RESEARCH ARTICLE

CAUDAL BLOCK USING ROPIVACAINE WITH OR WITHOUT TRAMADOL IN CHILDREN FOR LOWER ABDOMINAL AND LOWER LIMB SURGERY

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ABSTRACT

Background: Caudal anaesthesia is a useful adjunct to general anaesthesia for lower abdominal surgery in children as it provides intraoperative analgesia, smooth recovery period and good post-operative pain control which reduces Perioperative narcotic requirements.

Aims & Objective: This Study was designed to evaluate duration of analgesia of Ropivacaine and Ropivacaine with Tramadol administered caudally for postoperative pain relief in children.

Materials and Methods: Study was conducted in 60 paediatric patients of either sex belonging to ASA grade I or II in the age group 1 to 6 years scheduled for elective lower abdominal and lower limb surgery. Patients were randomly selected by sealed envelope method and divided into two groups of thirty patients each. Group RS received 0.2% Ropivacaine, 1 ml/kg with saline 0.04 ml/kg and Group RT received 0.2% Ropivacaine, 1 ml/kg with Tramadol 2 mg/kg by caudal route immediately after induction of general anaesthesia. Vitals and oxygen level was monitored. The analgesic effect of the caudal block was evaluated by using the observational Pain discomfort Scale and Four Point Sedation Score was used for assessment of sedation after extubation at 30 minutes and at 1, 2, 4, 6, 12 and 24 hrs. The time for the first analgesic requirement and side effects in 24 hours period were recorded.

Results: Duration of analgesia was longer in Group RT [19.21 ± 2.25 hours] as compared to Group RS [6.38 ± 0.897 hours] ($p<0.01$). There were no significant changes in heart rate, blood pressure and oxygen saturation between two groups.

Conclusion: Caudal Tramadol 2 mg/kg, combined with 0.2% Ropivacaine, 1ml/kg, provides longer duration of postoperative analgesia as compared to 0.2% Ropivacaine alone in children undergoing lower abdominal and lower limb surgery.

Key Words: Caudal; Observational Pain Discomfort Scale (OPS); Postoperative Analgesia; Ropivacaine; Tramadol

Introduction

Caudal anaesthesia is a useful adjunct to general anaesthesia for lower abdominal surgery in children as it provides intraoperative analgesia, smooth recovery period and good post-operative pain control which reduces Perioperative narcotic requirements.[1] Unfortunately, motor blockade resulting from caudal block may be a cause of distress to children in the postoperative period and could lead to delayed hospital discharge. Long acting local anaesthetic, such as Bupivacaine had a well- defined role in regional anaesthesia and analgesia for many years. Ropivacaine is another newer amide local anaesthetic introduced in clinical practice that offers a wider margin of safety than Bupivacaine with less motor blockade and cardiovascular side effects.[2-5] However its main disadvantage is shorter duration of action after single shot injection (4 to 5 hours) The use of caudal catheter to administer repeated doses or infusions of local anaesthetic solution is not popular, partly because of concerns about infection. However, prolongation of anaesthesia can be achieved by adding various adjuvants; such as opioids and Non-opioids like Clonidine, Ketamine Midazolam and Neostigmine. Tramadol a synthetic analogue of codeine and centrally acting analgesic has low affinity for opioid receptors and also appears to modify the transmission of pain impulses by the inhibition of monoamine reuptake.

A few studies have shown that epidural or caudal Tramadol can be free from postoperative analgesia side effects.[5-8] We designed a prospective double blind randomized trial to compare analgesic efficacy of caudally administered 0.2% Ropivacaine and 0.2% Ropivacaine-Tramadol (2 mg/kg) combination in children undergoing surgery such as Inguinal herniotomy, cystolithotomy orchiopexy, hypospadias repair and CTEV correction.

Materials and Methods

This was randomized prospective double blind study. After approval from the Institutional Ethical Committee, 60 paediatric patients attending hospital during July 2010 till June 2011 of either sex belonging to ASA grade I or II in the age group 1 to 6 years scheduled for elective lower abdominal and lower limb surgery were included. Patients with history of drug allergy, skin infections at the site of block, abnormalities of sacrum, central nervous system diseases, history of bleeding disorder were excluded from the study. Detailed history and preoperative assessment was carried out on the day before surgery. Routine investigations were carried out. Informed written consent

was taken from parents. All patients were kept nil by mouth as per guidelines. In the preoperative room, pulse rate and blood pressure were recorded and Eutectic mixture of local anaesthetics (EMLA) was applied at the dorsum of the hand to prevent pain from the insertion of intravenous cannula. Patients were premedicated orally with Inj. Midazolam 0.5 mg/kg, 30 minutes before induction of anaesthesia and Inj. Glycopyrrolate 4 mcg/kg I.V. just prior to induction of anaesthesia. In the operation room after preoxygenation for 3 minutes, anaesthesia was induced with inj. Sodium Thiopentone (2.5%) 4 to 6 mg/kg I.V. Endotracheal intubation was facilitated using Inj. Suxamethonium Chloride, 1.5- 2 mg/kg I.V. with appropriate sized endotracheal tube, anaesthesia was maintained with nitrous oxide 50% and oxygen 50% along with halothane 0.5-1% and Inj. Vecuronium bromide 0.1 mg/kg I.V. as muscle relaxant. Caudal anaesthesia was performed under aseptic conditions in the left lateral position with 23 gauge needle using a standard loss of resistance technique. Patients were randomly selected by sealed envelope method and divided into two groups of 30 patients each. Group RS received 0.2% Ropivacaine 1 ml/kg with saline 0.04 ml/kg and Group RT received 0.2% Ropivacaine, 1 ml/kg with Tramadol 2 mg/kg by caudal route immediately after induction of general anaesthesia. Drug was prepared by anaesthetist, who was not involved in this study. Pulse rate, Mean arterial pressure and oxygen saturation were monitored till the end of surgery. On completion of surgery, residual neuromuscular block was reversed with Inj. Neostigmine 0.05 mg/kg and Inj. Glycopyrrolate 0.008 mg/kg I.V. Analgesic effect of block after tracheal extubation was evaluated using an Observational pain-discomfort scale (OPS) at 0.5, 1, 2, 4, 6, 12 and 24 hours postoperatively1. Duration of caudal analgesia was defined as the interval from caudal block until the first analgesic supplementation. OPS assessed behavioural objective parameters (crying, facial expression, position of the torso, position of the legs and motor restlessness). Each parameter scores 1-3 (none, moderate, severe) to give a cumulative score of 5-15 to estimate the quality of analgesia. An OPS score of 5 signified excellent analgesia and a score of 15 signified that the analgesia was ineffective. Patients were administered syrup paracetamol 10 mg/kg as rescue analgesic when the OPS was more than 11 or if the patient had obvious signs of pain. Sedation was assessed with Four Point sedation score at 0.5, 1, 2, 4, 6, 12 and 24 hours postoperatively.

Four Point Sedation Score, a four point sedation score was assigned: 1 = Asleep, not arousable by verbal command; 2 = Asleep, arousable by verbal command; 3 = Drowsy/not sleeping; 4 = Alert/aware.

Statistical Analysis: Sample size of 60 with 30 patients in each group was determined with power of study of 100%.All data were presented as mean ± (SD) except wherever specified. Continuous variables were analyzed using student's t-test. Paired t-test was used for comparisons within the groups and unpaired t-test for intergroup comparisons. Analysis was done by SPSS 15 and we applied chi-square test for 5% level of significance for categorical data and independent t- test for continuous data. Probability value <0.01 was considered significant.

Results

Data from 60 patients were analyzed, there were no differences between the groups in terms of age, sex, weight, duration of surgery and type of surgery as shown by student' t test (Table-1). In both the groups there was no significant change in the pulse rate from the baseline value both in the intra-operative and post-operative period. Change in the mean arterial pressure in both groups did not show any marked deviation from the baseline. No statistically significant differences were observed in oxygen saturation at different time intervals between the two groups intra-operatively and postoperatively ($p>0.05$). Pain evaluation as per the OPS was carried out after patients were awake at 0.5, 1, 2, 4, 6, 12 and 24 hours. Postoperatively (Table-2). On comparing quality of postoperative analgesia between the two groups, it was seen that 30 minutes after completion of surgery Pain score was 5.067 ± 1.015 in Group RS and 5.5 ± 0.682 in Group RT, it suggest excellent analgesia. Later on OPS score started increasing and reached up to 10.73±0.907 in group RS and 6.8 ± 0.925 in group RT at 4hrs, which was statistically significant (Table-2). Patients in Group RS started having mild pain after 4 hours and the pain was significant after 6 hrs. Whereas in group RT the patients were pain free for almost 12 hours and started having significant pain after 24 hours (Table-2). Syrup paracetamol 10 mg/kg, was supplemented when pain score reached more than 11. The mean duration of analgesia was 6.38 ± 0.89 hours in Group RS and 19.21 ± 2.25 hours in Group RT (Table-3). There was significant prolongation in the duration of analgesia observed in Group RT as compared to Group RS ($p<0.01$). Sedation was assessed by four Point Sedation score. We observed a statistically significant difference in the sedation score between both the groups up to 6 hours postoperatively but no patients were deeply sedated, that means no patient had a sedation score of less than 2 in the post-operative period. Mean sedation scores were '4' after 6 hours in both the study groups and it was statistically insignificant ($p >0.05$) (Figure 1). Considering side effects ,nausea was

observed in 10% patients in Group RS and 13.34% patients in Group RT ,vomiting occurred in 6.67% patients in Group RS and 10% patients in Group RT which was treated by Inj. Ondensatron 0.1 mg/Kg. None of the patients had hypotension, bradycardia, respiratory depression or urinary retention post operatively during study period.

Table-1: Demographic data, duration of surgery and surgeries performed

Patient characteristics		Group RS	Group RT	P Value
Age in years (Mean ± SD)		4.83 ± 1.44	4.98 ± 2.27	0.76
Gender	Male	26	27	>0.05
	Female	4	3	
Weight in kg (Mean ± SD)		13.57 ± 2.96	13.93 ± 4.23	0.70
Duration of Surgery in minutes (Mean ± SD)		59±12.83	59.83±13.03	0.81
Operative Procedure	Herniotomy	21	19	>0.05
	Hypospadias	2	1	
	Cystolithotomy	1	2	
	Orchiopexy	3	4	
	CTEV correction	3	4	

Table-2: Observational Pain-Discomfort Scale (OPS) Score

Time	Group (RS)		Group (RT)		P Value
	Mean	SD	Mean	SD	
0.5 hour	5.067	1.015	5.500	0.682	0.06
1 hours	7.700	0.915	5.733	0.785	<0.01
2 hours	8.933	0.828	6.267	1.015	<0.01
4 hours	10.730	0.907	6.800	0.925	<0.01
6 hours	12.570	0.568	8.400	0.855	<0.01
12 hours	13.530	0.571	10.430	0.679	<0.01
24 hours	14.730	0.450	12.870	0.730	<0.01

Table-3: Duration of analgesia (in hours)

	Group RS (n=30)	Group RT (n=30)
Mean	6.380	19.210
S.D.	0.897	2.250
P value	<0.01	

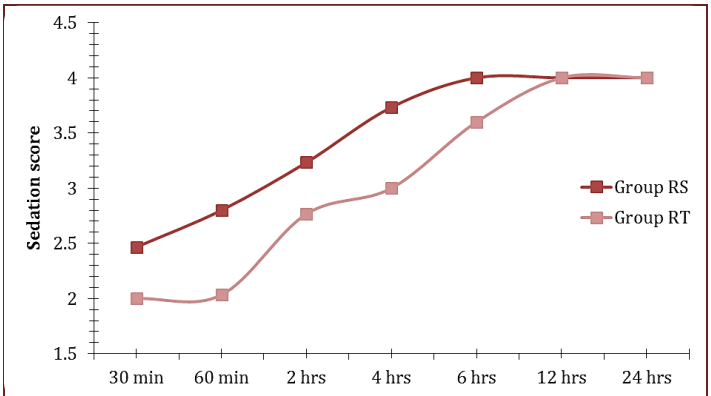

Figure-1: Sedation score over time in both the groups

Discussion

It has been reported from previous studies that quality and duration of analgesia was similar between 0.25% Bupivacaine and 0.25% Ropivacaine administered caudally in pediatric patients[9,10] Luz et al[11] & Koining et al[1] found that 0.2% Ropivacaine provided satisfactory analgesia and 0.1% was less efficacious while 0.5% was associated with a more frequent incidence of motor block. In addition, Tramadol was used as an adjuvant in the dose of 2 mg/kg was significantly more effective than 1 mg/kg and 1.5 mg/kg.[12] So we have decided to take Ropivacaine 0.2% and Tramadol 2 mg/kg in the present study. Our study revealed that the duration of post-operative analgesia and the time for the first dose of rescue analgesic was significantly longer with caudal Tramadol in a dose of 2 mg/kg co-administered with 0.2% Ropivacaine 1 ml/kg than 0.2% Ropivacaine alone. Prolonged duration of analgesia of caudal Tramadol observed in the present study may be attributed by slow absorption across the dura or slow uptake of Tramadol from the epidural space into the systemic circulation. This study confirms the findings of hemodynamic changes as shown by other workers.[5,13] There was no significant changes in heart rate, respiratory rate and blood pressure from the baseline with the use of Tramadol with Ropivacaine in caudal epidural analgesia. There was no significant sedation in the post-operative period leading to respiratory depression. The sedation score was either 2 or more in all patients. We found a lower incidence of side effects in both the groups. Similar results were reported by S. Prakash and colleagues.

Conclusion

This study demonstrates that caudal administration of Tramadol 2 mg/kg along with 0.2% Ropivacaine 1 ml/kg significantly prolongs the duration and quality of postoperative analgesia. Children remained calm, quiet and minimally sedated but easily arousable. Thus Tramadol is considered to be a safe and effective adjuvant to Ropivacaine for caudal analgesia in children undergoing surgery below umbilicus.

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