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Case Report

Unexpected High Sensory Blockade during Continuous Spinal Anesthesiology (CSA) in an Elderly Patient

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Received 19 June 2012; Accepted 31 July 2012

Academic Editors: A. Apan, M. Dauri, and R. Riley

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A 98-year-old woman presented for a hemiarthroplasty of the left hip. Because of her age and cardiac and pulmonary co-existing diseases we decided to provide adequate regional anesthesia by continuous spinal anesthesia. Fragmented doses of isobaric bupivacaine 0.5% were administered through a system consisting of a spinal catheter connected to an antimicrobial filter. After an uneventful surgical procedure, prior to removal of the catheter, this system was flushed with 10 mL of normal saline in order to try to prevent post-dural-puncture headache. After arrival at the postanesthesia care unit and fifteen minutes after removal of the catheter the patient suffered an unexpected high thoracic sensory blockade and hypotension requiring treatment. The continuous spinal anesthesia technique can be used in selected cases to be able to administer local anesthetic agents in a slow and controlled manner to reach the desired effect. The risk of post-dural-puncture headache using this technique in elderly patients is very low and therefore precludes the need to try to prevent it. We have described a potentially dangerous complication of flushing a bupivacaine-filled system into the spinal canal of an elderly patient resulting in an undesirable high sensory blockade.

1. Introduction

Continuous spinal anesthesia (CSA) is an accepted technique of achieving regional anesthesia for surgery below the waist in elderly patients [1, 2]. Its advantages are the superior control by the physician on the type and dosage of drugs administered intrathecally. Consequently the level of sensory blockade can be controlled very precisely leading to minimal respiratory, hemodynamic and mental implications [3].

The height of a sensory block achieved with a single-shot spinal anesthesia (SSA) depends on various patient factors including age [4]. Advanced age also influences cardiovascular instability following spinal anesthesia, CSA may therefore be preferred over SSA for elderly patients [5]. Moreover the extent and intensity of the intrathecal blockade induced with local anesthetic agents influences cardiovascular instability. Concomitant conditions like cardiomyopathy or aortic valve stenosis may increase this risk of hemodynamic instability and cardiovascular complications further, strengthening the indication for CSA.

The downside of CSA over SSA is its higher rate of complications such as infection, epidural hematomas, post-dural-puncture headache (PDPH), and cauda equina syndrome [6–9].

This report is, as far as we know, the first one describing unintentional and unexpected high sensory blockade following CSA. We do not believe this to be an uncommon or even unrecognized complication but it nevertheless appears to be an underreported one.

2. Case Presentation

A 98-year-old woman suffered a left-sided femoral neck fracture caused by a fall and presented for a hip hemiarthroplasty. Her medical record shows paroxysmal atrial fibrillation, hypertension, recurrent complaints attributed to cardiac decompensation, a cardiac murmur and hypoxic chronic obstructive pulmonary disease (COPD), global initiative for chronic obstructive lung disease (GOLD) classification stage II (moderate severity), for which she received supplemental
of 17 per minute, peripheral oxygen saturation (SpO2) 92%.

She took no antiplatelet drugs or vitamin-K antagonists.

We hypothesized that the 10 mL flush of normal saline prior to the removal of the intrathecal catheter caused the late and high level of the unintended intrathecal anesthesia. The system we used consisted of a 104 cm catheter connected with a connector to an antimicrobial filter, closed with a cap. This system contains a total volume of 0.8 mL. In the worst case scenario this system would contain undiluted bupivacaine 0.5% and thus a dose of 4 mg. By flushing the system with normal saline we diluted and flushed most of the bupivacaine into the cerebrospinal fluid (CSF).

We hypothesized that the resulting effect resembled a technique called barbotage in which during the performance of a SSA a local anesthetic agent is injected while intermittently CSF
is aspirated and reinjected to dilute the local anesthetic and to induce a certain current in the CSF. The rationale of the barbotage technique is to increase sensory block height using a relatively low dose of local anesthetic drugs, however evidence is lacking [4, 11].

Elderly patients may have a lower lumbosacral cerebrospinal fluid (CSF) volume with lower CSF pressures [12]. The combination of 4 mg bupivacaine and its dilution with 10 mL normal saline into a relatively small volume of CSF might also have contributed to the unexpected large extent of intrathecal anesthesia up to the 3rd thoracic dermatome.

When using the CSA technique, the risk of PDPH is slightly higher, but probably still very low. By injecting normal saline, we intended to reduce the risk of PDPH, despite the incidence of this occurring after an SSA decreases with age [13]. In addition there appears to be little evidence, if any, for a single intrathecal injection of normal saline before removing a catheter to prevent the occurrence of postdural-puncture headache [9, 14, 15].

In conclusion we recommend that regional anesthesia by CSA be the technique of choice in the elderly high-risk patient requiring hip surgery. In this case the procedure went well until we flushed the intrathecal catheter with 10 mL saline before catheter removal. This probably caused an unintended and undesirable high sensory blockade because the intrathecal system contained enough bupivacaine to block the spinal afferent and efferent nerves up to a high thoracic level in an elderly patient.

This case demonstrates that the injection of normal saline through the intrathecal catheter before removal in order to reduce the chance on PDPH in elderly patients is debatable and not without risk. Anesthesiologists may be aware of this potential event, but as far as we know an incident like this has not been reported in literature previously.

Conflict of Interests

The authors declare that they have no conflict of interests.

Consent

Consent for publication was granted by the patient.

References


