

Original Paper

Current Status of Perioperative Nursing Care for Patients Undergoing Coronary Artery Rotational Thrombectomy

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Abstract

This paper reviews the current status of perioperative nursing care for patients undergoing coronary artery rotational thrombectomy. Drawing on multiple domestic and international literature sources, it summarizes specific nursing measures during the perioperative period of coronary artery rotational thrombectomy, analyzes the shortcomings of current nursing protocols in China, provides theoretical basis for clinical nursing, and proposes future research directions.

Keywords

Rotational atherectomy, Perioperative, Nursing Care

1. Introduction

With the acceleration of population aging and the rising incidence of coronary artery calcification, China has 11.39 million patients with coronary heart disease (China The Writing Committee Of, 2021). As a key treatment for severe calcific lesions, coronary atherectomy improves vascular patency. However, the procedure is technically challenging, carries high complication risks, and patients often experience significant psychological stress due to unfamiliarity with the technique. The perioperative period encompasses the entire process from the patient's decision to undergo surgery through the procedure itself to basic recovery, including preoperative, intraoperative, and postoperative stages. Perioperative nursing for coronary atherectomy is crucial for ensuring surgical safety, reducing complications, and promoting patient recovery. This review aims to comprehensively examine the current status and nursing methods of perioperative care for coronary atherectomy patients, providing reliable evidence for clinical nursing practice.

2. Preoperative Care for Coronary Artery Thrombus Removal

2.1 Psychological Care

Preoperatively, provide psychological counseling to patients and their families by explaining the surgical objectives and anticipating the high-pitched noise generated by the high-speed rotational atherectomy device during the procedure. Assess patients using the Self-Rating Anxiety Scale (SAS) and Hamilton Depression Rating Scale (HAMD) (Ma Lichang, 2014). For anxious patients, administer oral sedatives the night before surgery (Dobrzycki, S., Reczuch, K., Legutko, J. et al., 2018).

2.2 Preoperative Preparation

2.2.1 Complete all preoperative examinations, including complete blood count, liver and kidney function tests, and echocardiography. Administer preoperative medication as prescribed: loading doses of 300 mg enteric-coated aspirin and 300 mg clopidogrel bisulfate tablets orally.

2.2.2 Assess the puncture site. For transradial (TRA) coronary atherectomy, perform the Allen test preoperatively (Jiang Yixiao, Huang Bo, Wang Yuchuan, et al., 2021). Patients with a negative Allen test or a small radial artery diameter <2.5 cm should undergo transfemoral coronary atherectomy (Wang Yueping, 2020). Preoperative assessment of the puncture site improves the success rate of intraoperative puncture. Prepare both groin areas or forearms for shaving regardless of femoral or radial artery access.

2.2.3 Conduct routine iodine allergy testing.

2.2.4 Measure vital signs preoperatively. Promptly manage patients with abnormal heart rate or blood pressure (Guo Na, 2023). Establish and ensure patency of a left forearm venous access preoperatively for rapid emergency medication administration.

2.2.5 Instruct patients to practice bedside urination and defecation. Before the operating room nurse receives the patient, advise them to fully empty their bladder to prevent intraoperative urinary retention and postoperative urinary retention (Lin Meixiang, Ma Weidong, & Chen Jianhong, 2010).

3. Intraoperative Care for Coronary Artery Rotablation

3.1 Preparation of atherectomy equipment, emergency supplies, instruments, and medications:

3.1.1 Preparation of atherectomy equipment: ① Condensate solution (atherectomy fluid): Use 500 ml 0.9% sodium chloride solution + 6000 U heparin + 0.25 mg nitroglycerin. Connect to the pump during surgery and maintain continuous pressurized perfusion during atherectomy (Tong Xiaoshan, Jin Jianfen, & Shen Yun, 2016). ② Ablation equipment: Ablation system, gas conversion valve, nitrogen cylinder, etc. Regularly inspect equipment to ensure it remains in good working order and ready for use. ③ Single-use interventional consumables: In addition to routine supplies, prepare: guidewires, ablation head actuator, ablation catheter, microcatheter. Perform an external test of the ablation system to confirm proper functionality.

3.1.2 Intravascular Ultrasound (IVUS) and coronary atherectomy represent two emerging technologies in coronary intervention, increasingly adopted during procedures. IVUS not only accurately reflects

vessel lumen dimensions, cross-sectional structure, plaque thickness, morphology, and characterizes plaque composition (Kubo, T., Shinke, T., Okamura, T. et al., 2017), but also evaluates post-ablation outcomes. Their combined use is becoming the mainstream interventional approach for treating severe calcified lesions.

3.1.3 Prepare emergency medications (dopamine, atropine, epinephrine hydrochloride, etc.) and supplies (suction catheters, pericardial puncture equipment, etc.), along with a defibrillator, temporary pacemaker, suction device, IABP device, activated clotting time (ACT) monitor, and emergency cart.

3.2 Patient Preparation: Assist the patient to lie supine in the center of the operating table. Administer oxygen via nasal cannula and connect to cardiac monitoring and pulse oximetry.

3.3 Intraoperative Humanistic Care: Patients often experience anxiety and fear during surgery. Due to prolonged procedure times and noise from the burr, patients remain in a highly tense state. Nurses should position themselves where easy communication is possible to address concerns and provide reassurance. Closely observe the patient's reactions. If necessary, hold the patient's hand, gently stroke their head, or help wipe away sweat to provide psychological support, helping them relax and cooperate better with the procedure (Li Hongming, 2020).

3.4 Anticoagulation Care: Due to the high difficulty and complexity of the procedure, which significantly increases operating time, the risk of stroke is higher compared to conventional coronary angiography (Hoffman, S. J., Routledge, H. C., Lennon, R. J. et al., 2012). To maintain heparinization levels during surgery and reduce arterial embolism, monitor ACT as needed to ensure precise heparin dosage until the procedure concludes. ACT offers advantages including simplicity, accuracy, rapid results, and convenience, making it the ideal anticoagulation monitoring method for surgery.

3.5 Management of Complications and Nursing Strategies:

3.5.1 Management of Major Intraoperative Complications:

① Coronary Artery Spasm: Promptly implement emergency measures. Due to direct vibration stimulation from the rotablator, patients may experience varying degrees of coronary artery spasm. The circulating nurse must accurately and promptly assist the physician in administering coronary perfusion solutions containing nitroglycerin, tirofiban hydrochloride, sodium chloride, etc. For severe, unrelieved spasm, cease rotational atherectomy and administer sodium nitroprusside to dilate vessels, prevent thrombus formation and vasospasm, and reduce slow or no-flow episodes (Guo Xiao-Ping, Gu Yan-Mei, Mei Jing, et al., 2014). ② No-Reflow/Slow Flow: This represents another common complication during rotational atherectomy, primarily caused by spasm and microembolism of coronary microvessels. Vasodilators may be administered intravascularly within the coronary artery when no-reflow or slow flow occurs. ③ Coronary artery perforation: Perforation during rotational atherectomy is a potentially fatal vascular complication, commonly occurring in angulated lesions or severely tortuous calcified lesions. Immediate withdrawal of the atherectomy catheter is required upon perforation, while leaving the guidewire in place. Small perforations may be managed with prolonged local compression using a low-pressure balloon; surgical intervention may be necessary if required. ④ Coronary artery

dissection: Primary causes include mechanical injury; tortuous or angulated lesions are relatively common; prolonged atherectomy duration. Management mirrors other interventional procedures. ⑤ Bradycardia, hypotension: Bradycardia is more frequent during right coronary artery atherectomy; likely related to neural reflexes triggered by rotational stimulation. Transient decreases in heart rate and blood pressure resolved after intravenous administration of 0.5 mg atropine and 3 mg dopamine.

3.5.2 Nursing Strategies ① Ensure seamless coordination: Adhere to procedural protocols, maintain close collaboration with the operator, prepare instrument connections, execute medical orders promptly and accurately, and maintain readiness for emergency interventions.

Nurses should pre-emptively prepare medications such as nitroglycerin coronary perfusion solution, tirofiban hydrochloride, and sodium chloride for the surgeon's use. Should severe spasm persist without resolution, recommend discontinuing rotational atherectomy and administer nitroglycerin or diltiazem to dilate vessels, prevent thrombus formation, relieve vasospasm, and avert hypoperfusion or no-flow events. When necessary, assist the surgeon in proficiently using emergency equipment such as temporary pacemakers or aortic balloon counterpulsation based on the patient's condition. ② Intensive Intraoperative Monitoring: Nurses must maintain continuous circulation duties, closely observing vital signs, arterial pressure fluctuations, patient consciousness, and ECG changes. Immediate intervention is required if ST-segment changes, inverted T waves, arrhythmias (including malignant arrhythmias such as ventricular tachycardia, ventricular fibrillation, or conduction block), or signs like hypotension, respiratory abnormalities, decreased oxygen saturation, abnormal arterial pressure curves, or altered mental status, they should promptly notify the physician and assist in resuscitation efforts. Nurses must also closely monitor the surgical process and progress, vigilantly observe cardiac shadow changes under fluoroscopy, and watch for coronary artery perforation, cardiac tamponade, or coronary artery dissection. Additionally, circulating nurses should promptly address patient complaints of discomfort, such as chest tightness or pain, reporting these to the surgeon immediately and administering appropriate interventions.

3.6 Establish intraoperative emergency response protocols for critical situations and contingency plans for potential surgical complications to address sudden critical events that may arise during surgery.

4. Postoperative Care for Coronary Artery Rotational Thrombectomy

4.1 Vital Signs Monitoring

Upon returning to the ward, the assigned nurse shall immediately position the patient supine, initiate continuous ECG monitoring, and administer oxygen. Particular attention shall be paid to monitoring blood pressure, heart rhythm, cardiac enzymes, and changes in the patient's symptoms. Blood pressure shall be measured every 15 minutes initially, with medication administered promptly based on blood pressure fluctuations. Once blood pressure stabilizes, measurements should be taken every 30 minutes, gradually extending monitoring intervals (Qiu Jie, 2018). Immediately notify the physician if chest pain or ECG abnormalities occur. Administer vasodilators and anticoagulants as prescribed for symptomatic

treatment, and recheck cardiac enzymes. Conduct frequent rounds to address patient complaints, closely monitor consciousness levels, and vigilantly observe clinical progression. Notify the physician promptly upon detecting any abnormalities.

4.2 Puncture Site Care

4.2.1 Apply pressure to the puncture site postoperatively to control bleeding. For femoral artery punctures, maintain pressure for 15–30 minutes with a pressure dressing. Monitor the site for bleeding, oozing, hematoma formation, and peripheral circulation status (e.g., skin temperature, dorsalis pedis pulse). Instruct patients to immobilize the punctured limb. For femoral artery punctures, apply pressure dressing after suturing the puncture site with a vascular stapler and instruct the patient to immobilize the left lower limb for 6 hours. For radial artery punctures, instruct patients to avoid forcefully flexing the wrist on the punctured side and monitor the puncture site (Wang Yueping, 2020). Immobilize the punctured limb: avoid bending the lower limb on the femoral artery puncture side. Elevate the upper limb on the radial artery puncture side to prevent movement at the radial artery site. Closely monitor skin temperature, color, and arterial pulses on the operative side, comparing with the contralateral limb. Prepare emergency medications such as atropine and dopamine to prevent vagal reflex.

4.2.2 Sheath Management: Monitor sheath stability, check puncture site for bleeding, and strictly prevent sheath displacement, kinking, dislodgement, or contamination. If no adverse reactions occur, remove the sheath 6 hours postoperatively. After sheath removal, apply local pressure for 20 minutes, followed by 24-hour compression bandaging and 6 hours of sandbag compression (Lin Meixiang, Ma Weidong, & Chen Jianhong, 2010).

4.2.3 Pressure Device Decompression: Initiate initial decompression 1–2 hours postoperatively. Studies indicate that starting decompression within 1 hour significantly reduces patient pain and vagal nerve reflex incidence, improving tolerance and comfort (Ren Jing, Lü Shun, Liu Feng, et al., 2020). If the compression site is the femoral artery, monitor for abnormalities in dorsalis pedis pulse.

4.3 Anticoagulation Care Patients undergo systemic heparinization during surgery. Upon returning to the ward, anticoagulation is continued with tirofiban or low molecular weight heparin. Therefore, routine blood tests should be performed 6 hours postoperatively to monitor platelet counts, strictly preventing acute thrombocytopenia caused by anticoagulation during and after apheresis (Qiu Jie, 2018). Responsible nurses should intensify patient rounds, closely monitor anticoagulation therapy, and observe for signs of bleeding tendency. These include arterial puncture site bleeding or hematoma, gingival bleeding, scattered skin/mucosal petechiae or ecchymoses, nasal mucosal bleeding, blood-tinged secretions, hematuria, subcutaneous hemorrhage, and tarry stools. Simultaneously, vigilance is required for intracranial hemorrhage and major gastrointestinal bleeding.

4.4 Postoperative Diet and Urination: Assist patients in consuming semi-liquid foods. Monitor fluid intake (Ma Lichang, 2014). Since contrast agents used during surgery are primarily excreted via the kidneys, encourage increased hydration. Postoperative fluid intake should reach 1500–2000 mL to

mitigate contrast-induced renal impairment (Heyman, S. N., Solomon, R., & Abassi, Z., 2025). Observe urination to prevent urinary retention (Xu Yufang, & Mao Junjie, 2022).

4.5 Sleep Care: Maintain a quiet environment with gentle handling. Dim lights at night to promote sleep. Administer analgesics as needed for wound pain to ensure patient comfort. Administer sedatives or hypnotics as medically indicated when necessary (Lin Meixiang, Ma Weidong, & Chen Jianhong, 2010).

4.6 Postoperative Rehabilitation Care: Develop personalized rehabilitation exercise plans based on recovery progress, such as strict bed rest for 24 hours postoperatively, initiating bedside activities on day 2, and gradually increasing exercise intensity to include aerobic activities like walking and cycling (Xu Yufang, & Mao Junjie, 2022). Instruct patients on appropriate dietary habits, including low-salt, low-fat, easily digestible foods. Remind patients to take medications as prescribed and attend regular follow-up appointments. Instruct patients to perform a 6-minute walk test, use results to develop exercise protocols, and advise regular follow-up to monitor cardiac function indicators (e.g., LVEF) for rehabilitation assessment (Yuan Wei, Nie Shan, Jia Nan, et al., 2021).

4.7 Health Education Explain disease-related health knowledge and postoperative precautions to patients and families. Provide medication guidance, emphasizing timely and accurate dosing—particularly for antiplatelet agents—and monitoring for adverse reactions or bleeding tendencies. Instruct patients to seek immediate medical attention for bleeding from gums, nose, skin/mucous membranes, or gastrointestinal tract. Teach patients to observe stool color. Distribute health education pamphlets and provide dietary guidance, advising patients to follow a low-salt, low-fat, low-cholesterol, high-fiber diet. Encourage small, frequent meals instead of large, heavy ones to maintain bowel regularity. Schedule regular outpatient follow-up appointments (Wang Yueping, 2020).

5. Summary

In summary, this paper reviews the current status of perioperative care for coronary atherectomy from four aspects: preoperative care, intraoperative care, and postoperative care. It elaborates on the origin and development of this care, assessment tools, clinical prevalence, and specific nursing methods at each stage. Currently, domestic research on perioperative care for coronary atherectomy remains limited. The authors believe that proactive nursing interventions during the perioperative period can enhance patient engagement, improve satisfaction, effectively reduce the incidence of postoperative complications and adverse reactions, and better ensure patient safety and postoperative recovery.

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