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CASE REPORT

Peripheral Nerve Block as A Safer Alternative than General Anesthesia in High-Risk Patients with Multiple Comorbidities: A Case Report

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ABSTRACT

Background : Managing anesthesia in high-risk patients with multiple comorbidities is a significant challenge, particularly when general anesthesia may increase perioperative risks. Peripheral nerve block offers a safer alternative by minimizing systemic involvement and avoiding complications associated with general anesthesia.

Case Illustration : This case report presents a 68-year-old male with uncontrolled hypertension and a history of stroke who underwent surgery for a clavicle fracture. Due to the patient's cardiovascular and neurological risks, regional block anesthesia was chosen as the preferred technique. The approach allowed for stable perioperative management without complications.

Conclusion : This case emphasizes the potential benefits of peripheral nerve block in high-risk surgical patients, offering a safer and effective alternative to general anesthesia.

Keywords: Alternative; Comorbidities; Elderly; General Anesthesia; High-Risk Patients; Peripheral Nerve Block.

INTRODUCTION

Selecting the optimal anesthetic approach for high-risk patients with multiple comorbidities is a critical challenge in perioperative care. General anesthesia, while commonly applied, presents heightened risks in patients with pulmonary, cardiovascular, and neurological conditions due to its potential to exacerbate hemodynamic instability, particularly in elderly patients.[1] This is especially concerning in those with uncontrolled hypertension and a history of stroke, where fluctuations in blood pressure and systemic effects could significantly increase postoperative complications.

Regioanal anesthesia and Perpiperal nerve block, offer a safer and often preferable alternative for managing high-risk cases.[2] Peripheral nerve block works by minimizing systemic involvement and avoiding the respiratory and cardiovascular depressant effects typically associated with general anesthesia. The utilization of peripheral nerve block extends postoperative analgesia, which can facilitate early mobilization and support the restoration of baseline function and range of motion. It is also associated with a decreased length of stay for patients undergoing ORIF surgery.[3] Furthermore, studies suggest that peripheral nerve block anesthesia is associated with fewer postoperative complications, such as postoperative delirium, reduced PONV in elderly patients with comorbidities.[4]

In this case report, we present a unique instance of a 68-year-old patient with uncontrolled hypertension and a previous stroke under 3 months who required surgery, highlighting the anesthetic approach, management considerations, and outcomes. This case illustrates the effectiveness of peripheral nerve block anesthesia as a safer alternative for high-risk patients with multiple comorbidities, adding valuable insight into optimizing anesthesia in complex cases.

CASE ILUSTRATION

A 68-year-old man was admitted to the emergency department (ED) after falling an hour prior to admission while climbing stairs, landing on the right shoulder first. The patient's main complaint was pain in the right shoulder which worsened with movement. There were no complaints of pain in other parts of the body. There was no history of fainting, vomiting, or seizures. The patient has a medical history of

uncontrolled hypertension since 2014, a stroke in 2018, and right-hand dominance. There is no history of prior trauma, surgery, malignancy, chemotherapy or radiotherapy.

The patient's primary survey was a clear airway, breathing, disability, and exposure with a problem in circulation. His initial vital signs were: blood pressure 180/107 mmHg, heart rate 74 bpm, respiratory rate 20 times per minute, temperature 36.6ºC, and oxygen saturation 98% in room air with supine position. A secondary survey of the head, face, neck, thorax, abdomen, trunk, and other extremities was normal. Local examination of the right shoulder region revealed a swelling with intact skin, no skin tenting, and unclear deformity with inspection, tenderness on lateral one-third of the region, capillary refill time under two seconds, no neurovascular deficits and SpO2 of all digits were 98% on palpation. There was a limitation in the range of motion of the shoulder due to pain and normal range of motion in the elbow, wrist, and finger.

Figure 1. Clinical pictures of patient.

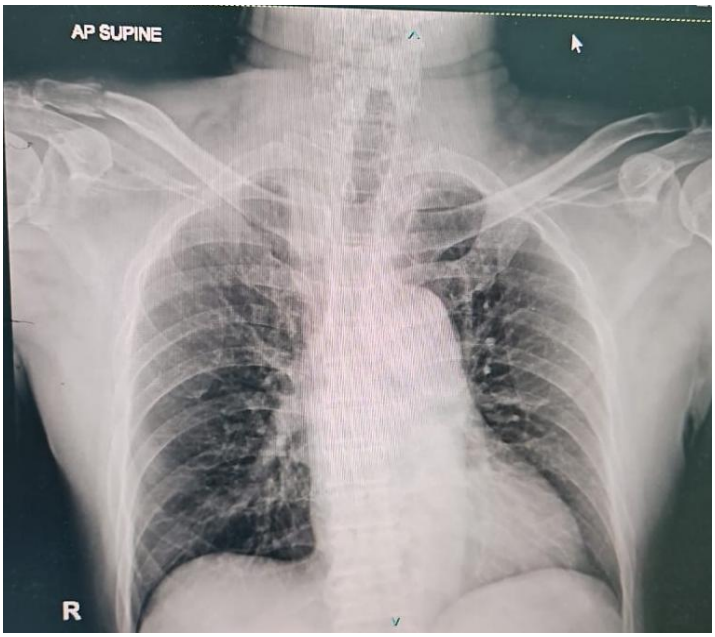

Figure 2. Plain chest x-ray.

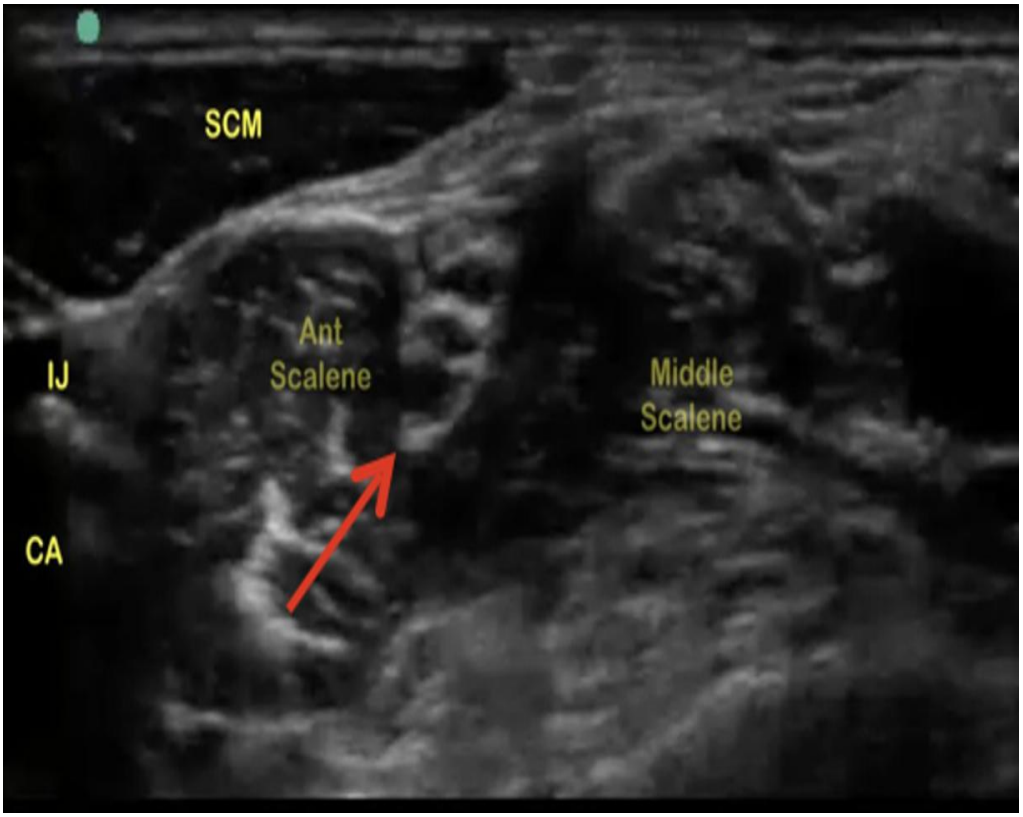

Figure 3. USG Interscalene Block

The problems in this patient were the patient is a geriatric patient age 68 years old with predicted difficult airway due to sunken cheeks, toothless, thyromental distance of 3-3-2, Mallampati score of 2; uncontrolled hypertension with BP 180/107 mmHg; and history of stroke 6 year prior with ICH score of 0 and right-sided motor weakness.

Laboratory examination showed hyperglycemia with a blood glucose of 141 mg/dL and leukocytosis, while the plain chest x-ray (Figure 2) showed a complete fracture of the lateral third of the right clavicle, mild cardiomegaly, aortosclerosis, and no abnormality in the lung.

The patient's physical status was assessed as ASA II-E. This patient was diagnosed with a closed fracture of the right clavicle, Allman group II, comminuted type with hypertensive urgency. For this patient, emergency open reduction and internal fixation were planned.

We chose regional block anesthesia with levobupivacaine 0.375% and lidocaine 1.5%. the interscalene nerve block was performed using a combined ultrasound Linear probe and peripheral nerve stimulator technique with a 22G 50 mm insulated needle. The probe was positioned in the transverse plane to identify the carotid artery. Once the artery was identified, the probe was moved laterally. The goal was to identify the scalene muscles and the brachial plexus sandwiched between the anterior and middle scalene muscles just below the level of the transverse process of the seventh cervical vertebra. Ultrasound findings can be seen in Figure 3. After arriving at the C6-C7 sheath, twitching occurred in the biceps and deltoid area; the current was slowly decreased from 1.5 to 0.2 mA until the muscle twitch disappeared, and 1 ml levobupivacaine 0.375% was added to determine the spread of local anesthetic. After making sure it spreads properly, another 9ml was added slowly. Then the needle is directed to the C5-C6 sheath, and 10ml of lidocaione is slowly injected. Multimodal anestehsia was perfom by adding paracet, amol 1 gram IV Post-operatively, he was kept on RL infusion at 20 drops per minute, analgesic paracetamol 1g every 8 hours IV, ondansetron 4mg every 8 hours IV, oxygen at 2 liters per minute, and gradual mobilization. He also received

treatment for his hypertension. His vital signs were: blood pressure 173/99 mmHg, heart rate 89 beats per minute, respiration rate 22 times per minute, temperature 37.1^{o}C, and oxygen saturation 99% on a 2 liter per minute nasal cannula. The laboratory examination showed leukocytosis and hyperglycemia. After two days in the HCU, the patient was then transferred to the general ward and discharged from the hospital. Monitoring the Numeric rating score (NRS) at 6, 10, 12, 24, 36, 48, 72 hours postoperatively. The incidence of PONV and other rescue analgetics (Table 1).

Table 1. NRS, rescue analgesia, ponv output table

Hours	NRS	Rescue Analgesia	PONV
6	2-3	Not performed	Not found
10	2-3	Not performed	Not found
12	2-3	Not performed	Not found
24	2-3	Not performed	Not found
48	2-3	Not performed	Not found
72	1-2	Not performed	Not found

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DISCUSSION

This case involves a 68-year-old male with a closed comminuted clavicle fracture (Allman Group II), uncontrolled Grade I hypertension, a history of stroke, and a predicted difficult airway (Mallampati score 2). Given the complexity of the patient's medical history, including cardiovascular and neurological risks, the decision to proceed with peripheral nerve block, in combination with sedation, was made to avoid the potential complications associated with general anesthesia (GA).

General anesthesia posed multiple risks for this patient. His uncontrolled hypertension and prior stroke increased the risk of perioperative cardiovascular instability and cerebrovascular complications, such as intraoperative hypotension or postoperative stroke. Additionally, the patient's predicted difficult airway, with a Mallampati score of 2, raised concerns about intubation challenges. While Mallampati's score of 2 suggests a

relatively moderate airway difficulty, combined with his comorbidities, intubation could have led to complications like aspiration or prolonged mechanical ventilation.[5]

Considering these risks, a peripheral nerve block approach was selected to minimize cardiovascular and airway complications. A brachial plexus block, particularly an interscalene block, was favored for this clavicle surgery.[6] This technique provided adequate anesthesia for the procedure while allowing the patient to maintain spontaneous breathing, thus avoiding the need for airway manipulation and reducing the risk of postoperative respiratory complications.

Regional block anesthesia has emerged as a safer alternative to general anesthesia for high-risk patients with multiple comorbidities. One of its primary benefits lies in reduced perioperative risks; it significantly lowers the likelihood of morbidity and mortality in individuals suffering from conditions such as heart failure and chronic obstructive pulmonary disease (COPD).[7] Additionally, techniques like the intermediate cervical plexus block exhibit superior hemodynamic stability compared to general anesthesia, which is essential for managing cardiovascular issues.[8]

Moreover, Pheriperal nerve block provides exceptional postoperative care by offering excellent pain management, decreasing the occurrence of nausea and vomiting, and reducing reliance on narcotics. These factors collectively contribute to faster recoveries and shorter hospital stays. Specific case studies illustrate the effectiveness of r in challenging scenarios. For example, a thoracic spinal block proved invaluable during abdominal aortic aneurysm repair in a patient with severe COPD and ischemic heart disease, while a combined thoracic paravertebral and interscalene block facilitated the smooth execution of extensive breast surgery in another individual with multiple comorbidities.[9]

The decision to use peripheral nerve block in this patient aligns with current literature supporting its benefits in high-risk surgical patients. Several studies have demonstrated that patients with cardiovascular comorbidities undergoing surgery with regional techniques experience fewer perioperative complications than those receiving GA.[9] Additionally, literature on difficult airways emphasizes the importance of avoiding unnecessary

intubation when alternative anesthesia options are available, particularly in elderly or medically fragile patients.

A study by Al Harbi et al. (2023) demonstrated that peripheral nerve block significantly reduces perioperative complications in elderly patients with comorbidities compared to general anesthesia.[10] The authors noted that regional techniques provide effective analgesia while minimizing systemic effects, which is particularly beneficial for patients with cardiovascular concerns. Furthermore, a study by O'Neill et al. (2022) emphasized the importance of multimodal analgesia in managing postoperative pain effectively.[11] In our case, the combination of levobupivacaine and lidocaine allowed for optimal pain control while reducing the need for opioids, which can exacerbate respiratory depression and complicate recovery in high-risk populations.

In a study by Lee et al., the use of interscalene block for clavicle surgery was associated with effective pain control, minimal hemodynamic changes, and a low rate of postoperative complications.[12] Similarly, a review by Galway et al. supports peripheral nerve block as a superior option in patients with difficult airways, helping to avoid the risks associated with intubation and mechanical ventilation.[13]

A potential limitation of the peripheral nerve block approach is the risk of block failure or incomplete coverage, which could necessitate conversion to general anesthesia.[14,15] In this case, ultrasound guidance was used to ensure accurate block placement, thereby minimizing the risk of failure. While the patient experienced mild discomfort during positioning, the block provided sufficient analgesia for the surgical procedure, eliminating the need for GA.

This case underscores the importance of careful preoperative assessment and planning in high-risk patients. For patients with significant cardiovascular and cerebrovascular comorbidities, peripheral nerve block can offer a safer alternative, reducing the need for airway manipulation and minimizing hemodynamic fluctuations. Furthermore, it demonstrates the utility of peripheral nerve block in predicted difficult airway scenarios, where avoiding general anesthesia can prevent potential complications related to airway management. Further research is necessary to explore the long-term

outcomes of regional versus general anesthesia in similar high-risk surgical populations, particularly those with complex comorbidities and predicted difficult airways.

CONCLUSION

The successful use of intercalene anesthesia in this patient with multiple comorbidities highlights its role as a safer alternative to general anesthesia. Regional block techniques, combined with sedation, minimized the risks of cardiovascular complications and airway difficulties, providing a favorable outcome for a complex surgical case.

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