

Bilateral Spread of Analgesia Following Interscalene Brachial Plexus Block

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Since its description by Winnie,¹ interscalene brachial plexus block has become an accepted technique for surgery involving the upper limb. Several complications have been described which include permanent neurologic damage to the motor outflow of the brachial plexus,² inadvertent subarachnoid³ and epidural blockade,^{4,5} cardiac arrest,⁶ hoarseness and Horner's syndrome,⁷ carotid bruit,⁸ and phrenic nerve palsy.^{9,10} These are infrequent complications and the technique is still considered safe.

Cobcroft¹¹ reported two cases of bilateral block without epidural or subarachnoid spread. We describe another case of bilateral block with different features.

REPORT OF A CASE

A 53-year-old, 61-kg woman was admitted with a compound fracture of the ring metacarpal of the right hand and a swollen contused left elbow (no fracture or dislocation). She was orientated to name, time, and place. Her arterial blood pressure was 120/90 mmHg, heart rate 75 bpm, and had a respiratory rate of 16/min. A right interscalene brachial plexus block was planned. The procedure then was explained to the patient and the block was performed using the technique described by Winnie.¹ A 19.1-mm, 21-gauge butterfly needle was inserted during which the patient complained of a sharp sensation in the opposite arm (*i.e.*, left arm). The position of the tip of the needle was altered and the sensation that the patient experienced moved up the arm and across the back with repositioning of the needle. When paresthesiae were elicited from the right upper arm, 35 ml of a mixture of 15 ml 2% lidocaine and 20 ml 0.5% bupivacaine with adrenalin 1:300,000 were injected. Within 15 min both arms were blocked totally for both motor and sensory function. There was no pain on pressure over the previously tender left elbow, and the right arm was blocked adequately for the surgeon to continue surgery after tourniquet application. At no time after the block was the patient in any respiratory distress. Heart rate and arterial blood pressure remained relatively constant for the following two hours.

The extent of the block, as tested by pinprick, was from C5-T4 bilaterally. The patient could not elevate either arm against gravity, and finger movement and grip strength were decreased. Motor func-

tion of the left arm returned 70 min after the block, and motor function of the right arm 165 min after the block. Sensory function returned on the left side, three hours after the block, and on the right arm 4.5 hours after the block. The patient made an uneventful further recovery.

After full recovery the patient was sent for radiologic examination of the cervical spine which showed no abnormality. Further questioning of the patient elicited no history of neck trauma or previous awareness of any cervical abnormality.

Studies were done on six cadavers in an attempt to explain the bilateral block. The neck regions of the cadavers were dissected. In the first two, with blunt dissection behind the prevertebral fascia, a finger could be passed from one side of the neck to the other. In the other four cadavers, 40 ml of a dye (methylene Blue) were injected behind the prevertebral fascia under direct vision. No crossing-over was noticed. The dye spread up and down the space.

There is a connective tissue septum in the midline which was easily broken down by blunt dissection but which prevented the passage of fluid. The distance from the point of insertion of the needle to the vertebral foramina also was measured in the cadavers. The minimum distance (from the skin over the medial edge of scalenus medius to the vertebral foramen at C6, at right angle to the vertebral column) was 23 mm. The minimum distance from the medial edge of scalenus medius to the vertebral column in the direction the needle is inserted for the block was 35 mm.

DISCUSSION

Bilateral spread of analgesia following the interscalene brachial plexus block technique is easily understandable after inadvertent epidural or subarachnoid injection. However, in this patient there was no evidence of either epidural or subarachnoid spread. The volume injected was large (35 ml) and would have been expected to cause bilateral phrenic nerve palsy, block of thoracic segments lower than T4, and possibly depression of the medullary respiratory and vasomotor centers if injected into the subarachnoid or epidural spaces. Accidental epidural or subarachnoid injection is unlikely to have occurred with a 19.1-mm long needle.

In the two cases of bilateral block reported by Cobcroft,¹¹ no explanation is given, but the author warns of the possibility of bilateral phrenic nerve palsy with respiratory depression. Our primary explanation is

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based on spread of analgesic solution via the prevertebral fascial space which lies immediately anterior to the brachial plexus and its sheath. If punctures had been made in the fascia by the repeated repositioning of the needle, a fairly large volume might have been injected into this fascial plane. Spread in this plane to the opposite side of the neck is possible if the patient has inadequately developed midline septa.

Although a finger can be passed from one side of the neck to the other in this plane, we have not been able to demonstrate spread of dye across the midline in cadavers. The volume needed to cause paresis by this means would be expected to be much greater than that used. The fact that the patient was thin might, however, have allowed easier spread of the analgesic in this fascial plane.

Another possibility is a hysterical reaction. This is unlikely because the patient was calm, quiet, and rational at all times during the block. Furthermore, the block wore off on the side opposite to where the needle had been inserted before it did on the ipsilateral side. Motor paresis also disappeared before sensory paresis as would be expected in a truly blocked limb.

None of the above explain both the bilateral block and the paraesthesiae which the patient experienced in the contralateral arm on insertion of the needle. Thus, we have no explanation for our case of bilateral brachial plexus block following use of the interscalene technique.

No other case with complete motor paralysis of the opposite limb lasting for more than one hour has been documented. Furthermore, there was no depression of respiration or the cardiovascular system.

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Massive Occult Retroperitoneal Hemorrhage during Hip Surgery

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Major vascular injury is a rare but important complication of hip surgery.¹⁻³ The most common signs of vascular injury are penetration or disruption of iliac or femoral vessels with subsequent signs of hemorrhage,

ischemia, and pseudoaneurysmal formation.²⁻⁴ Many of these injuries occur in the postoperative period in patients who were previously hemodynamically stable.²⁻⁴ We describe an unusual vascular complication in a patient undergoing hip surgery which underscores the potentially catastrophic result that can occur.

REPORT OF A CASE

An 80-year-old, ASA II man was admitted with a right subcapital hip fracture and was scheduled for a right hemiarthroplasty. Preoperative radiologic examination showed a fracture of the right femoral neck with intracapsular swelling suggesting a hematoma. His medical history was unremarkable except for prostatic adenocarcinoma that had been treated with diethylstilbesterol plus radiation therapy (2400 rads) to metastatic lesions of the right sacroiliac joint. Arterial blood pressure was 120/60 mmHg and heart rate was 84 beats per minute. The preoperative hemoglobin was 10.6 g/dl. All other laboratory data including electrolytes, electrocardiogram (ECG), chest roentgenograph, urinalysis, prothrombin time, and partial thromboplastin times

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