ORIGINAL ARTICLE

Comparative Study of Ropivacaine versus Ropivacaine with Clonidine for Caudal Analgesia in Paediatric Age Group Among Lower Abdominal and Lower Limb Surgery

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ABSTRACT

Introduction: Clonidine, an a_2 adrenergic agonist, prolongs analgesia without significant respiratory depression. The analgesic action of epidurally-administered clonidine is due to stimulation of descending noradrenergic medullospinal pathways inhibiting the release of nociceptive neurotransmitters in the dorsal horn of spinal cord. The present study was done with the objective of assessing advantages of use of clonidine with Ropivacaine for caudal analgesia in paediatric age group among lower abdominal and lower limb surgery.

Methodology: A randomized controlled study consisted in two groups of thirty paediatric patients (1-10 years) each with lower abdominal and lower limb surgery was carried out at Department of Anaesthesia, SMIMER Hospital, Surat during Jan to Dec 2012.Total 60 patients were randomly allocated in two groups by chit method. In Group R patients Inj.Ropivacaine0.25% (0.5 ml/kg) was given and in Group RC patients Inj. Ropivacaine 0.25%(0.5 ml/kg)+ Inj. Clonidine 2mg/kg was given. Patients were assessed for pain Modified objective pain score and sedation assessed with Four Point sedation score.

Results: Mean age of patient was 4.77 ± 2.487 years in Group R and 5.37 ± 2.723 yrs in Group RC. Total Male:Female ratio was 9:1. Majority of patients were operated for congenital herniotomy (68.3%) followed by Hypospadiasis repair (16.6%).Mean modified pain score was measured at each hour postoperatively. It was higher at each level in Group R and this difference was statistically significant. The mean duration of analgesia was 7.17 hrs in Group R and 12.93 hrs in Group RC. This difference was also statistically significant (p-Value < 0.001).

Conclusion: From the study, it was concluded that the addition of clonidine 2μg/kg to single shot caudal block with Ropivacaine 0.25% prolongs the duration of postopertive analgesia while maintaining hemodynamic stability. Clonidine 2μg/kg is safe & effective adjuvant in caudal block for paediatric lower abdominal and lower limb surgery.

Keywords: Clonidine, Ropivacaine, Caudal block,Analgesia

INTRODUCTION

Pain is the most feared symptom in paediatric age group. The main difference in pain perception between children and adults is related to cognitive-evaluative component which develops throughout childhood and adolescence. Different local anaesthetic agent can be used for caudal block. Ropivacaine is newer local anaesthetic used for caudal block.

Caudal block is a well-accepted technique and proved to be a good alternative to general anesthesia in pediatric infra-umbilical surgeries. Caudal analgesia is an extradural block is notable for its simplicity, safety and effectiveness. Its advantage is postoperative pain relief, early ambulance and early discharge. Usage of single local anesthetic agent via caudal route provides shorter duration of block[1] and requires often supplemental anesthetics. Ropivacaine, an amide local anesthetic, offers some advantages over bupivacaine e.g., less cardiac and neurological toxicity, less motor blockade and prolonged sensory analgesia.[2]Its main disadvantage is shorter duration of action after single shot injection (4 to 6hr). So, various drugs have been added to local anaesthetic to prolong the duration of analgesia. Addition of opioids and non opioids like adrenaline, clonidine, ketamine, benzodiazipine etc. are used along with

local anaesthtetics. Opioids carry risk of post-operative respiratory depression, and ketamine has the potential of neurotoxicity if inadvertently injected intrathecally.[3]

Clonidine, an a_2 adrenergic agonist, prolongs analgesia without significant respiratory depression. The analgesic action of epidurally-administered clonidine is due to stimulation of descending noradrenergic medullospinal pathways inhibiting the release of nociceptive neurotransmitters in the dorsal horn of spinal cord.[4] The analgesic effect of clonidine is more pronounced after neuraxial injection, which suggests a spinal site of action and makes this route of administration preferable.[5,6]

The present study was done with the objective of assessing advantages of use of clonidine with Ropivacaine for caudal analgesia in paediatric age group among lower abdominal and lower limb surgery.

METHODOLOGY

A randomized controlled study consisted in two groups of thirty paediatric patients (1-10 years) each with lower abdominal and lower limb surgerywas carried out at Department of Anaesthesia, SMIMER Hospital, Surat during Jan to Dec 2012.

After approval from the Institutional Ethics committee, the present study was conducted in 60 paediatric patients of either sex belonging to ASA grade I or II, in the age group 1 to 10 years scheduled for elective lower abdominal and lower limb surgery. Written Informed consent of the guardian was taken before enrolment of the patients in the study.

Detailed history and preoperative assessment was carried out a day before operation. A detailed general as well as systemic examination was done to rule out any major systemic illness. Routine investigation were carried out. Patients with drug allergy, skin infections at the site of block, abnormalities of sacrum, active central nervous system diseases, history of disorders of blood clotting, and patients with cardiovascular, respiratory, hepatic and renal diseases were excluded from the study.

Total 60 patients were randomly allocated in two groups by chit method.In Group R patients Inj.Ropivacaine0.25% (0.5 ml/kg) was given and in Group RC patients Inj.Ropivacaine 0.25%(0.5 ml/kg)+ Inj.Clonidine 2mg/kg was given.

Clonidine used in study was a preservative free preparation, available in 150mg/ml amouples. All the patients were premedicated oral midazolam in sugar syrup 0.3mg/kg fourty-five minutes before surgery. General Anaesthesia was given thiopentone sodium 0.25% & suxamethonium 2mg/kg intravenously, intubation was done with appropriate size endotracheal tube. Anaesthesia was maintained with nitrous oxide 66% oxygen 33% along with isoflurane & vecuronium bromide as muscle relaxant. The duration of caudal analgesia was defined from the time of caudal injection to the time of the first analgesic supplementation. Respiratory depression was defined as an oxygen saturation <93%. Patients were assessed for pain Modified objective pain score and sedation assessed with Four Point sedation score. Side effects like nausea, vomiting, bradycardia, hypotension, urinary retension and respiratory depression were noted.

RESULTS

Mean age of patient was 4.77 ± 2.487 years in Group R and 5.37 ± 2.723 yrs in Group RC. Total Male:Female ratio was 9:1. Majority of patients were operated for congenital herniotomy (68.3%) followed by Hypospadiasis repair (16.6%). Heart rate, Arterial Blood Pressure, Mean Oxygen saturation and respiratory rate studied intra operative as well as post operative within normal limit or controlled. Analgesic consumption was significantly higher in Group R (206.50 ± 71.633 mg) when compared with Group RC (99.35 ± 147.854 mg) (p-Value <0.001). In the immediate post-operative period, sedation score was 2.47 ± 0.507 in Group R and 2.20 ± 0.407 in Group RC ($p<0.05$)

Table 1: Mean Modified pain score

TIME	GROUP R (Mean ± SD)	GROUP RC (Mean ± SD)	p-Value
1 hrs	0.30 ± 0.466	0.07 ± 0.254	0.019
2 hrs	1.20 ± 0.925	0.37 ± 0.669	<0.001
4 hrs	2.20 ± 0.665	1.10 ± 0.845	<0.001
6 hrs	2.97 ± 1.273	1.90 ± 0.403	<0.001
8 hrs	7.13 ± 1.332	2.20 ± 0.407	<0.001
12 hrs	6.10 ± 0.923	4.40 ± 2.711	0.002
18 hrs	5.63 ± 0.809	4.57 ± 1.135	<0.001
24 hrs	4.40 ± 1.070	3.33 ± 0.802	<0.001

Mean modified pain score was measured at each hour postoperatively. It was higher at each level in Group R and this difference was statistically significant. The mean duration of analgesia was 7.17 hrs in Group R and 12.93 hrs in Group RC. This difference was also statistically significant (p-Value < 0.001).

DISCUSSION

Caudal analgesia provides an excellent means of pain relief to children in the postoperative period. Prevention of pain is always easier than cure. Not providing adequate pain relief may lead to serious psychological upset in children. Early postoperative pain relief hastens the recovery and minimizes hospital stay. For

outpatient surgery, agents that provide minimal side effects are essential.

Clonidine, an antihypertensive agent with sedative and analgesic effects is a mixed α1 and α2adrenoceptor agonist with a predominant α2 action. The analgesic action of epidurally administered clonidine is due to stimulation of descending noradrenergic medullospinal pathways inhibiting the release of nociceptive neurotransmitters in the dorsal horn of spinal cord. When given epidurally, in the dose of 1-2μg/kg body weight, it prolongs the duration of analgesia without any fall in heart rate, mean arterial pressure, respiratory depression and oxygen saturation. Synergistic effect of epidurally administered clonidine with ropivacaine, increases the duration of analgesia.

Several pediatric studies involving caudal use of clonidine together with local anesthetics have indicated a spinal mechanism of action.[7,8] Co-administration of clonidine with local anesthetics has been shown to improve the quality of peripheral nerve blocks.[9,10]

The present study shows that mean modified pain score was measured at each hour postoperatively. It was higher at each level in Group R and this difference was statistically significant. The mean duration of analgesia was 7.17 hrs in Group R and 12.93 hrs in Group RC. This difference was also statistically significant (p-Value < 0.001). Bajwa SJ *et al.*[11] found in a study that caudal block with ropivacaine 0.5 ml/kg combined with 2 μg/kg of clonidine provides efficient analgesia intra-operatively and prolonged duration of analgesia post-operatively. Koul A *et al.*[12] also found significant prolongation of post-operative analgesia with an addition of clonidine with bupivacaine caudally.

CONCLUSION

From the study, it was concluded that the addition of clonidine 2μg/kg to single shot caudal block with Ropivacaine 0.25% prolongs the duration of postopertive analgesia while maintaining hemodynamic stability. Clonidine 2μg/kg is safe & effective adjuvant in caudal block for paediatric lower abdominal and lower limb surgery.

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