

Very long-lasting spinal anesthesia with dexmedetomidine: A report of two cases

ABSTRACT

Spinal anesthesia usually lasts up to two hours, but an infusion of IV dexmedetomidine can prolong it to three to four hours. We report two cases where single spinal anesthesia with IV dexmedetomidine was maintained for more than six hours during tibia fracture surgery. The spinal anesthesia was maintained for 350 and 390 minutes without another medication, and the sensory level confirmed after the surgery was T10 and L1. Dexmedetomidine can very-prolong the duration of spinal anesthesia beyond what has been reported. However, longer infusion times can also result in longer recovery times.

Key words: Dexmedetomidine, spinal anesthesia, surgical time

Introduction

Spinal anesthesia is a widely used technique for lower limb surgeries, with the typical duration lasting about two hours. However, the use of dexmedetomidine has been reported to prolong the duration of spinal anesthesia up to three to four hours.^[1,2] In this report, we present two cases in which the duration of spinal anesthesia was significantly prolonged due to the intravenous (IV) administration of dexmedetomidine.

Case Presentation

Case 1

A 21-year-old male patient without an underlying disease underwent surgery for fractures of the tibia and fibula. Spinal anesthesia was performed with needle puncture at L4-5 interspinous space, and 14 mg of 0.5% hyperbaric bupivacaine was administered. The sensory block level before

surgery was up to T8. To provide sedation, a loading dose of 0.4 µg/kg of dexmedetomidine was given over 10 minutes, followed by an infusion of 0.4 µg/kg/hr. The operation time was 350 minutes, and the dexmedetomidine infusion time was 340 minutes. Ephedrine 5 mg was administered for hypotension during surgery, and there were no other significant complications. The sensory block level in the post-anesthesia care unit (PACU) was L1. PACU stay duration was 80 minutes.

Case 2

A 31-year-old male patient without an underlying disease underwent tibia fracture surgery. After needle puncture at L4-5 interspinous space, 13 mg of 0.5% hyperbaric bupivacaine was administered. The sensory block level before surgery was T10. A dexmedetomidine infusion of 0.5 µg/kg/hr was administered to provide sedation.

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A loading dose was not given due to the initial heart rate of 55 per minute. Midazolam 3 mg was administered at the start of the operation due to inadequate sedation. During surgery, atropine 0.5 mg was administered due to bradycardia and ephedrine 5 mg was administered twice due to hypotension. The operation time was 390 minutes, and the dexmedetomidine infusion time was 365 minutes. The sensory block level in the PACU was L2. The duration of the stay in PACU was 56 minutes.

Discussion

The patients in these cases underwent surgeries lasting six to seven hours, which was maintained using spinal anesthesia with IV dexmedetomidine. Although it was not initially planned, the surgeries unintentionally prolonged. If the patient complained of pain, additional opioids administration or conversion to general anesthesia was considered. However, spinal anesthesia was well maintained until the end of the surgery.

The mechanism behind this prolonged effect is not well understood, but it may be related to the supra-spinal and direct analgesic actions of dexmedetomidine.^[3,4] IV administration of dexmedetomidine prolongs the effect of spinal anesthesia by acting on the supra-spinal level at the locus coeruleus. Stimulation of presynaptic α 2-A receptors at locus coeruleus causes a reduction in release of norepinephrine, resulting to sedative and hypnotic effects. When the α 2-A receptors located in the descending medullo-spinal noradrenergic pathway are activated, they stop the transmission of pain signals, which leads to analgesia. Dexmedetomidine decreases the activity of nociceptive neurons and suppresses the release of substance P in the substantia gelatinosa of the spinal cord. This mechanism of action allows dexmedetomidine to modulate pain by inhibiting the transmission and perception of pain.^[5]

Dexmedetomidine has been shown to prolong spinal anesthesia through the mechanism described above, although it is unclear how it can last for up to six to seven hours. A meta-analysis examining the facilitatory effect of IV dexmedetomidine during spinal anesthesia found that while the sensory block duration was prolonged, the mean duration was 183.76 minutes.^[2] In contrast, our patients experienced durations of 350 and 390 minutes, which makes our cases difficult to be explained.

In our cases, the sedative and analgesic effects of dexmedetomidine might have been helpful to cover surgical pain far beyond the regular spinal anesthesia duration.

However, considering that the surgery was a bone fracture open reduction, known to be particularly painful, and the sensory block level in the PACU was higher than expected, it is possible to postulate that the spinal anesthesia had been prolonged.

Prolonged use of dexmedetomidine has been associated with a tendency for delayed consciousness recovery in PACU.^[6] Therefore, at our hospital, when using dexmedetomidine during spinal anesthesia for sedation, we stop the infusion about 20-30 minutes before the end of the surgery. In Case 1, the surgery lasted longer than expected, so dexmedetomidine was administered until almost the end of the surgery to prevent pain complaints upon discontinuation. As a result, the PACU stay time was 80 minutes, which was longer than usual. In Case 2, the infusion was discontinued 25 minutes before the end of the surgery, and the PACU stay time was 56 minutes, which was also longer than the usual stay time of 30 minutes.

A spinal-epidural combined procedure is generally used to prolong the duration of spinal anesthesia, but dexmedetomidine intravenous infusion may also help to maintain the duration of single spinal anesthesia for up to about three to four hours, and it may help cover any accidental (unintentional) prolongation of the surgery, as in our case.^[7]

Conclusion

The cases presented here demonstrate a significant prolongation of spinal anesthesia with the use of dexmedetomidine, up to six to seven hours. This knowledge may provide clinicians with an additional option for long surgeries, which needs spinal anesthesia. Additionally, further research might be needed to determine whether dexmedetomidine with spinal anesthesia always leads to ultra-prolonged anesthesia and under what conditions it can occur.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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