

Usefulness of Caudal Block in Children

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Background: We are becoming aware of the need for adequate analgesia in children. **Aim:** is to find the effectiveness of caudal analgesia in children undergoing circumcision. Forty boys undergoing circumcision were studied in Services Hospital, Lahore. Caudal Block (CB) was given after general anaesthesia but before the start of surgery. Half the boys (LAG), received CB with 0.5 ml/kg of 0.2% bupivacaine solution, the other half received equivalent volume of normal saline (NSG). Behaviour of the boys, pain relief and side effects were assessed postoperatively. Complete pain relief was obtained in 100% of LAG while in (NSG) only 10 % boys had adequate pain relief. Boys in LAG were pain free for 12 to 18 hours postoperatively. NSG required pethidine to achieve pain relief. Complications were only few and minor, but the pain relief was very good with CB. CB for circumcision in children is quite simple, safe and provides effective analgesia for 12 to 18 hours postoperatively.

Key words: Children, Caudal block, and circumcision.

Regional analgesia (RA) is generally not preferred in children, however, in last few years there has been an increase in the popularity of RA in children.

Better knowledge of the child's anatomy, physiology and pharmacokinetics has increased the safety of R.A in children. A greater appreciation of the need of pain relief and availability of special needles for children has been useful in RA (Giaufre 1995) and side effects are generally minor.

R.A produces profound selective analgesia of the region of surgery with minimal physiological alterations. When used at the start of an operation, RA minimises the total dosage of inhalation or intravenous anaesthetic drugs required, hastens awakening, permits early ambulation and shortens hospital stay.

Caudal analgesia has been used in children for the operations upon anus, rectum, perineum, penis, urethra, vagina, and also for lower abdominal operations. We decided to look into the usefulness of caudal analgesia (CA) in children.

When prolonged analgesia is required a catheter may be inserted into the caudal or lumbar epidural space for intermittent or continuous injections of local anaesthetics.

RA is also useful when general anaesthesia (GA) is technically difficult or is associated with an increased morbidity or mortality. RA may also offer an alternative to GA in children with neuromuscular, metabolic, cardiac or chronic lung diseases, malignant hyperthermia, and in emergency situations when children are at a great risk of pulmonary aspiration of stomach contents.

Material and Methods:-

After the department's approval, this prospective study was conducted in Services Hospital, Lahore, with the collaboration of the department of Paediatric surgery. Forty children were identified from the outpatient clinic. All were of ASA I physical status. Informed consent of

parents obtained. They were given preoperative instructions, including those for fasting; premeditation with phenergen elixir. They arrived on the morning of surgery; and were admitted post operatively overnight in the ward to help with assessment and management.

The children were divided into two groups (20 each) to receive caudal block (CB) either with Bupivacaine 0.2% (0.5ml / Kg to a maximum of 2mg / Kg) (LAG) or to receive equivalent volume of normal saline (NSG) Two anaesthetists were involved in each case. These children were anaesthetised with gases (Oxygen / nitrous oxide / Halothane). Anaesthesia was maintained with spontaneous breathing, face mask and Ayre's T-piece circuit. Monitoring included Precordial stethoscope, pulse oximetry, ECG, BP. All patients received 0.5mg / Kg pethidine intravenously at the beginning of the operation. The CB was administered after anaesthesia, but before the start of surgery. Child was placed in the left lateral position with hips and knees flexed at 90°. Aseptic technique was used. Short bevel 23G needle inserted close to apex of the sacral hiatus, at 30 to 40° to the skin. After the sensation of loss of resistance through the sacro-coccygeal ligament, the needle was advanced only 2 to 3 mm. Once aspiration for CSF and blood was negative, 1ml test dose was given; rest of the solution was injected very slowly. After operation all the boys were kept in the recovery area for at least 1 hour, where they were observed and assessed for various parameters like: excessive crying, irritability, comfort, playful, demand for drink / food / candy, self reporting of pain, parents opinion of analgesia; pethidine requirement, motor weakness of legs, ability to stand, pass urine, itching and vomiting. Post operatively if the child was in pain, additional 0.25 to 0.5mg / Kg pethidine was given intravenously until the child was comfortable; paracetamol 15mg / Kg, 6 hourly² was prescribed once the fasting period was over.

Results: -

Forty boys of ASA I were studied. They were divided into local anaesthetic group (LAG) and normal saline group (NSG), with 20 boys each. The two groups were matched for age and weight (Table II).

Table I- Suggested doses for a single-injection Caudal Block¹⁰.

Reference	Suggested Dose(s)	Mean spinal Dermatomal Level of Analgesia
Armitage	0.5ml / Kg	Sacrolumbar T 11± 1.5
	0.75ml / Kg	Lumbosacral T 10 ± 1.7
Takasaki	0.06 ml / Segment / Kg (0.7 ml / Kg)	T 10

" Recommended for neonates to 7 years and body weight less than 25 Kg."

Table - II

	LAG	NSG
Age	3.10 years	3 to 10 years
Mean	4.78 years	Mean 4.9 years
Weight	10 to 20 years	Weight 10 to 20
Mean	14.2 years	Mean 15 kg.

LAG = Local analgesia group. NSG = Normal Saline group.

There was very good pain relief in 100% (n=20) boys in (LAG), while there were only 10% (n=2) in (NSG). 80% (n=16) children were playful and had good mood in LAG, only 5% (n=1) were playful in NSG. 40% (n=8) boys in LAG and none in NSG demanded drink / food within first post operative hour. Pain scoring, done by self-reporting, was very good in LAG compared to NSG. Views of the parents about the child's pain relief were given due regard, as parents know their child. Parents of all boys in LAG were satisfied with pain relief and felt that their child was comfortable. In NSG the parents view were that: 60% (n=12) had moderate to severe pain; mild pain in 30% (n=6) and no pain in 10% (n=2). (Table III).

Table - III

Out Come	LAG (n)	NSG (n)
Excessive Crying	5% (1)	80% (16)
Irritable	0	60% (12)
Comfortable	95% (19)	10% (2)
Playful	80% (16)	5% (1)
Demand for drinks / food with in 1 hour post op.	40% (8)	0
Self reporting of pain	No pain	Severe to moderate pain.
Parents view	Complete satisfaction	Modrate to severe 60%; Mild Pain 30%; satisfied 10%
Requirement of Pethidine	Nil	3.7mg (mean) per child.

Table - IV

Complications	LAG (n)	NSG (n)
Blood vessel puncture	10% (n=2)	10% (n=2)
Dural puncture	0	0
Convulsions	0	0
Motor weakness	0	0
Inability to stand up 1 hour post op.	5% (n=1)	15% (n=3)
Itching	5% (n=1)	5% (n=1)
Urine retention	0	0
Pethidine requirement	0	80% (n=16)
Vomiting	5% (1)	30% (6)

Excessive crying was seen in 5% (n=1) in LAG and 80% (n=16) in NSG. On inquiry this one child in LAG was crying not because of pain in the operative area, but because he was afraid to see the IV cannula on his hand.

Complications observed (Table IV): In both groups there were no dural punctures, convulsions, motor weakness at 1 hour, and inability to pass urine at 3 hours. Identification of sacral cornu and hiatus was difficult in 10% (n=2) boys in each group; but it did not make the CB unsuccessful. Accidental puncture of blood vessel during CB occurred in 10% (n=2) in each group. Vomiting occurred in 30% (n=6) in NSG and 5% (n=1) in LAG. Itching at the upper border of block occurred in 5% (n=1) in each group.

Analgesia (pethidine) was required in 80% (n=16) in NSG and none in LAG. Of these 16 boys in NSG, 40% (n=8) needed 0.5mg /Kg and other 40% (n=8) needed 1mg /Kg pethidine iv to achieve a level of comfort. Two boys (10%) in NSG had intense pain even after 1mg / Kg pethidine. This was relived only after block of dorsal nerve of penis.

Post operatively boys in LAG were completely pain free up to 12 hour in 100% (n=20); up to 16 hours in 80% (n=16), up to 20 hours in 70% (n=14), and up to 24 hours in 60% (n=12). Analgesia in most patients in NSG was not satisfactory; it was no way near the pain relief seen in LAG. The boys in NSG needed pethidine (along with Paracetamol 15mg / Kg, 6 hourly). Total requirement of pethidine was 75mg in these 20 boys of NSG, which comes to 3.75mg pethidine per child per 24 hour. No pethidine was needed in first 24 hour in LAG boys, who were comfortable only with paracetamol 15mg / Kg, 6hourly.

Discussion

Caudal Analgesia (CA) is safe, simple, effective and one of the most commonly used RA techniques used in children for operations below the level of diaphragm. (Hannallah³ 1987; Blaise⁴ 1986).

Difficulty in identifying the sacral hiatus is reported in 5% subjects. (Atkinhead & Smith 1996)⁵. We also came across this difficulty in 5% (n=2) children in our study; but this did not make it difficult to perform CB.

Dural puncture, urine retention, convulsions and motor weakness were not seen in any patient in either group. Dural puncture is rare with CB.

Convulsions can occur from intravascular injection or rapid absorption from the caudal space. If one remains within safe total dose, aspiration for blood is checked and a test dose is given, then the chances of local anaesthetic toxicity are negligible.

Accidental vessel puncture occurs 1.6% with short bevel needles and 10.6% with long bevel needles, especially if he needle is advanced more than 1cm cephalad into the caudal space (Dalens & Hasnoui, 1989).⁶

Accidental vascular puncture occurred in 10% (n=2) in each of our groups. This is around the level for

long bevel needles, though we were using a short bevel needles. However, with repositioning of the needle, aspiration test for blood was negative in all cases; test dose was safe and no problem was seen later on.

Motor blockade and inability to walk upto 6 hours after CB can occur in upto 31% children with 0.5% bupivacaine. (Broadman et al, 1987)⁷. There was no motor blockade in any of our patients because we used 0.2% Bupivacaine solution. Inability to stand unsupported occurred in 5% (n=1) in LAG and 15% (n=3) in NSG at 1 hour post operatively. We believe that this was due to residual sedation, rather than any motor weakness.

Retention of urine is uncommon especially if concentration of Bupivacaine does not exceed 0.25%. There was no retention of urine in our study. Itching sometime occurs in the area between the normal and analgesic skin. It occurred in 5% (n=1) patients in each group.

There are many formulae for the calculation of dose and volume of local anaesthetic drug for CB in children. Busoni & Andruccetti⁸ (1986) and Takasaki⁹ (1977) found that body weight is a better predictor for dose than age. See table I (Sethna N.F & Berde CB¹⁰ (1994). We saw good blockade using 0.5ml / Kg of 0.25% Bupivacaine in our study with only few minor and no major side effects.

Assessment of pain in children is quite difficult (Talman & Ralston¹¹ 1997). We used reporting by the child and his parents to assess pain in our study. Armitage¹² (1989) with CB has suggested pain relief up to 6 to 8 hours in children. In our study 0.25% Bupivacaine in CB provided analgesia for circumcision in up to 18 hours postoperatively.

This study has convinced our team of the need of analgesia in children and the relative safety of CB in them. We hope to use it for other operations below umbilical level, in children in future.

Conclusion:

CB in children for circumcision is quite simple, safe and effective regional analgesia technique. It provides good pain relief for up to 12 to 18 hours postoperatively. It spares the child from lying in pain and agony; and also from the side effects of opioids and pricks of injections.

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