

Caudal Block of Postoperative Analgesia in Children

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Summary

Caudal block as a method of analgesia has been evaluated in 95 children after abdominal and perineal operations. A high success rate has been obtained.

Introduction

Providing sufficient postoperative analgesia for children is no easy task but children suffering from pain worsens this fear of hospitalisation and might influence unfavourably their future well-being. Obtaining cooperation and confidence in the postoperative period from the child in pain is difficult

Administering opioid analgesics parenterally, often in combination with phenothiazines, is the most frequent solution. Although such a solution is acceptable and has proved effective. It is by no means the only option.

In some cases it might be possible to use caudal epidural analgesia. Unfortunately, local techniques are seldom used on children even though caudal block is simple, effective and offers only a minimal risk of complications (1). This technique can be used for providing analgesia after operations on the lower abdomen, on the perineum, genitals and the lower extremities.

Method

After premedication the child is brought into theatre, general anaesthesia is induced, either by inhalation of a mixture of nitrous oxide, oxygen and halothane, or by i.m. administered ketamine and i.v. access is secured. The caudal block is performed with the child lying on his side, with the lower extremities well flexed and knees tucked towards the abdomen. The anaesthetist himself stands in front of the child and leans over him. The whole area is cleaned and disinfected an aseptic procedure being strictly followed. For the puncture itself the normal single-use needle G20 or G21 is

used. The needle is aimed in a sagittal plane at an acute angle (about 30°) towards the skin, pointing cephalad. Anatomical landmarks - the apex of the coccyx, cornua sacralis and a slight depression overlying the hiatus canalis sacralis - are all easily identifiable. The feel of piercing the membrana sacrococcygea is distinct. The needle is inserted into the cavity of the sacral bone a few millimeters only and lies now almost parallel to the skin surface. When in the course of several seconds no fluid or blood appears in the hub of the needle, the attempt of aspirating from the needle is made. Aspiration test being negative, local anaesthetic is slowly injected. The amount of the solution depends on the age of the child, as shown.

table 1.

Age	ml of 0,25% solution of bupivacaine
up to five years	age + 1
6 to 10 years	age + 2
11 to 15 years	age + 3

Table 1. The dosage of 0,25% solution of bupivacaine. In each category a coefficient is added to the age in years (thus the 2 years child receives 3 ml, 7 years 9 ml, etc).

Our dosage is based on recommendations of Schulte-Steinberg (2), and secures analgesia up to the umbilicus - up to the height of the tenth thoracic dermatome. Other dosing schemes exist and can be used successfully (4) (5). A 0,25% solution of bupivacaine (Marcaine ASTRA, Sweden) is used and becomes fully effective within 30 minutes. The Caudal block allows lightening of general anaesthesia to the inhalation of the mixture of nitrous oxide and oxygen with traces of halothane.

A group of 95 children is presented, where a 0,25% solution of bupivacaine has been employed

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for caudal epidural analgesia. The age distribution of the children is shown.

Table 2

Age (Years)	Number
less than 1	6
1 - 2	25
3 - 5	30
6 - 10	20
11 - 15	14

Table 2. Age distribution if the group of children (total 95), where caudal block has been used for postoperative analgesia, employing 0.25% solution of bupivacaine.

The Length of Operation

The duration of operations varies considerably (the shortest and the longest being 20 minutes and 8 hours 10 minutes respectively), but more than half of them lasted less than 2 hours. The children were operated on for various conditions requiring surgery of a non-emergency nature. The site of the operation was in the lower abdomen, in the groin, perineum or lower extremities.

After the operation no other analgesics were given at first. The children were observed in the ward. If they became uncomfortable, started crying or complained of pain, opioid analgesics were administered immediately and the time was noted. The period from performing the caudal block up to this moment was considered to be the Total Analgesia Time.

The Results

In all but two cases an excellent postoperative analgesia was achieved, thus the success rate was 97.9%. The children were comfortable, playful, perfectly awake and cooperative - in striking contrast to the sight of those who had been given parenteral opiates only. The mean total analgesia time was 8.5 ± 0.8 hours (mean \pm SEM). If from this time interval the duration of the majority of operations is subtracted the remaining 6 hours of postoperative analgesia is obtained.

A further analysis showed the difference in various type of operations. The total analgesia time was 12.7 ± 6 hours (Mean \pm SD) in the children who have been operated on the lower extremities,

on the perineum or in the groin. It meant 9 - 10 hours of good postoperative analgesia. Where the reimplantation of ureter (or ureters) for vesico-ureteric reflux was performed (a total of 35 cases), the results were far less satisfactory: the total analgesia time was found to be 6.4 ± 5.1 (Mean \pm SD) hours only. They were restless and complained of a colicky pain with an urge to urinate soon after the operation, though at the same time the skin analgesia had not regressed below Th¹¹ - Th¹². The functional neuroanatomy of the ureters gives some clue of this finding: some neural fibres conveying pain from lower ureters and urinary bladder travel alongside the abdominal sympathetic chain with connections as high as 8. This is a possible reason why the suitability of this method to provide analgesia for such operations could be questioned.

The mean dose of bupivacaine was 0.77 mg/kg - 0.77 ± 0.02 (mean \pm SEM). This is less than $\frac{1}{3}$ of the maximum allowable dose in the epidural space. No complications with this method were encountered.

It might be stressed, that the postoperative course with caudal analgesia is rather different. Firstly, although the general anaesthesia is fairly light, the children tend to sleep longer than after a G.A. Probably the pain following G.A. acts as a non-specific arousing stimulus. When pain is absent, as is the case following caudal block, awakening is gradual, slow and comfortable. Secondly, once the children do wake up, their expression is not hindered either by pain or by drugs. They are playful and exhibit keen interest in their surrounding (3). The nursing staff might be surprised by this fact, for parenteral analgesia with opiates is commonly accompanied by a deep sedation.

Since the time we have finished the above series of patients we have adopted the use of 0.5% solution of bupivacaine. The volume used is the same as in table 1. Our experience with stronger solution totals over 50 cases so far. There has been no failure yet, nor any complications. The postoperative analgesia is even better and lasts 12 - 14 hours in most cases. It frequently lasts well into the first postoperative day and parenteral analgesics are entirely avoided. Unfortunately, there was practically no difference in the case of ureteric reimplantations: a short time after the operation the children feel discomfort and a sort of ureteric colic.

Two cases of failure in the first series of 95 patients were both children with development defects of the anorectal region and of the sacral bone - the use of caudal block in such cases should be very carefully assessed as it might fail.

The experience acquired from this study confirms the method as a valuable alternative way of providing postoperative analgesia in children as no special equipment or undue skill needed. Because of its effectiveness, simplicity and safety, it is recommended for more widespread use in paediatric patients.

Literature

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