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Clonidine as An Additive to Bupivacaine for Caudal Block in Paediatric Patients

KEYWORDS: caudal block, bupivacaine, Clonidine, postoperative analgesia.

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ABSTRACT *Paediatric caudal epidural can be used very effectively for postoperative pain relief.. Threre has been reports of Clonidine being used with bupivacaine with advantages of potent and prolonged postoperative analgesia with minimal side effects. Thus we undertook this study to find out whether the addition of Clonidine to bupivacaine given caudally offers any advantages in terms of postoperative analgesia. This study was carried out in 60 patients of ASA1 or ASA2 in age group of 1-7years. They were randomly devided in two groups, Group A receiving plain bupivacaine 0.25%(0.75ml/kg) and group b receiving bupivacaine 0.25%(0.75ml/kg) along with Clonidine 2mcg/kg. The mean duration of analgesia in group A was 5hours 38mins and in group B was 10 hours 16mins.*

INTRODUCTION

Use of caudal epidural in paediatric population of post-operative analgesia has been gaining intrest. Single shot caudal block is effective technique due to anatomy sacrum in paediatric population. It provides good quality of post-operative analgesia for below umbilical surgeries in paediatric population. Caudal with local anaesthetics after induction of general anaesthesia prior to surgery has become a wide spread approach. Recently there has been reports of Clonidine an alpha 2 adrenergic agonist being used with bupivacaine with the advantage of prolonged postoperative analgesia.

The concurrent injection of Alpha2 adrenergic agonist drug with local anaesthetics has been suggested to improve the characteristic of local anaesthetic solutions through either local vasoconstriction [1] and facilitation of C fibre blockade [2] or a spinal action caused by slow retrograde axonal transport or simple diffusion along the nerve.[3] Clonidine is a selective Alpha2 adrenergic agonist with some Alpha1 agonist property. In clinical studies, the addition of clonidine to local anaesthetic solutions improved nerve blocks by reducing the onset time, improving the efficacy of the block during surgery and extending postoperative analgesia. [4] Clonidine possibly enhances or amplifies the sodium channel blockade action of local anaesthetics by opening up the potassium channels resulting in membrane hyperpolarization, a state in which the cell is unresponsive to excitatory input. [5]

AIMS AND OBJECTIVES

1. To evaluate duration of analgesia after caudal administration of bupivacaine alone and bupivacaine with Cloni dine.
2. To evaluate quality of postoperative analgesia with addition of Clonidine to bupivacaine
3. To find out complications if any with addition of Clonidine to bupivacaine for caudal block.

MATERIALS AND METHOD

After approval by ethical committee the study was carried out to observe effect of addition of Clonidine to bupivacaine for caudal block for surgeries below umbilicus with respect to

- Duration of postoperative analgesia
- Quality of postoperative pain relief
- Complications if any in intraoperative and postoperative period

PATIENT SELECTION

For this study total 60 patients of either sex were selected, between age group of 1-7 years. They were posted for elective surgeries for operations involving the lower abdomen, genitourinary system and lower limbs.

Children were selected randomly and were of ASA grade 1 and 2. Informed parenteral consent was obtained in each case. A through preanaesthetic evaluation was carried out. The childs weight was recorded, routine investigations which include haemoglobin estimation , bleeding time, clotting time, urine examination were carried out.

The childrean were randomly divided in two groups.

Group 1 receiving plain bupivacaine 0.25%(0.75ml/kg) and Group 2 receiving bupivacaine 0.25%(0.75ml/kg) along with Clonidine 2mcg/kg.

PROCEURE

All children were given general anaesthesia and the caudal block was then performed.

INDUCTION

Inj. Pentothal sodium 5mg/kg iv
Inj suxamethonium 2mg/kg iv

MAINTAINANCE

50% O_2+ 50%N_2O on IPPV
Isoflurane as an inhalational agent
Atracurium as muscle relaxant.
Caudal block given using complete aseptic precautions.

EQUIPMENTS REQUIRED

- Hypodermic needles 22G, 23G
- Syringes 10cc, 20cc and 2cc
- Sponge holding forceps
- Gauze pieces
- Sterile towel

DRUGS

vial of 0.5% bupivacaine.
an ampoule of Clonidine.

The patient was then placed in left lateral position for caudal block.

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Landmarks for identification of the hiatus were

- At the apex of an equilateral triangle formed with the base as a line drawn between the posterior superior iliac spines.
- The tip of the coccyx is felt and traced up till the first depression is palpated
- The lumbar spine is palpated down towards the sacrum where hiatus is felt.

A short bevelled 22G hypodermic needle was inserted at an angle of 45degrees from the skin about 2-3mm cephald to a line joining the cornu with the bevel facing upwards. Once the needle pierced the sacrococcygeal ligament, a characteristic give way was felt.

The correct placement of needle in epidural space was confirmed by using loss of resistance technique. The total calculated dose was then taken in a syringe and given slowly after negative aspiration of blood and CSF. Needle was withdrawn and benzoin seal was placed.

Figure 1. Caudal block

Intraoperatively pulse blood pressure, oxygen saturation were recorded at 5min interval until the end of the operation. No narcotics or analgesics were given intraoperatively.

The duration of motor block was charted as the time taken from the caudal block to the full return of the muscle power in the lower limbs. Similarly duration of sensory block was checked by pinprick.

Pain assessment in postoperative period was done using OPS score(at 1,2,4,6,8,10,12hrs) and duration of analgesia noted. Each variable (crying, facial expression, verbal response, position of torso and motor restlessness) will be scored between 0-2. (0- none, 1- moderate, 3- severe). If the OPS score is more than 4 in 2 subsequent measurements or if the patient shows obvious signs of pain they were given oral paracetamol 10mg/kg as rescue analgesia.

Assessment of sedation score was done by sedation score at 30min, 1hour and 4 hour after the operation. Patient sedation score was defined as

1. Asleep, not arousable by verbal contact.
2. Asleep, arousable by verbal contact
3. Drowsy, not sleeping
4. Alert/ awake.

RESULTS

Table 1.Sex wise distribution in two groups

Group	Gender		Total
	Male	Female	
Group1	24	6	30
Group2	24	6	30

Sex wise distribution in two groups were comparable.

Table 2.Comparision of age in two groups

	Number of patients	Age
Group 1	30	4.45+/- 1.02
Group2	30	4.34+/- 1.10

By using unpaired t- test, p- value > 0.05. therefore there is no significant difference between the mean age in two groups.

Table 3.Comparision of weight in two groups

	Number of patients	Weight in kg
Group 1	30	15.25+/- 1.8
Group2	30	15.30+/- 1.2

By using unpaired t- test, p- value > 0.05. therefore there is no significant difference between the mean weight in two groups.

Table 4. Comparision of pain scores between two groups

Pain score at	No of patients	Pain score		p-value
		Group 1	Group2	
1st hour	30	1.04+/- 0.24	0.32+/-0.40	<0.001
2nd hour	30	2.24+/- o.38	0.9+/-o.14	<0.001
4th hour	30	3.46+/-0.38	2.0+/-0.10	<0.001
6th hour	30	4.2+/-0.5	2.5+/-0.4	<0.001
8th hour	30	4.21+/-0.3	2.8+/-0.1	<0.001

By using unpaired t- test, p- value < 0.05. therefore there is significant difference between the pain scores in two groups.

Table 5.Comparision of duration to rescue analgesia in two groups

	Number of patients	Requirement of rescue analgesia(hours)	P- Value
Group 1	30	5.30+/-0.16	< 0.001
Group2	30	10.58+/-0.40	

By using unpaired t- test, p- value < 0.001. therefore there is significant difference between the duration of rescue analgesia in two groups.

Table 6.Comparision of sedation score in two groups

	median sedation score		P- Value
	Group 1	Group 2	
Immediate post operative	2	2	>0.05
1st hour	2	2	>0.05
2nd hour	3	3	>0.05
4th hour	4	4	>0.05

By using unpaired t- test, p- value >0.05. therefore there is no significant difference between the sedation score in two groups.

DISCUSSION

To a child undergoing surgery, the main concern afterward is whether or not he will feel pain. To a surgeon other factors such as good surgical anaesthesia, adequate muscle relaxation, early ambulation and recovery are important. A technique which combines both these sides would be a useful method of anaesthesia. Caudal block combines both of these advantages.

In our study we have randomly chosen 60 childrean in age group between 1year to 7 year belonging to ASA1 or ASA 2. The two groups were comparable in age , sex, ASA grading ang weight.

The various surgeries performed were herniotomies, hydrocelectomy, cystolithotomy, circumcision and orchidopexy. The dose of the anaesthetic drug was based upon mg/kg body weight.

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Armitage, fortuna6
have used body weight as the determinant for dose calculation, achived adequate level of anaesthesia.

All children were given general anaesthesia and then caudal block was then performed. This insured that the child is motionless during the block. Thereby minimizing the complications like dural puncture, intravascular puncture or breakage of needle, resulting in high success rate.

General anaesthesia was induced with inj. Pentothal sodium 5mg/kg iv ,Inj suxamethonium 2mg/kg iv and maintainance with50% o_2+ 50%n_2o on ippv . Isoflurane was used as an inhalational agent and atracurium as muscle relaxant.

In our study the block was performed in left lateral position. A short , 22G bevelled hypodermic needle was used for the block.

Surgery was allowed to proceed after 10 minutes of giving block. This is the anaesthesia latency time.

In our study we used bupivacaine in concentration of 0.25%.

The dose we used are based on the observation of Armitage6 where using 0.25% bupivacaine a dose of 0.75mi/kg is sufficient for blocking lower thoracic nerves. Chandrakumar7 compared 0.25% , 0.125% concentrations and found that 0.125% showed lesser degrees of motor blockade and at times produce inadequate motor relaxation.

Afte intraoperative period was over the patient was shifted to recovery room and duration of anaesthesia was noted post operatively.

In this study we used OPS pai score system and duration of anaesthesia was noted post operatively. If the OPS score is more than 4 in two subsequent measurements or if the patient showed obvious signs of pain they were given oral paracetamol 10 mg/kg as rescue analgesia. Aruna parameshwari8 and her colleagues used FLACC pain scores which includes assessment of face, leg, activity , cry , consolability.

Hannallah[9]
and his colleagues used a 5 point pain assessment chart which include cry, pulse, BP, movement, posture.

The difference in pain score indicating quality of pain relief was statistically significant when mean pain scores was compared between two groups.

This means that children receiving bupivacaine and Clonidine caudally had a much better quality of pain relief.

The mean duration of rescue analgesia in Group 1 in our study was 5 hours 30 min and in group 2 was 10 hour and 58 min. This shows a significant increase in the duration of analgesia in bupivacaine plus Clonidine group. Archana Koul, D eepanjali Pant, Jayshree Sood10 observed longer duration with Clonidine 2mg/kg caudally with bupivacaine(0.25%).

Several mechanisms have been suggested for Clonidine induced prolongation of caudal analgesia with bupivacaine. The antinociceptive action is due to the direct suppression of the spinal cord nociceptive nerves by epidural Clonidine. clonidine also suppresses neurotransmission in peripheral sensory Aδ and C nerve fibres.

SUMMARY
This study was carried out in 60 patients of ASA1 or ASA2 in age group of 1-7years.

They were randomly devided in two groups, Group 1 receiving plain bupivacaine 0.25%(0.75ml/kg) and Group 2 receiving bupivacaine 0.25%(0.75ml/kg) along with Clonidine 2mcg/kg caudally.

After approval by ethical committee the study was carried out to observe effect of addition of Clonidine to bupivacaine for caudal block for surgeries below umbilicus with respect to
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The study was carried out to observe effect of addition of Clonidine to bupivacaine for caudal block for surgeries below umbilicus with respect to
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The average age of children in group 1 was 4. Years and in group 2 was

The average weight of children in group 1 was 4. Years and in group 2 was

The mean duration of postoperative analgesia using plain bupivacaine was and with addition of Clonidine was

The difference in duration and quality of postoperative pain relief was statistically significant between two groups.

There was no case of apnea, hypotension, respiratory depression or local anaesthetic toxicity.

The quality and duration of pain relief of the children in the group receiving bupivacaine plus Clonidine caudally was better.

CONCLUSION
Addition of Clonidine to bupivacaine for caudal block significantly prolongs duration of post operative analgesia and improve quality of post operative analgesia, without causing any side effects.

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