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The Prolonged Effect of a Spinal Adjuvant Drug or an Iatrogenic Complication: An Unprecedented

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Abstract

Introduction: Bupivacaine is one of the most widely used local anesthetics in spinal anesthesia. Clonidine is a known adjuvant added to prolong the duration of anesthesia. Amongst the complications related to spinal block, neurological complications can be the most troublesome.
Case Presentation: We presented a case where the reversal of motor and sensory blockade after spinal anesthesia with bupivacaine and clonidine was extremely delayed in the absence of any neurological injury.
Conclusions: Such cases remind the significance of timely and elaborate assessment in the detection of iatrogenic complications and the unpredictability of physiological and pharmacological interactions.

Keywords: Spinal Anesthesia, Prolonged, Complication, Clonidine, Bupivacaine

1. Introduction

Single-shot spinal anesthesia is the most common technique of anesthesia for lower limb surgeries. It is a safe and effective mode of anesthesia with a predictable onset and dense block (1). Bupivacaine is one of the most widely used local anesthetics in the spinal block. Various additives, like fentanyl, sufentanil, ketamine, dexmedetomidine, clonidine, morphine, etc., have been used with local anesthetics to prolong the duration of anesthesia and analgesia. After taking informed consent, we presented a case where the motor and sensory blocks were extremely prolonged after spinal anesthesia for a lower limb surgery.

2. Case Presentation

A 35-year-old female patient (weight: 60 kg, height: 160 cm) was referred for wide local excision with flap reconstruction of a soft tissue tumour in the right thigh. She had an uneventful history of two cesarean sections performed under spinal anesthesia 12 and 9 years ago. There was no history of any comorbidities. Her hemoglobin was 13.4 g/L, platelet count was 2.3 lakh/μL, and PT/INR was 11.7/1.07. All other investigations were also within normal limits. Inside the operation theatre, under all aseptic precautions, spinal anesthesia was given in a single non-traumatic attempt at L3 - L4 interspace using a 25-gauge Quincke spinal needle. Then, 2.8 mL of 0.5% hyperbaric bupivacaine and 30 μg clonidine adjuvant were administered. The evaluation after 10 minutes revealed a sensory block at the T8 level, and the motor modified Bromage score of 2, and the surgery was commenced. Intra-operatively, a 4 $\times$ 4 cm subcutaneous lesion was found in the medial compartment of the right thigh, which was extending up to the medial margin of the biceps femoris. The excision was done up to the muscles, and a fasciocutaneous flap was performed. The surgery was uneventful and finished after three hours. At the time of shifting the patient from the operating room, the sensory block was still at T8 level with a modified Bromage score of 1. The evaluation after another 2 hours revealed no regression of the sensory and motor block. The subsequent evaluations were done hourly thereafter. The sensory block receded to T10, and Bromage score was 2 in the 12-hour evaluation. The magnetic resonance imaging (MRI) of the lumbosacral spine was performed to rule out any nerve lesion, spinal cord compression, or subarachnoid hematoma. It showed no abnormal findings. There were no associated neurological features, like urinary or anal incontinence, back or leg pain, and dysthesias. The complete recovery of the motor and sensory block occurred 46 hours after the administration of spinal anesthe-

sia. The patient was discharged four days after the surgery without any complications.

3. Discussion

Neuraxial anesthesia is the most popular anesthetic choice for surgeries involving the abdomen, pelvis, and lower limbs. Anatomically, the white matter terminates towards the end of the spinal cord, and the grey matter blends into a mass called conus terminalis, and parallel spinal roots form the cauda equina. Conus medullaris is usually found at the lower border of the first (L1) or second lumbar vertebral body (L2) (2). Therefore, spinal anesthesia is performed below L2 to avoid any inadvertent neurological injury. The various complications that can lead to motor and sensory abnormalities after spinal block include transient neurological syndrome/transient radicular irritation (TNS/TRI), sub-arachnoid hematoma, arachnoiditis, anterior spinal artery syndrome, cauda equina syndrome, etc. There are also few reports suggesting low cerebrospinal fluid (CSF) volume as the culprit behind prolonged sensory and motor block after spinal anesthesia. Higuchi et al. reported that the time required for regression of the sensory block in spinal anesthesia is inversely correlated with the CSF volume (3).

In our case, we performed spinal anesthesia at the L3 - L4 interspace in a single atraumatic attempt (no hemorrhage, pain, or paresthesia) with a 25-gauge quincke needle, which reduces the probable risk of a neurological insult. As there were no features of saddle sensory loss or loss of bladder and bowel control; hence, cauda equina was ruled out. TRI and TNS are associated with bilateral pain in the lower back and buttocks, which radiates to the legs. Arachnoiditis was ruled out as a probable cause as it usually occurs within days, weeks, or even months after regional anesthesia as gradually progressive weakness and sensory loss in the lower extremities, unlike in our case. Normal coagulation profile and atraumatic procedure rule out any hematoma. Nerve injury, compression, or hematoma was also ruled out due to normal MRI findings.

The surgical procedure and site (the subcutaneous plane in the anteromedial thigh) did not involve any major nerve distribution (only some cutaneous branches of femoral and obturator nerve) to cause the neurological damage leading to such motor and sensory block.

Bupivacaine is a local amide anesthetic. The adjuvants, like opioids (morphine, fentanyl, sufentanil, etc.), alpha-2 agonists (clonidine and dexmedetomidine), dexamethasone, midazolam, magnesium, and epinephrine have been used along with local anesthetics for the intrathecal block. Intrathecal clonidine has been extensively studied as an alternative to neuraxial opioids for control of pain and has proven to be a potent analgesic and spare opioid-related side effects. Various studies and reports have documented the use of clonidine at 1 - 2 μg/kg as an adjuvant.

Bajwa et al. demonstrated that using 50 μg of intrathecal clonidine along with bupivacaine, the duration of analgesia was 497.20 $\pm$ 139.78 minutes (4). Intrathecal clonidine not only offers prolonged analgesia and reduced spinal anesthesia-associated shivering but also spares the intrathecal opioid-related side effects.

There are few reports of prolonged spinal blocks in the literature. Abbas and Asker reported a prolonged sensory and motor block of nearly 20 hours with the use of intrathecal dexamethasone as an adjuvant with bupivacaine (5).

After careful assessment, the most probable diagnosis in our case was the prolongation of the block due to the effect of clonidine, as there was a gradual regression of the block. To the best of our knowledge, this is the first case reporting this extremely prolonged effect after spinal anesthesia with clonidine as an adjuvant. This is also an unprecedented report showing both delayed motor and sensory recovery, as earlier reports have documented isolated sensory block prolongation. This report serves as a reminder of the unpredictability of various physiological and pharmacological interactions. To conclude, patients with unanticipated delayed recovery after spinal anesthesia warrant elaborate evaluation to rule out an iatrogenic complication from a normal prolonged effect.

Footnotes

Authors' Contribution: Priyanka Mishra conceived and designed the evaluation and drafted the manuscript. Mohit Kumar participated in designing the evaluation, performed parts of the statistical analysis, and helped to draft the manuscript. Robina Makker and Pankaj Kumar Garg re-evaluated the clinical data, revised the manuscript, performed the statistical analysis, revised the manuscript, collected the clinical data, and interpreted them. Priyanka Mishra re-analyzed the clinical and statistical data and revised the manuscript. All authors read and approved the final manuscript.

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