

# Comparison of The Analgesic Outcomes of Local Wound Infiltration using Bupivacaine with Tramadol in Pediatric Inguinal Hernia Repair

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## ABSTRACT

**Objective:** To compare the time for first analgesic requirement after local wound infiltration with tramadol and bupivacaine in pediatric inguinal herniotomy.

**Materials and Methods:** A total of 130 children aged 4 to 12 years who underwent inguinal herniotomy were included in this randomized comparative study. The study was conducted in anesthesiology unit of a tertiary care center in Qatar from Nov-2020 to July-2021. Patients in Group T received wound infiltration by Inj. Tramadol 2 mg/kg diluted in 10cc distilled water while patients in Group B received Inj. Bupivacaine 1mg/kg diluted in 10 cc distilled water. Postoperatively Pain score using Wong Baker Faces Scale was noted from ½ hour to 6 hours after surgery. Time of first rescue analgesia was noted.

**Results:** The mean age was 7.98±2.40 years in group B versus 7.49±2.58 years in group T (p-value 0.26). There were 42 (64.6%) in group B versus 45 (69.2%) in group T (p-value 0.93). Mean surgery duration was 46.66±4.73 minutes in group T and 45.50±4.37 minutes in group B. The Wong-Baker pain score at different time intervals was significantly lower in group T in comparison to group B. Time of first analgesia requirement was 6.87±0.76 hours in group P versus 5.67±0.97 hours in group P, this duration was significantly prolonged in group T with p-value <0.001.

**Conclusion:** Local wound infiltration with tramadol provides a longer time for first analgesic requirement as compared to the bupivacaine in children undergoing inguinal hernia repair.

**Keywords:** Inguinal hernia, wound infiltration, tramadol, bupivacaine, post-operative pain.

## INTRODUCTION

The Pain is a nasty sensory and emotive experience related to or explained in terms of existing or prospective tissue damage.<sup>1</sup> Pain causes a wide range of alterations and has a variety of consequences for regular physiological activities. Hypertension, tachycardia, increased myocardial irritability, increased minute breathing, reduced tidal volume, increased CO<sub>2</sub> generation, increased sympathetic tone, and excessive release of catabolic hormones are some of the most prevalent side effects.<sup>2</sup>

Pain relief is achieved by using systemic drugs like opioids, paracetamol and NSAIDS, local nerve blocks, central neuraxial blocks, Transcutaneous electrical nerve stimulation (TENS), use of adjuncts like antidepressants, anticonvulsants and magnesium sulphate, acupuncture, psychological interventions, cryoanalgesia<sup>5</sup> and radiofrequency ablation.<sup>3,4</sup>

Inguinal hernia is a frequent occurrence in children, and the defect is treated with a herniotomy or repair.<sup>5</sup> It's usually done under general anaesthetic, and the most frequent complaint afterward is discomfort.<sup>6</sup> Infiltration of local anesthetic into the surgical site reduces pain at the incision site and is often utilized as part of multi-modal analgesia regimens. The most frequent local anaesthetic for this function is 0.25 percent bupivacaine. However, because of the cardiotoxic effects of Bupivacaine, numerous additional medicines have been explored for local wound infiltration as a stand-alone agent or as a supplement to 0.25 percent Bupivacaine.<sup>7,8</sup> Tramadol's local anesthetic effects have recently been documented. Studies have reported that locally wound infiltration with

tramadol provide better postoperative analgesia than bupivacaine and reduced the need for postoperative analgesics.<sup>9</sup> In this study we compared the time for first analgesic requirement after local wound infiltration with tramadol and bupivacaine in children undergoing inguinal hernia repair.

## MATERIALS AND METHODS

A total of 130 children who underwent inguinal herniotomy were included in this randomized comparative study. The study was conducted in anesthesiology unit of a tertiary care center in Qatar from Nov-2020 to July-2021. Children of age 4 to 12 years, planned for elective inguinal herniotomy were included. While patients having obstructed inguinal hernia requiring emergency herniotomy and having hypersensitivity to local anesthetics or tramadol were excluded. After taking informed consent from the parents of the child, patients meeting the inclusion criteria were enrolled.

Patients were randomly divided into 2 equal groups by lottery method. All patients were given standard general anaesthesia with appropriate doses of Nalbuphine, Midazolam, Propofol, Atracurium, Endotracheal intubation with IPPV (Intermittent Positive Pressure Ventilation). Reversal with Glycopyrrolate and Neostigmine was done. Standard monitoring like SpO<sub>2</sub>, Pulse rate and ECG was applied. At the end of surgery, patients in Group T received skin infiltration by Inj. Tramadol 2 mg/kg diluted in 10cc distilled water while patients in Group B received Inj. Bupivacaine 1mg/kg diluted in 10 cc distilled water. Skin

infiltration was done by surgeon who was blinded to the drug included in the syringe for local infiltration.

Postoperatively all the patients were monitored in PACU (Post Anaesthesia Care Unit) OR surgical ward. Pain score by Wong Baker Faces Scale at ½ hour, 1 hour, 2 hours, 4 hours and 6 hours interval were noted by a blinded observer and 3<sup>rd</sup> figure was taken as significant to give rescue analgesia in the form of Inj. Paracetamol 15 mg/kg IV. If the score becomes significant other than the entered duration in performa, the nearest duration was taken significant.

The collected data was analyzed through SPSS v19. Independent sample t-test was applied to compare Wong-Baker score and time for rescue analgesia between the tramadol and bupivacaine group. P-value of ≤ 0.05 was taken as significant.

**RESULTS**

The mean age of the studied patients was 7.98±2.40 years in group B versus 7.49±2.58 years in group T (p-value 0.26). There were 42 (64.6%) male children in group B versus 45 (69.2%) in group T (p-value 0.93). Mean weight of children was 18.86±5.59 Kg in group T versus 18.93±5.5 Kg in group B (p-value 0.93). Mean surgery duration was 46.66±4.73 minutes in group T and 45.50±4.37 minutes in group B. The baseline study characteristics were comparable between the groups [Table 1].

The Wong-Baker pain score at different time intervals was significantly lower in group T in comparison to group B. Time of first analgesia requirement was 6.87±0.76 hours in group P versus 5.67±0.97 hours in group P, this duration was significantly prolonged in group T with p-value <0.001 [Table 2].

Table 1. Baseline Patient's Characteristics.

	Group T	Group B	P-value
Age	7.49±2.58	7.98±2.40	0.26
Weight	18.86±5.59	18.93±5.5	0.93
Gender (Male/Female)	45 (69.2%)/20 (30.8%)	42 (64.6%)/23 (35.4%)	0.57
ASA (I/II)	46 (70.8%)/19 (29.2%)	47 (72.3%)/18 (27.7%)	0.84
Duration of Surgery (min)	46.66±4.73	45.50±4.37	<0.001

Table 2. Comparison of Wong-Baker Pain Score and Time of Rescue Analgesia after Surgery.

	Group T	Group B	P-value
<b>Wong-Baker Pain Score</b>			
After ½ Hour of Surgery	1.58±0.66	2.16±0.74	<0.0001
After 1 Hour of Surgery	2.20±1.44	2.90±0.94	0.001
After 2 Hour of Surgery	1.64±0.67	2.58±0.58	<0.001
After 4 Hour of Surgery	1.43±0.53	2.0±0.73	<0.001
After 6 Hour of Surgery	1.27±0.57	1.67±0.73	0.001
Time of 1 <sup>st</sup> Analgesia Requirement (Hours)	6.87±0.76	5.67±0.97	<0.001

**DISCUSSION**

In the previous two decades, some progress has been achieved in the treatment of childhood pain. Pediatric pain therapy has altered as a result of a growing corpus of understanding regarding the nature of pain throughout pregnancy and childhood. However, the number of powerful analgesics approved for use in children is restricted. Paracetamol, NSAIDs, and opioids are examples of these drugs.<sup>10</sup> NSAIDs are only approved for use in children under the age of 18 since they may induce bleeding, renal impairment, and asthma exacerbation. Respiratory depression is a side effect of opioids. Systemic opioids are the gold standard for postoperative pain relief; yet, fear of major side effects (particularly respiratory depression) and other issues have led to a reluctance to provide parenteral opioids to children. In children undergoing "day-case" surgery, pediatric surgeons and anesthesiologists rely mostly on paracetamol and localized procedures such as peripheral nerve block, caudal block, and wound infiltration with local anesthetics.<sup>11</sup> There is still a need for a medicine with various formulations that may effectively relieve moderate to severe pain in children.

Tramadol is a racemic combination of (+) and (-) enantiomers that is marketed as a synthetic 4-phenyl-piperidine derivative of codeine. Tramadol works by acting on cerebral monoaminergic systems, which may contribute to its analgesic properties. Tramadol's opioid action is due to the (+) enantiomer's low affinity binding to-opioid receptors. Naloxone partly reverses the central analgesic effects of tramadol.<sup>12</sup>

Studies have demonstrated that injecting bupivacaine into the wound after herniotomy has a positive impact on postoperative analgesia. Because of its strong potency and long-lasting impact, this local anesthetic was selected. However, major systemic toxic responses, such as seizures and cardiovascular collapse, may occur following unintentional IV administration of high doses of bupivacaine, despite their rarity.<sup>13</sup>

Tramadol has also been found in clinical investigations to have peripheral local anesthetic effects.<sup>14</sup> Tramadol has been shown to have a local anesthetic effect when applied directly to the sciatic nerve in rats.<sup>15</sup> Tramadol has a local anesthetic activity comparable to lidocaine, and because of its antinociceptive impact, it might be used in the postoperative period, according to Altunkaya et al.<sup>16</sup> Demiraran et al demonstrated an identical analgesic efficacy with a subincisional injection of 2 mg/kg tramadol and 0.25 percent bupivacaine.<sup>17</sup> Subcutaneous tramadol infiltration may give excellent analgesia and may have anti-inflammatory benefits, according to Gerçek et al.<sup>18</sup>

When compared to Bupivacaine, local wound infiltration with Tramadol before sealing the skin following inguinal hernia surgery gave considerable postoperative pain reduction. The mean time required for initial analgesia in our research was 6.90±0.76 hours in the tramadol group and 5.75±0.94 hours in the bupivacaine group.

According to Afaq et al., when Tramadol was administered locally after inguinal hernia surgery, the mean time for needing adjuvant analgesics was 11.6 hours, but when Bupivacaine was used as local wound infiltration, the

mean time for needing adjuvant analgesics was 8.2 hours.<sup>19</sup>

Furthermore, Abdullah et al. found that after inguinal hernia repair, Tramadol used locally at 1mg/kg total body weight diluted in normal saline required 6.6 0.99 hours, whereas Marcaine 0.25 percent 10cc required 3.7 0.74 hours.<sup>20</sup>

Demiraran et al. also conducted research comparing post hernia local wound infiltration with Tramadol and Bupivacaine, finding that the pain score was higher in the Bupivacaine group than in the Tramadol group, and that the average time to first analgesic requirement was significantly longer in group T 6.72±4.09 hours after herniotomy versus 6.04±3.7 hours in the bupivacaine group.<sup>21</sup> Our findings are consistent with those of other research that have been published.

## CONCLUSION

Local wound infiltration with tramadol provides a longer time for first analgesic requirement as compared to the bupivacaine in children undergoing inguinal hernia repair.

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