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Original Research Paper

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A COMPARISION OF POST OPERATIVE ANALGESIC EFFICACY OF SINGLE DOSE CAUDAL EPIDURAL BETWEEN ROPIVACAINE AND BUPIVACAINE IN INFRAUMBILICAL SURGERIES IN CHILDREN'

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ABSTRACT

Background and Aims: Caudal epidural analgesia is commonly used regional block in children undergoing infra-umbilical surgeries. The aim of this study was to observe and compare the analgesic efficacy & side effects of 0.25% Bupivacaine 0.5 ml/kg and equal volume of 0.2% Ropivacaine for caudal analgesia in paediatric patients with infra-umbilical surgeries.

Methods: In a randomised, prospective, study, fifty children (1–6 years) belonging to American Society of Anaesthesiologists' physical status I or II scheduled for infra-umbilical surgeries were included. Patients were allocated by random number table in two groups of 25 patients each to receive inj. bupivacaine (group A) or inj. ropivacaine (group B) for caudal block. The primary outcome was the duration of analgesia.

Results: The mean duration of analgesia was 194.16 ± 19 min in Group A, while in Group B, it was 196.32 ± 19.66 min. There was no significant difference of analgesic efficacy between bupivacaine and ropivacaine. No significant difference was observed in the incidence of haemodynamic changes or side effects.

Conclusion: Ropivacaine (0.2%) administered through caudal epidural route provides similar duration and quality of postoperative analgesia compared to Bupivacaine (0.25%).Due to less motor blockade it can be used in day care surgery.

KEYWORDS : Paediatric patients, Analgesia, bupivacaine, ropivacaine

INTRODUCTION

Caudal epidural analgesia is very commonly practiced technique in paediatric patients specially following infraumbilical surgeries. Post-operative pain control is important in paediatric patients because poor pain control may result in increased morbidity and mortality. Bupivacaine has proved its efficacy in producing long lasting analgesia when administered in caudal epidural space [1]. Ropivacaine is another amide local anaesthetic recently introduced in clinical practice . It provides similar type of pain relief with less motor blockade[2]. Early report[3] suggests that these agent is less cardiotoxic than bupivacaine. Hence ropivacaine may be more suitable agent for caudal epidural analgesia specially following infraumbilcal surgeries. singleshot caudal blockade is a simple technique commonly used in conjunction with general anesthesia andlimits the need to use narcotics for intraoperative and postoperative pain relief.[1,2,3]

Bupivacaine has proved its efficacy in producing long lasting analgesia when administered in caudal epidural space [4]. Ropivacaine is the analogous of bupivacaine having fewer cardiotoxic and neurotoxic side effects compared to bupivacaine.[5,6] .Ropivacaine has less motor blockade as compared to bupivacaine.[7] Hence ropivacaine may be more suitable agent for caudal epidural analgesia specially following infraumbilcal surgeries .

MATERIAL AND METHODS:

After obtaining approval, from institutional ethics committee and parental written informed consent, the study was conducted in 50 paediatric patients . 1-6 years of ASA grade 1 and grade 2 cases, who were scheduled for operations of infraumblical surgeries. Patients were allocated by random number table in two groups of 25 patients each to receive injection bupivacaine (group A) or injection ropivacaine (group B) for caudal block . Children with neuromuscular disease , back problem , local infection , mental retardation , H/O seizures and raised intracranial tension were excluded from the study.

Group A: Receive inj. 0.25% Bupivacaine 0.5 ml/kg
Group B: Receive inj. 0.2% Ropivacaine 0.5 ml/kg

Patients with intravenous cannula will be placed and ringers'lactate solution will be infused to provide fluid during surgery . Inj glycopyrrolate 0.01 mg/kg will be administered intravenously as premedicant. Patients were premedicated with syrup diazepam 0.3 mg/kg body weight (maximum dose 15 mg). General anaesthesia was induced with increasing conc. of (0.4 -2%) halothane with 60% nitrous oxide & 40% oxygen mixture Endotracheal intubation will be facilitated by administering inj vecuronium bromide 0.1mg/kg intravenously. After securing the endotracheal tube in place, patients will be placed in left lateral position . A short bevelled 23 gauge needle will be introduced in caudal epidural space under full aseptic precaution and after confirming the space 0.5ml/kg of 0.25% preservative free bupivacaine (group A) and 0.2 % preservative free ropivacaine (group B) 0.5 ml/kg will be administered slowly . Patients will be monitored clinically and ECG throughout the procedure . After deposition of drug in epidural space patients will be placed in supine position and anaesthesia will be maintained by halothane (0.5-1) % , 60% nitrous oxide in oxygen top up doses of vecuronium bromide . During surgery, adequate analgesia was defined as haemodynamic stability as indicated by the absence of increase in MAP or HR of more than 15% compared with baseline value obtained just before the surgical incision, Intra-operative decreases in MAP and HR more than 30% of baseline values were defined as severe hypotension or bradycardia respectively and were treated by rapid infusion of fluids or, if unsuccessful, the use of ephedrine, or atropine. At the end of surgery reversal from general anaesthesia will be done with inj. neostigmine 0.05mg/kg and inj. glycopyrrolate 0.01mg/kg . Patient will be extubated once they will be fully awake , moving all four limbs and presence of adequate cough reflex . Pt will be shifted to ward when they are alert , cooperative , haemodynamically stable , capable of maintaining airway , spo2 more than 95% in room air , No signs of residual blockade , CHEOPS Score less than 4. Children's Hospital of Eastern Ontario pain scale (CHEOPS) developed by McGrath et al. in 1985.[8] It is an observational scale for measuring postoperative pain in children aged 1-7 years. The scale includes six categories of pain behaviour : (Cry, facial, verbal, torso, touch, and legs). A score ranging from 0 to 2 or 1 to 3 is assigned to each activity and the total score ranges between 4 and 13. If at the

moment CHEOPS score was more than 6 then rescue analgesia was given in the form paracetamol suppository15 mg/kg.

During postoperative period, moist O2 was administered for 2 hours. The parameters assessed were

- Time to administration of 1st rescue analgesic- the time between completion of caudal epidural administration and 1st post-operative rescue analgesia.
- CHEOPS score at 30, 60, 90, 120,150, 180 min after extubation.
- Adverse effects like vomiting, retching, urinary retention.

Samples were analysed statistically using student 't' test. A p value <0.05 was considered statistically significant.

OBSERVATION AND RESULTS

The quality and duration of postoperative pain relief was not statistically significant between the two groups. Lack of analgesia was not found in any patient during surgery and there is no haemodynamic response to initial incision. Postoperative pain score was comparable in two groups. Average duration of analgesia in bupivacaine group was 194.16 ± 19 and in ropivacaine group was 196.32 ± 19.66 min. Two hour after surgery all patients had full sensory recovery. None of the children had complete motor power recovery 2 hour after surgery in group A, while 6 children have normal motor power (score 10) in group B during the study period, None of the patients showed severe bradycardia or hypotension.

Table – 1 Comparison of time to rescue analgesia (in min) between two groups

Gr	n	mean	median	min	max	SD	P value
A	25	194.16	192	162	234	19.81	0.67
B	25	196.32	198	168	222	16.66	0.67

Table show that descriptive statistics of time to rescue analgesic in two groups. The median values were not statistically significant. (p>0.05)

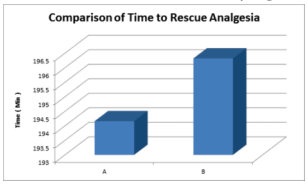

Table-2 Pain score between Group A & Group B at various time points.

Time (min)	n		mean		median		min		max		SD		P value	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
30	25	25	3	3	3	3	3	3	3	3	0.0	0.0	0.6	0.6
60	25	25	3.08	3.16	3	3	3	3	4	4	0.27	0.37	0.94	0.94
90	25	25	3.96	3.8	4	4	3	3	5	4	0.61	0.4	0.83	0.83
120	25	25	5.4	4.44	5	4	4	4	9	8	1.47	1.04	0.78	0.78
150	25	25	7.21	6.78	7.5	6.5	5	5	8	9	1.05	1.11	0.85	0.85
180	25	25	8	8.5	8	8.5	7	8	9	9	1.41	0.7	0.68	0.72

Table show that the pain score between Group A & Group B at various time points. The median values were not statistically different (p>0.05)

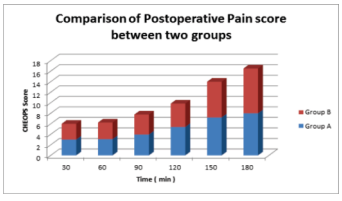

Table-3 Side Effects

Complication	Group A	Group B
Vomiting	2 (8%)	2 (8%)
Retching	2 (8%)	1 (4%)
Urinary Retention	4 (16%)	5 (20%)

Table show that there is no statistical significant in the incidence of vomiting, Retching, Urinary Retention between the two Groups. (p >0.05)

DISCUSSION

In our study quality and duration of analgesia did not differ significantly between the two groups. Average duration of analgesia was 194.16 ±19 min in bupivacaine group and 196.32 ±19.66 min in ropivacaine group in this series. Ivani et al [9] reported a significant difference in the duration of analgesia between the bupivacaine (253 min) and ropivacaine (520 min). J.S Tan et al,[10] in a study comparing the post-operative analgesia of caudal Ropivacaine vs Bupivacaine showed no difference between the two groups in duration of postoperative analgesia. Similar studies were shown in a study by Samia Khalil et al.[11] Both the findings are corroborative with the finding of the study.

Immediately after surgery all patients showed some amount of motor weakness in both the group. But after two hours almost normal motor power was recorded in ropivacaine group. Khalil et al also reported significant motor block initially which almost recovered to normal power within three hours in ropivacaine group. Motor recovery was significantly slow in bupivacaine group. Ray et al[12] also supported to this findings.

In this study 0.5 –1ml/kg of 0.2% ropivacaine or 0.25% bupivacaine was used for caudal analgesia. Because pharmacokinetic studies of ropivacaine show that maximal plasma concentration achieved after 1ml/kg 0.25% ropivacaine is much lower than the maximal tolerated plasma concentration of ropivacaine in adult volunteers. Habre et al[13] reported that maximum plasma concentration of ropivacaine was achieved at 2 hours following caudal block which is much later than for bupivacaine in children. Ropivacaine has less cardiotoxic effect compared to bupivacaine and its sensorial and motor effectiveness is superior to bupivacaine.

Another reason of using 0.2% ropivacaine is to avoid motor blockade in postoperative period, which may occur with higher concentration. However Da Conceicao and Coelho[14] reported a significantly shorter duration of motor block with 0.375% ropivacaine as compared to bupivacaine.

CONCLUSION

Ropivacaine (0.2%) administered through caudal epidural route provides similar duration and quality of postoperative analgesia compared to Bupivacaine (0.25%).Due to less motor blockade it can be used in day care surgery.

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