Single Shot Spinal Anaesthesia for Caesarean Delivery of Two Achondroplastic Parturients

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Because of structural defects in achondroplasia, as one of the dwarfism types, the choice of an anaesthetic technique and management for caesarean delivery presents a challenge. We aimed to discuss our successful single-shot spinal anaesthesia approach for caesarean section for one urgent and one elective achondroplastic parturient based on the literature.

Keywords: Achondroplasia, caesarean section, spinal anaesthesia

Introduction

The incidence of achondroplasia, which is the most common form among more than a 100 types of dwarfism, has been reported in approximately 15 cases per 1 million births in the United States of America (1). On the other hand, in prenatal screenings conducted in Turkey, the incidence of achondroplasia varies between 1/10000 and 1/30000 (2).

Although there are discussions on the dose, choice and safety of medication for achondroplastic parturients undergoing caesarean section, spinal anaesthesia has been preferred for years (3, 4). In this case study, the management of single-dose spinal anaesthesia administered for an emergency and elective cesarean delivery with an elective caesarean section in two parturients who were achondroplastic dwarfs, a rarely seen case in our clinic, was presented along with literature.

Case Presentations

Case 1

An emergency caesarean section was performed for a 20-year-old and 37 weeks and 3 days pregnant woman (gravida: 2, parity: 1) diagnosed with cephalopelvic disproportion due to spontaneous amniotic membrane rupture. She was 145-cm tall and weighed 58 kg (body mass index 27.5 kg m⁻²). No medical problem was encountered during preoperative evaluation. In her physical examination, her airway was evaluated to be Mallampati class 2. No remarkable features were observed in the examination of the heart and respiratory system. Complete blood count and renal functions were within normal limits. After receiving written consent from the patient, she was taken into the operating room and her ECG, heart rate, non-invasive blood pressure (BP) and peripheral oxygen saturation were monitored. BP was 133/91 mmHg. While 0.9% NaCl infusion was being applied after the establishment of an intravenous (IV) route, 10 mg of metoclopramide, 50 mg of ranitidine and single-dose 1 g of cefazolin were given. Following skin disinfection, 7.5 mg of hyperbaric bupivacaine, 75 µg of morphine and 5 µg of fentanyl (total 2.2 mL) were intratracheally administered between the L3-4 intervertebral space with a sharp-tipped 25 G Quincke spinal needle in the sitting position. The patient was then rapidly turned to the supine position, and the operating table was turned to the left by approximately 15° after the insertion of a urinary catheter. The level of sensory block was controlled with a bilateral pinprick test. Three minutes later, the block level was at T4, and bilateral complete motor block developed. Since BP decreased to 96/47 mmHg and nausea developed, 15 mg of ephedrine was applied, and BP increased to 118/67 mmHg. Six minutes after onset of surgery, a 2920-g, 48 cm-tall boy baby was delivered. The Apgar scores at the 1st and 5th minutes were 8 and 10, respectively. After umbilical cord clamping, infusion with 20 IU of oxytocin (Synpitan forte 5 IU mL⁻¹, Deva İlaç, Istanbul, Turkey) in 1000 mL of Ringer's lactate was initiated. No problem was experienced during the operation that lasted for 45 min. After approximately 2.5 h, the sensory block regressed 2 segments, and the motor block completely disappeared at the postoperative 2nd hour.

Case 2

An elective caesarean section was planned for a 24-year-old and 39 weeks pregnant woman due to polyhydramnios and transverse presentation. Her height was 147 cm and weight was 66 kg (body mass index: 30.5 kg m^{-2}). In the preoperative history of the patient, from whom written consent was obtained, no medical problem was found. Her airway was evaluated to be the Mallampati class 2. Through the vascular access established after standard haemodynamic monitoring, 10 mg of IV metoclopramide, 50 mg of ranitidine and 1 g of cefazolin were injected. Similar to the first case, spinal anaesthesia was administered with the same type of spinal needle and at the same doses from the midline between the L3-4 intervertebral space in the sitting position (with a 25G Quincke spinal needle, 7.5 mg of hyperbaric bupivacaine, 75 µg of morphine and 5 µg of fentanyl). With a pinprick test, it was observed that the sensory block level reached to T10 level 3 min later, and 3rd degree complete motor block developed. Since BP decreased at the 2nd and 6th minutes, totally 20 mg of ephedrine was administered. Two minutes after the surgical incision, a 3570-g girl was born. The Apgar scores at the 1st and 5th minutes were 9 and 10, respectively. Similar to case 1, after umbilical cord clamping, oxytocin infusion was started (20 IU of oxytocin within 1000 mL of Ringer's lactate). The operation lasted for 35 min. The motor function was completely regained at the postoperative 3rd hour. After 3 h and 45 min, the sensory block ended.

Discussion

In this study, the successful management of single-dose spinal anaesthesia with an appropriate dose of a local anaesthetic agent and additional opioid combination was presented in 2 achondroplastic pregnant women, one of whom gave birth with an emergency caesarean section and the other with an elective caesarean section.

Dwarfism is defined as an adult height of 148 cm and less (5). Achondroplastic dwarfism in parturients may require caesarean section due to the accompanying cephalopelvic disproportion. There may be many factors affecting the decision of anaesthesia technique (general or regional anaesthesia) in achondroplastic dwarf parturients (6). Airway complications, such as difficult intubation due to a big head; big tongue; wide mandible; narrowed nasal, oral and tracheal airways; and limited neck extension can be observed (7). Regional anaesthesia can become more difficult owing to reasons such as lumbar lordosis, thoracic scoliosis, narrowed epidural and intrathecal space and expanded epidural veins. Depending on anatomical problems, the distribution of the drug that is administered cannot be predicted, and in addition, there can be difficulty during the insertion of a catheter (5, 6).

In literature, single-dose spinal anaesthesia is among the anaesthesia techniques preferred for caesarean sections in achondroplastic dwarf parturients. In these case reports, various doses of hyperbaric bupivacaine were administered in com-

bination with different adjuvants (fentanyl, morphine and/or meperidine) (4, 8, 9). In an emergency caesarean section of an achondroplastic parturient, 0.5% of 1.3 mL hyperbaric bupivacaine was intrathecally applied with 10 µg of fentanyl (4). In this case report, in which the height of the patient was not specified, the level of sensory block reached up to T3, and temporary decreases in BP were treated with ephedrine. Similarly, in an emergency caesarean section, single-dose spinal anaesthesia was administered using 1 mL of 0.5% hyperbaric bupivacaine with 10 µg of fentanyl in a dwarf parturient whose height was 109 cm (8). Although the level of sensory block did not rise above T4-T6 and the observation of no decrease in BP was attributed to low-dose local anaesthesia, anaesthesia was sufficient during the surgical procedure that lasted for 1 h.

In another case where single-dose spinal anaesthesia was administered, although it was reported that spinal anaesthesia failed due to low-dose spinal bupivacaine, 10 mg of hyperbaric bupivacaine and 0.2 mg of morphine were intrathecally given to a 124 cm-tall parturient who was to undergo emergency caesarean section because of breech presentation. Despite the fact that drug distribution was held responsible for unsuccessful regional anaesthesia in the dwarf parturient, the effect of spinal anaesthesia continued for 40 min, but an additional analgesic was needed because the surgery lasted for 82 min. Therefore, it was suggested that techniques including the use of a catheter, such as epidural, combined spinal epidural or continuous spinal, would be more appropriate in achondroplastic parturients (5). In our patient whose height was 145 cm, a 45-min anaesthesia administration was succeeded by intrathecally combining a lower dose of 7.5 mg of hyperbaric bupivacaine with 75 µg of morphine and 5 µg of fentanyl. Similarly, in our second patient whose height was 147 cm, efficient anaesthesia was intrathecally provided with 7.5 mg of hyperbaric bupivacaine, 75 µg of morphine and 5 µg of fentanyl. It was observed that the doses of local anaesthetic agents used in these two patients were appropriate with the addition of an opioid in achondroplastic parturients whose heights were above 140 cm.

In achondroplastic dwarf parturients, combined spinal-epidural anaesthesia is one of the preferred anaesthesia techniques (6, 10). In combined spinal-epidural anaesthesia administered in a 135-cm tall pregnant woman diagnosed with Leri-Weill dyschondrosteosis characterized by a non-proportional short stature, 9 mg of hyperbaric bupivacaine, 10 µg of fentanyl and 100 µg of morphine were administered into the subarachnoid space. When the patient felt pain 40 min after the administration, an additional dose was administered through an epidural catheter (10). It has been reported that techniques including catheter, even the continuous spinal anaesthesia technique with a microcatheter for spinal anaesthesia, can be safely used instead of single-dose spinal anaesthesia in caesarean sections lasting longer than 40 min (3, 5, 10). Because the duration of operation was 45 min in our first patient and 35 min in our

second patient, it was observed that the bilateral sensory block level reached at T4 and that the block was sufficient during the caesarean section in both patients.

Conclusion

There is no consensus on whether single-dose or techniques including catheter among neuraxial blocks is more suitable for caesarean sections in achondroplastic parturients. However, we suggest single-dose spinal anaesthesia, which we successfully administered with a proper dose of local anaesthetics and an additional opioid to two pregnant women, one of whom was to undergo emergency and the other elective caesarean delivery, for situations not requiring extra processes such as tubal ligation, which might prolong the duration of surgery.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

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