CT) or magnetic resonance imaging (MRI) scans for patients with a history of stroke, TIA, or significant neurological symptoms to assess for structural abnormalities or vascular lesions.²

Laboratory Investigations: Conduct a battery of tests including complete blood count, electrolyte panel, coagulation studies, renal function tests,

and lipid profile to uncover underlying metabolic abnormalities or coagulation disorders potentially heightening the risk of perioperative stroke.¹

Functional Assessment: Assess the patient's activities of daily living, mobility, and nutritional status to identify potential perioperative complications risks and facilitate optimized care planning and resource allocation.²

Psychosocial Assessment: Explore the patient's social support system, coping mechanisms, psychiatric history, and substance use to gauge readiness for surgery and to identify potential barriers to adherence to postoperative care instructions.²

Perioperative Optimization Strategies to Reduce Stroke Risk

Blood Pressure Management: Prioritize preoperative optimization of blood pressure to attain target levels and mitigate the risk of perioperative hypertension or hypotension, both of which can predispose patients to stroke.⁴

Cardiac Function Optimization: Implement comprehensive management of cardiac risk factors, including appropriate medical therapy, cardiac monitoring, and thorough perioperative cardiac risk assessment, especially for patients with existing cardiovascular disease or arrhythmias.⁴

Smoking Cessation: Advocate for smoking cessation before surgery to diminish the risk of perioperative cardiovascular complications and enhance overall cardiovascular health, recognizing smoking as a significant modifiable stroke risk factor.⁴

Glycemic Control Optimization: Tailor medication regimens, dietary adjustments, and vigilant blood glucose monitoring for diabetic patients to mitigate the risk of perioperative hyperglycemia, a contributor to heightened stroke risk.⁴

Venous Thromboembolism Prophylaxis: Employ both pharmacological and mechanical

prophylaxis methods to lower the risk of perioperative thromboembolic events, including stroke.⁴

Anticoagulation Management: Exercise meticulous perioperative management of anticoagulant therapy in patients with indications such as atrial fibrillation or venous thromboembolism, carefully balancing thromboembolism risk against the potential for perioperative bleeding complications.⁴

Fluid and Electrolyte Balance: Optimize fluid and electrolyte equilibrium through preoperative hydration, electrolyte supplementation, and continuous perioperative monitoring to avert dehydration, electrolyte imbalances, and hemodynamic instability.⁴

Temperature Regulation: Maintain normothermia via diligent perioperative temperature monitoring and appropriate temperature management strategies to prevent perioperative hypothermia, a factor associated with heightened risk of various perioperative complications, including stroke.⁴

Understanding Stroke Protocols and Interventions in Perioperative Nursing Standardized Assessment Tools

Numerous professional organizations and expert consensus panels have crafted guidelines and protocols for stroke management across various healthcare settings.

American Heart Association/American Stroke Association (AHA/ASA): This body has developed comprehensive guidelines for handling acute ischemic stroke, intracerebral hemorrhage, and subarachnoid hemorrhage. These guidelines prioritize timely evaluation, diagnostic imaging, acute treatment options, and secondary prevention strategies.

European Stroke Organisation (ESO): Offering evidence-based guidelines, the ESO covers acute stroke management, prehospital care, acute

medical management, neuroimaging, reperfusion therapies, and post-stroke rehabilitation.

National Institute for Health and Care Excellence (NICE): NICE guidelines furnish recommendations for stroke diagnosis and management, encompassing acute assessment, thrombolysis, endovascular treatment, secondary prevention, and long-term rehabilitation.

Joint Commission Stroke Certification: The Joint Commission administers certification programs for stroke centers, evaluating adherence to specific performance measures and best practices in stroke care. These measures include rapid assessment, treatment protocols, and quality improvement initiatives.

Role of Perioperative Nurses in Stroke Management

Early Recognition and Rapid Response: Perioperative nurses play a crucial role in promptly identifying potential stroke symptoms such as sudden weakness, speech difficulties, or altered mental status. Upon suspicion, they initiate immediate monitoring of vital signs, ensuring airway patency and oxygenation. This includes activating a rapid response protocol, which involves notifying a multidisciplinary team, activating emergency services, and preparing for transfer to advanced care facilities.^{5,6}

Supportive Care and Pain Assessment: Perioperative nurses provide essential supportive care to stroke patients, prioritizing tasks such as maintaining airway patency, optimizing oxygenation and ventilation, and ensuring effective pain management. They also monitor hemodynamic status and sympathetic activity to prevent complications such as aspiration pneumonia or pressure ulcers.⁵

Fluid and Electrolyte Management: Integral to stroke management, nurses closely monitor fluid intake, output, and serum

electrolyte levels to prevent complications such as hypovolemia, hemodynamic or metabolic instabilities, and electrolyte disturbances like hyponatremia or hypernatremia.⁵

Neurological Monitoring and Assessment: Utilizing standardized assessment tools like the National Institutes of Health Stroke Scale (NIHSS) or Glasgow Coma Scale (GCS), nurses evaluate various neurological functions including motor function, sensory perception, speech/language abilities, cranial nerve integrity, and level of consciousness. This assessment aids in determining the severity and progression of stroke symptoms.^{5,6}

Preparation for Neuroimaging: Perioperative nurses prepare patients for emergent neuroimaging studies such as computed tomography (CT) or magnetic resonance imaging (MRI) of the brain. These imaging studies confirm the diagnosis, assess the extent of cerebral injury, and guide treatment decisions.⁵

Seizure Prophylaxis: Perioperative nurses administer antiepileptic drugs such as levetiracetam or phenytoin to high-risk post-stroke seizure patients, particularly in cases of hemorrhagic stroke or large hemispheric infarctions, to mitigate seizure risks.

Thrombolytic Therapy and Endovascular Thrombectomy: Nurses ensure adherence to eligibility criteria for administering tissue plasminogen activator (tPA) to dissolve blood clots and restore cerebral perfusion. Additionally, they facilitate endovascular thrombectomy procedures to remove occlusive thrombi from large cerebral arteries, aiming to restore blood flow and salvage brain tissue in patients with acute ischemic stroke and large vessel occlusions.⁵

Anticoagulation and Antiplatelet Therapy: Following established guidelines, nurses initiate anticoagulants such as heparin or low-molecular-weight heparin in acute ischemic stroke patients with cardioembolic or thromboembolic etiologies.

They may also administer antiplatelet agents like aspirin or clopidogrel for stroke prevention in patients with a history of TIA, thus reducing the risk of recurrent thromboembolic events including venous thromboembolism (VTE) such as deep vein thrombosis (DVT) and pulmonary embolism (PE).⁵

Rehabilitation and Patient Advocacy: Perioperative nurses actively engage in multidisciplinary stroke teams, collaborating with physical therapists, occupational therapists, and speech-language pathologists to implement individualized rehabilitation strategies. They encourage early mobilization and ambulation postoperatively to promote circulation, prevent venous stasis, and reduce the risk of VTE associated with stroke-related thromboembolic events. Additionally, nurses empower patients to actively participate in their care and recovery process.⁷

Case Study

A 65-year-old male with symptomatic coronary artery disease undergoes elective coronary artery bypass grafting (CABG) surgery. Upon recovery, he experiences sudden right-sided weakness, facial droop, and slurred speech, indicative of an acute ischemic stroke. Rapid response protocols are promptly initiated, and a neurological assessment reveals a NIH Stroke Scale score of 12. Emergent brain CT scan confirms a left middle cerebral artery (MCA) territory infarction, but the patient is deemed ineligible for thrombolytic therapy due to recent surgery, with endovascular thrombectomy not feasible within the time constraints. Blood pressure is controlled, and neuroprotective measures are initiated before transferring the patient to the stroke unit for further evaluation and management. Rehabilitation services are promptly initiated, and follow-up imaging shows mild improvement, leading to the patient's discharge home with residual

deficits.

This case underscores the critical importance of early recognition and activation of rapid response protocols, the necessity for timely neuroimaging to confirm diagnosis and guide treatment decisions, and the challenges inherent in managing acute stroke in the perioperative setting, particularly regarding the limitations of thrombolytic therapy and endovascular interventions. It also highlights the significance of interdisciplinary collaboration and coordination of care to optimize patient outcomes.

Future Directions and Challenges

Trends in Stroke Management

Contemporary stroke care is witnessing transformative advancements. Telemedicine and remote monitoring technologies allow real-time assessment of stroke patients, facilitating prompt consultation with specialists. Artificial Intelligence (AI) aids in stroke detection and treatment decisions, promising personalized care. Telestroke networks extend specialized care to underserved areas. Advanced neuroimaging modalities offer insights into stroke pathophysiology. Neuroprotective therapies and remote rehabilitation services enhance patient outcomes.⁸

Challenges in Stroke Care and opportunities for Improvement

Despite progress, challenges persist. Limited awareness among healthcare providers may lead to delayed diagnosis. Geographic disparities and resource limitations hinder access to specialized care, especially in rural regions. Issues with thrombolytic therapy and neurological confounders complicate perioperative stroke management. Inadequate training and healthcare system fragmentation exacerbate these challenges.

Opportunities abound for enhancing

perioperative stroke care. Developing risk prediction models tailored to perioperative patients could improve preventive strategies. Integrating multimodal neuroimaging techniques promises better stroke assessment. Quality improvement initiatives and patient-centered outcomes research are crucial. Health information technology solutions and healthcare system integration initiatives can streamline workflow and improve care coordination.

Conclusion

Ischemic stroke and hemorrhagic stroke represent the primary types of stroke, each demanding distinct pathophysiological understanding and management strategies. Within the perioperative period, stroke poses a significant concern, necessitating swift recognition, thorough assessment, and immediate intervention to mitigate neurological impairment and enhance patient outcomes. Perioperative patients face heightened stroke risks due to factors such as anesthesia, surgical procedures, and underlying health conditions. Guidelines and protocols offer evidence-based frameworks for managing stroke in perioperative settings, stressing the importance of interdisciplinary teamwork, prompt assessment, and timely treatment. Perioperative nurses are pivotal in preventing and managing strokes during the perioperative phase, playing a crucial role in early identification and intervention in PACU. Their duties encompass neurological assessments, vital sign monitoring, rapid response coordination, and interdisciplinary collaboration. Active involvement in quality improvement and research is vital for advancing perioperative stroke care. Therefore, it's imperative for nurses to remain vigilant, informed, and proactive in stroke prevention and management. Continuous education and awareness efforts are essential for enhancing proficiency in recognizing, assessing, and intervening in strokes effectively.

By staying updated and honing skills, perioperative nurses significantly contribute to improving perioperative stroke care and patient well-being.

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