

ISOLATED MUSCULOCUTANEOUS NERVE PALSY FOLLOWING SUPRACLAVICULAR NERVE BLOCK: A CASE REPORT

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Background: The supraclavicular (SC) nerve block is a procedure utilized by anesthesiologists with the goal of providing analgesia to the upper extremity at and below the shoulder. We present a case report of an SC continuous peripheral nerve block (CPNB) complicated by isolated musculocutaneous nerve palsy despite cessation of infusion of local anesthetic.

Case Report: Patient was a 39-year-old woman with chronic ischemic left-hand pain for which an SC CPNB was placed. Following sympathectomy of the radial and ulnar digital arteries, she reported inability to flex/extend her elbow or shoulder; motor function and sensation were otherwise intact. Following discontinuation of the CPNB, the patient regained sensation and motor function in her left upper extremity.

Conclusions: This isolated palsy may have been due to an entrapment or compression injury from the catheter itself. This case report demonstrates a potential complication of SC CPNB that had not been previously reported in the literature.

Key words: Supraclavicular nerve block, musculocutaneous nerve, palsy, catheter, case report

BACKGROUND

The supraclavicular (SC) nerve block is a commonly used technique for regional anesthesia of the upper extremities, reliably and effectively providing analgesia for procedures involving the shoulder, arm, forearm, and hand. Continuous peripheral nerve blocks (CPNBs) provide prolonged peripheral nerve block via a percutaneously inserted catheter that is adjacent to the nerve target. CPNB is now commonly performed under ultrasound (US) guidance, as opposed to nerve stimulation, as it requires less time, less discomfort, and decreases risk of injury (1,2). US-guided SC CPNBs have reports of high success rates and low complications; however, like any medical procedure, there are associated risks. One rare but significant complication is musculocutaneous nerve

(MCN) palsy, which can lead to functional impairment of the arm and shoulder. This article discusses causes, symptoms, diagnosis, and management of MCN palsy in the case of a patient undergoing SC CPNB.

The MCN is a branch of the brachial plexus that arises from the lateral cord and innervates the muscles of the anterior compartment of the arm, including the biceps brachii, brachialis, and coracobrachialis (Fig. 1). It also provides sensory innervation to the lateral aspect of the forearm. The MCN travels with the axillary artery and vein through the axilla and then descends in the arm between the biceps and the brachialis muscles. Symptoms of MCN palsy include weakness and numbness in the muscles of the anterior compartment of the arm and numbness in the lateral aspect of the forearm.

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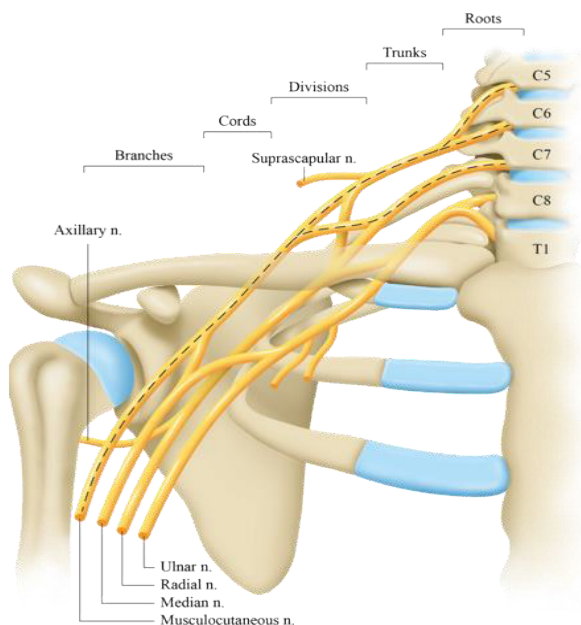


Fig. 1. Anatomic illustration of the brachial plexus, including pathway of the musculocutaneous nerve.

The patient may have difficulty flexing the elbow and lifting the arm due to the weakness of the biceps and brachialis muscles. Sensory deficits may be present in the lateral aspect of the forearm. We present the case of a 39-year-old woman with acute-on-chronic ischemic hand pain who was given an SC nerve block with a catheter and experienced a complication involving the MCN.

CASE PRESENTATION

A written consent was obtained from the patient for publication of this case report. A 39-year-old female patient, American Society of Anesthesiologists physical status III, weighing 78.6 kg and height 1.676 meters, with a history of Buerger's disease, factor V Leiden, hypertension, cerebrovascular disease, coronary artery disease, opioid dependence, and chronic ischemia of the left hand presented with acute exacerbation of chronic left-hand ischemic pain. Her pain proved refractory to medical management, so the acute pain service was consulted.

Our regional pain team performed a left SC nerve block with a CPNB catheter under US guidance. The patient was prepped and draped in typical sterile fashion. The SC artery, first rib, and brachial plexus were

identified and traced up the neck to an interscalene view to confirm identity of the brachial plexus. A 21G echogenic-insulated needle was introduced inplane and visualized throughout the procedure (Fig. 2). A nerve stimulator was not used. An injection of 10 mL lidocaine 1%, 20 mL bupivacaine 0.5%, and dexamethasone (4 mg/mL) 4 mg was deposited around the target. The patient tolerated the procedure well and did not report pain. No resistance to injection was appreciated, and intraneuronal and intravascular injections did not occur. The patient reported nearly immediate relief of pain. The peripheral nerve catheter was attached to a pump, which infused ropivacaine 0.2% at 6 mL/h. The next day, the patient was taken to the operating room (OR) with plastic surgery and underwent a revision amputation of her left index and long fingers, sympathectomy of the left distal radial and ulnar arteries, Guyon's canal, and carpal tunnel release. The patient was reassessed the day following the procedure and reported improvement of ischemic pain, now only reporting incisional pain. She was additionally found to have return of normal sensation from shoulder to fingertips, but reported inability to flex her shoulder or elbow. The left SC CPNB catheter was removed at this time, and the patient started on an oral and intravenous pain medication regimen. Five hours later, the patient reported complete return of motor function in her left upper extremity.

Two days later, the patient reported uncontrolled burning pain in her left thumb that felt similar to her ischemic pain preoperatively. To better control her pain and in anticipation of a return to the OR, a second SC CPNB was placed under US guidance, using 20 mL ropivacaine 0.5%, and 5 mL of lidocaine 2%. The procedure progressed without difficulty or complication, and successfully provided the patient with pain relief without loss of motor function.

CONCLUSIONS

Peripheral nerve injury following nerve block is a rare complication of regional anesthesia that can occur for a variety of reasons. Retrospective studies (3) have estimated an incidence of 0.5% to 1.0%. Fortunately, most injuries are typically acute and transient, or present as mild mononeuropathies. The most common causes include direct needle trauma, intraneural injection, and local anesthetic-induced neurotoxicity. Other potential causes include knotting or looping of the nerve catheter, or formation of a compressive hematoma or abscess in the area, which may cause local ischemia (3,4). Russon et

al (5) describe an incidence of inadvertent intraneural injection of the MCN during an SC nerve block under US guidance that fortunately did not result in neurological deficit. This raised the point that intraneural injection may occur intra- or extrafascicularly, with the latter being associated with higher pressures that may induce neurological injury. Further compounding the issue is the limited follow-up that anesthesiologists often have with patients to evaluate for nerve block complications. A case series by Draeger et al (4) noted 3 incidents of SC nerve block resulting in suprascapular nerve palsy with isolated weakness and pain in the shoulder that persisted months after the nerve block, with diagnosis confirmed by electromyography (EMG). They concluded that while published complication rates from SC nerve block risk are low, the actual complication rate may be higher than reported (4).

Concerning neurotoxicity of local anesthetics, direct toxicity is related to excessive concentrations at the target site, which can induce some histological damage, such as destruction of axons and Wallerian degeneration (1,3). It is also important to note that patients with a prior history of peripheral neuropathy are at increased risk of nerve block complications, such as increased duration, susceptibility to local anesthetic neurotoxicity, or infections, as seen in patients with diabetic neuropathy, exposure to harmful substances, or disruption of normal neural blood supply.

Diagnosis of MCN palsy following SC nerve block is based on the patient's symptoms and physical examination. The patient should be assessed for weakness and numbness in the muscles of the anterior compartment of the arm and lateral aspect of the forearm. An isolated MCN injury typically presents with weakness in flexion at the shoulder or elbow, and loss of or abnormal sensation of the lateral forearm. Other diagnostic modalities, such as EMG, can be used to assess nerve function. Management depends on severity of the injury.

In the case of our patient, resolution of the palsy occurred within 5 hours of stopping the nerve block and removing the nerve catheter. These 2 actions did occur simultaneously; however, thus it proves chal-

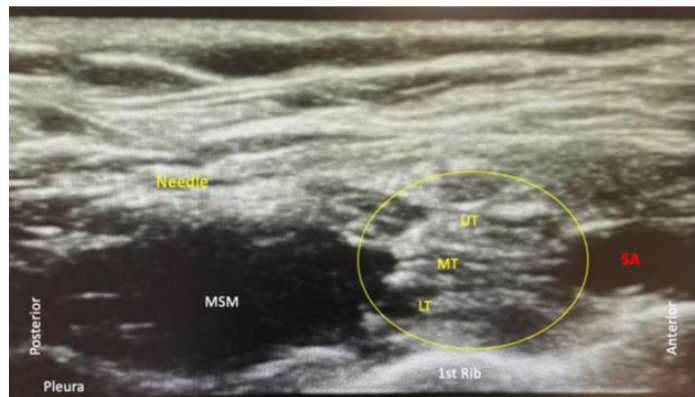


Fig. 2. US-guided SC nerve block. The UT, MT, and LT of the brachial plexus seen posterior to the SA, superficial to the first rib, and anterior to the MSM.

US, ultrasound; SC, supraclavicular; UT, upper trunk; MT, middle trunk; LT, lower trunk; SA, subclavian artery; MSM, middle scalene muscle.

lenging to determine whether the insult was from nerve compression due to catheter placement or from concentrated effects of local anesthetic. In severe cases, patients may require surgical intervention, such as nerve grafting or neurolysis. Pain management is essential if indicated, and physical therapy may be recommended to improve range of motion and strength in the affected arm.

The risk of MCN palsy can be reduced by following proper techniques during the SC nerve block procedure. The use of US guidance can help ensure accurate placement of the needle and reduce the risk of direct needle trauma, intraneural injection, or mispositioning of the nerve catheter. Careful monitoring of the patient during and after the procedure will help identify any potential complications early and guide steps to mitigate further sequelae.

In conclusion, we present a case of MCN palsy following an SC nerve block with continuous nerve block that resolved with discontinuation and removal of the nerve catheter. This case highlights a rare complication of regional anesthesia that should be considered when performing this routine pain procedure.

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