

## ASSESSMENT OF CAUDAL LEVOBUPIVACAINE, TRAMADOL AND A COMBINATION OF BOTH IN PAEDIATRIC INGUINAL HERNIA SURGERIES

Vivek Vaibhav<sup>1</sup>, Niyati Sinha<sup>2</sup>, Abhishek Bhardwaj<sup>3</sup>, Himanshi Solanki<sup>3</sup>

<sup>1</sup>Associate Professor, Rama Medical College, Atal Bihari Bajpayee Medical University, Lucknow, Uttar Pradesh, India.

<sup>2</sup>Assistant Professor, Rama Medical College, Atal Bihari Bajpayee Medical University, Lucknow, Uttar Pradesh, India.

<sup>3</sup>Post Graduate, Rama Medical College, Atal Bihari Bajpayee Medical University, Lucknow, Uttar Pradesh, India.

Received : 17/04/2022  
Received in revised form : 12/07/2022  
Accepted : 23/07/2022

**Keywords:**  
Analgesia,  
Levobupivacaine,  
Tramadol.

Corresponding Author:  
**Dr. Vivek Vaibhav,**  
Email: vivekdbest2019@yahoo.com  
ORCID: 0000-0003-4447-8981

DOI: 10.47009/jamp.2022.4.3.28

Source of Support: Nil,  
Conflict of Interest: None declared

*Int J Acad Med Pharm,*  
2022; 4 (3); 120-123



### Abstract

**Background:** The aim is to compare caudal levobupivacaine, tramadol and a combination of both in paediatric inguinal hernia surgeries. **Materials and Methods:** Ninety children aged 4–10 years of either gender planned for inguinal herniotomy were randomly allocated into three groups. Group I received levobupivacaine 0.125% 1 ml/kg, group II received tramadol 1.5 mg/kg in 0.9% normal saline and group III received 1 ml/kg of 0.125% levobupivacaine with 1.5 mg/kg tramadol caudally. Parameters such as duration of analgesia, rescue analgesic doses required, the duration of motor blockade and adverse effects were recorded for 12 hours post-operatively. **Result:** The mean weight in group I patients was 12.1 kgs, in group II was 13.4 kgs and in group III was 13.7 kgs. The mean duration of surgery was 27.3 minutes in group I, 28.5 minutes in group II and 28.7 minutes in group III. Duration of analgesia was 452.3 minutes in group I, 604.2 minutes in group II and 791.4 minutes in group III. Rescue analgesia requirement 0 was seen in 3 in group II and 30 in group III. Requirement of 1 was seen in 11 in group I and 22 in group II and 2 in 19 in group I and 5 in group II. The mean CHIPPS in group I, group II and group III at 3 minutes was 0, 0 and 1.1, at 1 hour was 0, 1.2 and 1.5, at 2 hours was 1.1, 2.4 and 2.4, at 4 hours was 1.3, 2.8 and 2.0, at 6 hours was 1.1, 1.2 and 1.0, at 9 hours was 0.91, 0.83 and 0.51 and at 12 hours was 0.53, 0.50 and 0.24 respectively. A significant difference was observed ( $P < 0.05$ ). **Conclusion:** A combination of 1.5 mg/kg of tramadol and 0.125% levobupivacaine-administered caudally provided long-lasting analgesia.

## INTRODUCTION

Caudal block is the regional anesthetic technique that is used most frequently in pediatric surgery. The single caudal block with local anesthetics provides only a short duration of analgesia and can lead to inadequate postoperative pain control in these operations.<sup>[1]</sup> Not only does caudal blockade provide satisfactory postoperative analgesia, it also decreases the intraoperative requirement for anaesthetic agents and attenuates the stress response to surgery.<sup>[2]</sup> A major limitation of single-shot caudal block is its relatively short duration of analgesia. Caudal catheters are also rarely used due to increased risk of infection and soiling. Various additives have been used to increase the duration of caudal analgesia.<sup>[3]</sup>

Tramadol, a synthetic 4-phenyl-piperidine analogue of codeine, has only a weak opioid receptor effect,

and the analgesic effect is mainly attributable to the inhibition of monoamine reuptake. Animal studies have suggested that tramadol has a selective spinal action. Tramadol is a synthetic opioid which when given epidurally has shown to provide effective long-lasting analgesia with no significant respiratory depression in children.<sup>[4]</sup>

Levobupivacaine, an S-enantiomer of bupivacaine, is shown to have safer pharmacological profile with decreased cardiovascular and neurologic adverse effects attributed to its faster protein binding rate. The use of tramadol as an adjuvant to bupivacaine and ropivacaine resulted in significant prolongation of duration of analgesia during the postoperative period in paediatric patients.<sup>[5]</sup> Considering this, we selected present study with the aim to compare caudal levobupivacaine, tramadol and a combination of both in paediatric inguinal hernia surgeries.

## MATERIALS AND METHODS

After obtaining approval from ethical review committee of the institute, we selected ninety children aged 4–10 years of either gender who were planned for inguinal herniotomy. All parental gave their written consent for active participation of their wards in the study.

Demographic profile of each patient was recorded. They were randomly allocated into three groups. Group I received levobupivacaine 0.125% 1 ml/kg, group II received tramadol 1.5 mg/kg in 0.9% normal saline and group III received 1 ml/kg of 0.125% levobupivacaine with 1.5 mg/kg tramadol caudally. Parameters such as duration of analgesia, rescue analgesic doses required, the duration of motor blockade and Children and Infants Post-operative Pain Scale (CHIPPS) score were recorded for 12 hours post-operatively. The results were compiled and subjected for statistical analysis using

Mann Whitney U test. P value less than 0.05 was set significant.

## RESULTS

Group I comprised of 16 male and 14 female and group II had 13 male and 17 female and group III had 15 males and 15 females. [Table 1].

The mean weight in group I patients was 12.1 kgs, in group II was 13.4 kgs and in group III was 13.7 kgs. The mean duration of surgery was 27.3 minutes in group I, 28.5 minutes in group II and 28.7 minutes in group III. Duration of analgesia was 452.3 minutes in group I, 604.2 minutes in group II and 791.4 minutes in group III. Rescue analgesia requirement 0 seen in 3 in group II and 30 in group III. Requirement of 1 was seen in 11 in group I and 22 in group II and 2 in 19 in group I and 5 in group II. The difference was significant ( $P < 0.05$ ) [Table 2].

**Table 1: Patients distribution**

Groups	Group I	Group II	Group III
Method	0.125% 1 ml/kg levobupivacaine	1.5 mg/kg tramadol	0.125% 1 ml/kg levobupivacaine +1.5 mg/kg tramadol
M:F	16:14	13:17	15:15

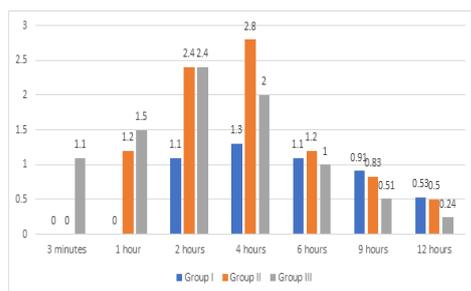
**Table 2: Assessment of parameters**

Parameters	Variables	Group I	Group II	Group III	P value
Weight (kgs)		12.1	13.4	13.7	0.91
Duration of surgery (mins)		27.3	28.5	28.7	0.82
Duration of analgesia (mins)		452.3	604.2	791.4	0.01
Rescue analgesia requirement	0	0	3	30	0.02
	1	11	22	0	
	2	19	5	0	

**Table 3: Comparison of Children and Infants Post-operative Pain Scale (CHIPPS) score**

Duration after surgery	Group I	Group II	Group III	P value
3 minutes	0	0	1.1	0.01
1 hour	0	1.2	1.5	0.92
2 hours	1.1	2.4	2.4	0.05
4 hours	1.3	2.8	2.0	0.12
6 hours	1.1	1.2	1.0	0.82
9 hours	0.91	0.83	0.51	0.04
12 hours	0.53	0.50	0.24	0.05

The mean CHIPPS in group I, group II and group III at 3 minutes was 0, 0 and 1.1, at 1 hour was 0, 1.2 and 1.5, at 2 hours was 1.1, 2.4 and 2.4, at 4 hours was 1.3, 2.8 and 2.0, at 6 hours was 1.1, 1.2 and 1.0, at 9 hours was 0.91, 0.83 and 0.51 and at 12 hours was 0.53, 0.50 and 0.24 respectively. A significant difference was observed ( $P < 0.05$ ) [Table 3, Figure 1].



**Figure 1: Comparison of Children and Infants Post-operative Pain Scale (CHIPPS) score**

## DISCUSSION

The lower lipid solubility and greater intrinsic vasoactivity of levobupivacaine decreases absorption and produces differential neural blockade with less motor block.<sup>[6]</sup> It has been demonstrated that patients who received 0.125% levobupivacaine caudally were free from post-operative motor block.<sup>[7]</sup> Tramadol is a synthetic opioid with moderate mu receptor affinity and weak kappa and delta activity.<sup>[8]</sup> It also has serotonin and norepinephrine reuptake inhibiting effects and does not cause significant respiratory depression. Caudal tramadol has been shown to be superior to bupivacaine in analgesic efficacy and in reducing the need for additional analgesia during the post-operative period in paediatric patients.<sup>[9]</sup> The present study compared caudal levobupivacaine, tramadol

and a combination of both in paediatric inguinal hernia surgeries.

Our results showed that group I comprised of 16 male and 14 female and group II had 13 male and 17 female and group III had 15 males and 15 females. Sezen et al,<sup>[10]</sup> included sixty- eight children aged 2 to 7 years who were undergoing inguinal herniorrhaphies or orchidopexies received bupivacaine 0.25% plus tramadol 2 mg/kg (1 ml/kg) (BT group) or levobupivacaine 0.25% plus tramadol 2 mg/kg (1 ml/kg) (LT group) by the caudal route after laryngeal mask anesthesia. The primary outcome of the study was to compare the duration and quality of postoperative analgesia. The postoperative pain relief was evaluated by the Children and Infants Postoperative Pain Scale (CHIPPS) at 2, 4, 6, 12, and 24 h postoperatively. In addition, the time of first analgesic requirement was noted. The CHIPPS scores were not statistically different between the groups. The duration of analgesia and requirements for rescue analgesia was similar. Urinary retention was observed more often in the BT group. There were no significant differences between groups for arterial pressures and heart rate values after caudal block and during the operation. Caudal bupivacaine plus tramadol and levobupivacaine plus tramadol have similar postoperative analgesic efficacy. But the use of bupivacaine plus tramadol may cause a greater frequency of urinary retention.

Our results showed that the mean CHIPPS at 3 minutes was 0, 0 and 1.1, at 1 hour was 0, 1.2 and 1.5, at 2 hours was 1.1, 2.4 and 2.4, at 4 hours was 1.3, 2.8 and 2.0, at 6 hours was 1.1, 1.2 and 1.0, at 9 hours was 0.91, 0.83 and 0.51 and at 12 hours was 0.53, 0.50 and 0.24 in group I, group II and group III respectively. Dogra et al,<sup>[11]</sup> compared the effects of caudal levobupivacaine, tramadol and a combination of both in paediatric patients undergoing inguinal herniotomy. A total of 78 children aged 1–7 years, planned for inguinal herniotomy were randomly allocated into three groups. Group L received levobupivacaine 0.125% 1 ml/kg, Group T received tramadol 1.5 mg/kg in 0.9% NS and Group LT 1 ml/kg of 0.125% levobupivacaine with 1.5 mg/kg tramadol caudally. All groups were comparable with regard to age, sex and duration of surgery. No motor block was observed in any of the patients. The mean duration of analgesia in Group L was 321.46 ± 84.76 minutes, in Group T was 565.19 ± 107.08 minutes, and in Group LT was 720 minutes. The requirement for rescue analgesia in tramadol group was significantly less as compared to levobupivacaine group. Sedation scores and adverse effects were comparable among all groups.

We observed that mean CHIPPS in group I, group II and group III at 3 minutes was 0, 0 and 1.1, at 1 hour was 0, 1.2 and 1.5, at 2 hours was 1.1, 2.4 and 2.4, at 4 hours was 1.3, 2.8 and 2.0, at 6 hours was 1.1, 1.2 and 1.0, at 9 hours was 0.91, 0.83 and 0.51 and at 12 hours was 0.53, 0.50 and 0.24

respectively. Batra et al,<sup>[12]</sup> in their study 40 children scheduled for hypospadias repair were allocated randomly to receive either caudal tramadol (1 mg/kg) or 0.25% plain bupivacaine (0.5 ml/kg). Postoperative pain score, side-effects and oxygen saturation (SaO<sub>2</sub>) were recorded during 24-hour observation period. The results point toward a significantly lower pain scores with caudal bupivacaine in the immediate postoperative period, whereas caudal tramadol caused a significantly lower pain score in the late postoperative period. Total consumption of rescue analgesics was significantly higher in bupivacaine group as compared to tramadol group during the study period. The incidence of side-effects such as vomiting was more frequent with caudal tramadol, but there was no detectable difference in SaO<sub>2</sub>. They concluded that caudal tramadol can safely be used for postoperative analgesia with a longer duration as compared to caudal bupivacaine.

## CONCLUSION

A combination of 1.5 mg/kg of tramadol and 0.125% levobupivacaine-administered caudally provided long-lasting analgesia.

## REFERENCES

1. Büttner W, Finke W. Analysis of behavioural and physiological parameters for the assessment of postoperative analgesic demand in newborns, infants and young children: A comprehensive report on seven consecutive studies. *Paediatr Anaesth.* 2000;10:303-18.
2. Malviya S, Voepel-Lewis T, Tait AR, Merkel S, Tremper K, Naughton N, et al. Depth of sedation in children undergoing computed tomography: Validity and reliability of the University of Michigan Sedation Scale (UMSS). *Br J Anaesth.* 2002;88:241-5.
3. Ousley R, Egan C, Dowling K, Cyna AM. Assessment of block height for satisfactory spinal anaesthesia for caesarean section. *Anaesthesia.* 2012;67:1356-63.
4. Breschan C, Jost R, Krump Holz R, Schaumberger F, Stettner H, Marhofer P, et al. A prospective study comparing the analgesic efficacy of levobupivacaine, ropivacaine and bupivacaine in pediatric patients undergoing caudal blockade. *Paediatr Anaesth.* 2005;15:301-6.
5. Foster RH, Markham A. Levobupivacaine: A review of its pharmacology and use as a local anaesthetic. *Drugs.* 2000;59:551-79.
6. Ivani G, De Negri P, Lonnqvist PA, Eksborg S, Mossetti V, Grossetti R, et al. A comparison of three different concentrations of levobupivacaine for caudal block in children. *Anesth Analg.* 2003;97:368-71.
7. Yildiz TS, Ozdamar D, Bagus F, Solak M, Toker K. Levobupivacaine-tramadol combination for caudal block in children: A randomized, double-blinded, prospective study. *Paediatr Anaesth.* 2010;20:524-9.
8. Ivani G, De Negri P, Lonnqvist PA, L'Erario M, Mossetti V, Difilippo A, et al. Caudal anesthesia for minor pediatric surgery: A prospective randomized comparison of ropivacaine 0.2% vs. levobupivacaine 0.2%. *Paediatr Anaesth.* 2005;15:491-4.
9. Vickers MD, O'Flaherty D, Szekely SM, Read M, Yoshizumi J. Tramadol: Pain relief by an opioid without depression of respiration. *Anaesthesia.* 1992;47:291-6.
10. Sezen G, Demiraran Y, Karagoz I, Kucuk A. The assessment of bupivacaine-tramadol and levobupivacaine-tramadol combinations for preemptive caudal anaesthesia in children:

- a randomized, double-blind, prospective study. *Int J Clin Exp Med.* 2014;7(5):1391-6.
11. Dogra N, Dadheech R, Dhaka M, Gupta A. A study to compare caudal levobupivacaine, tramadol and a combination of both in paediatric inguinal hernia surgeries. *Indian J Anaesth.* 2018;62:359-65.
  12. Batra YK, Prasad MK, Arya VK, Chari P, Yaddanapudi LN. Comparison of caudal tramadol vs bupivacaine for post-operative analgesia in children undergoing hypospadias surgery. *Int J Clin Pharmacol Ther.* 1999;37(5):238-42.