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Perioperative Nursing Management of a Lateral Ventricle Trigone Meningioma Resected via a Contralateral Approach: A Case Report

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Abstract: This article summarizes the nursing experience with a patient who underwent resection of a lateral ventricle trigone meningioma via a contralateral interhemispheric approach. Key nursing measures included preoperative health education and psychological care, baseline neurological assessment, and comprehensive physiological preparation. Postoperative care focused on intensive vital sign monitoring and support, comprehensive neurological evaluation and early rehabilitation, as well as a proactive strategy for preventing secondary epilepsy and controlling intracranial infection. Through active treatment and systematic nursing care, the patient achieved an uncomplicated recovery and was discharged on postoperative day 9. The successful implementation of these structured nursing interventions contributed to favorable postoperative outcomes, offering a valuable reference for the perioperative management of similar complex neurosurgical cases.

Keywords: The lateral ventricle trigone; Meningioma; Perioperative nursing management

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1. Introduction

The lateral ventricle trigone (LVT) is a triangular space deep in the brain, sitting at the crossroads of the temporal and occipital horns of the lateral ventricle. Because it's surrounded by vital neural pathways and blood vessels, it's a common spot for tumors like meningiomas [1]. Surgeons traditionally reach tumors here by cutting through the cortex of the parietal, temporal, or parieto-occipital lobes. The problem with these standard routes is that they often involve removing or pulling back healthy brain tissue. This can make it hard to get a clear view of the arteries feeding the tumor and often leads to heavy bleeding. Worse, these approaches risk damaging the optic radiation, which can cause permanent blind spots, or harming language and motor areas, especially when dealing with large tumors in the dominant hemisphere [2–4].

In contrast, the contralateral interhemispheric transfalcine precuneus approach avoids critical functional cortices and minimizes vascular interference. This technique leverages the advantages of endoscopy by utilizing natural anatomical corridors to reach the lesion, allowing close visualization for early devascularization and precise hemostasis [5,6]. It also reduces the likelihood of postoperative isolated hydrocephalus. However, both the complexity of the region and the technique impose high demands on the surgical and nursing teams. Successful execution requires not only exceptional patience and meticulous microneurosurgical skills from the medical team but also individualized perioperative care throughout the patient's treatment cycle. At present, this procedure is performed in only a limited number of institutions worldwide, and related nursing experiences remain unreported.

In April 2025, our department admitted a patient diagnosed with a lateral ventricle trigone meningioma. The medical team performed tumor resection via the contralateral transfalcine precuneus approach. Through multidisciplinary collaboration and meticulous nursing care, the patient was successfully discharged on the ninth postoperative day. The following report details the nursing experience in this case.

2. Case materials

A 58-year-old woman was admitted to the hospital for a persistent headache, which she had been experiencing for a year along with hearing loss in her left ear and worsening vision. The headaches started a year ago for no clear reason. They came in episodes, mainly affecting the left frontoparietal area of her head. Around the same time, she developed left-sided hearing loss, deteriorating vision, tinnitus, and occasionally had trouble swallowing. She also reported intermittent dizziness and vertigo. Her symptoms grew noticeably worse in the two weeks leading up to her admission.

Her past medical history was notable for a few things. She had been dealing with cervical spondylosis, lumbar spine issues, and rheumatoid arthritis for the last two years. For these conditions, she had been taking Xuesaitong orally, though the specifics of her other medications are not known. She was also diagnosed with hypertension about three months ago but hadn't started any treatment for it. Physical examination on admission showed the patient was alert and conscious. Both pupils were equal and round, approximately 2.5 mm in diameter, with prompt light reflexes. Vital signs were as follows: body temperature 36.2 ℃, pulse 91 beats/min, respiratory rate 20 breaths/min, blood pressure 151/90 mmHg, and oxygen saturation 98%. Left-sided visual and hearing acuity were reduced, while the right side was normal. Muscle strength in all four limbs was normal, and the pain score was 3. Contrast-enhanced magnetic resonance imaging (MRI) of the head revealed a round nodular lesion in the posterior horn of the left lateral ventricle, suggestive of a likely benign neoplasm. The admission diagnosis was intracranial space-occupying lesion (tumor in the left lateral ventricle trigone).

3. Treatment and clinical course

After admission, a full preoperative evaluation confirmed the patient was a good candidate for surgery. The multidisciplinary team agreed on the plan, and the patient was taken to the operation on April 7, 2025. Patient was put under general anesthesia and removed the tumor in the trigone of the left lateral ventricle. For access, the endoscopic was used, contralateral interhemispheric transfalcine precuneus approach. The surgery took about six hours, with an estimated blood loss of 400 mL. Before closing, A lumbar drainage catheter was placed and a subcutaneous drain. The patient was then transferred to the Neurosurgical Intensive Care Unit (NICU) for

monitoring.

After surgery, the immediate focus was on controlling bleeding, managing blood pressure, and preventing seizures. On the first day, the patient's vision in her left eye hadn't changed, but she complained of dizziness, headache, and a painful, swollen feeling in her left leg with some loss of sensation. After a clinical check-up, her breathing tube was removed. Lab work showed a high white blood cell count (11.14×10^9/L), anemia (hemoglobin at 97.0 g/L), and a spike in neutrophils (90.6%). The tests also pointed to low protein levels, slightly elevated liver enzymes, and an electrolyte imbalance. Given these results, her treatment was stepped up, adding dehydration therapy, medication to prevent vascular spasms, antibiotics, and agents to protect her liver. She was then stable enough to be transferred to the general ward. Two days after the procedure, the patient was still experiencing numbness and a swollen, painful feeling in her left leg, so the neurotrophic medication was started. The next day, her temperature rose to 38.2 ℃. A spinal tap revealed a very high cell count and elevated protein and lactate levels, prompting a switch to stronger, broader-spectrum antibiotics to cover a suspected infection. By post-operative day seven, the patient had been afebrile for two full days and her left leg sensation had improved enough to remove the lumbar drain. She was discharged on day nine in stable condition, recovering well. At her one-month follow-up in May 2025, she reported better vision and hearing. Her visual fields were intact, the numbness in her left leg had almost completely resolved, and she only experienced occasional headaches with no other issues.

4. Nursing interventions

4.1. Preoperative nursing management

Before surgery, nursing care focuses on getting the patient physically and mentally ready. Good preparation helps lower the risks of surgery and makes it easier for the patient to handle the procedure [7]. In fact, studies show that organized preoperative nursing can cut down on complications after surgery by as much as 20–30% [8].

For this particular patient, few things should be considered: their age, high blood pressure, and a history of neck problems (cervical spondylosis). With that in mind, the nursing team put together a detailed plan covering health education, getting them physically prepared, checking their neurological function, and talking with their family. This whole process took about three to five days. Close attention was paid to providing emotional support and taking preventive steps, to head off any potential problems during the operation.

4.1.1. Preoperative health education and psychological care

When the patient arrived, one-on-one interview was conducted to get a sense of their emotional state. Using the Hamilton Anxiety Rating Scale (HAMA), they found a score of 18, which points to moderate anxiety [9]. Since managing anxiety before surgery can lead to less pain and a quicker recovery, then mapped out a psychological support plan for the patient [10]. The roots of their anxiety were first explored, noting specific fears like "worried about surgical failure". The next day, a simple deep breathing exercise was introduced: inhale for four seconds, hold for four, and exhale for six, repeated in three sets daily. By day three, mindfulness meditation was included, guiding the patient to picture a successful surgery [11]. Since the initial assessment pointed to clear triggers, fear of the operation itself, potential complications, and the tumor coming back, our approach was direct. The listening therapy was used to help the patient open up, paired with the breathing exercises and progressive muscle relaxation. The guided sessions were run for about 15–20 minutes each day so the patient could get comfortable with the techniques. This plan worked well, bringing the preoperative HAMA score down to 10.

To educate the patient and her family on the upcoming surgery, audiovisual materials and printed leaflets were mixed. Benefits of our chosen surgical path were discussed, the contralateral interhemispheric transfalcine precuneus approach, and explained how this route helps us steer clear of critical areas in the dominant brain hemisphere, lowers the risk of damaging the optic radiation, and reduces bleeding. Of course, the potential downsides were covered, including a 10–15% chance of worsened vision, a less than 5% risk of hearing loss, and a small possibility (under 10%) of sensory changes in the lower limbs. For post-op care, few key instructions were highlighted. Patients need to rest in a semi-upright position (30–45°) to help cerebrospinal fluid circulate properly and to prevent lung issues. She was also told to avoid any straining that mimics a Valsalva maneuver13 like holding their breath while coughing hard or during a bowel movement, to keep the pressure inside their head from rising [12]. The patient's condition and treatment were described to her step-by-step, making sure the information wasn't overwhelming. Research shows this kind of layered teaching helps people learn more and stick to their recovery plan after surgery, compliance rates often hit around 85% [13]. Her family was also involved inside the conversation. They learned how to spot emergency signs like a sudden, severe headache, blurred vision, or weakness in an arm or leg. To check that everyone was on the same page, the "teach-back" method was used, where they would explain the information back to us. Ultimately, both the patient and her family understood the basics of her condition and were ready to work with us on the treatment.

4.1.2. Baseline neurological function recording

Before surgery, a detailed neurological baseline was established to monitor any postoperative changes. Visual acuity measured 0.4 in the left eye and 0.8 in the right. Hearing was normal on the right, with a moderate 50 dB hearing loss on the left. Visual field testing revealed no deficits. Language function was fully intact, with fluent speech and no evidence of aphasia. Motor examination demonstrated full strength (5/5) throughout. The patient also reported symptoms requiring monitoring, including left-sided tinnitus occurring approximately 3–5 times per day and intermittent dysphagia with liquids a few times per week. Pain levels were low, rated between 0 and 4 on the NRS scale.

4.1.3. Preoperative preparation

Studies indicate that adequate preoperative preparation can reduce hospital length of stay by several days [14]. In this case, preoperative optimization focused on several key measures to ensure the patient was well prepared for surgery. Blood pressure was closely monitored every four hours. If readings exceeded 150/90 mmHg, a 10 mg oral dose of sustained-release nifedipine was administered. Cardiopulmonary function was also evaluated; pulmonary function testing demonstrated normal respiratory status, with an FEV1/FVC ratio greater than 70%. Nutritional risk was assessed using the NRS-2002 screening tool, with a score of 2 indicating moderate nutritional risk. To support neuroprotection and overall recovery, a high-protein diet including foods such as eggs and milk was initiated, along with B-vitamin supplementation. Comprehensive laboratory testing, including complete blood count, liver and renal function tests, and coagulation studies, was performed to identify any contraindications or conditions requiring intervention prior to surgery. The overall aim of these measures was to provide targeted support and optimize the patient's condition before the operation. Preoperative fasting protocols were followed: solid food was discontinued 6 hours before surgery, and clear liquids were allowed until 2 hours prior to anesthesia. At the 2-hour mark, the patient also consumed a carbohydrate-rich solution. Surgical site preparation followed standard protocols. On the day before surgery, hair at the incision site was clipped using electric clippers, and the patient

completed two showers with antimicrobial soap, with particular attention to the scalp. After the second shower, the hair was braided, and clean bed linens were provided. Immediately before surgery, the scalp and surrounding hair were disinfected with povidone-iodine, after which the patient was transferred to the operating room.

4.2. Postoperative nursing care

Postoperative care was the most critical part of this patient's treatment journey. Every morning, the nursing team met to check on her progress, tweak the care plan, and decide on the best next steps. Their main goals were simple but vital: keep infections at bay, help her recover smoothly, and prevent any accidental harm during treatment.

4.2.1. Postoperative early vital-sign monitoring and support (0–24 h)

The first 24 hours after surgery represent the highest-risk period, during which complications such as postoperative hemorrhage or acute cerebral edema are most likely to occur. Accordingly, nursing priorities focused on intensive life support and continuous monitoring of vital signs to maintain physiological stability and enable early detection of adverse events [15–17].

Following surgery, the patient was transferred directly to the neurological intensive care unit (NICU). The overarching goal was a "zero tolerance for acute adverse events" approach. To achieve this, a comprehensive protective nursing plan was implemented, encompassing condition monitoring, postural management, circulatory support, and psychological care.

(1) Condition monitoring

Hourly assessments were conducted, including level of consciousness, pupillary response, vital signs, and limb motor function, to promptly identify any signs of neurological deterioration or systemic complications.

(2) Postural management

Appropriate positioning is critical after meningioma surgery, as it can reduce the risk of elevated intracranial pressure and promote recovery [18]. Rather than maintaining a fixed position, a dynamic positioning strategy was adopted. The head of the bed was initially elevated to 15° and gradually increased to 45° in 5° increments every few hours. In addition, the patient was repositioned every two hours to facilitate cerebrospinal fluid circulation and prevent pressure injuries and pulmonary complications.

(3) Circulatory management

Circulatory care focused on two primary objectives. First, systolic blood pressure was maintained at approximately 130 mmHg to minimize the risk of rebleeding during the initial 24-hour postoperative period. Second, Goal-Directed Fluid Therapy (GDFT) was employed to optimize fluid balance and support earlier resumption of oral intake. Arterial blood gas analysis was performed every four hours to guide fluid management.

(4) Psychological care

Psychological and emotional support was provided based on Swanson's Theory of Caring, emphasizing understanding the patient's needs, maintaining a supportive presence, and promoting comfort throughout recovery.

The postoperative course was uneventful, with no complications observed. The patient recovered as expected and was transferred from the NICU to the general ward within 24 hours.

4.2.2. Postoperative neurological assessment and rehabilitation

After surgery, close monitoring of neurological function was essential to evaluate the effectiveness of the surgical technique and to enable early detection of potential complications [19,20]. Regular neurological assessments were conducted to identify signs of cerebral edema, postoperative hemorrhage, or injury to the optic radiation or deep brain structures. Continuous observation allowed timely intervention to support recovery. Assessments were performed hourly immediately after surgery, then every four hours once the patient stabilized, and finally every eight hours during the later recovery phase.

(1) Visual function assessment

The trigone of the lateral ventricle is anatomically adjacent to Meyer's loop and the occipital visual cortex. As a result, the optic radiation is vulnerable to stretching or injury during surgery in this region, making visual impairment the most common postoperative complication. Once the patient regained consciousness, a basic visual assessment was performed, including fixation on a finger, finger counting, and subjective comparison of vision between the two eyes. A confrontation visual field test was then conducted to assess all four quadrants of each eye, specifically screening for hemianopia or quadrantanopia. Findings were compared with the preoperative baseline. Serial visual assessments were emphasized, as progressive visual field deterioration accompanied by worsening headache could indicate postoperative edema or hemorrhage compressing the occipital cortex. Throughout monitoring, the patient's visual acuity and visual fields remained unchanged from baseline, with no new deficits identified.

(2) Limb motor function assessment

The trigone of the lateral ventricle lies close to critical structures such as the posterior limb of the internal capsule and parts of the thalamus, which contain dense motor and sensory pathways. Consequently, even mild intraoperative traction, postoperative edema, or transient ischemia can affect limb movement or sensation [21,22]. Muscle strength was routinely evaluated using the Medical Research Council (MRC) scale. Sensory function on both sides of the body was also assessed, using light touch with a cotton swab and pinprick testing for pain, with particular attention to the progression or spread of hypoesthesia or reduced pain sensation. Postoperatively, muscle strength remained intact. However, the patient reported a sensation of fullness, pain, and numbness in the left leg, suggesting transient sensory pathway disturbance, likely related to manipulation or pressure near the thalamus or internal capsule during surgery. With coordinated medical and nursing management, these sensory symptoms improved significantly by the time of discharge.

(3) Auditory assessment

Once consciousness was restored, a bedside hearing assessment was conducted using simple methods such as finger rubbing and whispered speech to evaluate sound perception and localization. The primary objective was to compare postoperative hearing with preoperative status and detect any decline, particularly on the side with preexisting hearing impairment. The patient described hearing as "muffled", with sounds perceived as "distant", along with a sensation of ear blockage. These symptoms were carefully documented, as they could be associated with temporal lobe edema from surgical traction or postoperative pressure changes. Following appropriate therapeutic interventions, the patient's hearing improved and was reported to be better than preoperatively.

4.2.3. Postoperative secondary-seizure prevention and management

After surgery, factors such as cortical edema, microhemorrhage, or alterations in cerebrospinal fluid dynamics

can significantly increase the risk of seizures [23]. This risk profile made the implementation of a proactive nursing management strategy essential.

(1) Dynamic monitoring

The patient's level of consciousness, language function, and limb mobility were continuously assessed and carefully documented. Any abnormal findings were promptly reported and addressed, with the frequency of nursing rounds increased as needed to ensure early detection and intervention.

(2) Pharmacological prevention

Maintaining a stable and effective serum concentration of antiepileptic medication is central to seizure prevention [24]. Levetiracetam was administered at a dose of 500 mg intravenously every 12 hours, with a transition to oral maintenance therapy after 3 days. Health education was provided to the patient and family, emphasizing that the medication regimen should not be altered without medical authorization to ensure therapeutic drug levels and effectiveness.

(3) Daily risk factor monitoring

Potential seizure triggers, including electrolyte disturbances and signs of infection, were evaluated daily. Patient and family education formed a key component of care, focusing on the identification and avoidance of common precipitating factors such as caffeine intake and emotional stress.

(4) Acute seizure management

In the event of a seizure, immediate measures were implemented to ensure airway patency and prevent injury from falls or external impact. Supplemental oxygen was administered, and vital signs were closely monitored. Benzodiazepines were administered as prescribed when necessary to terminate seizure activity. Detailed documentation followed each event, including seizure characteristics, duration, and patient response. Once the patient stabilized, reassurance and targeted health education were provided.

Through this comprehensive and anticipatory approach, the patient remained seizure-free throughout the hospital stay and demonstrated full adherence to the prescribed antiepileptic regimen.

4.2.4. Postoperative intracranial infection prevention and control

The contralateral interhemispheric approach provides an extensive surgical field; however, prolonged exposure of cerebrospinal fluid (CSF) substantially increases the risk of intracranial infection [25]. Therefore, a comprehensive and well-structured infection prevention and control strategy was essential.

(1) Antibiotic protocol

Ceftriaxone was administered intravenously at a dose of 2 g every 12 hours for 3 days. Escalation to higher-tier antimicrobial agents, such as vancomycin or meropenem, was implemented when clinically indicated.

(2) Infection prevention related to lumbar drainage

Meticulous management of the lumbar cistern drainage system was critical to preventing retrograde bacterial entry into the central nervous system. Preventive measures focused on three key areas.

① Aseptic technique

Strict sterile procedures were adhered to during all drainage-related interventions, including hand hygiene and aseptic technique during bag changes and CSF sample collection. Drainage ports were disinfected with povidone-iodine prior to each connection.

② Maintenance of a closed system

Tubing connections were inspected hourly to ensure secure and airtight fittings, and the catheter was properly fixed to prevent kinking or accidental dislodgement. Drainage volume, color, and clarity were monitored hourly as prescribed. Cloudy CSF or the presence of particulate matter was treated as a potential indicator of infection, prompting immediate sample collection and physician notification.

③ Insertion site care

The puncture site was routinely inspected for signs of CSF leakage. Dressings were changed promptly if leakage was observed, and the patient was instructed to avoid scratching the area to reduce the risk of infection or catheter displacement.

(3) Monitoring for clinical indicators of infection

Body temperature was closely monitored for unexplained fever. New or worsening signs of meningeal irritation, such as headache, vomiting, altered mental status, or neck stiffness were carefully assessed. In parallel, CSF characteristics and inflammatory markers, including complete blood count, C-reactive protein (CRP), and procalcitonin (PCT), were regularly evaluated.

(4) Targeted nutritional support:

In collaboration with nutrition specialists, an individualized nutritional plan was developed to support immune function and recovery. The target intake was approximately 30 kcal/kg/day and 1.2–1.5 g/kg/day of protein, corresponding to 1500–1800 kcal and 72–90 g of protein daily. As oral intake alone was insufficient to meet these requirements, whey protein supplementation was added.

Through comprehensive management and targeted interventions, no serious postoperative infections occurred, and the patient's body temperature gradually returned to normal.

5. Conclusion

This case study describes the nursing management of a patient undergoing resection of a lateral ventricle trigone meningioma via a contralateral interhemispheric transfalcine approach to the ipsilateral precuneus. This complex surgical route posed distinct challenges for perioperative and postoperative care. Preoperatively, nursing priorities centered on alleviating patient anxiety through individualized health education and psychological support, while systematically documenting baseline neurological function to establish a reliable reference for postoperative comparison.

Postoperatively, care focused on dynamic neurological monitoring and early rehabilitation. Particular emphasis was placed on seizure prevention, given the elevated risk associated with this surgical approach. In addition, a multilayered infection prevention strategy was implemented, including strict lumbar drainage management and continuous monitoring of clinical and laboratory infection indicators. Through a structured yet individualized nursing care plan, secondary seizures and intracranial infections were successfully avoided. The patient's neurological function improved steadily, leading to discharge in good condition. The nursing strategies outlined in this case may provide practical guidance for the care of patients undergoing similarly complex intracranial procedures.

Disclosure statement

The authors declare no conflict of interest.

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