Nursing Care of a Patient with Progressive Stroke Complicated by Hemorrhagic Transformation After Mechanical Thrombectomy

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Abstract

Summary of nursing experience for one case of hemorrhagic transformation after mechanical thrombectomy for progressive stroke. Nursing points: integrated medical-nursing emergency rescue, multidisciplinary team collaboration for diagnosis and treatment, multi-dimensional precision nursing, prevention of complications and promotion of patient comfort. After 41 days of meticulous treatment and nursing care, the patient' s condition stabilized and the patient was discharged successfully.

Full Text

Nursing Care of a Patient with Hemorrhagic Transformation After Mechanical Thrombectomy for Progressive Stroke: A Case Report

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Abstract

Objective: To summarize the nursing experience of a patient with hemorrhagic transformation following mechanical thrombectomy for progressive stroke. **Key Nursing Interventions:** Integrated emergency medical care, multidisciplinary team collaboration, multi-directional precision nursing, and complication prevention to promote patient comfort. After 41 days of meticulous treatment and nursing care, the patient achieved stable condition and was discharged. **Conclusion:** Coordinated emergency response, multidisciplinary collaboration, and comprehensive precision nursing are critical for managing hemorrhagic transformation after mechanical thrombectomy.

Keywords: Stroke; Mechanical thrombectomy; Hemorrhagic transformation; Complications; Nursing

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Introduction

Acute ischemic stroke (AIS) results from interruption of cerebral blood flow, leading to ischemia, hypoxia, and necrosis of brain cells in the affected region, which causes corresponding neurological deficits [1]. The key to AIS treatment lies in early recanalization of the occluded vessel, with endovascular therapy—particularly mechanical thrombectomy—being the preferred method for large vessel occlusive AIS [2]. While mechanical thrombectomy can significantly increase recanalization rates (70%-90%) and effectively reduce disability and mortality, postoperative patients may face complications such as cerebral reocclusion [3], with hemorrhagic transformation being the most common and severe complication [4]. Currently, few nursing reports address recurrent stroke coma due to hemorrhagic transformation following mechanical thrombectomy. In May 2024, our hospital admitted a patient with progressive stroke who developed intracerebral hemorrhage rupturing into the ventricles with recurrent stroke coma after mechanical thrombectomy. After 41 days of intensive treatment and nursing care, the patient was discharged in stable condition. We summarize our nursing experience below.

Case Presentation

1.1 General Information The patient was a 63-year-old male with a history of cerebral infarction complicated by residual left homonymous hemianopia. He walked into the hospital on May 27, 2024, with left limb numbness for 16 hours and was diagnosed with cerebral infarction. On admission, he was conscious with vital signs as follows: temperature 36.3°C, heart rate 68 beats/min, respiratory rate 17 breaths/min, blood pressure 141/79 mmHg, and pulse oxygen saturation 98%. Muscle strength was grade 5 in all four limbs with normal tone, and the water swallow test was grade 1.

1.2 Treatment and Outcome Although the patient walked into the hospital, his condition progressed rapidly. On the second day after admission, he underwent cranial CT examination through the hospital green channel. After excluding hemorrhage, cerebral angiography and percutaneous intracranial arterial thrombectomy were performed. Postoperatively, he was admitted to the ICU for monitoring. On the day of surgery, his consciousness gradually became clouded and progressed to coma. Repeat cranial MRI and CT revealed brainstem infarction with thalamic hemorrhage rupturing into the ventricles. Immediate multidisciplinary collaborative treatment was implemented, including dehydration to reduce intracranial pressure, intermittent lumbar puncture for cerebrospinal fluid drainage, high-dose vasoactive agents to maintain blood pressure and ensure cerebral perfusion, and active maintenance of vital signs. One week postoperatively, the developed glossoptosis and fever. Laboratory results showed white blood cell count 6.25$×10^{9}$/L, C-reactive protein 30.36 mg/L, and procalcitonin >100 ng/mL, indicating septic shock. Meropenem was administered for anti-infection treatment. Subsequent sputum culture revealed *Staphylococcus aureus* infection, prompting addition of vancomycin. After infection control, antibiotics were de-escalated to piperacillin-tazobactam. The patient eventually achieved stable condition and was discharged.

Nursing Care

2.1 Precise Identification and Emergency Nursing Care As the patient' s condition progressed rapidly, he developed consciousness disturbance with markedly accelerated heart rate, undetectable blood pressure, respiratory rate of 30-45 breaths/min, and continuously unmeasurable oxygen saturation. Immediate emergency measures included assisted ventilation with a simple resuscitator and bedside endotracheal intubation with mechanical ventilation. Two intravenous access lines were established for high-dose vasoactive agents to elevate blood pressure, with nimodipine infusion to relieve cerebral vasospasm. Mannitol and glycerol fructose were administered via subclavian venous catheter to reduce intracranial pressure. An indwelling urinary catheter was placed to monitor urine output, and 24-hour fluid balance was recorded. As the condition further progressed to septic shock, the team assisted with tracheostomy and continued mechanical ventilation using SIMV mode, achieving 100% pulse oxygen saturation with non-invasive monitoring.

2.2 Multidisciplinary Team Collaboration to Improve Patient Outcomes The ICU implemented a multidisciplinary team (MDT) approach comprising specialists from critical care medicine, neurology, neurosurgery, interventional radiology, nutrition, and neurocritical care nursing. The team conducted multiple consultations throughout treatment, developing optimal therapeutic and nursing plans based on the patient' s vital signs and laboratory parameters. ICU physicians and nurses jointly implemented these plans, identified existing or potential nursing problems, and applied the PDCA cycle model to continuously improve diagnostic and nursing measures through shift-to-shift handover

of treatment and nursing outcomes. This approach enabled individualized nursing care and maximized patient benefit.

2.3 Multi-directional Precision Nursing

2.3.1 Standardized Management of Multiple Devices and Tubing Infusion pumps and syringe pumps were placed on the right side of the head with red identification cards, while enteral feeding pumps were placed on the left side with blue cards. Central venous catheter (CVC) and ventilator tubing were marked with red labels, gastric and duodenal tubes with blue labels, and urinary catheters with yellow labels to prevent misuse or accidental dislodgement. All tubing was positioned correctly to avoid kinking or twisting and ensure patency. During patient repositioning, physicians and nurses collaborated: physicians monitored the patient' s condition and instrument parameters while nurses ensured tubing patency and assisted with turning.

2.3.2 Enhanced Monitoring and Implementation of Responsibility-Based Nursing Neurocritical care specialists dynamically monitored and documented changes in the patient' s condition with shift-to-shift handover. Consciousness, pupils, vital signs, and oxygen saturation were checked hourly, with close observation for clinical manifestations of increased intracranial pressure for timely intervention.

2.3.3 Temperature Management Elevated or persistent fever exacerbates neurological injury and increases mortality risk, requiring prompt management. Antipyretic medications combined with surface cooling methods (e.g., tepid sponging, ice packs, ice caps) were used to reduce temperature below normal, decreasing cerebral blood flow and oxygen consumption to protect neural function [5]. Temperature was monitored every 4 hours, with repeat measurement 30 minutes after pharmacological or physical cooling. Anti-infective agents were administered according to monitoring results for sensitive organisms per physician orders.

2.3.4 Blood Pressure Management Intraoperative and immediate postoperative blood pressure management is a research focus in mechanical thrombectomy. Observational studies indicate that hypotension is associated with poorer outcomes [5], making hemodynamic stability through blood pressure monitoring and control crucial. Extreme blood pressure fluctuations and behaviors that increase intracranial pressure (e.g., vigorous coughing, suctioning, or straining during defecation) should be avoided within 24 hours postoperatively [6]. Blood pressure was monitored hourly for the first 6 hours postoperatively and every 15 minutes during vasoactive agent infusion. The target blood pressure was systolic 110-130 mmHg and diastolic 60-90 mmHg, with timely physician notification and medication titration per orders. New medication bags were prepared 10-15 minutes before the current vasoactive infusion ended, using dual channels

to ensure continuous drug delivery and prevent abrupt blood pressure drops. During vasoactive infusion, mean arterial pressure $ $65 mmHg was maintained, hourly urine output was recorded, and fluid balance was carefully managed to avoid volume overload.

2.3.5 Nutritional Support Nutritional support is crucial for critically ill patients, and enteral nutrition should be initiated early [7]. The patient had an NRS2002 score of 6, albumin 24 g/L, and hemoglobin 80 g/L, indicating nutritional risk. On postoperative day 2, the patient developed stress ulcer with gastrointestinal bleeding, requiring fasting. Treatment included daily 200 ml albumin infusion and total parenteral nutrition with Kabiven, targeting 1400-1600 kcal/day. Gradual transition to enteral nutrition was achieved via continuous duodenal tube feeding at 60 ml/h, with gastric emptying and enteral nutrition tolerance assessed every 2 hours to ensure adequate nutrition and promote immune function and recovery.

2.4 Complication Prevention

2.4.1 Timely Airway Secretion Clearance to Ensure Effective Ventilation Timely suctioning prevents airway obstruction and pulmonary complications. Indications for suctioning were determined through auscultation and visual inspection [8]. The patient was turned and received chest percussion every 2 hours, with bilateral lung auscultation performed. Suctioning was performed immediately when secretions were evident, coarse crackles were heard, or the patient showed respiratory distress. Each suctioning episode was limited to 10-15 seconds, with assessment of cough ability and sputum characteristics.

2.4.2 Prevention of Skin Injury Long-term bed rest in passive positioning increases pressure ulcer risk. Research indicates [9] that semi-recumbent positioning and prolonged bed rest predispose to pressure sores, while proper positioning techniques effectively prevent them. The Braden Scale was used to assess pressure injury risk, with air mattresses and medical turning pillows employed to reduce local pressure. Proper limb positioning, passive range-of-motion exercises, and massage were provided to reduce joint stiffness and muscle spasm while promoting patient comfort.

Conclusion

Patients with progressive cerebral infarction complicated by cerebral hemorrhage present extremely critical conditions, posing significant challenges to nursing care. Through rapid collaborative emergency response, multidisciplinary teamwork, timely treatment adjustment, and effective nursing interventions, disease progression was controlled. Enhanced early monitoring and active prevention of complications promoted patient recovery.

Note: Figure translations are in progress. See original paper for figures.