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CASE REPORT

Scalp Nerve Block for External Ventricular Drain in a Geriatric Patient with Anticipated Difficult Airway: A Case Report

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Abstract

Emergency neurosurgical procedures in geriatric patients with an anticipated difficult airway pose major anesthetic challenges due to limited physiological reserve and the risk of hemodynamic instability during general anesthesia. We report the use of a scalp nerve block (SNB) as the primary anesthetic technique for urgent external ventricular drain (EVD) placement in a female patient in her mid-70s with intracerebral hemorrhage and obstructive hydrocephalus. She presented with decreased consciousness and a LEMON score of 6, indicating a high likelihood of difficult airway, and was classified as American Society of Anesthesiologists (ASA) physical status IIIE. Given the elevated intracranial pressure and anticipated difficulty in airway management, SNB with lidocaine and dexmedetomidine as an adjuvant was performed under standard monitoring. The procedure was completed uneventfully, with stable hemodynamics and adequate analgesia, without the need for airway manipulation or conversion to general anesthesia. This case highlights that SNB may be a feasible alternative anesthetic approach for selected high-risk geriatric patients undergoing EVD placement, particularly when airway intervention may be hazardous or when advanced airway and critical care resources are limited. Further reports and larger studies are required to determine safety and generalizability.

Keywords: Diaphragm; Intensive Care Units; Mechanical Ventilation; Ultrasonography; Ventilator Weaning

Introduction

Emergency neurosurgical procedures in geriatric patients are associated with increased anesthetic risk because of age-related physiological changes, reduced cardiopulmonary reserve, and increased sensitivity to anesthetic agents. The presence of an anticipated difficult airway further complicates anesthetic management, as airway manipulation during induction and emergence from general anesthesia may precipitate hypoxia, hemodynamic fluctuations, and secondary increases in intracranial pressure.[1,2]

External ventricular drain (EVD) placement is a critical intervention for managing elevated intracranial pressure in

conditions such as obstructive hydrocephalus, intraventricular hemorrhage, and intracerebral hemorrhage.[3] In selected high-risk patients, general anesthesia may not be the optimal approach. Scalp nerve block (SNB) provides scalp analgesia by blocking sensory input from multiple cranial nerve branches, thereby attenuating sympathetic responses to surgical stimulation.[4] Evidence from systematic reviews and meta-analyses suggests that SNB may improve hemodynamic stability during neurosurgical procedures.[3]

Although SNB has been widely studied as an adjunct to general anesthesia and in awake craniotomy, reports describing its use as the sole anesthetic technique for emergency EVD placement in geriatric patients with an anticipated difficult airway remain limited. Evidence regarding its application in resource-limited settings is also scarce. This gap highlights the need for clinical reports exploring alternative anesthetic strategies for high-risk patients. This report describes the anesthetic management and clinical outcome of a geriatric patient with an anticipated difficult airway who underwent urgent EVD placement under SNB as the primary anesthetic technique.

Case Presentation

A female patient in her mid-70s was admitted with a sudden decrease in consciousness approximately 8 hours before presentation. There was no history of trauma or fever. Her medical history was notable for long-standing uncontrolled hypertension.

On examination, the vital signs were stable: blood pressure 130/80 mmHg, heart rate 90 beats/min, respiratory rate 18 breaths/min, oxygen saturation 96% on room air, and axillary temperature 36.8°C. Neurological examination revealed a Glasgow Coma Scale score of E2V2M5, isocoric pupils, and neck stiffness. Thyroid enlargement was noted. There was no audible stridor or orthopnea before the deterioration in consciousness. Chest radiography showed no significant tracheal deviation. However, a detailed dynamic airway assessment was limited by the patient's neurological status. Cardiopulmonary and abdominal examinations were otherwise unremarkable.

Table.1 Laboratory Findings

Laboratory Examination	Result	Laboratory Examination	Result
Hemoglobin	13.8 g/dL	Urea	32.1 mg/dL
Hematocrit	42.3 %	Serum Creatine	0.45 mg/dL
Leukocyte count	11.670 /µL	Aspartate aminotransferase (AST)	22.9 U/L
Platelet count	136,000 /µL	Alanine aminotransferase (ALT)	13.9 U/L
Blood Glucose	171 mg/dL	Potassium (K)	3.97 mmol/L
Bleeding Time (BT)	3 minutes	Sodium (Na)	136.6 mmol/L
Clotting Time (CT)	12 minutes	Chloride (Cl)	100.1 mmol/L
		Ionized Calsium (Ca ion)	1.094 mmol/L

Head computed tomography demonstrated intracerebral hemorrhage with obstructive hydrocephalus. Chest radiography also revealed cardiomegaly. Laboratory investigations were largely within normal limits (Table 1).

The patient was diagnosed with decreased consciousness due to intracerebral hemorrhage with obstructive hydrocephalus and was scheduled for urgent EVD insertion. Preanesthetic airway evaluation indicated a high likelihood of difficult airway, with a LEMON score of 6, which consisted of a large tongue on external inspection, an abnormal 3-3-2 rule indicating reduced inter-incisor distance and thyromental space, Mallampati class III, and limited neck mobility. These findings suggested a high probability of difficult laryngoscopy and tracheal intubation. The patient was classified as American Society of Anesthesiologists (ASA) physical status IIIE.

Given the elevated intracranial pressure, anticipated difficult airway, and limited resources, SNB was selected as the primary anesthetic technique. The team agreed to convert immediately to general anesthesia with airway control if the block proved inadequate, the patient became uncooperative, or clinical deterioration occurred. Therefore, an airway rescue plan was established prior to the procedure, despite a noted lack of advanced airway devices. This limitation further supported the decision to avoid primary general anesthesia and intubation in this high-risk patient.

Standard ASA monitoring was applied, including continuous noninvasive blood pressure monitoring, electrocardiography, pulse oximetry, and observation of respiratory rate. Premedication included intravenous midazolam 3 mg, ketorolac 30 mg, and fentanyl 25 μg. Midazolam was titrated incrementally in 0.5-1 mg with continuous reassessment of respiratory effort and level of consciousness. Supplemental oxygen was delivered through a non-rebreathing mask (NRM). Neurological responsiveness was reassessed after sedation to ensure preservation of spontaneous ventilation and protective airway reflexes.

SNB was performed using a landmark-based technique because of the limited availability of ultrasound guidance. Anatomical landmarks were identified before injection. The supraorbital, supratrochlear, and zygomaticotemporal nerves were selectively blocked to provide analgesia to the frontal scalp corresponding to the site of EVD insertion. Because the surgical field was confined to the anterior frontal region, posterior scalp nerves were not included. The procedure included supine positioning, sterile preparation of the injection sites, identification of anatomical landmarks, incremental aspiration before injection, slow infiltration of the anesthetic solution, and assessment of analgesic adequacy before incision. A 25-gauge needle was used for infiltration. A total of 10 mL of 2% lidocaine (200 mg) combined with dexmedetomidine 20 μg (0.2 mL) was administered incrementally, with careful aspiration before each injection. The total lidocaine dose was 2.5 mg/kg, which remained below the recommended maximum dose of 4.5 mg/kg without epinephrine. To improve reproducibility, the anesthetic solution was distributed according to anatomical landmarks: approximately 4 mL around the supraorbital nerve at the supraorbital notch

along the superior orbital rim, 3 mL around the supratrochlear nerve at the medial aspect of the supraorbital ridge near the midline, and 3 mL around the zygomaticotemporal nerve in the temporal region posterior to the lateral orbital rim. Continuous hemodynamic monitoring was maintained to detect any signs of local anesthetic systemic toxicity or dexmedetomidine-related bradycardia. No adverse events were observed during or after the procedure.

EVD placement was completed in approximately 30 minutes. Hemodynamic parameters remained stable throughout the procedure, with no significant fluctuations. Systolic blood pressure ranged from 120 to 130 mmHg and heart rate from 85 to 100 beats/min during block placement, skull puncture, and catheter insertion. No airway intervention was required and peripheral saturation remained stable within 97-98% on NRM 10 liter per minute. The patient was transferred to the recovery unit in stable condition. On the first postoperative day, vital signs remained stable, and analgesia was adequately maintained with intravenous ketorolac 30 mg every 8 hours and intravenous paracetamol 1000 mg every 8 hours.

Discussion

SNB provides significant advantages in neurosurgical procedures by blocking the major sensory nerve branches of the scalp and effectively attenuating sympathetic responses associated with cranial tissue manipulation.4 This effect is particularly relevant in geriatric patients, who are more vulnerable to hemodynamic fluctuations and complications related to general anesthesia. Although most available evidence concerns elective craniotomy performed under general anesthesia with adjunctive SNB, extrapolation to emergent EVD placement in geriatric patients should be made cautiously because of differences in clinical urgency and physiological status.[3]

In the present case, avoidance of airway manipulation was especially important because of the anticipated difficult airway, reflected by a LEMON score of 6, and the presence of elevated intracranial pressure. The stable intraoperative hemodynamic profile observed during EVD insertion is consistent with the reported benefits of SNB in attenuating sympathetic responses. Unlike its more common use as an adjunct to general anesthesia, SNB in this case served as the primary anesthetic technique, suggesting its feasibility in carefully selected high-risk geriatric patients. Immediate availability of airway rescue equipment and a predefined rescue strategy remained essential, given the anticipated difficult airway and decreased level of consciousness.[3,4]

A previous report described the successful use of SNB as the primary anesthetic technique in a 32-week pregnant patient undergoing EVD placement for acute hydrocephalus. The procedure was completed without endotracheal intubation, respiratory depression, or significant hemodynamic instability.[1] These findings are consistent with the present case, in which induction of general anesthesia was considered high risk because of the anticipated difficult airway and unstable neurological condition.

SNB has been shown to significantly reduce sympathetic responses and provide better blood pressure stability during craniotomy.[2] This is supported by a meta-

analysis demonstrating reductions in mean arterial pressure of up to 14 mmHg and in heart rate of approximately 11 beats per minute during cranial pinning.3 These findings suggest that SNB may help prevent acute increases in intracranial pressure triggered by nociceptive stimuli.

SNB has also been associated with reduced intraoperative fentanyl requirements, supporting its role in multimodal analgesia.[4] Opioid reduction is particularly important in geriatric patients to minimize adverse effects such as respiratory depression, postoperative nausea and vomiting, and delirium.

Beyond its use with general anesthesia, SNB has also been shown to be effective in awake craniotomy. When combined with light sedation, it may allow adequate patient comfort, intraoperative communication, and hemodynamic stability.[5] Within the framework of Enhanced Recovery After Surgery (ERAS), opioid-sparing anesthetic techniques, including SNB, may contribute to faster recovery and a lower incidence of postoperative nausea and vomiting.[6] This may be particularly beneficial in patients with significant comorbidities.

The effectiveness of SNB has also been reported in pediatric patients. Two randomized controlled trials demonstrated reduced postoperative pain, lower additional analgesic requirements, and a favorable safety profile.[7,8] Although pediatric physiology differs from that of geriatric patients, these findings support the consistency of the analgesic mechanism across age groups.

In the present case, dexmedetomidine was used as an adjuvant to lidocaine. Previous studies have shown that dexmedetomidine may prolong analgesia, provide sympatholytic effects, and reduce systemic anesthetic requirements without significant adverse effects.[9,10] These properties may be advantageous in geriatric patients with increased cardiovascular risk.[11] Intraoperative neurological status was intermittently assessed through spontaneous movement, respiratory pattern, and response to verbal stimuli, allowing a balance between patient comfort and preservation of airway protective reflexes.

From an economic perspective, regional anesthesia techniques may offer lower costs than general anesthesia in selected settings.12 However, this report did not include a direct economic analysis, and any conclusion regarding cost-effectiveness should therefore be interpreted cautiously.

This report has several limitations. It describes a single case without comparison with general anesthesia, which limits conclusions regarding superiority and broader applicability. Selection bias may also be present, as the anesthetic approach was chosen on the basis of specific clinical considerations. In addition, the success of SNB may depend on operator expertise and familiarity with regional techniques, which may limit generalizability across centers. Further prospective studies and larger case series are needed to evaluate the reproducibility, safety, and effectiveness of SNB as a primary anesthetic technique for EVD placement.

Conclusion

SNB may be considered as an alternative anesthetic technique for selected geriatric patients undergoing emergent EVD placement when general anesthesia poses substantial risk. Careful patient selection, preparation for airway rescue, and familiarity with the technique are essential.

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Conflict of Interest

The author(s) report no conflict of interest.

Data Availability Statement

The individual patient data collected in this Case Report/Series are not publicly available due to ethical, legal, and institutional restrictions. For further information, please contact the corresponding author.

Author's Contributions

Conceptualization: KAW. Data curation: KAW, AM. Investigation: KAW, AM. Writing – original draft: KAW, AM. Writing – review & editing: KAW, AM. Supervision: AM. All authors have read and approved the final version of the manuscript.

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