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EFFECT OF ADDITION OF CLONIDINE AS AN ADJUVANT TO 0.2 % ROPIVACAINE IN CAUDAL BLOCK FOR CHILDREN UNDERGOING INFRAUMBILICAL SURGERIES

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ABSTRACT

Background: Post operative pain relief in children is very important since they have reduced threshold for pain so adequate analgesia is necessary. Caudal block is well accepted technique for infraumbilical surgeries and provides good analgesia. Ropivacaine, an amide local anaesthetic has reduced cardiac and neural toxicity with lesser motor blockade and good level of sensory blockade but however they do not have prolonged effects so adjuvants can be added to prolong the analgesic effect. clonidine, alpha 2 agonist when added as an adjuvant to Ropivacaine can significantly prolong the analgesic effects with lesser systemic side effects and can provide effective post operative analgesia. **Materials And Methods:** A comparative study was conducted in paediatric population (1 to 7 years) of 40 members divided into two equal groups R and RC. Predesigned proforma was used. Informed consent was obtained. Group R received 0.2% Ropivacaine (1ml/kg) and group RC will receive 0.2% Ropivacaine (1ml/kg) with clonidine(1 mcg/kg) as caudal block after adequate sedation. Patients vitals was monitored and pain was assessed using FLACC scales postoperatively along with any side effects. **Results:** Duration of analgesia for RC group was around 9 hours and R group was around 5.3 hrs. Duration of analgesia was statistically significant with greater duration of analgesia in RC group thus making clonidine to be an effective adjuvant for caudal blockade **Conclusion:** Clonidine can be used as an effective adjuvant to local anaesthetic agent for caudal blockade without any adverse events and significant complications

Keywords: Clonidine, Duration of Analgesia, Ropivacaine

INTRODUCTION

Pain is defined as an unpleasant emotional and sensory experience associated with actual or potential tissue damage or described in terms of such damage. Pain is an unpleasant subjective sensation that can only be sensed and cannot be articulated. Children's postoperative pain management is crucial because of their highly developed emotional sensitivity to pain. Post-operative pain is often under treated in the paediatric population because pain is notoriously difficult to quantify. In paediatric infra-umbilical procedures, caudal block has shown to be a good substitute for general anaesthesia, and it is a widely accepted method.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 09, 2024

Ropivacaine, an amide local anaesthetic agent, offers some advantages over bupivacaine e.g., less cardiac and neurological toxicity, less motor blockade and prolonged sensory blockade.

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. Clonidine, an alpha 2 adrenergic agonist, prolongs analgesia without significant respiratory depression.

Co-administration of clonidine with local anaesthetic agent has been shown to improve the quality of peripheral nerve blocks.

The use of regional anaesthetic methods reduces the need for systemic analgesics and decreases post-operative discomfort dramatically. Given its high success rate and simplicity, the caudal route was selected for this study. Caudal analgesia attenuates the stress reaction to surgery, minimizes the requirement of inhaled and intravenous anaesthetic agent, promotes a quick and easy recovery and offers effective postoperative analgesia.

AIM OF THE STUDY

To study the effect of clonidine as an adjuvant to ropivacaine in caudal block for children between 1 and 7 years of age undergoing lower abdominal surgeries

Objectives

- To study the effect of caudal block with 0.2 % ropivacaine
- To study the effect of caudal block with 0.2 % ropivacaine and clonidine.
- To find out the systemic side effects of clonidine when used as adjuvant to ropivacaine

METHODOLOGY

This study was performed at the Department of Anaesthesiology, Government Cuddalore medical college, Chidambaram. Forty children between the age group 1 to 7 years posted for elective infra umbilical were randomly divided into two groups .Anesthesiologist who was unaware of drug combination was involved in the administration of caudal block and observation of the patients involved in the study

Group R - Received caudal epidural block with 1ml/kg of 0.2% ropivacaine

Group RC- Received caudal epidural block with 1ml/kg of 0.2% ropivacaine and clonidine 1mcg/kg

The age and weight of the child was noted. Preoperative fasting protocols strictly followed. All patients posted for surgery were shifted to operation theatre and premedicated with oral midazolam 5 mg/ kg, 30 mins before surgery. The child was connected to monitors (Non invasive blood pressure, electrocardiogram, pulse oximeter and precordial stethoscope). Intravenous line was secured with 22G or 24G IV cannula. Patient was induced with Propofol 2mg per kg mixed with lignocaine 2% 0.5 mg per kg and Ketamine 0.5 mg per kg. Patient was maintained in spontaneous ventilation with 50% N20 & 50% O2 and Sevoflurane 1 to 2% using Jackson Rees circuit and appropriate size face mask. After induction child was turned to left lateral position and caudal block was performed and drugs was given according to the study group. Intraoperatively IV fluids was given at the rate of 15-20ml /kg/ hr using Ringer lactate. Intraoperatively heart rate, blood pressure, Spo2 were noted . Surgery was started after 10mins after caudal block. Caudal block was regarded as failure if there is raise of heart rate or blood pressure > 20% of pre incision value. If there was block failure, patient was supplemented with injection Fentanyl 1mcg/kg iv for pain and surgery was proceeded

Child was monitored in the recovery room for 2 hours and then transferred to Postoperative ward.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 09, 2024

Pain was assessed by using FLACC pain score, if the score is 4 or above, rescue analgesia was given with injection paracetomol 15 mg/ kg intravenously for pain relief.

Motor blockade was assessed using Bromage score(Grade 1 to 4). Patient is considered as recovered from the motor blockade if the score is grade1.

The heart rate, NIBP and complications like vomiting, nausea, urinary retention were recorded post operatively. If the heart rate is <60/min(Bradycardia) injection atropine 0.02mg/kg was given. Oral feeding was started after 2 hours.

Primary Parameters noted include:

- FLACC pain score
- Duration of analgesia
- Bromage scale

Secondary Parameters include:

- Heart rate
- Systolic, Diastolic and mean blood pressure
- SPO2.
- Any adverse effects

RESULTS

DISTRIBUTION OS STUDY SUBJECTS BASED ON AGE & WEIGHT

The mean age of children in group R was 4.05 years and in group RC was 4.50 years which is found not to be statically significant with P value. (P>0.05). The mean weight of children were 14.00 ± 2.128 kg in group R and 14.20 ± 2.215 kg in group RC. Both groups were compared and found not to be statistically significant. (P>0.05)

Table 1

VARIABLE	GROUP R		GROUP RC		T value	Significance
	MEAN	SD	MEAN	SD		
AGE IN YEARS	4.05	1.234	4.50	1.539	1.020	P>0.05
WEIGHT IN KGS	14.00	2.128	14.20	2.215	0.291	P>0.05

DISTRIBUTION Of STUDY SUBJECTS BASED ON PROCEDURE TYPE

The procedures done for R group were 14 were herniotomy, 5 circumcisions, 1 underwent foreign body removal. In RC group 13 were herniotomy, 6 underwent circumcisions, 1 underwent foreign body removal respectively.

Table 2

PROCEDURE	GROUP R		GROUP RC	
	Frequency	Percentage	Frequency	Percentage
Bilateral herniotomy	3	15%	2	10%
Circumcision	5	25%	6	30%
Foreign body removal in leg	1	5%	1	5%
Left herniotomy	8	40%	7	35%
Right herniotomy	3	15%	4	20%
Total	20	100%	20	100%

HAEMODYNAMIC PARAMETERS

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 09, 2024

Pulse rate, Spo2, Mean arterial pressure of patient were monitored for every 5 minutes intraoperatively and every hour postoperatively upto 12 hours. All haemodynamic parameters were not statistically significant in both groups.

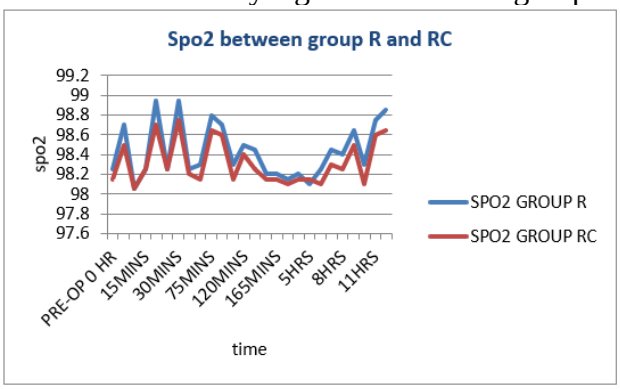

Figure 1

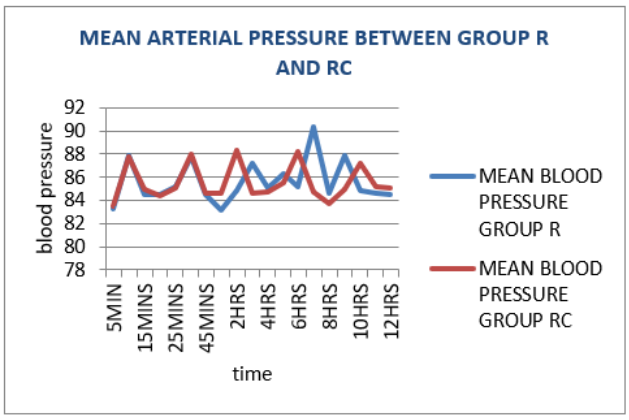

Figure 2

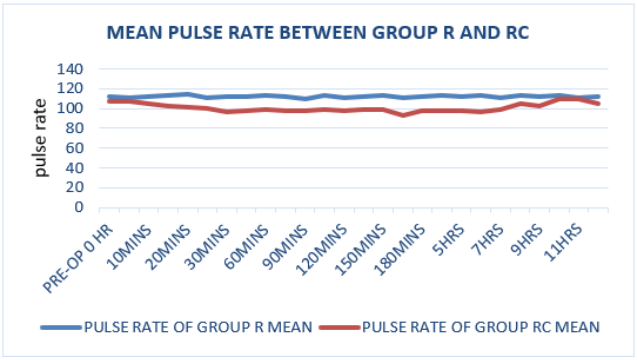

Figure 3

DISTRIBUTION OF MEAN DURATION OF SURGERY

The mean duration of surgery in group R was 20.7 minutes and RC 27.5 minutes, which was found not to be statistically significant

Table 3

Variable	Group R		Group RC		T value	P-value unpaired T test	Significance
	Mean	SD	Mean	SD			

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 09, 2024

Duration of surgery in Mins	20.75	6.340	27.50	6.977	Not Significant	0.577	Not Significant

DISTRIBUTION OF MEAN DURATION OF ANALGESIA OF GROUP R AND RC

The duration of analgesia for group R was 4.7 hrs, whereas for group RC was 9.2hrs, which was found to be statistically significant.

Table 4

Variable	Group R		Group RC		T Value	P-Value unpaired t test	Significance
	Mean	SD	Mean	SD			
Duration of analgesia in hrs	4.725	6382	9.250	8811	Significant	0.003	Significant

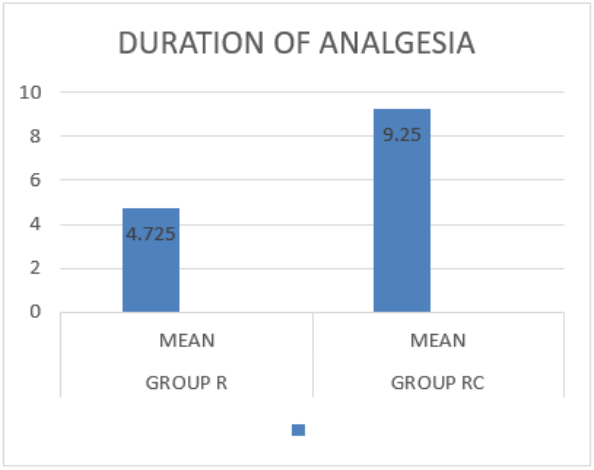

Figure 4

DISTRIBUTION OF MEAN FLACC PAIN SCALE OF GROUP R AND RC

FLACC pian scale were monitored postoperatively every hour for 12 hours and score of 4 were considered as reversal of pain and rescue analgesia were given

By conventional criteria the association between the intervention groups and mean FLACC pain score were postoperatively considered to be statistically insignificant since p > 0.05 as per unpaired t test.

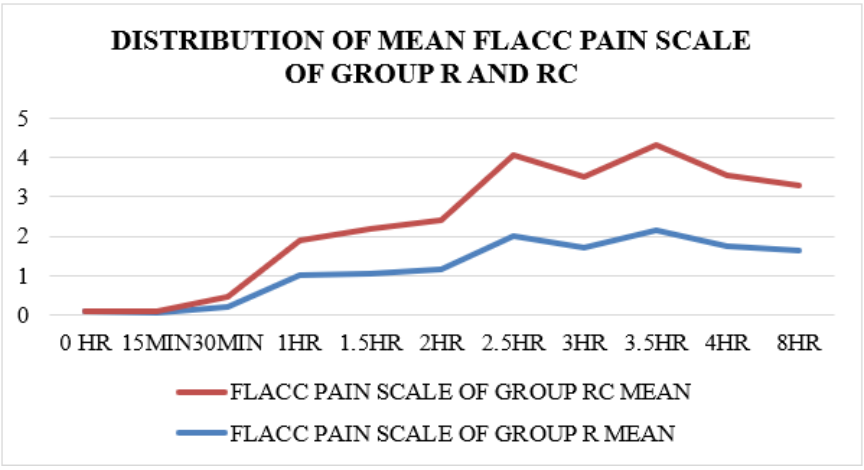

Figure 5

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 09, 2024

DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO COMPLICATIONS

Among study subjects, majority of them had no complications, 4 suffered with nausea, 1 suffered from vomiting and 1 from bradycardia respectively.

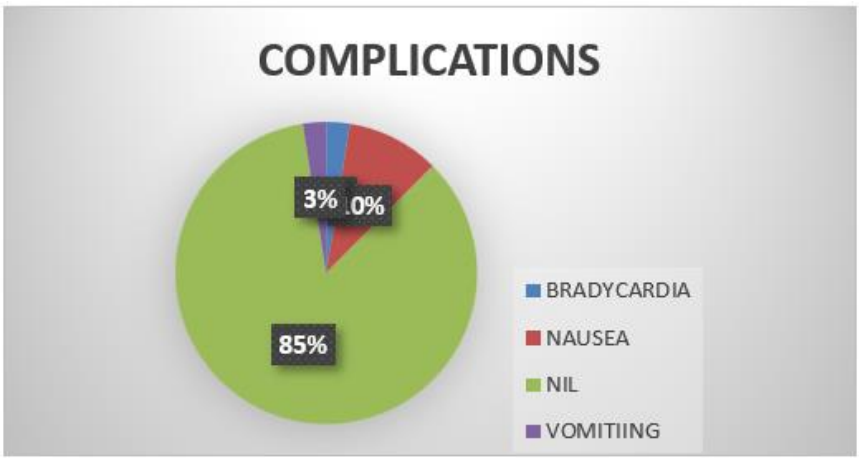

Figure 6

DISCUSSION

The current study shows the effect of addition of clonidine to Ropivacine in caudal block for children (1-7 years) undergoing infraumbilical surgeries at Government Cuddalore Medical College and Hospital.

The caudal block is a widely used technique for managing pain in paediatric patients. It offers effective intraoperative and postoperative analgesia, reducing the need for other anaesthetic agents both during and after surgery. By minimizing the use of volatile anaesthetics and opioids, it contributes to improved postoperative outcomes, including pain relief, early mobilization, and faster discharge. This technique is particularly beneficial for surgeries below the umbilicus, such as hernia repairs, lower limb surgeries.

Ropivacaine is becoming increasingly preferred for caudal blocks in paediatric patients due to its reduced motor blockade and lower risk of systemic toxicity.

Clonidine, an alpha-2 adrenoceptor agonist, was widely used as an antihypertensive agent in the 1970s and 1980s. Today, its use has expanded to include sedation, premedication, and as an adjuvant analgesic. Additionally, clonidine is increasingly being utilized in combination with local anaesthetics for neuraxial blocks. The co-administration of clonidine with local anaesthetics has been shown to enhance the quality of peripheral nerve blocks.

In the current study, the mean age of children in group R was 4.05 years & in group RC was 4.50 years which is found not to be statically significant with P value($P>0.05$) & the mean weights of children were 14.00 ± 2.128 kg in group R and 14.20 ± 2.215 kg in group RC. Both groups were compared and found not to be statistically significant. ($P>0.05$)

In the present study, the procedures done for R group were 14 were herniotomy, 5 circumcisions, 1 underwent foreign body removal. In RC group 13 were herniotomy, 6 underwent circumcisions, 1 underwent foreign body removal respectively.

According to the study, Hemodynamic changes in pulse rate, Mean arterial pressure and Spo2 were compared between the two groups during the preoperative, intraoperative, and postoperative periods. Significant differences were not observed during most of the intraoperative and postoperative periods,

According to the study, the duration of analgesia for group R was 5.3 hrs, whereas for group RC was 9hrs, which was found to be statistically significant .

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 09, 2024

Bajwa SJ *et al.* (2010) found that caudal block with 0.25% of isobaric ropivacaine 0.5 ml/kg combined with 2 μg/kg of clonidine provides efficient analgesia intra-operatively and prolonged duration of analgesia post-operatively.

According to the study, by conventional criteria the association between the intervention groups and mean FLACC pain score majority were postoperatively considered to be statistically insignificant since $p > 0.05$ as per unpaired t test.According to Subramanyam *et al.* (2016) 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.

In the present study, the mean Onset of sensory blockade in group R was 3.90 mins & group RC was 6.20 mins which was found not to be statistically significant & Onset of motor blockade in R was 6.20 mins & group RC was 5.20 mins which was found to be statistically significant.

In the present study, by conventional criteria the association between the intervention groups and mean bromage motor score were not significant.

Clonidine, an alpha 2 agonist is an excellent adjuvant that can be used with local anaesthetics like Ropivacaine as it significantly prolonged the duration of analgesia for infraumbilical surgeries without any significant complications.

CONCLUSION

This study suggests that addition of clonidine as an adjuvant with 0.2% ropivacaine through caudal route increases the duration of post-operative analgesia without unnecessary prolongation of motor blockade or production of any other adverse effects.

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ISSN: 0975-3583,0976-2833 VOL15, ISSUE 09, 2024

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