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RESEARCH ARTICLE
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BRONCHOSPASM FOLLOWING SUPRACLAVICULAR BLOCK ….A DIAGNOSTIC DILEMMA

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ABSTRACT:

INTRODUCTION:

Regional anesthesia techniques, such as brachial plexus blocks, are commonly used for upper limb surgeries due to their efficacy in providing targeted anesthesia and postoperative analgesia. They may be preferred over general anesthesia in patients with compromised cardio-respiratory function or the elderly. We report a case in which the patient developed bronchospasm and acute respiratory failure following a supraclavicular block. Limited reports (two-three) about such incidents have been published.

CASE PRESENTATION: A 70-year-old obese female with chronic hypertension and diabetes, housewife (with chronic use of biofuel), presented with a right forearm fracture and received a right supraclavicular block. Within 20 minutes, she developed acute dyspnea, anxiety, and oxygen saturation of 75%, with bilateral wheezing but no rash or cardiopulmonary compromise. Oxygen and medications were administered to manage the wheezing, and the procedure was postponed. The patient was transferred to the ICU and managed conservatively and later operated on under general anesthesia.

CONCLUSION: The exact cause of bronchospasm was unclear, with possible contributing factors including local anesthetic reaction, cold injection, sympathetic blockade, and her pre-existing respiratory and systemic conditions, the probabilities are multiple but a clear cut answer is none.

Keywords: Acute respiratory distress, supraclavicular block, ultrasound, sympathetic blockade, local anaesthetic toxicity.

INTRODUCTION

A 70-year-old female (85 kg, BMI 31.2kg/m^2) was planned for right-sided both-bone forearm fracture (olecranon and head of the radius). The patient had a 20-year history of poorly controlled hypertension and diabetes due to non-compliance with her prescribed medications (Amlodipine 5mg + Atenolol 50 mg, Metformin 500 mg). There was a long-standing history of usage of biofuel with recent onset breathlessness and poor functional status. Per institutional protocols, Cardiology and respiratory medicine opinions were sought before surgery. Cardiology evaluation showed a normal 2D echo (EF 55%) and negative stress echo. Spirometry indicated obstruction and possible restriction, with an ARISCAT score of 3. She was advised of nebulization with steroids and bronchodilators. For a 7th rib fracture, conservative management with incentive spirometry and deep breathing exercises was recommended after surgery consultation.

The patient's preoperative vitals were stable with BP 140/86 mmHg, PR 92 bpm, RR 16, and SpO2 97% on room air. Chest auscultation revealed bilateral air entry with no added sounds, but there was a visible tracheal tug. After obtaining written informed consent, the patient was shifted to the operation theatre, and ASA standard monitors were connected. Under all aseptic precautions, an Ultrasound-guided right supraclavicular brachial plexus block was given with a total of 30 ml of local anesthetic (20ml 0.5% Bupivacaine and 10ml 2% lignocaine was given). After 20 minutes, the block was effective, and the patient was positioned laterally. However, the patient developed acute breathlessness, tachypnea, wheezing, and hypoxemia (SpO2 75%). Immediate intervention with oxygen supplementation, nebulization (Duolin, Budecort, adrenaline), and IV hydrocortisone and Avil resulted in partial improvement (SpO2 90%). Arterial blood gases were normal. There were no features suggestive of Horner's Syndrome, rashes or drug allergy. A mutual decision in consultation with the orthopaedician was taken and the patient was shifted to ICU for further management. Chest X-ray showed bilateral lower lung haziness and possible pleural effusion, while USG chest was unremarkable. The patient was stable after ICU management and successfully underwent surgery under general anesthesia one week later.

DISCUSSION

Supraclavicular brachial plexus blocks are often chosen for upper limb surgeries to avoid general anesthesia, ensure effective pain management, and facilitate outpatient procedures. In this case, a USG-guided supraclavicular block was planned for an elderly patient with pre-existing respiratory issues. However, the patient developed respiratory complications, which contradicted the block's intended benefits. While evaluating the cause of bronchospasm, multiple potential factors were considered, but none provided a clear and definitive explanation for the bronchospasm. A review of available literature on bronchospasm following supraclavicular blocks will help explore the underlying causes.

Bronchospasm in this patient could stem from several causes. Pneumothorax, a rare but possible complication of supraclavicular blocks (0.5–6%), presents with chest pain, dyspnea, and decreased breath sounds. The onset of symptoms is usually delayed and may take up to 24 hours.[1] Proximity of the apex of the lung lying medial and posterior to the brachial plexus and behind the first rib makes pneumothorax a likely complication post supraclavicular block. Pneumothorax needs to be differentiated from bronchospasm, pulmonary edema, pulmonary embolism, and aspiration. However, pneumothorax was ruled out as the post-operative chest X-ray was normal, and clinical signs, including bilateral wheeze, were inconsistent with pneumothorax.

Phrenic nerve palsy, a known complication of supraclavicular blocks, occurs in 67% of cases, with higher incidence in interscalene blocks due to the injection site's proximity.[2] While healthy individuals can compensate for the transient decrease in pulmonary function, patients with cardiopulmonary comorbidities may decompensate.[3] Phrenic nerve involvement is rare but has been linked to pulmonary failure in patients with severe pulmonary disease or contralateral phrenic

nerve palsy.[4] However, phrenic nerve involvement was excluded in this case, as the patient had bilateral air entry, normal chest X-ray (Image 1 and 2), and no diaphragmatic dysfunction on postoperative USG.

Allergy to local anesthetics, ranging from mild symptoms to anaphylaxis, could explain bronchospasm, but this was ruled out in our patient as there were no signs of rash, itching, chest tightness, or hemodynamic instability. Additionally, large volumes of local anesthetics at room temperature can trigger an asthmatic response, though warming lignocaine has been shown to increase pH and shorten onset time when administered epidurally.[5]

Local anesthetic systemic toxicity (LAST) can cause symptoms from mild (numbness, metallic taste) to severe (seizures, arrhythmias). LAST is unlikely in our patient, as no cardiovascular or neurological symptoms were observed.

Regional anesthesia has been linked to acute bronchospasm in several reports. Spinal anesthesia, in particular, has been shown to sensitize the pulmonary response to methacholine in animal models.[6] Bronchospasm has also been documented following spinal[7] and epidural anesthesia.[8] While regional anesthesia is often preferred over general anesthesia for asthmatic patients, it can still trigger an asthmatic attack.

Anxiety and high levels of sensory and motor block are potential triggers for bronchospasm, particularly in predisposed individuals. While the role of sympathetic blockade in bronchospasm has been refuted, T1-T4 sympathetic nerve blockade can lead to bronchoconstriction due to parasympathetic overactivity [9]. Bronchospasm has been associated with interscalene, interpleural, and intercostal phenol blocks. In this case, although the injection was made in the supraclavicular plexus, a spread affecting the sympathetic supply or recurrent laryngeal nerve could not be ruled out. Deep injection along the posterior border of the sternocleidomastoid may block the recurrent laryngeal nerve [10], potentially contributing to bronchospasm and patient discomfort.

Our patient, at risk for postoperative respiratory complications as indicated by the ARISCAT score, was given preoperative nebulization with bronchodilators. Despite this, acute bronchospasm occurred, likely triggered by factors such as local anesthetic allergy, cold LA injection, or sympathetic blockade leading to parasympathetic overactivity. However, no clear cause was identified. A literature review revealed only two case reports of bronchospasm following supraclavicular block, highlighting the need for caution when planning regional anesthesia for patients with bronchial hyperreactivity.

CONCLUSION:

This case is an original report and highlights the need for heightened vigilance when performing supraclavicular brachial plexus blocks, particularly in elderly patients or those with underlying cardiopulmonary or metabolic comorbidities. Although regional anesthesia is often considered safer than general anesthesia in high-risk populations, it is not without potential complications. Acute bronchospasm following a supraclavicular block, though rare, can be life-threatening and may not present with typical signs of anaphylaxis or cardiovascular compromise.

CLINICAL MESSAGE:

Regional anaesthesia and nerve blocks, though generally safe, can cause unexpected respiratory complications in high-risk patients. Vigilant monitoring and prompt management are essential, especially in the elderly with comorbidities.

CONSENT: this case is reported after obtaining written informed consent from the patient.

Acknowledgments: Published with the written consent of the patient.
COMPETING INTERESTS: NONE

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Image1: Chest X-ray (pre-operative)

Image 2 :Bedside Chest X-ray (post-operative in ICU)