

ACUTE QUADRIPLÉGIA AFTER INTERSCALENE BLOCK SECONDARY TO CERVICAL BODY EROSION AND EPIDURAL ABSCESS

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Abstract

Although the incidence of neurological complications after shoulder surgery with regional anesthesia remains low but serious negative outcomes have been reported in the literature. Here we report a case of acute quadriplegia secondary to cervical epidural abscess and possible neck manipulation.

Keywords

Brachial Plexus, Interscalene, Nerve Block, Postoperative Complications, Spinal Cord, Cervical Vertebrae, Anesthesia, Conduction, Shoulder Surgery

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Introduction

The interscalene approach to the brachial sheath effectively provides analgesia for surgery on the shoulder or upper arm by providing blockade of the lower cervical plexus and the cephalic portion of the brachial plexus¹. Neurological complications attributed to the administration of interscalene anesthesia have been reported²⁻⁵, including the permanent loss of cervical spinal cord function⁶. This report describes a case in which our patient developed acute postoperative quadriplegia following the intraoperative administration of combined interscalene and general anesthesia that was initially attributed to an inadvertent subdural injection of local anesthetic. Rapid and appropriate multidisciplinary intervention resulted in the complete return of neurological function for this patient although the occurrence was subsequently demonstrated to have arisen from a preexisting medical condition.

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Case Report

A 59 year-old, male presented for drainage of a left shoulder abscess and biopsy of the head of the right humerus. His past medical history was significant for hypertension and type II diabetes melitus. Preoperative sedation was provided with midazolam 1 mg intravenously (IV). Even though patient consented to regional anesthesia but also he firmly requested to have general anesthesia for the procedure. A right interscalene block and inhalational general anesthesia (GA) via laryngeal mask airway (LMA) was planned. The induction of GA was accomplished with propofol 100 mg to facilitate LMA insertion and maintained with spontaneous respirations of Sevoflurane 0.7 vol% and 60% nitrous oxide. No muscle relaxants or narcotics were administered. The interscalene block was performed under sterile technique by inserting an insulated 22 gauge 1¼ inch Stimuplex (B. Braun Medical, Bethlehem, PA) needle connected to a peripheral nerve stimulator into the right interscalene groove in a caudad direction. Contraction of the right biceps muscle was present at a depth of 1.6 cm with stimulation at 0.4 mA. Levobupivacaine (Chirocaine) 0.25% 20 ml was injected in incremental doses after negative aspirations for blood and cerebrospinal fluid. Surgical exposure was optimized by placing a thyroid pillow between the patient's shoulders providing cervical extension and the head was rotated to the contra lateral operative side during the two stages of the surgery. The patient's vital signs remained stable throughout the 90-minute intraoperative period and no adverse events were noted.

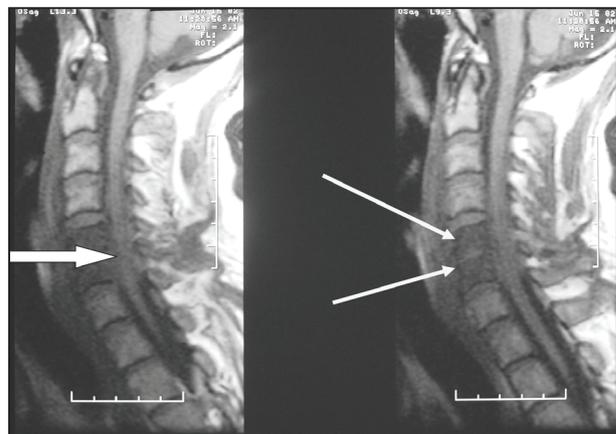
After arrival in the recovery room, the patient's heart rate dropped to 47 beats per minute and his blood pressure decreased to 73/40 mmHg. Hemodynamic stabilization was accomplished by administering 500 ml 0.9 normal saline and ephedrine 10 mg IV. Respiratory parameters were unremarkable, respiratory rate of 22 per minute, pulse oximetry reading was 100% on 2 liters/nasal cannula, arterial blood gas was within normal limit, however the patient complained of mild dyspnea. Physical examination revealed hypophonia and quadriplegia. Sensation was present only above T4. In light of respiratory stability and the lack of an ensuing mitigation of sensation or the return of strength,

it was suspected that an inadvertent subdural injection of the local anesthetic had occurred. Dexamethasone 10 mg IV was administered to attenuate possible spinal cord inflammation. A neurology consult and CT of the cervical spine were obtained.

Six hours after termination of surgery, the patient then began showing mild improvement, with the return of bilateral lower extremity proprioception, contraction of the left biceps, and the recovery of phonation. The computed tomography of cervical spine excluded spinal hematoma but demonstrated intrathecal and subcutaneous air around the cervical spinal cord. Fourteen hours following surgery, there was no further recovery. Magnetic resonance imaging of the cervical spine revealed a severe case of osteomyelitis with complete destruction of the vertebral bodies and spinal cord compression due to an epidural abscess at the level of C5-C6 (Fig. 1). Retrospective reviews of the preoperative bone scan (Fig. 2) and cervical X-ray films revealed this lesion was a preexisting inflammatory process. Emergent neurosurgical intervention to relieve the spinal cord compression consisting of C4-5, C5-6, and C6-7 discectomy; C5-6 vertebrectomy; C4-C7 anterior fusion with fibular strut and plate, and C4-T1 posterior fusion with mass fixation and allograft was performed. Antibiotic therapy with Vancomycin and Ceftazadime was instituted. The patient regained full sensory and motor function over the next 10 days.

Fig. 1

Cervical spine magnetic resonance imaging performed post-interscalene block showing vertebral body erosion at C5-6 (indicated by the small solid arrows) and the presence of a large epidural abscess (large hollow arrow)



*Fig. 2**Preoperative bone scans demonstrating cervical and bilateral shoulders inflammatory processes*

Discussion

Timing of interscalene block after general anesthesia remains a controversial topic in anesthesiology mostly because it may contribute to delay in diagnosis of neurological complications. However, Bogdanov et al was able to demonstrate no permanent or long-term neurological complications related to interscalene block after induction of general anesthesia in 548 consecutive cases of arthroscopic shoulder surgery patients⁷. Based on finding from his study and request by our patient to have general anesthesia for the procedure, we proceeded with combined general and regional techniques. Interscalene block would also provide post operative pain relief.

This case highlights some of the major neurologic complications of interscalene block including acute postoperative quadriplegia that was thought to be related to inadvertent injection of LA into subdural space. Neurologic complications after interscalene block have been well described in the literature including reported cases of postoperative quadriplegia

or quadreparesis secondary to diverse etiologies^{2, 8-9}.

Norris¹⁰ and his group suggested anatomical explanations of injected anesthetics into dural cuff and Reina et al.¹¹⁻¹² suggested spread of local anesthetic from epidural fat storage site to epidural and subdural space. Alternative etiologies described include the presence of space-occupying lesions¹³, trauma¹⁴, inadvertent injection of local anesthetics into the substance of the cervical spinal cord⁶, epidural, subdural⁴, or subarachnoid space³, continuous infusion of cisatracurium and steroids, intraoperative hypotension resulting in cord ischemia and injection of LA into vertebral artery. Acute quadriplegia may also arise from odontoid process dislocation or fracture¹⁵⁻¹⁶, and rarely secondary to cobalamin deficiency or bilateral medullary pyramid infarctions¹⁷.

The initial diagnosis of subdural blockade was based on clinical presentation of a slow onset neural blockade, extensive involvement of dermatomes outside of the brachial plexus distribution, the absence of apnea, relative lack of sympathetic block, and the delayed resolution of symptoms⁴. Total spinal anesthesia and cord ischemia was ruled out since he was hemodynamically compensated and was breathing spontaneously during his entire operative and post operative course. Intraneuronal injection was unlikely since patient usually complain of severe pain both intra-operatively and in post operative phase of recovery.

In conclusion, it is important to note that quadriplegia in this case was not related to the interscalene block, but we must mention that interscalene block may have contributed to the complexity of diagnosing neurologic injury in this case. Such diagnostic uncertainty may contribute to a delay in the definitive treatment of spinal cord compression where early diagnosis and surgical intervention are crucial. Therefore, we recommend a comprehensive diagnostic strategy when there are atypical neurologic findings following interscalene block.

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