

Effect of Age, Adrenaline and Operation Site on Duration of Caudal Analgesia in Paediatric Patients

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Abstract

The effect of age, operative site and addition of 1: 200,000 adrenaline to bupivacaine was evaluated on the duration of post operative analgesia after caudal block in 200 children between the age group of 1 year to 14 years. Anaesthesia was induced and maintained on Halothane/N₂O/O₂. After this caudal block was performed with 0.5 ml/kg of 0.25% bupivacaine in one group of 100 Children and with 0.25% bupivacaine with adrenaline 1 : 200,000 in another 100 children. The duration of post operative analgesia was noted to be significantly longer in young children, in children having penoscrotal operations and when adrenaline was added to bupivacaine. Conclusion was drawn that duration of post-operative analgesia depended upon age, site and addition of adrenaline to bupivacaine.

Key words

Paediatric anaesthesia, Anaesthetic technique, Caudal epidural

Introduction

Caudal block is often used in children to reduce pain after surgery. This is technically simple and safe technique to take care of post operative pain. This technique is almost devoid of complications. Duration of pain relief has been reported to be between 4-12 hours (1). Pain relief has been studied to be of excellent quality especially in patients taken up for penoscrotal and inguinal region surgeries (2).

Material and Methods

Two hundred male paediatric surgical patients of ASA-I were selected between the age group of 1 to 14 years for various surgical procedures in penoscrotal and inguinal region. One hundred children were studied in group-I with a caudal block with bupivacaine 0.25% (0.5ml/kg) and one hundred children in group-II were

given caudal block with bupivacaine 0.25% (0.5 ml/kg) and adrenaline (1: 200,000). Presence or absence of post operative pain was noted by resident doctors, nurses or parents who were instructed to identify, in a standard manner, the evaluation of post operative pain both in verbal and non-verbal children. No sedative, narcotic or NSAID was used in perioperative period Observations were started when the child was completely awake.

Results

The observation regarding the effect of age, operative site and addition of adrenaline to bupivacaine were significant as seen in Tables I, II & III. In general, the mean duration of analgesia increased with decreasing age, in penoscrotal procedures and with the addition of adrenaline.

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Table I. Age Distribution

Age in years	Group-I Bupivacaine (0.25%)	Group-II Bupivacaine (0.25%) + Adrenaline i:200,000
1-5	40	40
6-10	35	30
11-14	25	30
Total	100	100

The effect of adrenaline on prolongation of analgesia caused by bupivacaine decreased with increasing age and

to a lesser degree, with the operative site (duration of analgesia was longer with penoscrotal than inguinal procedures).

There were no major complications of caudal block. Minor complications included nausea and/or vomiting in 4 patients (2%) and transient weakness of lower extremities in 6 patients (3%). In most cases children who in preoperative period were able to control micturition were able to void within 2-4 hours of caudal injection. Only two children were unable to void within 5 hours while one voided after 8 hours and another after 6 1/2 hours (both had received bupivacaine + adrenaline).

Table II

Distribution of surgeries in different age groups.

GROUP I	SURGERIES					
	1-5 Yrs.		6-10 Yrs.		10-14 Yrs.	
	Hydrocele	Herniotomies	Orchidopexies with circumcision	Bilateral Orchidopexies	Herniotomies	Orchidopexies
Total	20	20	25	10	20	5

GROUP II	SURGERIES						
	1-5 Yrs.			6-10 Yrs.		10-14 Yrs.	
	Hydrocele	Herniotomies with circumcision	Orchido- pexies	Orchidopexies with circumcision	Orchidopexies	Herniotomies	Orchidopexies
Total	20	12	8	22	8	25	5

Table III

Post Operative Pain Relief

	Age (yrs.)	Pain Relief in Hours	
		Group I (0.25% Bupivacaine)	Group II (0.25% Bupivacaine + Adrenaline)
Lower Inguinal Area	1-5	4-12	6-14
	6-10	4-8	6-12
	11-14	3-6	6-12
Penoscrotal Area	1-5	6-12	6-14
	6-10	4-12	6-12
	11-14	4-8	6-12

Discussion

It has been observed in one of the studies that addition of adrenaline (1:200,000) results in increase of 25% in analgesia caused by caudal block with bupivacaine (3). A similar increase was found in our study in patients more than 5 years of age. But, more increase in the duration of analgesia was found in our children below 5 years. It goes with the observations made by Warner *et. al.* that the increase was unrelated to the site of operation (penoscrotal V/S inguinal) (4).

The mechanism of prolongation of analgesia in younger children is unclear, the possible explanation being more cephalad spread of sensory block with 0.5 ml/kg bupivacaine in younger children than older ones. Some have given explanation on the basis of epidural fat being loosely packed and gelatinous in young children as compared with early adulthood where it is tightly packed. This loose fat allows a greater spread of volume of drug in young children (5,6). Because of greater volume of distribution in young children (below 5 years) the terminal half life of bupivacaine prolongs but this may not contribute greatly to prolongation of analgesia.

In summary, adding adrenaline 1:200,000 to bupivacaine, young age, and operation performed in areas with sacral innervations were factors that resulted in prolongation of analgesia period in post operative periods after caudal block. Moreover our observation regarding the safety of the block goes with that of Gunther *et. al.* (7).

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