

Subdural Block—From a Spinal? A Case Report

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Abstract

Introduction: Multicompartmental blocks are commonly described in epidurals but not spinals. We describe a case of subarachnoid block performed in an obese patient which resulted in a clinical presentation resembling that of a subdural block. **Clinical picture:** A 29-year-old woman, scheduled for saucerisation of thigh carbuncle, was administered 2.1 mL of hyperbaric bupivacaine. The spinal resulted in a late onset of sensory block that extended to the neck and upper limbs. There was no sympathetic or motor blockade. **Treatment/Outcome:** The block receded spontaneously without causing any cardiovascular or respiratory compromise. **Conclusions:** The diagnosis of subdural block must be considered in patients with unusual presentations after a spinal anaesthetic. Factors affecting spread of hyperbaric bupivacaine are also highlighted.

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Introduction

There have been multiple reports of accidental subdural blocks published in the last 20 years.¹⁻⁵ Majority of these have been the result of an epidural gone astray, and the lowest reported volume of local anaesthetic used was 3.5 mL.⁶

We report an unusual complication of a subarachnoid block with the use of only 2.1 mL of hyperbaric bupivacaine.

Case Report

A 29-year-old woman [height, 164 cm; weight, 94 kg; body mass index (BMI) 34.9] was admitted for saucerisation of right thigh carbuncle. The only medical history of note was a 5-year history of non-insulin dependent diabetes mellitus which was fairly well controlled on oral hypoglycaemics.

Anaesthetic techniques suitable for the procedure were discussed with the patient and a subarachnoid block was decided upon.

An 18 gauge venula was set in the left hand and 500 mL of Hartman's solution infused. Intravenous midazolam 2 mg was administered prior to the block. The patient was then placed in the right lateral position. A subarachnoid block was performed at the L3/L4 interspace using the midline approach with a 26 gauge Quinke needle. Following a good flow of cerebrospinal fluid (CSF), 2.1 mL of 0.5%

hyperbaric bupivacaine was injected over 5 to 6 seconds. The patient was then turned supine.

Although she was still able to lift her legs weakly, there was excellent analgesia in her right leg up to the level of L1. A decision was made to proceed with surgery. Ten minutes after the subarachnoid block, the patient was repositioned in a lithotomy, Trendelenburg position.

About 20 minutes after the subarachnoid block was performed, the patient began to complain of 'heaviness' in her chest, followed shortly by tingling sensation in both hands. She was still able to lift both upper limbs. At this point, the sensory level was tested with a cold alcohol swab and it had extended to C7/T1 level. The patient's systolic blood pressure (SBP) and heart rate (HR) remained stable throughout (SBP, 100 to 120 mm Hg; HR, 70 to 80/min). Saturation was maintained at 94% to 96%.

The procedure ended 10 minutes later and the patient was sent to the post anaesthetic care unit. On repeated testing, it was found that the sensory block had extended to the neck, sparing the entire face. Nevertheless, the patient was still able to lift both upper limbs above her head and her blood pressure and heart rate remained unchanged.

The patient was reassured and left propped up at 60 degrees for another 35 minutes, by which time the block had receded to T5 level, and eventually wore off 4 hours later. The recovery was otherwise uneventful.

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Discussion

The subdural space is a potential cavity between the dura and arachnoid mater. It extends from the lower border of the sacral vertebra to the cranial cavity, but it does not communicate with the subarachnoid space. However, it does continue on the cranial and spinal nerves for a short distance.⁷

An accidental subdural block has been a well known albeit rare complication of epidural block.^{1,8} The exact mechanism remains to be elucidated although frequent postulations include catheter misplacement or migration.⁵ It was not until 1975 that Boys and Norman,⁹ using subdural dye injection, suggested that unusually extensive epidural blocks were in reality subdural blocks. This was further verified by Collier¹⁰ in 1992 who published a review of all radiologically confirmed cases of subdural blocks, 4 of which were collected by him over a 10-year period.

The common features observed by Collier include an unexpectedly high level of sensory block, sometimes following relatively small volumes of local anaesthetic (as low as 3.5 mL). Onset of block is delayed, about 20 to 35 minutes with bupivacaine, and it usually lasts for 65 to 230 minutes. Height of block appeared unrelated to volume of local anaesthetic used, but often reached the cervical nerve roots. Weakness of intercostal muscle and loss of sensation of respiration may result in respiratory embarrassment. However, larger volumes of local anaesthetic, 15 mL or more, when infused, have resulted in intracranial spread with loss of consciousness and respiratory failure.

There is usually absence of dense motor block in the lower limbs. Other suggested features described by Bell and Taylor¹¹ include relative lack of sympathetic block and sparing of sacral nerve roots.

All the features described so far have been related to epidural blocks in which the catheters have either migrated or were misplaced in the first place resulting in a subdural or multicompartamental block.

What about displacement of a spinal needle into the subdural space? Sechzer,¹² in 1963, actually suggested that some cases of failed spinal block may have been the result of a spinal needle sitting in the subdural space rather than the subarachnoid space. In 1992, Mollmann et al¹³ performed spinaloscopy in an anatomic human model. They concluded that it was indeed possible to deposit local anaesthetic in the subdural space even when there is both manually registered penetration of the dural and appearance of CSF in the needle hub. This was especially seen in the Sprotte needle with its lateral opening. Thus, accidental subdural injections secondary to spinal anaesthesia can occur. With myelographies, the incidence of subdural spread has been estimated to be over 10% via the spinal technique.¹³

In our patient, it was quite obvious that some local anaesthetic was indeed deposited in the subarachnoid space. This was evidenced by positive aspiration of CSF prior to initial injection of bupivacaine, fast onset of sensory block (within 5 minutes) as well as a fairly dense motor block, at least up to the level of L1. Unfortunately, 20 minutes later, the subarachnoid block had extended more cephalad.

If this block had been a pure subarachnoid block, the high sensory level achieved would have resulted in a 'total spinal', accompanied by a drastic fall in blood pressure, together with loss of consciousness, pupillary dilatation and respiratory failure. These were not evident in our case. Instead, the presentation resembled very much the clinical features described by Collier for a subdural block.

One postulation is that the spinal needle could have slipped out during the injection of bupivacaine. The anaesthesiologist who performed the block did not aspirate for CSF again at the end of the injection to confirm that the needle was still in the subarachnoid space. If indeed the spinal needle had slipped into the subdural space, it was surprising that such a small amount of local anaesthetic could actually produce a significant sensory blockade. Our postulation is that since the patient was placed in Trendelenburg position soon after the block was given, the local anaesthetic deposited in the subdural space could have tracked upwards, thus extending the block further cephalad. In addition, the patient was obese and it has been shown that obese individuals require a smaller amount of local anaesthetic to achieve the same level of sensory blockade as compared to non-obese individuals.¹⁴ Therefore, the small amount deposited in the subarachnoid space was sufficient to anaesthetise the operative site and the remainder in the subdural space could produce a significant level of sensory blockade in this particular patient.

In view of such an unusual presentation from a subarachnoid block, we would recommend certain precautions especially when performing this block in obese patients. Firstly, aspiration for CSF at the start and at the end of injection to ensure that the spinal needle is still in the subarachnoid space.

Secondly, rotation of the spinal needle through 360 degrees to ensure a good backflow of CSF before injection; this might help to detect spinal needles that may be sitting only partially within the subarachnoid space. As hyperbaric bupivacaine was used, it might be prudent to keep the patient in a dependent position for at least 10 to 15 min¹⁵ before switching to the Trendelenburg position as change in position is known to be one of the more significant contributing factors to the spread of hyperbaric local anaesthetic in a subarachnoid block. Dosage adjustments should also be considered in obese patients undergoing central neural blocks.

In conclusion, the authors feel that firstly, deposition of local anaesthetic into the subdural space is a possible, albeit uncommon complication of subarachnoid blocks. Secondly, they may present as unusually high sensory blocks. This is in contrast to Sechzer's postulation that failed spinal blocks are secondary to spinal needles sited in the subdural space.

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