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A COMPARATIVE STUDY OF CAUDALLY ADMINISTERED BUPIVACAINE AND BUPIVACAINE-TRAMADOL COMBINATION FOR POSTOPERATIVE ANALGESIA IN CHILDREN IN INFRAUMBILICAL SURGERIES.

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ABSTRACT Caudal anaesthesia is commonly performed regional block in children for infraumdilical surgeries. Caudal opioids have advantages of prolonging the duration of analgesia over bupivacaine alone. In this study effect of tramadol as adjuvant to bupivacaine has been compared with bupivacaine alone with regards to analgesic potency and side effects. 60 children of either sex, age group of 1-12 yrs and ASA grade I & II , posted for surgery were randomly divided into 2 groups of 30 each. Group A received caudal 1 ml/kg 0.25% bupivacaine and Group B received caudal 1 ml/kg 0.25% of bupivacaine with tramadol 1mg/kg. Result- mean duration of analgesia in group B was 425.3 ± 33.4 minutes and 219.3 ± 19.1 minutes in group A. There were no significant side effects in both groups. Conclusion- Caudal administration of bupivacaine 0.25% (1ml/kg) with tramadol (1mg/kg) resulted in superior analgesia as compared to 0.25% bupivacaine (1ml/kg) alone, without significant incidence of side effects.

KEYWORDS : caudal anaesthesia, bupivacaine, tramadol, postop analgesia

Introduction

Alleviation of pain is a basic human right. In past children had received inadequate analgesia due to lack of basic understanding or data on development of pain and nociceptive mechanisms. Recently pain pathways have been identified in children. So postoperative analgesia in children is gaining importance.[1] Effective pain relief means a smooth postoperative period, increased patient compliance and early discharge from hospital.[2] Caudal anaesthesia is a commonly performed regional block in children for abdominal and lower limb surgeries. It is a reliable and safe technique that can be used with general anesthesia for intra and postoperative analgesia.[3] However, the mean duration of surgical analgesia provided by single shot caudal procedure is limited by the duration of local anesthetic being chosen. Various adjuvants like opioids, clonidine, midazolam, neostigmine, ketamine etc are used to prolong the duration of action of single shot caudal block. Opioids as adjuvants have side effects such as nausea,vomiting,pruritis and late respiratory depression,which can be minimized by reducing concentration.[3]Tramadol, an opioid agonist, is a synthetic analogue of codeine. It is a potent norepinephrine inhibitor and also inhibits serotonin uptake with facilitation of its release. It has moderate affinity for mu receptor and has an analgesic potency equal to that of pethidine and 1/5 th to 1/10th potent as morphine with lack of respiratory depressant effect.[4,5]

Here is an attempt to study effect of adding tramadol to bupivacaine with regards to analgesic potency and side effects.

Method

After obtaining approval from hospital ethics committee and informed written consent from the parent, 60 children of either sex, age group of 1-12 yrs and ASA grade I & II , posted for various infraumbilical surgical procedures were included in the study. Exclusion criteria were ASA grade III and IV,infection at the site ofinjection, coagulopathy, congenital abnormalities of lower spine and meninges,active disease of the CNS,history of allergy to local anaesthetics.

Solid foods were restricted for 6 hours, milk for 4-5 hours and clear fluids for 2-3 hours prior to surgery.All patients were pre-medicated with syrup Promethazine 1 mg/kg on the previous night and 1hr before the surgery. Patients were induced with oxygen, nitrous oxide (50:50) and halothane (in increasing concentration) using Jackson Rees modification of Ayre's 'T' piece and intravenous line was secured. Injection atropine 0.02mg/kg was given intravenously after securing iv access. An infusion of Ringer Lactate was started and fluid was administered according to the calculated requirements.

Caudal block :

Patient was gently placed in the Sim's position (left lateral), vitals were recorded including adequacy of spontaneous breathing. Under strict aseptic conditions, sacral hiatus was identified by running the thumb up from coccyx towards the sacrum.

After identifying the sacral hiatus, a 23G hypodermic needle with its bevel facing anteriorly was inserted at an angle of 60-70° to the skin till the sacro-coccygeal membrane was pierced, when a distinct "pop" was felt. The needle is now lowered to an angle of 20° and advanced 2-3 mm to make sure that the entire bevel is inside the space. Confirmation of the needle point being in the epidural space was done with the "whoosh" test and the lack of resistance encountered by injection of 2-3 ml of air.Aspiration was done to exclude accidental dural puncture or vessel puncture and the drug was injected after confirmation.

After injection was complete, the needle was removed and the child was placed in supine position. No analgesia was given by any route pre-operatively or intraoperatively. Anesthesia was maintained with oxygen, nitrous oxide and halothane (0.5-2%) with patient on spontaneous ventilation throughout the surgery.

The patients were randomly divided into 2 groups of 30 each.
Group A- received caudal 1 ml/kg of 0.25% of bupivacaine.

Group B- received caudal 1 ml/kg of 0.25% of bupivacaine with Tramadol 1mg/kg.
Monitoring included precordial stethoscope, pulse-oximetry, NIBP, respiratory rate and ECG. The time of caudal block and duration of surgery was noted.

Recovery :

Anaesthetic agents were discontinued at the beginning of skin closure. 100% oxygen through a face mask was administered for 3-5 minutes. Once the vitals were stable and the child was awake, the child was shifted and placed in semi-prone position in the recovery room. On arrival to the recovery room, the child was monitored for another 1 hour with SpO2, respiratory rate, NIBP and heart rate every 15 minutes. After that the child was shifted to the ward and monitored thereafter. Post-operative analgesia was assessed by Paediatric Objective Pain Scale for a period of 24 hours after caudal block. If the pain score was more than 6 for 2 consecutive intervals of 10 minutes, then supplementary analgesia with syrup Paracetamol (15mg/kg) was given. These assessments were made at 1,2,3,4,8,12 and 24 hours after caudal block. Patients were monitored for intra-operative and post-operative complications which included nausea and vomiting, bradycardia- decrease in the heart rate of more than 30% of the baseline value. It was subsequently treated with Inj. Atropine 0.01mg/kg, hypotension- decrease in the mean arterial pressure of greater than 30% of the baseline value. It was treated with rapid infusion of IV fluids and if that was unsuccessful, then Inj. Ephedrine 0.1-0.3 mg/kg and respiratory depression - a decrease in the SpO2 of <93% that required administration of supplemental oxygen via face

mask or a respiratory rate of < 10 breaths per minute.

Statistical analysis :
The results of continuous variables are given as mean ± SD and proportion as percentage. The difference between the two groups was assessed by student's – t test and chi-square test. For all the tests a 'p' value of 0.05 and less was considered for statistical significance.

Results

Table 1 : Duration of Analgesia

Duration of analgesia(min)	Group A	Group B
Mean duration ± SD	219.3 ± 19.1	425.3 ± 33.4
Range	180 – 255	380 – 500

p < 0.001, student's unpaired 't' test

The mean sedation score was 1 in both the groups at all the time intervals, indicating no significant difference in the sedation score between the groups as shown in table 13 and graph 11.

Table 2 : Incidence of Complications

Complications	Group A	Group B
Hypotension	0	0
Bradycardia	0	0
Vomiting	2(6.7%)	4(13.3%)
Dural puncture	0	0
Blood vessel puncture	0	0
Respiratory depression	0	0
Pruritis	0	0

Chi-square=1.69,P=0.43,NS

Discussion

Treatment of acute pain is one of the most important tasks of perioperative paediatric anesthesia. Pain relieving agents are usually administered on the basis of the concept of balanced analgesia, which involves a combination of analgesics with either synergistic or additive effects.[12]

Postoperative analgesia through the caudal route is considered to be the most appropriate and satisfactory analgesia for small children undergoing anoperineal,inguinal and urogenital surgeries. It allows rapid recovery from anaesthesia with effective post-operative analgesia. The main disadvantage is the short duration of action following single shot caudal using only local anaesthetic, so various additives to local anaesthetic solutions have been tried.[13]

The use of caudal opioids does prolong the duration of analgesia but associated with side-effects like respiratory depression, pruritis, urinary retention, nausea and vomiting. Tramadol, an opioid has been shown to provide long lasting analgesia almost equivalent to that of pethidine with striking lack of respiratory depressant effect.[3]

It has been observed that 0.175% bupivacaine offered the best combination of effectiveness and rapid recovery and discharge for paediatric surgical outpatients.[14] There have been studies recommending 0.25% bupivacaine in a dose of 0.5 ml/kg for lumbo-sacral, 1 ml/kg for thoraco-lumbar, 1.25 ml/kg for mid-thoracic level of block while plasma bupivacaine levels were always below 1.2µg/ml, which was below toxic levels.[15] However, in some studies 0.25% bupivacaine (1ml/kg) has been used for pediatric herniotomy[8] and orchidopexy[9] as a single shot caudal block.In our study also, we have used a single dose of 0.25% bupivacaine (1ml/kg).Higher concentration can produce motor blockade in the immediate post-operative period and delay discharge. Since all the patients are monitored for 24 hours postoperatively in our hospital, 0.25% bupivacaine was used for post-operative analgesia. Tramadol in different doses (1mg/kg,1.5mg/kg,2mg/kg) as an adjuvant to different doses of 0.25% bupivacaine (0.5 ml/kg, 0.75mg/kg, 1ml/kg) for infraumbilical surgeries and hypospadias surgery to prolong the duration of analgesia without producing significant adverse effects has been used in earlier studies[6,7,8,10,11].

In our study, we chose 0.25% bupivacaine which provides better quality of analgesia when compared to lower concentrations and tramadol 1mg/kg which prolongs the duration of analgesia significantly, while avoiding the side effects like excessive nausea and vomiting associated with higher doses.

Conclusion

Caudal administration of bupivacaine 0.25% (1ml/kg) with tramadol (1mg/kg) resulted in superior analgesia with longer duration of action when compared with 0.25% bupivacaine (1ml/kg) alone, without any significant incidence of side effects.

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