

Comparing the Analgesic Efficacy of Local Wound Infiltration by Bupivacaine & Tramadol in Children Undergoing Inguinal Hernia Repair

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ABSTRACT

Aim: To compare the time for first analgesic requirement after local wound infiltration with bupivacaine and tramadol in children undergoing inguinal hernia.

Methods: A total number of 122 children having age 4-12 years who were planned to undergo elective inguinal hernia repair were included from Oct-2018 to Jan-2019. Patients were randomly allocated to tramadol group and bupivacaine group. 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. Pain score by Wong Baker Faces Scale at $\frac{1}{2}$ hour, 1 hour, 2 hour, 4 hour and 6 hour interval were noted by a blinded observer and 3rd figure was taken as significant to give rescue analgesia

Results: Mean age of the studied patients was 7.72 ± 2.52 years. There were 76 (62.30%) male and 46 (37.70%) female children. Mean weight of children with inguinal hernia repair was 18.82 ± 5.61 Kg. Mean duration of surgery was 45.66 ± 4.71 minutes. Mean time of analgesia was 6.90 ± 0.76 hours in tramadol group and 5.75 ± 0.94 hours in bupivacaine group (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

Pain is defined as " an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage".¹ Pain itself imposes a diversity of changes and effects normal physiological functions in many ways. Most common effects are hypertension, tachycardia, increased myocardial irritability, increased minute ventilation, decreased tidal volume, increased CO₂ production, enhanced sympathetic tone and excessive release of catabolic hormones.²

Pain relief is achieved by using systemic drugs like opioids, paracetamol and NSAIDS, local nerve blocks, central neuraxial blocks, Transcutaneous electrical nerve stimulation (TENS),³ use of adjuncts like antidepressants, anticonvulsants and magnesium sulphate⁴, acupuncture, psychological interventions, cryoanalgesia⁵ and radiofrequency ablation.

Inguinal hernia is a common manifestation among paediatric population and herniotomy or repair of the defect is done. Most commonly it's done under general anaesthesia and after recovery, pain is the most common complaint. Instillation of local anesthetics into the site of incision has gained a good repute in multi-nodal anesthesia. 0.25% bupivacaine is the commonest local anaesthetic which is used for this purpose. But due to its cardiotoxic effects, various other drugs have been tried for local wound infiltration as sole drug or as an additive to 0.25% Bupivacaine. Recently, the local anesthetic effects of tramadol have been reported.¹ I reviewed local literature and found an article published by Afaq et al. in 2011, they concluded that infiltration using tramadol provide better analgesic outcomes when compared to bupivacaine⁶.

In another study, it was found that the use of clonidine as additive to local anesthetic bupivacaine for caudal block enhances the recovery and reduces post-op pain⁶.

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As there is no local data available in Paediatric age group, comparing the time for first analgesic requirement after local wound infiltration with bupivacaine and tramadol in children undergoing inguinal hernia repair.

METHODS

We included 110 children who were planned for elective inguinal hernia repair diagnosed by surgeon on clinical examination having age 4 to 12 years. Children planned for emergency herniotomy, hypersensitivity to Tramadol or Bupivacaine, or having history of fits and seizures were excluded.

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 SpO₂, 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 $\frac{1}{2}$ hour, 1 hour, 2 hour, 4 hour and 6 hour interval were noted by a blinded observer and 3rd figure was taken as significant to give rescue analgesia in the form of Inj. Paracetamol 15mg/kg IV. If the score becomes significant other than the entered duration in performa, the nearest duration was taken significant. The collected information was entered and analyzed through SPSS version 23. Independent sample t-test was applied to compare the mean pain score, and time of first analgesia requirement between the groups.

RESULTS

The mean age of the studied patients was 7.72 ± 2.52 years. There were 76 (62.30%) male and 46 (37.70%) female children. Mean weight of children who presented with inguinal hernia repair was 18.82 ± 5.61 Kg. There were 77 (63.11%) children whose ASA status was I before surgery as calculated by the consultant anesthetist and there were 45 (36.89%) children with ASA status II. The mean duration of surgery was 45.66 ± 4.71 minutes.

Descriptive statistics were calculated for Wong-Baker pain score after half hour, 1 hour, 2 hours, 4 hours and 6 hours of surgery. The mean post-operative score was minimum at half hour and one hour of surgery and maximum after 6 hours of surgery (Table 1).

Mean time of first analgesia requirement was 6.32 ± 1.03 hours. The minimum time for requirement of analgesia was 4 hours and maximum time was 8 hours. On comparison of time of first analgesia requirement between the groups, the mean time of analgesia was 6.90 ± 0.76 hours in tramadol group and 5.75 ± 0.94 hours in bupivacaine group. The mean time of requirement of first analgesia was significantly longer in tramadol group as compared to the bupivacaine group with a p-value of <0.001 (Table 2).

Table 1: Descriptive Statistics of Wong-Baker Pain Score after Surgery.

Wong-Baker Pain Score	Tramadol Group	Bupivacaine Group	P-value
After ½ hr of surgery	1.59 ± 0.66	2.14 ± 0.74	<0.001
After 1 hr of surgery	2.22 ± 1.48	2.85 ± 0.94	0.007
After 2 hr of surgery	1.63 ± 0.68	2.57 ± 0.59	<0.001
After 4 hr of surgery	1.44 ± 0.53	2.01 ± 0.74	<0.001
After 6 hr of surgery	1.29 ± 0.55	1.65 ± 0.75	0.003

Table 2: Comparison of Time of First Analgesia Requirement between the Groups.

Time of first Analgesia (Hours)	Tramadol Group	Bupivacaine Group
Mean	6.90	5.75
S.D.	0.76	0.94

P value <0.001

DISCUSSION

Relieving pain in children is under serious consideration since decades. Knowing the basic knowledge regarding the nature of pain has changed the practice of pediatric pain management and there is still limited availability of drugs for pain management. Pain management in pediatrics is mainly using paracetamol or regional anesthesia such as peripheral blocks, wound instillation and caudal block.^{7,8} Still there is a struggle to find an ideal additive for pain relief in children.

Tramadol is synthetic analog of codeine, it exerts its analgesic effects by binding to μ -opioids receptors. These effects can also be neutralized using naloxone.⁹ A study by Tsai et al. put tramadol on sciatic nerve in rats and found local analgesic effects of tramadol.¹⁰ Some studies have proven beneficial effects of wound infiltration with tramadol on analgesic outcomes^{11,12}.

In this study, local tramadol wound infiltration just before skin closure gave a definitive superior pain relieve as compared to Bupivacaine wound infiltration. In our study, the mean time of requirement of first analgesia was 6.90 ± 0.76 hours in tramadol group and 5.75 ± 0.94 hours in bupivacaine group. Afaq et al. reported mean time of 11.6 hours in tramadol versus 8.2 hours in bupivacaine group⁵. Another study by

Abdullah et al. from Saudi Arabia, found that 1mg/kg of tramadol for wound infiltrations provides acceptable analgesia with time of 1st analgesia of 6.6 ± 0.99 hours, in comparison with only 3.7 ± 0.74 hours using Marcaine for local anesthesia¹³.

Demiraran et al. also found lower VAS score by local wound instillation of tramadol in-comparison with bupivacaine, with average time to first analgesic requirement 6.72 ± 4.09 h after herniotomy in Tramadol versus 6.04 ± 3.7 h in bupivacaine group.¹⁴ The results of our study are similar to the results of the previously published studies. In our study, there was no significant effect of confounder variables on the final outcomes of the study.

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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