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Original Research Article

# Comparative Study of Postoperative Pain Relief in Paediatric Surgery Using Bupivacaine 0.25% and Ropivacaine 0.5% as Post-Operative Incisional Skin Infiltration

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**Abstract:** Postoperative pain relief in pediatric surgery patients has remained an issue of ongoing debate. This study was undertaken to describe our own experience with postoperative pain relief in pediatric surgery patients using bupivacaine 0.25% and ropivacaine 0.5% as postoperative incisional skin infiltration. This was a prospective randomized double blind study of patients of age group 4-12 years in which postoperative pain relief is achieved using incisional wound infiltration with bupivacaine 0.25% and ropivacaine 0.5% . A total of 120 patients of ASA G-1, 2 of age group 4-12 years were studied. They underwent elective operation (herniotomy).they were divided in three groups A, B and C, each having 40 patients. Before skin closure infiltration done on each side of incision with ropivacaine .5% in group A, group B received bupivacaine .25% and group C did not received any infiltration. In all 3 groups further postoperative analgesia was administered in postoperative ICU. Pain score evaluated at every 1 hour. Analgesic request by the patient was more than 4 on VAS. In ropivacaine and bupivacaine group pain was less even at 10 hrs in compare to group C (not received any local infiltration). Analgesic request was also less in ropivacaine group i.e. group A. Bradycardia and some ECG changes are associated with bupivacaine but not with ropivacaine. Thus our prospective, randomized double blind study demonstrated excellent postoperative analgesia using wound infiltration with ropivacaine without severe side effects in pediatric patients.
**Keywords:** Postoperative pain relief, incisional wound infiltration, visual analogue score

## INTRODUCTION

Levobupivacaine & Ropivacaine the two new long acting local anaesthetic agents have been developed as an alternative to Bupivacaine after the evidence of its severe toxicity. Ropivacaine is the left isomer and due to their 3 dimensional structures seem to have less toxic effects on the CNS & CVS [1]. Bupivacaine is amino amide local anaesthetic first synthetized by Ekenstam in 1957 [2] Ropivacaine has butyl group, Bupivacaine has a propyl group on the amine portion of pipedoxylidine. Ropivacaine is much less lipophilic than bupivacaine. Faster return of motor function and effective sensory blockade is with ropivacaine. Ropivacaine has a shorter systemic half-life than bupivacaine which makes it safer for repeated doses.

## AIMS AND OBJECTIVE

In the postoperative period pain is the most distressing especially for paediatric patient. Opioid analgesic has many side effects like respiratory depression, excessive sedation. Nausea vomiting etc. So skin infiltration with local anaesthetic agents can be a good choice. Different local anaesthetic agents for this purpose are lignocaine, bupivacaine, levobupivacaine and Ropivacaine. A suitable agent for this purpose is based on its duration of action, safe dose limit, less toxicity etc. now commonly in use are ropivacaine and bupivacaine. To compare the analgesic effect of incisional infiltration of these 2 agents following paediatric inguinal surgery with the group where no infiltration done, we have conducted this study. We have also compared nausea vomiting, respiratory depression among the entire group.

## METHOD

After obtaining institutional ethic committee approval and written informed parental consent, 120 number of ASA G-1, 2 patient of age group of 4-12 years scheduled for elective operation studied using a double blind protocol.

**Table-1: Experimental design**

| Age | Group A | Group B | Croup C |
|---|---|---|---|
| 4-6 years | 22 | 20 | 22 |
| 6-8 years | 8 | 10 | 9 |
| 8-10 years | 6 | 4 | 5 |
| 10-12 | 4 | 6 | 4 |

120 patient divided in 3 group A group B and group C. Exclusion criteria include respiratory tract infection and inability to comprehend the visual analogue score (VAS). On the day of surgery patients were premeditated with oral midazolam syrup. A venous line was inserted in the forearm and infusion of balanced pediatric solution was started. Glycopyrrolate. 04mg/kg i.m. given. induced with propofol 2mg/kg i.v. and Tramadol 1mg/kg i.v., Succinylcholine 2 mg/kg i.v. given and intubation done. Maintenance of anaesthesia done with atracurium, Nitrous oxide and Oxygen.

**Operation done**

**Table-2: Herniotomy**

| Age | Group A | Group B | Croup C |
|---|---|---|---|
| Herniotomy | 40 | 40 | 40 |

**Duration of Surgery**

30-minutes to 1 hour, average 45 minutes

**Monitoring**

Intraoperative Monitoring did – Oxygen saturation, pulse rate, blood pressure. Before skin closure infiltration done on both side of incision with Ropivacaine .5% in group A, group B received Bupivacaine .25% and Group C did not received any infiltration. Total 8-10 ml solution infiltrated.

In all the 3 groups further postoperative analgesia was administered in the postoperative I.C.U. Pain score evaluated at every 1 hour. Analgesic request by the patient was more than 4 on the VAS. Initially paracetamol rectal suppository administered when the patient complained of pain and then repeated every 6 hrs. If sedation required promethazine (Phenergan) i.m. given at dose of 1mg/kg. If this regimen was insufficient then Tramadol 1mg/kg i.m. given.

## RESULT

**Nausea, vomiting**

No difference in postoperative antiemetic requirement during 1$^{st}$, 3$^{rd}$, 5$^{th}$, 7$^{th}$ hour postoperatively in group A and B incidence of nausea and vomiting was high in group C. No urinary retention in Ropivacaine and Bupivacaine group but in Group C 10 cases presented with urinary retention.

**Ventilation**

In all groups nurse monitored Ventilation by pulse oxymeter for first 8 hours. Sp $O_2$ was normal in group A and B but in Group C intermittent oxygen support required as $SpO_2$ sometimes came down to 90%.

**Pain**

**Table-3: VAS SCORE**

| Hrs | Group A | Group B | Croup C |
|---|---|---|---|
| 1 | 2 | 2 | 8 |
| 2 | 2 | 2 | 7 |
| 3 | 2 | 2 | 7 |
| 4 | 2 | 2 | 8 |
| 5 | 2 | 2 | 6 |
| 6 | 2 | 2 | 5 |
| 8 | 4 | 4 | 6 |
| 10 | 4 | 4 | 6 |

That means in Ropivacaine and Bupivacaine group pain was less even at 10 hours in compare to Group C (Not received any local infiltration). Analgesic requirement was also less in those 2 group. Bradycardia and some ECG changes are associated with bupivacaine but not with ropivacaine.

## DISCUSSION

Both Bupivacaine and Ropivacaine blocks impulse conduction in nerve conduction in nerve fibres via reversible inhibition of sodium ion influx. Ropivacaine has selective action on pain transmission nerve fibre than motor fibre.[3] Mean maximum tolerated dose for CNS toxicity is higher with Ropivacaine than Bupivacaine and ECG changes appear at lower dose with bupivacaine than Ropivacaine. Both Ropivacaine and Bupivacaine has onset of 10-15 minutes after skin infiltration and duration of analgesia of around 8-10 hours [3]. but in our study effective analgesia was for 7 hours. For skin infiltration dose of Ropivacaine is 3mg/kg without adrenaline and 4mg/kg with adrenaline. Dose of bupivacaine is 1 mg/kg. Recommended concentration of ropivacaine is .2-.7% for skin infiltration and .25-.5% for bupivacaine [4]. Higher concentration of ropivacaine and bupivacaine is associated with pain but here we infiltrated when the patient was anaesthetized.

## CONCLUSION

Our prospective, randomized double blinded study demonstrated excellent postoperative analgesia using wound infiltration with ropivacaine without severe side effects in paediatric patients.

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