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Comparison of Ropivacaine and Ropivacaine with Clonidine for Caudal Analgesia in Pediatric Patients for Lower Abdominal Surgeries

KEYWORDS: Analgesia, Caudal, Clonidine, Hemodynamic, Ropivacaine

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ABSTRACT ***AIM*** *The aim of the present study was to compare the post-operative pain relieving quality of ropivacaine 0.25% and clonidine mixture to that of plain ropivacaine 0.25% following caudal administration in children.*

METHOD *In a prospective, double-blinded, randomized controlled trial, 80 ASA I, II pediatric patients undergoing infraumbilical surgery were randomly allocated to receive a caudal injection of either plain ropivacaine 0.25% (0.5 ml/kg) (group A) or a mixture of ropivacaine 0.25% (0.5 ml/kg) with clonidine 1 µg/kg (group B). Objective pain score and need for supplemental analgesics were compared during the 1st 24 hours postoperatively. Residual post-operative sedation and motor blockade were also assessed.*

RESUITS *Significantly prolonged duration of post-operative analgesia was observed in group B (P<0.0001). Heart rate and blood pressure were not different in 2 groups. Neither motor blockade nor post-operative sedation varied significantly between the groups.*

Conclusion: *Addition of clonidine 1 mcg/kg to 0.25% ropivacaine for caudal analgesia significantly prolongs the duration of analgesia in the post-operative period with minimal changes in the hemodynamic parameters without any side effects. Therefore, we conclude that 0.25% ropivacaine with 1 mcg/kg clonidine has better post-operative analgesia when compared to plain ropivacaine.*

INTRODUCTION

Post-operative pain relief in children is very important since emotional component of pain is very strong in children. As pain is very difficult to assess in pediatric population very commonly, post-operative pain is undertreated in this age group. Caudal block is a well-accepted technique and proved to be a good alternative to general anesthesia in pediatric infra-umbilical surgeries. 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] Addition of adjuvants (opioids, ketamine etc.) prolongs the duration of block and are being increasingly used these days. 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]

Therefore, we did a prospective, randomized, double-blind study to compare the analgesic effects and side effects of ropivacaine and when ropivacaine added to clonidine for caudal analgesia in children undergoing lower abdominal surgeries

METHOD

After obtaining proper informed consent from parents and approval of institutional ethical committee, 80 ASA grade I,II children, aged 2 to9 years, scheduled for lower abdominal, perineal, and lower limb surgeries, were included in the study. Patients having cardiovascular, neurological diseases, coagulopathy, infection or deformity of local site and where parents refused to give consent were excluded from the study.

80 children were randomly allocated into 2 equal groups. Group A received ropivacaine 0.25% 0.5 ml/kg via caudal route. Group B received ropivacaine 0.25% 0.5 ml/kg plus clonidine 1 µg/kg in the same route. Drug was prepared by a person unrelated to study, and volume of drug contributed by clonidine being insignificant blinding could be done easily.

All patients were premedicated with nasal midazolam orally 0.2 mg/kg, and parental separation was done after 20 minutes.

After transferring the patient into operating room, multichannel monitor was attached and baseline readings of heart rate (HR), oxygen saturation (SpO_2), systolic blood pressure (SBP), diastolic blood pressure (DBP) were obtained. Patients were induced with gas mixture of nitrous oxide, oxygen, and halothane, and an intravenous access was achieved. Atropine 0.02 mg/kg, pentazocine 0.05 mg/kg were administered i.v. Caudal block was given in lateral position under all aseptic precaution with a 25 gauge i.m needle. After confirming the position of the needle, with Whoosh test, the allocated drug was given. Administering anesthesiologist was blinded to the composition of the drug. After making the patient supine, surgery was allowed once up to level T_{10} blockade was

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established. Intra-operatively HR, SBP, DBP were noted at 0,5,15,30,45,60,90,120 min

Post-operatively patients were observed in post-anesthesia care unit (PACU) for 24 hours The Pain score and Sedation score was assessed postoperatively, Pain score was assessed by Face ,Legs, Activity, Cry, Consolability (FLACC) scale and was noted at 1,2,3,4,8,12,24 hr postoperatively and if complained of pain. The time from caudal placement of drug to FLACC>3 was taken as duration of analgesia. Rescue analgesia was provided with Diclofenac suppository 1 mg/kg.

FLACC scale

Behavioral Observation Pain Rating Scale

Categories	Scoring		
	0	1	2
Face	No particular expression or smile; disinterested	Occasional grimace or frown, withdrawn	Frequent to constant frown, clenched jaw, quivering chin
Legs	No position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid, or jerking
Cry	No crying (awake or asleep)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging, or talking to. Distractable	Difficult to console or comfort

Each of the five categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, which results in a total score between 0 and 10.

Statistical analysis

Data were collected separately from both the groups and fed in a Microsoft excel worksheet. Mean value and standard deviation were computed for age, weight, duration of surgery, duration of analgesia, HR, SBP, DBP. Then, the mean values of the 2 groups were compared by using unpaired student t test. P<0.05 was considered as statistically significant.

RESULTS

Patients in the 2 groups were comparable regarding age, weight, sex distribution [Table 2]. HR, SBP, and DBP as noted intra-operatively did not vary significantly between the 2 groups [Figures1,2,3]. Analgesia persisted for a longer duration in clonidine group (600.25 ± 57.13minutes) in comparison to plain ropivacaine group (251.50±45.69 minutes), which is statistically significant (P<0.0001) [Table 3]. FLACC score between the two group were shown in figure 4.

Table 2 demographic data

DATA	Group A	Group B	P value
Age	6.325+1.84	6.45+1.80	0.759
sex			
Male	37	36	0.692
female	3	4	
weight	16+3.43	16+3.88	1.00

Figure 1 changes in HR

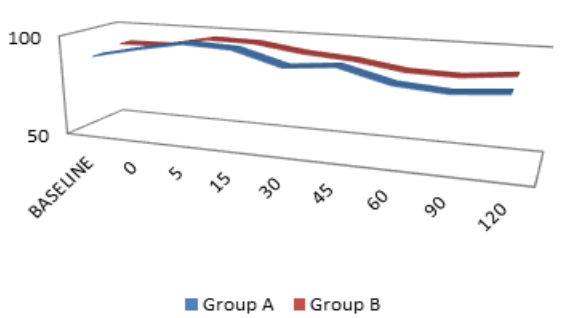


Figure 2 changes in SBP

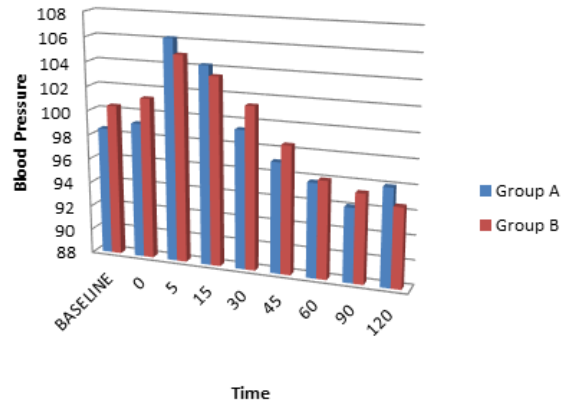


Figure 3 changes in DBP

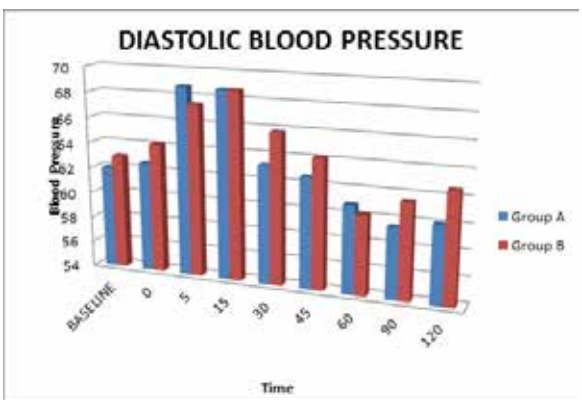
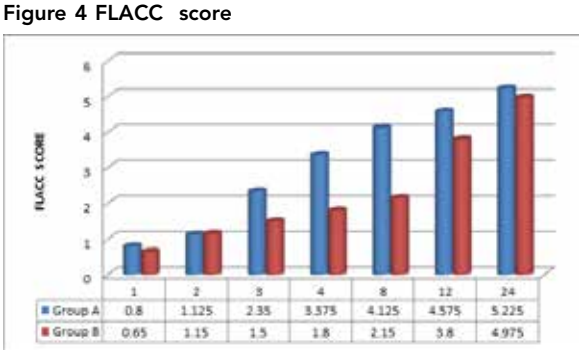


Table 3 duration of analgesia

	R GROUP	RC GROUP	P VALUE	SIGNIFICANCE
MEAN DURATION OF ANALGESIA	251.50±45.69	600.25 ± 57.13	0.001	SIGNIFICANT

Figure 4 FLACC score



DISCUSSION

The past decade has witnessed many advances in the understanding and treatment of pain in children. Caudal epidural blockade is one of the most popular regional block used in pediatric anesthesia. This reliable and safe technique is used widely for many surgical procedures in combination with general anesthesia. It allows rapid recovery from anesthesia with effective post-operative analgesia. The main disadvantage of this technique is the short duration of action following single shot caudal using only local

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anesthetic. To avoid extradural catheter placement, which carries the risk of infection, and yet prolong the duration of single-shot caudal anesthesia, various additives to local anesthetic solutions have been used.(7,8)

Hence, recently several studies have reported caudal use of opioids and other drugs in children to improve postoperative analgesia. Though the use of caudal opioids did prolong the duration of analgesia, it was associated with side-effects like respiratory depression, pruritus, urinary retention, nausea and vomiting. Hence, other drugs like clonidine have been administered to improve analgesia in the postoperative period while avoiding the side-effects associated with opioid use.(9)

In the present study, there was no significant difference in the two groups with regards to age, weight and Gender.

study conducted by S.J Bajwa et al in the year 2010 who compared caudal Ropivacaine 0.25% and Ropivacaine with clonidine 2 microgram/kg for lower abdominal surgeries in pediatric patients and above table suggests that mean intraoperative heart rate was 109.16 ± 7.94 /min in control group and 107.20 ± 8.02/ min in Study group which was statistically insignificant with P value 0.74 which proved that addition of clonidine 2 µg/kg caudally doesn't cause significant bradycardia.(10)

study conducted by Arpita laha, Sarmila ghosh et al in 2012 studied the comparison of caudal analgesia between ropivacaine 0.2% and ropivacaine 0.2% with clonidine 2 µg/kg and volume of 1 ml/kg in children, they did not found any significant difference in Hemodynamic parameters like Mean heart rate, Systolic Blood Pressure and Diastolic Blood Pressure, which were comparable with observations of present study.(11)

Motsch and colleagues found that children receiving found that using lower doses of clonidine (1-5 µg/kg) does not significantly affect hemodynamic parameters like Heart rate and Blood pressure , also these changes are less pronounced in children than in adults while using epidural clonidine.(12)

In Present study the duration of analgesia was significantly prolonged in Ropivacaine-clonidine group (600.25 ± 57.13 min) compared to Ropivacaine alone group (251.50±45.69 min) in our study. This is an agreement with a study by J. J. Lee and colleagues, which found that addition of clonidine to local anesthetic prolongs the duration of analgesia after a single shot caudal block. They reported an increase in the mean duration of analgesia (588 ± 120 min) after the addition of clonidine when compared to local anesthetic alone (312 ± 60 min).(13)

In 2012 Arpita laha et al compared the quality of analgesia between Ropivacaine 0.2%, 1ml/kg alone and Ropivacaine 0.2%, 1ml/kg with Clonidine 2microgram/kg for pediatric caudal block. Duration of analgesia in Clonidine group was 975 min compared to 466±0.94 min in Ropivacaine alone group . In this study all the children were premedicated with nasal midazolam 0.2mg/kg and of pentazocine 0.05mg/kg which may have increased the duration of analgesia. In contrast to our study the duration of analgesia is significantly increased, where they have used 1ml/kg of Ropivacaine 0.2% and Clonidine 2microgram/kg.(11)

CONCLUSION

Adjuvant clonidine 1 µg/kg with Ropivacaine 0.25% is better choice than Ropivacaine alone 0.25% in caudal block for infra-umbilical surgeries in pediatric patients for post-operative analgesia without any significant hemodynamic effects.

REFERENCES

1. Verghese ST, Hannallah RS. Postoperative pain management in children. Anesthesiol Clin North America.2005;23:163–84
2. Habre W, Bergesio R, Johnson C, Hackett P, Joyce D, Sims C, et al. Pharmacokinetics of ropivacaine following caudal analgesia in children. Paediatr Anaesth. 2000;10:143–7.
3. Malinovsky JM, Lepage JY, Cosian A, Mussini JM, Pinaudt M, Souron R. Is ketamine or its preservative responsible for neurotoxicity in rabbit? Anesthesiology. 1993;78:101–5.
4. Cook B, Dayle E. The use of additives to local anaesthetic solutions forcaudal epidural blockade. Paediatr Anaesth. 1996;6:353–9
5. Bonnet F, Boico O, Rostaing S, Loriferne JF, Saada M. Clonidine induced analgesia in post operative patients; epidural versus intramuscular administration. Anesthesiology. 1990;72:423–7.
6. Eisenach J, Detweiter D, Hood D. Haemodynamic and analgesic action of epidurally administered clonidine. Anesthesiology. 1993;78:277–87
7. De-Beer DAH, Thomas ML. Caudal additives in children – solutions or problems? Br J Anaesth 2003;90(4):487-98
8. Cook B, Doyle E. The use of additives to local anaesthetic solutions for caudal epidural blockade. Pediatric Anaesth 1996;6:353-9.
9. Basker S, Singh G, Jacob R. Clonidine in pediatrics – a review. Indian J Anaesth 2009;53(3):270-280.
10. Bajwa SJS, Kaur J, Bajwa SK, Bakshi G, Singh K, Panda A. Caudal ropivacaine–clonidine: A better post-operative analgesic approach. Indian J Anaesth 2010;54:226-30.
11. Laha A, Ghosh S.,Das H, Comparison of caudal analgesia between ropivacaine and ropivacaine with clonidine in children: A randomized controlled trial, Saudi J anaesth. 2012 Jul-Sep; 6(3): 197–200.
12. Motsch J, Bottiger BW, Bach A, Bohrer H, Skoberne T, Marin E. Caudal clonidine and bupivacaine for combined epidural and general anaesthesia in children. Acta Anaesthesiol Scand 1997;41:877-83.
13. Lee JJ, Rubin AP. Comparison of a bupivacaine-clonidine mixture with plain bupivacaine for caudal analgesia in children. Br J Anaesth 1994;72:258-262.