Caudal Block with Intermittent Re-dosing of Local Anesthetic for Abdominal Surgery in Infants

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Introduction:
Ongoing reports about anesthesia related neurotoxicity in fetal brain makes regional anesthesia more appealing for pediatric anesthesiologists and concerned parents.

Regional anesthesia can be successfully used in providing a quiet surgical field at the most young of the ages. Former premature neonates that need surgical repair of abdominal wall defects can avoid exposure to anesthetic drugs by having the surgery performed under regional anesthesia. These infants usually have chronic lung disease and avoiding the intubation can facilitate a quick recovery.

Case Reports:
We present 3 cases of infants that underwent regional anesthesia. The first case is a 2-month-old 6kg baby-boy, full term, scheduled for a left inguinal hernia repair, hydrocelectomy and diagnostic laparoscopy. After parental consent, we performed a caudal block in the operating room. The baby was placed in lateral decubitus and then we applied local anesthetic to the overlying skin with 1% Lidocaine using a hypodermic 30G needle. After the baby was comfortable again we used a 18G Jelico angiocath to access the caudal space. After a test dose, we inserted a 20G catheter to the level of T12-L1. Using the ultrasound we were able to visualize in real-time the advancement of catheter and spread of local anesthetic in the epidural space. We used 4 ml of 0.25% Bupivacaine. After securing the catheter on the skin, an intravenous line was placed and 1 mcg of Precedex was given. We verified that the block was working with a pinch test at 10 min. Surgery lasted 100 minutes, and in the second part the surgeon performed a diagnostic laparoscopy to check for the presence of a right inguinal hernia. Using gentle insufflation of the abdomen, with pressures less than 8 mm Hg, the surgeon was able to visualize the desired anatomical structures.

Case Reports Continued:
The pneumoperitoneum produced some discomfort in the baby and we supplemented the sedation with a small amount of Propofol. For the duration of laparoscopy we assisted the baby with mask ventilation to avoid hyperventilation and hypercarbia. At the termination of laparoscopy, which lasted 8 minutes, we returned the baby to Salter nasal canule with 1 L of oxygen. The catheter was removed at the end of the case after bolusing with 3 ml of 0.125% Bupivacaine. There were minimal changes in vital signs for the entire procedure, and the patient was discharged home with the parents.

The second case is a former 26 weeks premature boy, birth weigh 841 gr, now 12 weeks postconceptional age, 2.5 kg, on ½ L O2 nasal canula, scheduled for bilateral inguinal hernia repairs and circumcision. His neonatal course was significant for prolonged intubation for respiratory distress, BP, PICC line placement, anemia, apnea of prematurity and s/p PDA ligation. He was extubated 2 weeks prior coming to the OR and maintaining SpO2 in mid 90’s with 1/4L O2. Parents were very concerned about the effects of general anesthesia on the brain and we offered the option of regional anesthesia. We performed a caudal block with 2 ml of 0.2% Ropivacaine after placement of a 20G catheter. The onset of the block was quick with the baby being comfortable in less than 10 minutes. The duration of the surgery was anticipated to be longer than the half-life of the Ropivacaine and we re-dosed with 0.4 ml of 3% Chloroprocaine at 90 minutes after the block.

The third case was a 41-day-old infant born at 30 weeks gestation with a right inguinal hernia complicated by bronchopulmonary dysplasia and was on mechanical ventilation for the first day of his life. He is currently on ¼ liter of oxygen and weighed 2.6 kg. We performed a spinal anesthetic with 0.75% Bupivacaine and placed a 22G Angiocath in the caudal space for additional dosing of 3% chloroprocaine. We administered another 2 ml of 3% chloroprocaine in divided doses for the duration of the procedure.

Discussion:
Caudal anesthesia has been used as a single shot dose. The limitation of the duration of motor block was not desirable for larger surgeries. Spinal anesthesia that provides a solid motor block and has a much shorter duration in infants than in adults is not a viable option for longer surgeries. Some authors report an incidence of failed spinal as high as 21% (1). Our approach was to visualize in real-time the spread of local anesthetic with the ultrasound in order to minimize the chances of a failed block. We tried to use a caudally inserted catheter to be able to prolong the duration of the block for as long as needed. We observed a strong motor block and a sensory block up to T4. In addition, using the caudal block for rescue as the spinal block wears off is a good way to keep the child comfortable until the procedure is complete. However, older and more vigorous infants may have some movement of the

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lower extremities, and occasionally they require restraints. Additional sedation with Precedex was used as a drug-of-choice as there is no evidence to suggest any neurotoxicity for this drug, and it does not depress the respiratory drive. There is a paucity of reports about using mask ventilation and regional anesthesia for laparoscopic surgery. A short period of pneumoperitoneum was well tolerated by our patients.

Summary:
Though our experience is limited, the use of a caudal block as a rescue technique is a viable option if the spinal wears off prior to completion of surgery. The use of local anesthetic is also possible as the primary type of regional anesthesia in inguinal surgeries.

References:

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