

# Neonatal caudal block revisited: can safety be improved?

**A Bosenberg**

Department Anaesthesia, University of Cape Town

## Introduction

Ex premature infants less than 60 weeks conceptual age are at risk of apnoea following general anaesthesia. For this reason regional anaesthesia (spinal or caudal) has been advocated to reduce the incidence of apnoea following inguinal surgery in these high-risk infants. Spinal anaesthesia is technically difficult in these infants with a reported failure rate of up to 15%. Caudal block has a longer duration of action and has a higher success rate in experienced hands. However dural puncture, particularly in small infants, is a recognised complication of caudal block and may be attributable to faulty technique. Ultrasound examination of the spinal cord may provide useful information prior to placing the caudal block.

## Objectives

(i) To determine the position of the dural sac in relation to the sacral hiatus and (ii) To evaluate the anatomy of the spinal cord in infants and neonates using ultrasound. (iii) To correlate the termination of the spinal cord (conus) with the sensory level of blockade.

## Method

Premature infants, less than 60 weeks conceptual age, presenting for surgery were recruited to this prospective study, including those known to have abnormal anatomy (e.g. hemivertebrae, sacral agenesis, tethered cord). Ethical approval was obtained from the Ethics committee at UCT. Informed parental consent was obtained prior to surgery. The following demographic data were recorded: age, weight, height, gender, gestational age, and conceptual age.

Anaesthesia was induced using halothane or sevoflurane. Intravenous access was obtained and the infant was turned onto the right side. Prior to performing a caudal block a SonoSite 180+ portable ultrasound unit (SonoSite®, Bothell, WA, USA) and a 5-10 MHz linear hockey stick probe were used to determine the spinal cord and vertebral anatomy. Adjustments (depth, probe frequency, low and far gain) were made to obtain optimal ultrasonographic images of the conus medullaris, dural sac and the surrounding anatomical structures. The following measurements were recorded: the position of the conus medullaris and the dural sac in relation to

the vertebral bodies and their distance from the sacral hiatus. Any abnormal anatomy that may contraindicate the placement of a caudal block was recorded.

When no contraindication was noted a caudal block of 1 ml/kg 0.25% Bupivacaine with 1:400000 adrenaline was placed using a 20G short-beveled needle. Once satisfied that the caudal block was successful, the inhalational anaesthesia was terminated and the respiratory pattern was monitored by capnography via a nasal cannula. Other monitors included a noninvasive BP cycled every 3 minutes, ECG and pulse oximetry. The sensory level was determined at the end of surgery (but before 1 hour had elapsed) using ice and or skin pinch. The correlation between the level of the spinal cord and the sensory level was determined.

## Results

To date 72 infants weighing between 1.2-5.9 kg have been evaluated. Their ages ranged between 1-187 days; all were below 60 weeks conceptual age. The distance from the sacral hiatus (needle insertion) to the dural sac ranged from 0-12 mm. The planned insertion point was moved more caudad on three occasions to avoid the risk of dural puncture and was abandoned on one occasion because the anatomy was abnormal. The conus was positioned between L1-L3. The conus was at L4 in one infant with a tethered cord. The anatomy of the dural and cord was found to be normal in 5 infants with hemivertebrae. The sensory level was determined in 48 infants who had inguinal surgery. A weak correlation between the position of the conus and the sensory level was noted. More data is required.

## Conclusion

Ultrasound examination of the spinal cord anatomy provides valuable information that can improve the safety of a caudal block in neonates and infants. Unforeseen anatomical abnormalities that preclude the use of a caudal can be diagnosed. The proximity of the dural sac to the sacral hiatus is variable but less than 1 cm in most infants. The practice of changing the angle of insertion and advancing the needle should be discouraged particularly in young infants where the risk of dural puncture is high.