

# The Efficacy of a Caudal Bupivacaine and Bupivacaine-Tramadol Combination for Postoperative Analgesia in Pediatric Lower Abdominal Surgeries

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## ABSTRACT

**Background:** The major responsibility of perioperative pediatric anesthesia is to control acute pain in children undergoing surgery. Because some analgesics have synergistic or additive effects, they can be used to create balanced analgesia. This method of pain treatment is widely employed. Caudal analgesia is the most appropriate and tolerable type of postoperative analgesia for small children undergoing anoperineal, inguinal, or urogenital surgery.

**Objective:** To evaluate the duration of analgesia in two comparison groups where one group is given bupivacaine only and the other group tramadol is given tramadol in addition to bupivacaine.

**Study Design:** A Randomized Control Trial

**Place and Duration:** This study was conducted in CMC Hospital @ SMBBMU Larkana from March 2022 to March 2023

**Methodology:** A total of 110 patients undergoing lower abdominal surgery were inducted into the study, with 55 in each group using a simple random sampling method. The lottery approach was used to randomly assign 55–55 patients to each group. Patients in Group A received 90.59 mL/kg 0.25%, while patients in Group B received 0.5 mL/kg of bupivacaine 0.25% with tramadol 2 mg/kg. We analyzed the data using SPSS version 23.

**Results:** The mean age and mean weights were  $4.83 \pm 1.87$  and  $11.31 \pm 3.88$  in group A and  $5.16 \pm 1.9$  and  $12.46 \pm 3.77$  in group B. There were 38 (69.09%) males in group A and 42 (76.36%) males in Group B. Most (58.18%) of the children were aged 2 to 6 years in group A; similarly, in group B, most (52.73%) of the children were in the same age group. The mean duration of the analgesia in all three age groups in Group A was significantly higher than all the children in Group B, with a p-value of less than 0.005.

**Conclusion:** It is concluded that for post-operative patients who went through lower abdominal surgeries, the use of tramadol along with bupivacaine for analgesia yields sustained analgesia and is completely safe for the young and elderly patients.

**Keywords:** Bupivacaine, Tramadol, Abdominal Surgery, Pain

## INTRODUCTION

The major responsibility of perioperative pediatric anesthesia is to control acute pain in children undergoing surgery. Because some analgesics have synergistic or additive effects, they can be used to create balanced analgesia. This method of pain treatment is widely employed [1]. Caudal analgesia is the most appropriate and tolerable type of postoperative analgesia for small children undergoing anoperineal, inguinal, or urogenital surgery [2, 3].

Caudal epidural anaesthesia, which is induced by injecting a local anaesthetic into the caudal canal, is one of the most efficient pain management treatments used in children. It is used to give anaesthesia and analgesia for procedures performed behind the umbilicus. The duration of analgesia is the time in hours between the caudal block and the first dose of analgesic given postoperatively. In our case, the goal of postoperative pain therapy is to reduce or eliminate pain with as few adverse effects and as little cost as possible. A pharmaceutical concoction may be the most effective technique for dealing with postoperative pain. Tramadol is a mild opioid that is used to treat moderate to severe acute or chronic pain in children all over the world. Tramadol can be used to alleviate children's postoperative pain [4]. A variety of lower abdominal operations have been found to benefit from caudal block [5].

The aim of this study is to evaluate the duration of analgesia in two comparison groups where one group is given bupivacaine only and the other group is given tramadol in addition to bupivacaine.

## METHODOLOGY

In this randomized control trial study, 110 patients undergoing lower abdominal surgery were inducted into the study, with 55 in each group using a simple random sampling method.

Children aged between 6 months and 12 years, ASA I and II, either gender, undergoing lower abdominal surgeries were inducted into the research. We excluded children with sepsis, congenital heart disease, uncorrected hypovolemia, patients with coagulation disorders, sacral malformations, and cases presenting with infections at the site of injection. We recorded the baseline characteristics, including age and gender; patients' pulse, NIBP, SpO<sub>2</sub>, and ECG were monitored in the operation theatre with an I/V line maintained. Following anesthesia induction, a caudal epidural block was administered. The lottery approach was used to randomly assign 110 patients to two groups of 55–55 each.

We used bupivacaine 0.25% for the patients in Group A and tramadol in addition to bupivacaine 0.25% for the patients in Group B. Both groups were given 1 ml/kg, injected caudally. After the wound had been dressed, the anesthesia was withdrawn. From the start of the caudal injection through the first dosage of supplemental analgesia, the duration of analgesia was measured. If the pain score was greater than 3/10, IV Nalbuphine or oral paracetamol was used to provide rescue analgesia.

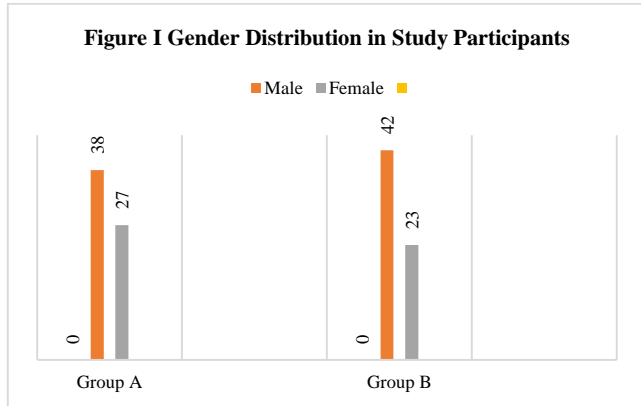
We analyzed the data using SPSS version 23. The categorical variables were measured using frequency and percentages, and the mean and SD were calculated for the quantitative variables. We employed the chi-square test of association and the independent t-test. A post-stratification independent sample T-test was applied. A p-value  $\leq 0.05$  was considered significant.

## RESULTS

We studied 110 patients undergoing lower abdominal surgery and subdivided them into two groups of 55 each. The mean age and mean weight were  $4.83 \pm 1.87$  and  $11.31 \pm 3.88$  in group A and  $5.16 \pm 1.9$  and  $12.46 \pm 3.77$  in group B. (As shown in Table I.)

Table 4: Descriptive Statistics of the Study Participants (Group A=55 and Group B=55)

Variable	Group A	Group B	p-value
	Mean ±SD	Mean ±SD	
Age (Years)	4.83 ± 1.87	5.16 ± 1.9	0.21
Weight (Kg)	11.31 ± 3.88	12.46 ± 3.77	0.72
SD= Standard Deviation			



There were 38 (69.09%) males in Group A and 42 (76.36%) males in Group B. (As shown in Fig. I)

Most (58.18%) of the children were aged 2 to 6 years in group A, similarly, in group B most (52.73%) of the children were aged in the same age group (As shown in Table II).

The mean duration of the analgesia in all three age groups in Group A was significantly higher than all the children in Group B with a p-value of less than 0.005 as detailed in Table III

Table 2: Gender Distribution in Study Groups n=110

Gender	Group A		Group B	
	n	%	n	%
Male	38	69.09	42	76.36
Female	27	49.09	23	41.82
Age Groups				
Less than 1 year	9	16.36	10	18.18
2 to 6 Years	32	58.18	29	52.73
7 to 12 years	14	25.45	16	29.09

Table 3: Mean Duration of Analgesia in Comparison Groups n=110

Age Groups	Group A				Group B				P-Value
	n	%	Mean Duration of Analgesia	SD	n	%	Mean Duration of Analgesia	SD	
Less than 1 year	9	16.36	9.24	2.52	10	18.18	13.7	2.19	<0.005
2 to 6 Years	32	58.18	8.93	2.11	29	52.73	13.2	1.89	
7 to 12 years	14	25.45	9.1	1.99	16	29.09	12.8	1.76	

**DISCUSSION**

Combining medicines with diverse mechanisms of action is the most effective strategy to treat pain after surgery. Tramadol, a mild opioid, is extensively used to treat children with varying degrees of pain. Tramadol can be administered to children to help with pain relief following surgery. Caudal block has been shown to be effective in a variety of surgeries of the lower abdomen [4, 5].

In an attempt to extend the duration of a single-shot caudal epidural injection, various additions to the local anaesthetic solution have been tried. Opioids and non-opioids typically have been used to extend analgesia duration; however, opioids have been linked to unacceptable side effects such as late respiratory depression, extended drowsiness, urine retention, or hypotension [6–7].

In the present study, the mean age and mean weight were 4.83 ± 1.87 and 11.31 ± 3.88 in group A and 5.16 ± 1.9 and 12.46 ± 3.77 in group B. The comparatively higher mean value of age was reported by Laiq et al., where the mean age of children was 1.51 years [8].

In the present study, the mean duration of the analgesia in all three age groups in Group A was significantly higher than all the children in Group B, with a p-value of less than 0.005.

According to various studies, the average duration of surgical analgesia supplied by bupivacaine is restricted. Tramadol, fentanyl, clonidine, and midazolam have all been tested as adjuvants with bupivacaine to prolong postoperative analgesia. Tramadol is an analgesic that acts centrally via opioid receptors [9].

In our study, in the age group less than 1 year, the mean duration of the analgesia was 13.7 SD 12.19 for the bupivacaine plus tramadol group compared to 9.24 SD 2.52 for the caudal bupivacaine group.

According to the findings of a 2008 study, the caudal bupivacaine group had an average duration of analgesia of 6.5 SD 4.1 hours [10]. Another study demonstrated that caudal bupivacaine with tramadol provided analgesia for 13.5 SD 2.2 hours [11].

In children undergoing urogenital surgery, caudal analgesia is routinely used for postoperative analgesia. Bupivacaine is employed due to its lengthy duration of effect, which can last up to 6–12 hours.

In our study, the mean duration of analgesia was substantially longer in the bupivacaine-plus-tramadol group than in the bupivacaine group. Several other researchers saw tramadol plus bupivacaine provide extended analgesia in children undergoing various surgeries [12, 13].

Additionally, it was reported that epidural tramadol provided good postoperative analgesia following abdominal procedures and identified a very low tramadol concentration in systemic circulation compared to intravenous treatment [14]. Ozcengiz et al. found that tramadol-bupivacaine combinations in caudal blocks provided satisfactory postoperative pain management in children undergoing inguinal operations [15]. Moreover, Murthy and colleagues discovered that epidural tramadol was more effective than intravenous tramadol in relieving postoperative pain [16].

**CONCLUSION**

In this study, it is concluded that for the post-operative patients who went through lower abdominal surgeries, the use of tramadol along with bupivacaine for analgesia yields sustained analgesia and is completely safe for the young and elderly patients.

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