Combined spinal and epidural anaesthesia for an elective Caesarean section in a patient with achondroplasia

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Abstract

We describe the use of combined spinal and epidural anaesthesia in a 32-year-old parturient with achondroplasia who presented for an elective Caesarean section. A low-dose spinal block, using 5 mg 0.5% hyperbaric bupivacaine with 10 µg fentanyl, was inadequate (sensory loss up to T10). Sensory loss was extended by an epidural bolus of 5 ml 0.5 % isobaric bupivacaine to T6 within 15 minutes for surgery, which lasted 33 minutes. This titratable regional anaesthetic technique proved to be a viable option in the care of this patient.

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Introduction

Controversies exist regarding the anaesthetic management of parturients with achondroplasia over the associated challenges with regional and general anaesthesia.[1-3] There are accounts of successful, single-shot spinal and epidural anaesthesia for Caesarean delivery,[4-8] but Saxena et al[9] encountered repeated dry taps during the only reported combined spinal and epidural (CSE) anaesthesia. For this reason, they abandoned the spinal anaesthesia and provided an epidural anaesthetic. To date, there has been no reported instance of administration of regional anaesthesia in this group of patients in Nigeria. There were three published cases of patients who were managed at the University of Benin Teaching Hospital. All of them received general anaesthesia, despite an interval of 24 years between the first and the subsequent cases.[1,10] We describe a case in which the CSE technique was used for an elective Caesarean section in a parturient with achondroplasia.

Case report

A 32-year-old woman with achondroplasia presented for an elective Caesarean section at a gestational age of 34 weeks and three days. Her only previous pregnancy, 19 months previously, ended in a spontaneous abortion at 18 weeks. She had no previous history of anaesthesia. Her pregnancy had been normal except for recurrent preterm contractions from 23 weeks, for which she was hospitalised until delivery. She was 105 cm tall and weighed 40 kg, with a large head and a short neck with a full range of movement. Her airway examination revealed a large tongue and protruding incisors with a Mallampati score of II. She had short limbs with 5 cm shortening of the right leg, T8-T10 scoliosis to the left, mild lumbar lordosis and a spinal length measuring 44 cm. Her neurological, respiratory and cardiovascular system examinations were normal, as were the electrolytes and urea. Her packed cell volume was 32%.

During the antenatal visits, the anaesthetic procedures were discussed in detail. The potential risks and benefits of general vs. regional anaesthesia were highlighted. The patient expressed a desire to remain awake during her Caesarean delivery, so the CSE technique was decided upon and written, informed consent obtained.

In the operating room, intravenous (IV) access was secured with a 16G cannula in the left arm. The patient was preloaded with 400 ml of a normal saline solution. Monitoring consisted of noninvasive blood pressure, electrocardiography, pulse oximetry and the heart rate using the Classic-120 Multiparameter® monitor (Hamburg,

Germany). The patient's baseline vital signs were a heart rate of 112 beats per minute, blood pressure 96/70 mmHg and an arterial oxygen saturation (SaO_2) of 98% breathing room air. The premedication consisted of metoclopramide 10 mg IV and dexamethasone 4 mg IV. (We considered 0.3 M sodium citrate to be an excellent choice of antacid because it is nonparticulate, but it was unavailable.)

The patient was placed in the sitting position and a needle-through-needle CSE technique was performed at the L4/L5 interspace using an Espocan set (B Braun, Melsungen, Germany), comprising an 18G Tuohy epidural needle, a 27G spinal needle and a 20G multiorifice epidural catheter. The epidural space was located at the first attempt without difficulty using the loss-of-resistance-to-air technique at a depth of 4 cm. Spinal anaesthesia was established with 5 mg hyperbaric bupivacaine combined with 10 µg fentanyl. This was followed by the injection of 2 ml normal saline into the epidural space, before threading 3 cm of catheter. The patient was then placed supine with a 15-degree left lateral tilt. Monitoring, which consisted of electrocardiography, pulse oxymetry and arterial oxygen saturation, was continuous. However, the blood pressure recording was taken at one-minute intervals for the first 15 minutes and thereafter every three minutes until the completion of surgery. The block height was assessed at five, 10 and 15 minutes after the CSE anaesthesia. The sensory block tested to temperature and pinprick was found up to T10 dermatome at 10 minutes, so the first epidural bolus of 5 ml 0.5% isobaric bupivacaine was administered, and at 15 minutes, the block height was T6 dermatome, allowing surgery to commence. The patient was observed to shiver after delivery of the baby. This abated following the administration of tramadol 25 mg IV. The patient remained haemodynamically stable throughout the surgery, which lasted 33 minutes. Her heart rate ranged between 78 and 100 beats/minute, systolic blood pressure was 96-110 mmHg, diastolic blood pressure 62-89 mmHg, and SaO_2 97-99% breathing room air.

A live, female 2-kg neonate was delivered, with an Apgar score of 6 at one minute and 10 at five minutes. The patient expressed feeling minimal discomfort during the application of fundal pressure to deliver the baby. Estimated blood loss was 400 ml. She received 1 300 ml of the normal saline solution intravenously. The epidural catheter was removed at the end of surgery, while the neuraxial block lasted a total of three hours and 58 minutes. Postoperatively, the patient had tramadol, piroxicam and paracetamol as per our protocol for analgesia, which was adequate. The mother had an uneventful postoperative course, but as a first-time nursing mother, had difficulty breastfeeding her baby. In this regard, she was trained by health educators and midwives and discharged on the eighth day.

Discussion

This case report illustrates that if the requisite skill is available, CSE anaesthesia is a viable option in the anaesthetic management of a patient with achondroplasia who presents for elective Caesarean delivery. Vaginal delivery is not only hazardous, but also impossible in parturients with achondroplasia. A Caesarean section is indicated to prevent the risk of cephalopelvic disproportion and obstruction.[4] The decision of whether or not to utilise regional or general anaesthesia in these patients is not easy. Some authors caution against use of the former, suggesting that it could be tha cause of any subsequent neurological complications associated with spinal deformities that are common in this group of patients.[2,3,6] The absence of a pre-existing neurological difficulty in our patient did not preclude the use of a regional technique. So far, no neurological complications have been reported in this group of patients which has undergone regional anaesthesia.[4-8] We did not encounter any neurological complications in our patient in the immediate postoperative period.

It is understandable that there is reluctance to offer regional anaesthesia to patients with achondroplasia, because of the associated vertebral deformities, shortening of the pedicles, reduced interpedicular distance and underdevelopment of the vertebral arch, which is accompanied by narrowing of the epidural space.[2] The latter increases the risk of dural puncture, while the spread of local anaesthetic in both the epidural and subarachnoid spaces is unpredictable.[5,10,11] Technical difficulties can lead to multiple attempts at lumbar puncture, bloody taps and the inability to thread the epidural catheter into the epidural space. In some instances, the neuraxial block may have to be abandoned altogether and general anaesthesia performed as a last resort.[4,7,11] Our report supports the position of Carstoniu et al[5] which is that clinical experience does not agree with the view that generally, regional anaesthesia is contraindicated in patients with achondroplasia. We were able to locate the epidural space at the first attempt and institute the CSE block successfully.

The most common complication that has been reported by many authors following regional anaesthesia is high block, manifesting as hypotension. Usually, this is treatable with intravenous fluids and vasopressors. The lack of clear dosage guidelines on the local anaesthetic agents to use in spinal or epidural anaesthesia in this group of patients is contributory.[6,7,12] In a reported case, spinal anaesthesia was inadequate in an 82-minute Caesarean section in a parturient with achondroplasia, despite the administration of 0.5% hyperbaric bupivacaine 10 mg plus morphine 0.2 mg.[13] The administered dose clearly exceeded the

estimation of 0.06 mg/cm height as the minimum effective dose of intrathecal bupivacaine needed to provide effective spinal block to 95% of women having a Caesarean section.[14,15] In another case, the spinal block that developed up to T6 over 20 minutes receded within 15 minutes to T8 on the left and T10 on the right before surgical incision. It necessitated local anaesthetic top-up via a spinal microcatheter.[8] These cases demonstrate inter-individual differences in the neuraxial anaesthetic experience of achondroplasia. A titratable regional anaesthetic technique that guarantees prolonged surgical anaesthesia is recommended because the risk of inadequate spinal anaesthesia is high in patients with achondroplasia.[8,13] In our patient, the low-dose spinal anaesthetic produced a block up to T10 which was supplemented with an epidural bolus so that surgery commenced only after a height of T6 was achieved in 15 minutes. There was no hypotensive episode or desaturation, despite breathing room air alone.

The catheter length in the epidural space affects the block characteristics and complications. Usually, the lead investigator threads up to 5 cm in most normal-sized adults, but Morrow and Black[4] threaded 2.5 cm in their case, which resulted in a bloody tap at the first attempt. The repeat with the catheter threaded up to 2 cm was uneventful and produced a successful block. Since, in our case study, the epidural block was strictly intended to extend the neuraxial anaesthesia for the Caesarean delivery with low-dose bupivacaine, the 3-cm catheter length proved to be optimal, as complications associated with lengthier catheters, such as knotting, unilateral block and inadvertent venous puncture, did not occur.

In conclusion, despite the contrary view, we advocate CSE anaesthesia as a safe technique in a parturient with achondroplasia undergoing a Caesarean section, as it allows the patient the benefit of being awake during the Caesarean delivery, while providing the potential of extending the block.

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