

## A Randomized Study of Bupivacaine with Clonidine and Ropivacaine with Clonidine in Paediatric Caudal Block for Circumcision

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**Abstract:Introduction:** Caudal analgesia, has gained popularity in paediatric intraoperative and postoperative pain management, more so with the use of adjuvants to prolong its duration, each of them having various results. Clonidine, an alpha<sub>2</sub>-adrenergic agonist is being used for its analgesic effects in various doses with 0.25% Bupivacaine. **Aims And Objectives:** To assess the safety, efficacy, onset and duration of analgesia of 0.25% Bupivacaine and 0.25% Ropivacaine when equal volumes of Clonidine is added as an adjuvant in paediatric caudal block. **Materials And Methods:** The present Study is a comparative randomized study where sampling method was purposive sampling. 80 children aged between 1 to 6 years weighing < 20 Kgs posted for circumcision were divided into two groups of 40 each. GROUP I received 0.25% Bupivacaine 0.5ml/kg + 1µg/kg Clonidine and GROUP II received 0.25% Ropivacaine 0.5ml/kg + 1µg/kg Clonidine. Intra-operatively, onset of analgesia was noted. Post-operatively, duration of analgesia was assessed using the observational pain scale, duration of sedation was assessed using sedation score and the duration of motor block was assessed using modified bromage scale. **Results:** The onset of action in Group I (Bupivacaine) and II (Ropivacaine) was 7.46±0.70 mins and 6.3±0.73 mins respectively. The duration of analgesia was 475.5±38.01 mins in group I (Bupivacaine) and 436±23.25 mins in group II (Ropivacaine). **Conclusion:** There was no significant difference in the onset of action, duration of sedation and vital parameters between the two groups. Bupivacaine with Clonidine produced longer duration of analgesia compared to Ropivacaine with Clonidine. Hence 0.25% Bupivacaine 0.5ml/kg with Clonidine 1µg/kg is a better choice than 0.25% Ropivacaine 0.5ml/kg with Clonidine 1µg/kg for short surgical procedures like circumcision.

**Keywords:** Caudal block, Clonidine, Bupivacaine, Ropivacaine, Circumcision.

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### I. Introduction:

Caudal epidural block is one of the oldest and the most popular regional block performed in paediatric anaesthesia.<sup>4</sup> It provides excellent intra-operative and post-operative analgesia in patients undergoing short surgical procedures below the umbilicus.<sup>5</sup>

Bupivacaine and Ropivacaine are the long acting amide local anaesthetics used for paediatric caudal block with various concentrations ranging from 0.125% to 0.5% and 0.2% to 0.75% respectively.<sup>6</sup> Profound motor block and systemic toxicity are the problems encountered with higher concentrations and volumes of local anaesthetics which can be minimized by reducing the concentration and dosage of the drugs.

To prolong the duration of action and to improve the quality of intra-operative and post-operative analgesia of local anaesthetics, various adjuvants have been used.

Clonidine, an α<sub>2</sub> adrenergic agonist has been used as an adjuvant using different dosages ranging from 0.5µg/kg to 3µg/kg in paediatric caudal block to improve the intra-operative and post-operative analgesia and to reduce the dose of local anaesthetics.<sup>7,8</sup>

Post-operative analgesia is of at most importance in short surgical procedure like circumcision. Since motor blockade is not necessary, lower concentrations and volumes of local anaesthetics with additives can be used for intra operative and post-operative analgesia.

Hence, we have compared Bupivacaine 0.25% combined with 1µg/kg of clonidine and Ropivacaine 0.25% combined with 1µg/kg clonidine at a volume of 0.5ml/kg in children undergoing circumcision.

### Aims And Objective:

1. To assess the safety and efficacy of 0.25% Bupivacaine and 0.25% Ropivacaine when Clonidine is added as an adjuvant in paediatric caudal block.
2. To compare the onset and duration of analgesia between the two study groups.

## II. Materials And Methods:

This prospective randomized comparative study was conducted on 60 children in the age group 1- 8 years posted for circumcision after fulfilling both inclusion and exclusion criteria. They were divided into 2 groups; Group I received 0.25% bupivacaine 0.5ml/kg + 1µg/kg clonidine and Group II received 0.25% ropivacaine 0.5ml/kg + 1µg/kg clonidine. The study was conducted in the Department of Anaesthesiology with co-operation from the Department of Anesthesiology, MGM Medical College and Hospital, Jamshedpur from December 2016 to September 2017. Sampling Method used was purposive sampling.

### Inclusion Criteria:

1. ASA physical status-I.
2. Children between 1 to 8 years posted for circumcision.

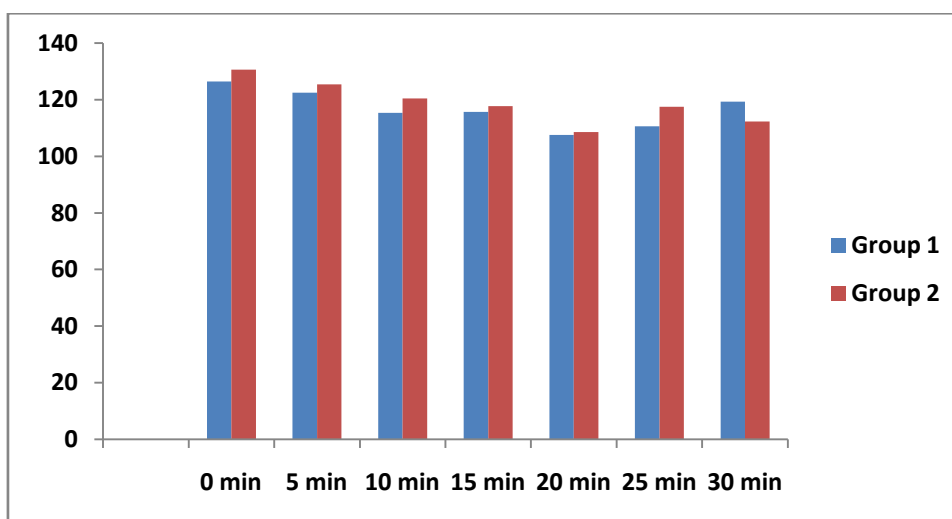
### Exclusion Criteria:

1. Body weight > 25 kgs.
2. Children with pre-existing neurological or systemic disorders.
3. Bleeding diathesis.
4. Infection at the site of block.
5. Abnormalities of the spine and or sacrum.
6. Allergy to local anaesthetics.
7. Patients on anticoagulants.

## III. Results:

Heart rate	Group 1	Group 2
0 min	126.45±8.54	130.56±10.40
5 min	122.45±6.54	125.45±6.59
10 min	115.35±5.45	120.45±2.50
15 min	115.7±4.98	117.67±4.76
20 min	107.54±6.59	108.54±6.69
25 min	110.56±8.34	117.54±8.43
30 min	119.32±3.76	112.34±4.50

**Table 1: Heart rate in two treatment groups**

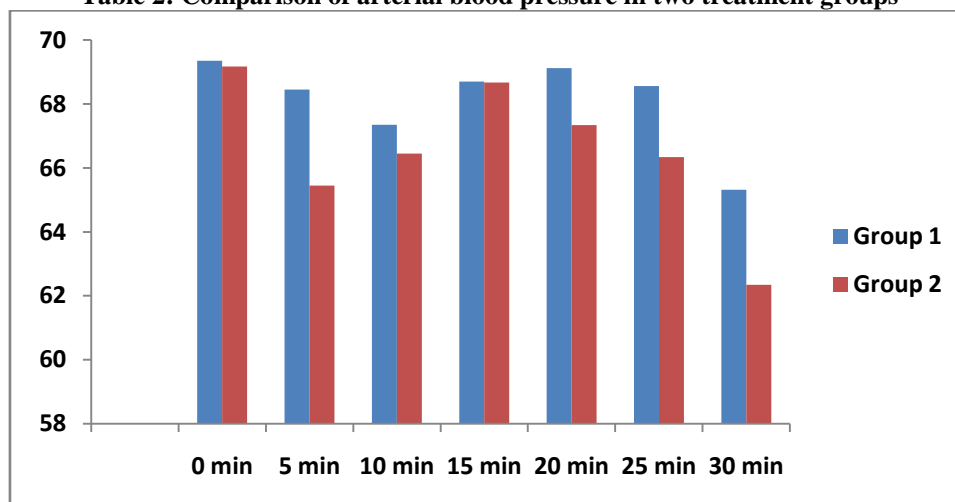


**Graph 1: heart rate in different treatment groups**

The mean basal heart rate in group I was 129.37±9.16/min and in group II was 132.72±11.86/min as shown in Table 2. At the end of 30 mins the mean heart rate in group I was 105.16±7.44/min and in group II was 105.25±6.36/min. There was a minimal fall in heart rate which was not statistically significant.

Mean arterial blood pressure	Group 1	Group 2
0 min	69.35±7.54	69.17±3.40
5 min	68.45±6.54	65.45±3.59
10 min	67.35±3.45	66.45±2.50
15 min	68.7±4.85	68.67±4.86
20 min	69.12±5.13	67.34±3.59
25 min	68.56±8.12	66.34±3.43
30 min	65.32±3.76	62.34±1.50

**Table 2: Comparison of arterial blood pressure in two treatment groups**



**Graph 2: Artrial blood pressure in different treatment groups**

The basal mean arterial pressure in group I was 69.56±3.52mmHg and in group II was 69.13±3.16mmHg. After 30mins it was 69.45±3.12mmHg and 69.13±3.54mmHg respectively (Table 3). This was not statistically significant.

Duration of analgesia	Group 1	Group 2
Mean	466.76±25.01	426.34±20.12

**Table 3: Duration of analgesia**

The duration of analgesia in both the groups. In our study the mean duration of analgesia in group I was 477.5±39.01mins, whereas in group II the mean duration of analgesia was 437±23.21mins which was statistically significant. (p< 0.001)

#### IV. Discussion

The advantages of regional anaesthesia are that it provides complete block of sensory transmission, hence offers complete pain relief and it can be extended to the post-operative period.<sup>10</sup>

In our study, we included children between 1- 6 years of age as there is difficulty in identifying caudal epidural space in children greater than 7 years due to the fusion of sacral vertebrae and reduction in the size of sacral hiatus.<sup>11</sup>

The volume of local anaesthetic required is directly proportional to the weight, larger volume of the drug increases the cephalad spread leading to higher levels of block.<sup>12</sup> Hence we have included children weighing less than 20 kgs in our study. Our study can be correlated with Constant.et.al <sup>13</sup> 1998 who studied the efficacy of caudal blockade in children weighing less than 25 Kgs.

Onset of analgesia differs with various local anaesthetics, adjuvants and different induction methods used. In our study the mean onset of action was 7.1mins in group I and 6.5mins in group II.

The onset of action observed by Locatelli et al<sup>14</sup> in 2004 was 8mins in those given caudal Bupivacaine 0.25% and Levobupivacaine 0.25%, and 7 mins in those given Ropivacaine 0.25% which is in par with our study.

In contrast to our study, Ivani et al<sup>15</sup> in 2000 observed the onset of action as 10min for those given caudal Ropivacaine 0.2% without adjuvant and 9 min for those given Clonidine 2µg/kg as adjuvant. They observed longer onset of action as the concentration of Ropivacaine used was 0.2%.

## V. Conclusion:

Bupivacaine with Clonidine produced longer duration of analgesia compared to Ropivacaine with Clonidine. Hence 0.25% Bupivacaine 0.5ml/kg with Clonidine 1µg/kg is a better choice than 0.25% Ropivacaine 0.5ml/kg with Clonidine 1µg/kg for short surgical procedures like circumcision.

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