

Comparison of Local Infiltration of Bupivacaine and Tramadol in Post-Operative Pain Management in Children after Inguinal Herniotomy

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Abstract

Keywords

- Inguinal herniotomy
- Children
- Postoperative pain
- Bupivacaine
- Tramadol
- efficacy

Introduction: Adequate pain control is essential in immediate post-operative period. Different methods are being used to provide pain management but none of these is completely effective. Regional blocks are becoming more popular than systemic opioids in all age groups due to efficacy and safety of agents used. The objective of this study was to establish the effectiveness of tramadol and bupivacaine for pain control after inguinal herniotomy in children.

Materials and Methods: This randomized controlled trial was conducted at pediatric surgery department, services hospital Lahore over 2 years. Two hundred and eighty four cases randomly divided into two groups B (Bupivacaine) & T (Tramadol). Bupivacaine (dose of 2 mg/kg) in group B or Tramadol (2mg/kg) in group T was infiltrated in the wound. Postoperatively pain score was measured using Wong-Baker Faces pain scale (WBFPS) at 0,1,2,4 and 8 hours. Both groups experienced side effects.

Results: Age and gender distribution in both groups were comparable. Pain score in both Groups was equal at 0- hours. However at 1-hour, 2-hour and 4-hour, pain score was slightly more in Group-B, But at 8-hours mean pain score was markedly raised in Group-B as compared to Group-T (3.32 ± 1.42 vs 2.45 ± 1.35). Only complication noted in patients was vomiting which was higher in Group T.

Conclusion: Locally infiltrated Tramadol is a better choice than bupivacaine as a local anesthetic for pain management in children after inguinal herniotomy. Further research is needed to elucidate any benefits it may have in other surgeries.

Introduction

According to International Association for the Study of Pain, "Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage".¹ Recent clinical studies have demonstrated that almost 40% of hospitalized children experience moderate to severe pain during their hospital stay.² Effective post operative analgesia may be attained by various techniques. These methods include; systemic use of opioids, non steroidal anti-inflammatory drugs and local anesthetic infiltration.³ Each of these techniques has its own advantages and disadvantages. Bupivacaine is a local anesthetic drug, with a long duration of action. It belongs to the amide group of local anesthetics and is a commonly used anesthetic agent for epidural, spinal, nerve block or infiltration anesthesia.⁴ It is safe when administered correctly. Side effects from systemic absorption of toxic quantities of bupivacaine may result primarily in the central nervous (CNS) and cardiovascular (CVS) symptoms. CNS effects include tinnitus, tremor, circumoral paresthesia, nervousness, anxiety, vertigo, blurring of vision, seizures, unconsciousness and depression of respiration leading to apnea. Effects on the CVS range from bradycardia, hypotension and arrhythmias to irreversible cardiac arrest.⁵

Tramadol is a centrally acting synthetic opioid drug, after systemic administration it acts at supra-spinal as well as spinal sites. There are several references in available literature about its additional local anesthetic properties. So it can be used for local infiltration as well as for systemic administration. Tramadol has no clinically relevant depressant

effects on respiration.^{6,7}

The objective of the study was to compare mean pain score after local infiltration of Bupivacaine with Tramadol in pain control after inguinal herniotomy in children.

Materials and Methods

This Randomized controlled trial was carried out at the Department of Pediatric Surgery, Services Institute of Medical Sciences/Services Hospital, Lahore. It was conducted over a period of two years from January 2014 to December 2016 after the approval of synopsis from ethical review board. The sample was calculated to be 284 patients taking mean pain in tramadol group as 1.44 ± 0.58 and in the bupivacaine group 1.72 ± 0.61 , 95% confidence level (5% alpha level) and 80% power of study. Children aged 4 to 12 years planned to have elective inguinal herniotomies were included. Patients with obstructed inguinal hernia, bilateral inguinal hernia, receiving additional caudal block & having other co-morbid conditions i.e respiratory, cardiovascular and neurological disorders were excluded from the study. They were randomly divided by computer generated numbers into two equal groups: group B and group T. A written consent was taken from the parents for including their child's data in this study. General anesthesia (GA) was induced in a standard way, inhalation agents were used for induction and air way was secured along with standard monitoring. Inguinal herniotomy was done, in a standard manner in both groups. After herniotomy and before closure of skin, Bupivacaine (2mg/kg) in group B patients and Tramadol (2mg/kg) in group T patients were infiltrated at wound site. For Post-operative pain assessment we used

Wong baker faces pain scale (WBFPS). Consent for using WBFPS was obtained from publishers. Postoperatively patients were assessed for pain using Wong Bakers Faces pain scale at 0, 1, 2, 4, 6 and 8 hours after surgery. Monitoring was started once patient were taken to the recovery room which was considered as zero hour. If the patient developed pain score ≥ 4 , Nalbuphine 0.2 mg/kg was administered intravenously as rescue analgesia and it was recorded. The collected data was entered and analyzed using SPSS (Statistical Package for the Social Sciences) version 21. Frequencies and percentages were calculated for qualitative variables quantitative data were presented in form of mean \pm S.D. Independent sample T test was used to compare mean pain level (at 0, 1, 2, 4, 8 hours) and time to require analgesia in both study groups.

Chi-square test applied for comparison, rescue analgesia given, vomiting, pruritis, respiratory depression and efficacy in both groups. P-value ≤ 0.05 was considered significant.

Results

A total of 284 cases (142 in each group) were enrolled in this study. Mean age was calculated as $7.1056 \pm$ SD years in Group-B and $7.5423 \pm$ SD years in Group-T. In group B 85.2% patients were male and 14.8% were female while in group T Male and female were 81.7 and 18.6 respectively. In group B 99 patients had right sided and 43 had left sided inguinal hernia. In group T 91 had right sided and 51 patients had left sided inguinal hernia

Table 1.

Table 1: Descriptive Statistics for Patient's Age, Gender and Side Hernia

	Group B	Group T
Age	7.10	7.54
Gender	n=142	n=142
Male	85.2%	81.7%
Female	14.8%	18.3%
Side of hernia	n= 142	n= 142
Right	69.7%	64.1%
Left	30.3%	35.9%

Mean pain score in both groups was almost equal at hour 0 and 1. However at hour 2, 4 and 8,

pain score was significantly less in Group-T than Group-B. All the data is summarized in **Table 2.**

Table 2: Comparison of Pain Score in Both Groups

	Group B (Mean ± SD)	Group T (Mean ± SD)	P value
hour 0	0.49 ± 0.45	0.83	0.5 ± 0.47
hour 1	0.67 ± 1.66	0.12	0.65 ± 1.59
hour 2	0.77 ± 2.10	0.04	0.79 ± 2.00
hour 4	±1.27 2.95	0.00	1.29 ± 2.65
hour 8	1.42 ± 3.32	0.00	1.35 ± 2.45

Number of patients receiving rescue analgesia in group B was 53(37%) while in group T it was 20 (14.08%). Side effects were noted in both groups. Vomiting occurred in 4 patients (2.8%) in group T while only one patient (0.7%) in group B experienced vomiting. Other side effects including pruritus and respiratory depression did not occur in any of our patients. The mean time at which rescue analgesia was used for the first time post-operatively was 5.14± 1.95 hours in group B, while in group T it was 7.37± 1.05 hours.

Discussion

Current options for post-operative pain control in pediatric age group are NSAIDs, opioids and paracetamol. NSAIDs are limited by their adverse effects which include bleeding tendency, renal impairment, and aggravation of asthma.⁸ Opioids are considered as the drug of choice for managing postoperative pain in adults; however, their use in paediatric patients is limited due to their adverse effects.⁹ A drug with lesser side effects & effective in moderate to severe pain is the need of the hour. As yet not a single drug or technique for post-operative analgesia has proven to be decidedly

superior to the rest.¹⁰

Many studies have shown that wound infiltration with local anesthetics is effective during the post operative period. Garimella V et al also reported that intraoperative bupivacaine wound infiltration is associated with a decreased need for postoperative parenteral narcotics.¹¹

It is an established fact that tramadol can produce local anesthetic effect; the mechanism of which is poorly understood. It is also notable for absence of any clinically significant effect on respiration or cardiovascular system¹² A study conducted by Buccellati et al in 2000 reported that it has anti-inflammatory properties along with anesthetic effects¹³ Sousa AM et al believed that the sensory blocking action of tramadol is due to blocking the voltage-dependent Na channel similar to that of local anaesthetics.¹⁴

In our study, when tramadol was compared with bupivacaine after local infiltration in the herniotomy wound, it provided better analgesia during the postoperative period (7.14 ± 1.05 hours for tramadol compared with 5.37 ± 1.95 hours for bupivacaine). In a study by Kaki et al.

bupivacaine 0.25% and tramadol were compared for the treatment of pain following adult inguinal hernia repair¹⁵ and it was shown that tramadol provided better analgesia compared to bupivacaine and for a longer duration. Altunkaya et al & S Buhari et al reported similar local anesthetic effect of subcutaneous infiltration of 2 mg/kg tramadol and 1 mg/kg lidocaine^{16,17} Similar findings were noted by Afaq et al in a study conducted in adults comparing postoperative pain after inguinal hernia repair. They had found mean postoperative pain relief time to be 8.2 hours after Bupivacaine and 11.6 hours after Tramadol infiltration.¹⁸

In our study vomiting as a side effect was noted in only one patient in the Bupivacaine group while it occurred in 4 patients in the tramadol group which were comparable to the previous studies. Demiraran et al conducted a study and found no adverse reactions in either group.¹⁹ Bahanur Cekic also found that postoperative complications including itching nausea and vomiting occurred after tramadol as well as bupivacaine use. However there was no difference in the rate of adverse reactions in both groups.²⁰ Altunkaya et al. only found nausea as an adverse reaction¹⁶ In another study, Ozcengiz et al. found that frequency of nausea and vomiting after use of tramadol was similar to that seen after use of caudal morphine in children undergoing inguinal hernia repair. He also

noted other post-operative complications during his study including delay in the first post operative micturition (206.75 ± 17.81 min versus 203.28 ± 16.93 min), pruritus (three patients in each groups) and nausea (two patients in each group).²¹

Conclusion

After wound infiltration with tramadol, the duration of post-operative analgesia significantly increased. Tramadol is an acceptable and suitable alternative to bupivacaine for pain control after inguinal hernia surgery in children because it has sustained effects over a longer period of time and reduces post-operative analgesia requirement. However, its benefit in other procedures remains to be proven, and further research is needed in this area.


Ethics Approval

This study was approved by the services institute of Medical Sciences/Services Hospital Lahore Ethical Committee on 29.07.2013.

Conflict of Interest

There is no conflict of interest.

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