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Case Report

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Assessing Expected Neurological Deficit with Spinal Anesthetic Before Removal of Spinal Needle – A Case of Failed Spinal Anesthesia Due to Drug Failure

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Abbreviations: CSF: Cerebrospinal Fluid

Introduction

We report a novel way of performing spinal anesthetics.

Instead of removing the needle immediately after injecting local anesthetic LA (traditional method), we propose keeping the spinal needle in-situ while determining if the block is truly working.

We saved a patient from painful experiences of a failed spinal, repositioning, more injections or conversion to general anaesthesia.

We could apply this new method to troubleshoot and manage in other scenarios.

Case Description

Our patient is an 89-year-old lady with past medical history of atrial fibrillation, cardiomyopathy (ejection fraction 48-55%), tricuspid regurgitation, pulmonary hypertension.

She had fractured her left neck of femur and was planned for bipolar arthroplasty. She consented for central neuraxial block.

Spinal anesthesia was performed in right lateral decubitus. Midline approach through L4/5 space yielded good cerebrospinal fluid (CSF) flow. Intrathecal 2.5ml 0.5% PLAIN bupivacaine was given via 25G Quincke spinal needle. Smooth aspiration of CSF was seen.

The stylet was reinserted (without moving needle) to prevent CSF and LA from leaking.

After 10 minutes, she did not develop any weakness or numbness. No sedation was given.

Intrathecal 2.5ml 0.5% HEAVY bupivacaine was given through the needle in-situ. CSF was flowing and aspiration was easy. Bilateral lower limbs sensory and motor loss and sensory level T10/11 was achieved within 1-2 minutes of administration. Her operation was uneventful.

In view of another recent case with failed spinal anesthesia using 0.5% plain bupivacaine, there was high suspicion of drug failure. The bupivacaine batch was within expiry and has been quarantined for investigation by hospital pharmacy.

Discussion

How to troubleshoot failed spinal [1,2]

Identify Problem	What to do
A. Unable to reach subarachnoid space (needle touches bone/ no characteristic tactile feel) -patient position -needle position -previous epidural injection before spinal attempted	- Reposition patient knee to chin as much as possible - Ultrasound to ascertain midline, depth, angle - Adjustments for scoliosis - Check if fluid coming back from needle hub is indeed CSF
B. Reached subarachnoid space but Unsatisfactory spread -Dural / arachnoid flap -heavy vs plain solutions and where spinal given (L5/S1 vs L3/4) -congenital tarlov cysts (meningeal dilatation of posterior nerve roots in 4.5-9% of people) -ligamentous septae (limit block height or limits to 1 side) -scoliosis, spinal stenosis -adhesions from spine operation or chemotherapy -dural ectasia marfan syndrome -needle clot / bent	- Choose quinke type of needle - Rotate needle 360 degrees before aspirating when using pencil point needle - Aspirate twice during injection - Check surgical site innervation corresponds to where block height is predicted to cover - Check patient records for any history of these and any radiological imaging - Avoid using damaged/bent needle
C. Ineffective/insufficient drug action on neural tissues -wrong solution -wrong dose/volume -LA solution leaked out between syringe and spinal needle hub -LA solution expired / inactive (could be due to manufacturing issues or storage problems) -LA solution incompatible with additives -LA resistance (mutation of Na channels)	- Check solution (whether it is the correct drug, volume/dose, expiry date) - Account for volume loss for leak and inject additional LA - Avoid additives especially multiple additives as these affect the pH, solubility of LA - Check if numbness is produced with skin infiltration (if suspect LA drug is ineffective)
D. Patient expectation -movement / traction / pressure may be perceived as “pain” -parasympathetic nerve activation from intra-abdominal viscera cause unpleasant sensation -fear/ anxiety cause heightened awareness -long operations in awkward positions causes discomfort	- Test with surgical forceps (Block height does not equate to block quality) - Patient selection - manage expectations - sedation - distraction like music - consider CSE/spinal catheters

Advantages of needle kept in-situ method

1. Less wastage of time, sterile equipment, patient discomfort in event of repeat spinal injection
2. We can ascertain if needle is intrathecal (bedside CSF glucose testing)
3. We can top up intrathecal medication (more LA, different LA, opioids)
4. We can use it to barbotage to increase block height

The onset of intrathecal bupivacaine is usually within 5-8 minutes **[3]**. The smaller autonomic fibers are blocked first, followed by sensory and lastly motor **[4]**. In patients who do not report any sensory or motor loss within 10-15 minutes, clinicians should suspect failed spinal anesthesia.

Spinal failure due to ineffective LA is not uncommon **[1]**. AstraZeneca received 562 'product defect notification' reports in 6 years to Dec 21, 2007, all ascribing failed spinal to ineffective bupivacaine from every country it was marketed. The numbers could be higher from under reporting.

Conclusion

By leaving the spinal needle in-situ until the assessment of the spinal anaesthsia is complete allows time and opportunity for the anesthetist to troubleshoot a failed spinal anesthesia.

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Conflicts of Interest: The authors declare no conflicts of interest

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