

CASE REPORTS

Successful Awake Caudal Anesthesia for Incarcerated Inguinal Hernia Repair in an Ex-Premature Baby at 8 Weeks of Age.

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Abstract

Introduction: Caudal anesthesia is a standard procedure in pediatric anesthesia because of its excellent safety and success rate. Usually, it is administered after general anesthesia, but in selected neonatal populations, awake caudal anesthesia is a method of choice.

Prematurely born, low birth weight neonates are more prone to complications from general anesthesia than term neonates, even after simple surgery. Among these complications, post-operative apnea is the most common.

Caudal epidural anesthesia in awake neonates is a recognized technique that enables the avoidance of general anesthesia and the complications associated with it. In skilled hands, it is also theoretically easier to perform consistent caudal anesthesia than an awake subarachnoid block. In our case, we report a successful awake caudal anesthesia in an ex-premature baby in the emergency setting for incarcerated inguinal hernia repair.

To our knowledge, this case report on this topic has yet to be published in Armenia.

Conclusion: Neuraxial (spinal, epidural, caudal) awake anesthesia is the method of choice for lower abdominal surgery in preterm infants. Both spinal and caudal anesthesia are effective methods; awake caudal anesthesia is a method of choice because of the success rate and lower analgesic requirements in the post-operative period.

Keywords: Anesthesia, Caudal, Neonatology, pediatric neuraxial anesthesia

Background

The pediatric anesthesia department of Arabkir Joint Medical Center in Yerevan (Armenia) has collaborated with Kinderspital of Zurich for around 15 years. Continuous

educational programs have been established with workshops and visits from colleagues from Zurich, including sharing experiences, which has helped modify the approach and strategy when dealing with ex-premature infants. These patients can only benefit thanks to the bidirectional collaboration between the Department of Anesthesia of Arabkir Joint Medical Center and the Department of Anesthesia of Kinderspital of Zurich.

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Case presentation

We present a case of an 8-week-old boy weighing 3400g who was scheduled for a right-sided incarcerated inguinal hernia repair. On admission, his general condition was stable. Vital signs were heart rate (HR) of 175 bpm, noninvasive blood pressure (NIBP) of 88/60mmHg, oxygen saturation (SpO₂) of 96% on room air, and respiratory rate (RR) of 34. He was fed with artificial milk formula 4 hours before admission to

the operating room. Considering that the patient may have delayed gastric emptying, a stomach suction was performed, and 10 ml of artificial milk was aspirated.

Past medical history was marked with birth at 30 weeks of gestation with a body weight of 1500 g by cesarean section due to premature rupture of amniotic fluid. The patient was diagnosed with neonatal distress syndrome and was in the neonatal intensive care unit for 12 days, receiving oxygen therapy and noninvasive continuous positive airway ventilation.

Among the laboratory tests, the following were noticeable: Hemoglobin 83g/l, Hematocrit 25%, MCV-102, MCH-34, and Platelets-450.000/ μ l.

Echocardiography revealed a patent foramen oval with no signs of cardiac failure.

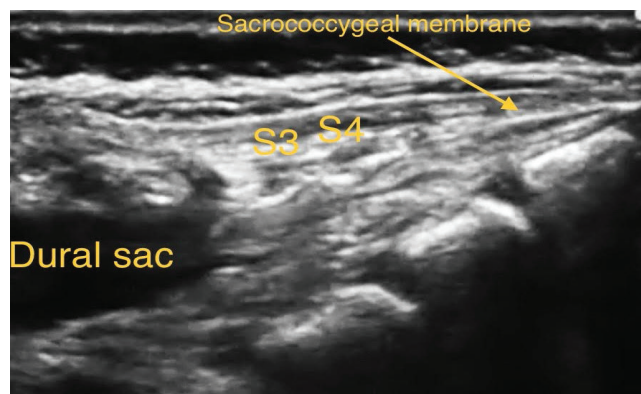
The other findings had no significant features.

Anesthetic management was determined as follows:

Establish intravenous access first to perform awake caudal anesthesia (24G needle, ropivacaine 0.25% 4,0 ml) using standard monitoring of the American Society of Anesthesia (continuous electrocardiography, noninvasive BP measurement, pulse oximetry). We typically use 1,2 ml/kg for lower abdominal surgeries.

Perioperative infusion of Ringer lactate solution with glucose 10mg/ml and 4-2-1 rule was administered with 10ml/kg bolus before caudal. Oral glucose 300mg/ml was administered as required for sedation purposes.

Caudal anesthesia was administered in the lateral decubitus position with a 24G IV catheter; once caudal space had been punctured, the catheter was treated without problems, then a test injection was made with no obvious sign of swelling, and the ultrasound control (see Picture 1) injection revealed a displacement of the dura and good spread of injectate in epidural space, then local anesthetic solution of ropivacaine 0,2 % 4,0 ml injected slowly in divided doses over two minutes with no changes in ECG morphology, such as ST segment changes and T wave elevation, with repetitive blood pressure control during and after injection. Rectal paracetamol 68 mg was administered just after caudal block was performed.



Picture 1 – Ultrasound of caudal space using a high-frequency linear probe with an in-plane approach.

After around 15 minutes, a motor block was established with no lower limb movements while the upper limbs were moving. The surgical incision was performed (see Picture 2). We asked the surgeon to be ready for disinfection once the motor block is established.



Picture 2 - Ultrasound of caudal space after injection of local anesthetic (LA) confirming that LA surrounds the Dural sac.

The operation lasted 40 minutes; during the perioperative period, the child remained comfortable. In our case, the motor block resolves after 50 minutes from the injection time.

The course was without complications, and vital signs were stable (HR 125-146, NIBP 75/45-90/60, SpO₂ 96-99%, RR 25-34). At the end of the surgery, the child was transferred to the post-operative recovery room, where monitoring continued. No apnea had been observed in the recovery room. The child was fed with artificial milk shortly after admission to the recovery room. No complications were noted 2 hours post-operatively, no additional analgesia was required, and the child was transferred to the standard surgical ward.

Discussion

Why was the decision made to perform an awake rather than under general anesthesia? General anesthesia is known to increase the risk of post-operative apnea in children up to 60 weeks of post-conceptual age [1]. The trouble is exceptionally high in preterm infants [2]. Anemia (Hct <30), in turn, increases the likelihood of apnea by about 4-fold [3]. All these risk factors were present, so the awake option was chosen.

The next question that needs to be discussed is whether spinal or caudal blockade is the best method. Many studies demonstrate the advantage of caudal anesthesia over spinal anesthesia due to the longer duration of post-operative pain relief, less need for additional analgesics, and a higher probability of success [4], [5]. In our practice with awake spinal anesthesia, even a tiny movement of a baby when the spinal needle is in place may displace the hand and result in the extrathecal spread of local anesthetic.

On this basis, a decision was made in favor of caudal anesthesia. However, it should also be noted that several studies show that episodes of intraoperative bradycardia and intraoperative hypotension are less familiar with spinal anesthesia than with caudal anesthesia.

Conclusion

Neuraxial (spinal, epidural, caudal) awake anesthesia is the method of choice for lower abdominal surgery in preterm infants. Both spinal and caudal anesthesia are effective methods. Still, in Arabkir Joint Medical Center, awake caudal anesthesia is the method of choice because of the success rate and lower analgesic requirements in the post-operative period.

We cannot be thankful enough to the Department of Anesthesia of Kinderspital of Zurich for their contribution and continuous education in pediatric anesthesia in our hospital, leading to better outcomes and better satisfaction, especially from parents.

COI Statement:

This paper has yet to be submitted in parallel. It has yet to be presented fully or partially at a meeting podium or congress. It has yet to be published or submitted for consideration beforehand.

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