

# RELIEF OF POST-TONSILLECTOMY PAIN BY TOPICAL APPLICATION OF BUPIVACAINE

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## ABSTRACT

**Objective:** To determine the relief of pain after tonsillectomy by application of topical 0.5% bupivacaine.

**Methodology:** This prospective single-blind study was conducted at Departments of ENT, Mufti Mehmood Memorial Teaching Hospital and District Headquarter Teaching Hospital, Dera Ismail Khan from January 2011 to June 2012. Subjects of either sex, aging 10-35 years with history of recurrent episodes of acute tonsillitis were included. Those with adenotonsillectomy, with history of acute tonsillitis within three weeks, bleeding diathesis, suspicious of malignancy, or hypersensitivity to bupivacaine were excluded. Subjects were divided into group 1 (treatment group) and 2 (control group) of 48 patients each on convenient sampling method. Patients in group 1 received a topical application of bupivacaine gauze soaked in 5 ml of 0.5% bupivacaine solution for five minutes in both tonsillar fossae while patients in group 2, received nothing. The post operative pain score was assessed on Visual Analogue Scale (VAS) and compared between the groups at 1, 3 and 8 hours.

**Results:** Out of 96 subjects (48 in each group), 56 (58.3%) were male and 40 (41.7%) female. Mean Pain Score was  $5.27 \pm 2.811$  in group 1 &  $6.02 \pm 2.914$  group 2 at 1 hour ( $p=0.203$ );  $4.81 \pm 2.750$  in group 1 &  $5.60 \pm 2.944$  group 2 at 3 hour ( $p=0.177$ ) and  $4.35 \pm 2.605$  in group 1 &  $5.08 \pm 2.901$  group 2 at 8 hour ( $p=0.198$ ).

**Conclusion:** Topical application of 0.5% bupivacaine provides no significant pain relief in post-tonsillectomy patients in first 8 hours.

**Key Words:** Bupivacaine topical, Post-tonsillectomy pain, Visual Analogue Scale.

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## INTRODUCTION

Pain is one of the most common complications after tonsillectomy, which can cause delay in starting oral intake, leading to dehydration of the patients particularly in children. It may also prevent early return to school or work after surgery.<sup>1</sup> Despite advancement in anaesthetic and surgical techniques, the post-operative pain still remains a significant problem. Different modalities for

managing the post operative pain are used by surgeons depending upon their own choice. These include, use of intravenous opioids, NSAIDs, local anaesthetic agents, nerve blocks, steroids and patient controlled analgesia.<sup>2-4</sup> Bupivacaine, one of the most commonly used long acting local anaesthetic, has a safety profile better than other similar anaesthetic agents.<sup>5,6</sup> It is gaining popularity for management of pain after tonsillectomy/ or adenotonsillectomy.<sup>7</sup>

Bupivacaine is a local anaesthetic drug belonging to the amino amide group. It can be used by local infiltration, topical spray, or topical application in the tonsillar bed. Bupivacaine binds to the intracellular portion of sodium channels and blocks sodium influx into nerve cells, which prevents depolarization. Since pain transmitting nerve fibers tend to be thinner and either un-myelinated or lightly myelinated, the agent can diffuse more readily into them than into thicker and more heavily myelinated nerve fibres like touch, proprioception, etc.

Bupivacaine is contraindicated for intravenous regional anaesthesia (IVRA) because of potential risk of tourniquet failure and systemic absorption of the drug.

Bupivacaine 0.5% needs to be in contact with a raw area for about 10 seconds to be effective. The recommended upper limit of safe dosage of bupivacaine is 2mg/kg body weight. This is equivalent to 25-30 ml of 0.5% solution. Systemic toxicity produces arrhythmia,

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drowsiness, convulsions, paraesthesia, disorientation and nystagmus.<sup>7</sup>

The objective of this study was to determine the relief of pain after tonsillectomy by application of topical 0.5% bupivacaine.

## METHODOLOGY

This prospective and single-blind study was conducted at Departments of ENT, Mufti Mehmood Memorial Teaching Hospital and District Headquarter Teaching Hospital, Dera Ismail Khan from January 2011 to June 2012. The patients were unaware about the nature of the content of the topical application of the material. Subjects of either sex, aging 10-35 years, with history of recurrent episodes of acute tonsillitis were included. Those with adenotonsillectomy, with history of acute tonsillitis within three weeks, bleeding diathesis, suspicious of malignancy, or hypersensitivity to bupivacaine were excluded. Subjects were divided into group 1 (treatment group) and 2 (control group) of 48 each on convenient sampling method in a 1:1 ratio. Patients with odd numbers were included in group 1 receiving a topical application of bupivacaine in tonsillar fossa while patients with even numbers were included in group 2, receiving nothing.

All subjects were admitted a day before surgery. A written informed consent was obtained from each patient or their parents (in case of paediatric patients) and they were briefed on how to score their pain on a 10-point visual analogue scale (VAS) where 0 represents no pain and 10 represents severe excruciating pain. Detailed otorhinolaryngological history and examination was carried out. All subjects underwent total and differential leukocytic counts, clotting and bleeding times, and HB-sAg and Anti-HCV. A standardized anaesthetic protocol was followed for all patients. Atropine 0.02mg/kg and midazolam 0.1mg/kg were given intravenously as pre-medication to all patients. After giving calculated doses of propofol and atracurium, endotracheal intubation was done. Anaesthesia was maintained with isoflurane, oxygen and nitrous oxide. Intravenous fluids were given as

per individual requirement. Tonsillectomy was performed by sharp dissection snare technique in all the patients by the same surgeons (Khan MI, Iqbal K). Haemostasis was secured by pressure gauze or suture ligation (silk 1 or catgut 2/0) and not by electrocautery. After securing haemostasis, both tonsillar fossae were packed with a gauze piece soaked in 5 ml of 0.5% bupivacaine solution for five minutes. Patients were reversed with inj. Atropine 0.02mg/kg plus inj. Neostigmine 0.05mg/kg and extubated after return of reflexes. All the patients were asked to express the intensity of their pain on VAS at 1, 3, and 8 hours post-operatively. All the patients received Injection diclofenac sodium 75 mg intramuscularly after scoring VAS at 3 hours. No further analgesic was given over the next 5 hours. All the patients were discharged 24 hours post operatively.

## Data collection

A Performa was used for each patient having following variables noted and entered into the data sheet of SPSS 17: gender and age as demographic and independent variables and post operative pain score at 1, 3 and 8 hours as study and dependent variables.

## Data analysis

Age and gender were expressed as frequency and percentage. Pain score at 1, 3 and 8 hours were expressed as mean and standard deviation and their differences between the groups were analyzed by Two-Sample Independent T Test. P value of < 0.05 was considered as statistically significant.

## RESULTS:

A total of 96 patients with 48 patients in each group, were included in the study. Males (58%.3) out-numbered the females (41.7%) in both groups. Mean age of the patients in group 1 was  $21.88 \pm 7.528$  range (10-35) years and in group 2 were  $19.75 \pm 6.525$  range (10-33) years. The difference in mean age between the groups was statistically non significant ( $p = 0.144$ ) as determined by

### AGE AND GENDER WISE DISTRIBUTION OF THE PATIENTS

Variables		Bupivacaine Group (n=48)		Control Group (n=48)	
		FREQUENCY	%AGE	FREQUENCY	%AGE
Gender	Male	29	60.4	27	56.2
	Female	19	39.6	21	43.8
Age	10-15	12	25	15	31.25
Group (years)	16-20	11	22.9	13	27.1
	21-25	9	18.75	8	16.65
	26-30	7	14.6	9	18.75
	31-35	9	18.75	3	6.25
Mean age (years)		$21.88 \pm 7.528$		$19.75 \pm 6.525$	

Table I

Two-Sample Independent T Test. So age was not a confounding variable. Further the age was stratified into five categories. The maximum number of patients in both the study groups was in the age group 10-15 years (Table-1)

Table-II shows analysis of research variables. The mean pain score was lower in group 1 than in group 2 at 1, 3, and 8 hours, although statistically non-significant ( $p$ =value 0.203, 0.177, 0.198 respectively) as determined by Two-Sample Independent T Test.

## DISCUSSION

### MEAN PAIN SCORE AT 1, 3 & 8 HOURS ON VAS (N=48 EACH GROUP)

Variables		Pain score on Visual Analogue Scale		t value	p value
		Mean	SD		
At 1st Hour	Group 1	5.27	2.811	-1.238	0.203
	Group 2	6.02	2.914		
At 3rd Hour	Group 1	4.81	2.750	-1.361	0.177
	Group 2	5.60	2.944		
At 8th Hour	Group 1	4.35	2.605	-1.296	0.198
	Group 2	5.08	2.901		

Table II

Pain control continues to be a challenge for tonsillectomy patients and is a leading cause of dehydration and unanticipated hospital admissions in post tonsillectomy patients especially in children. Colclasure and Graham noted a 1% readmission rate for patients undergoing tonsillectomy because of odynophagia and dehydration.<sup>8</sup> To minimize the post operative pain anaesthesiologists and otolaryngologists have focused primarily on anaesthetic technique with maximal analgesic potential in the post operative period. Bupivacaine as well as other local analgesics act via inhibiting stimulation of fiber-c afferent neurons resulting in decreased stimulation of dorsal horn of spinal cord.<sup>9</sup> Whether pre or post operative topical application or injection of bupivacaine affects the outcome has been studied by Mollieux et al, who concluded that pre or post operative timing has no clinical significance.<sup>10</sup>

The age range of our patients is almost similar to that in the study by Bir Singh et al though the eldest patient in their study was 25 years old.<sup>11</sup> On the other hand in the study by Mohammad SK et al, all of the patients were from pediatric age group.<sup>12</sup> Both the above studies also had male preponderance like our study but more females had been reported in another local study.<sup>13</sup>

We concluded that post tonsillectomy bupivacaine impregnated swabs provide no substantial pain relief. These results commensurate with other local studies.<sup>13,14</sup> Contrary to these, the results of two other local studies suggest that topical application of bupivacaine pack in tonsillar fossa is an effective method to reduce pain after tonsillectomy in the immediate post-operative period.<sup>15,16</sup>

Similarly Hung et al. studied 99 patients (3-16 years) and used bupivacaine dipped cotton wool in the tonsillar bed in the case group and normal saline dipped cotton wool in the control group and demonstrated that eating and drinking were started sooner and postoperative pain was lower at 1, 3, and 6 hours postoperatively in the case group. The long-lasting effect of this drug was not evaluated.<sup>17</sup>

We preferred topical bupivacaine application instead of local infiltration in our study because of the serious and life threatening complications associated with inadvertent intravascular bupivacaine like, cardiac arrhythmias, airway obstruction,<sup>8</sup> cervical osteomyelitis,<sup>18</sup> facial nerve paralysis,<sup>19</sup> Horner's syndrome<sup>20</sup> and vocal cord paralysis.<sup>21</sup> More importantly, local application is believed to be associated with less motor blockade.<sup>22</sup>

The surgical technique used for tonsillectomy also plays important role in post-operative pain. The electrocautery dissection technique increases postoperative morbidity in terms of pain, otalgia, and poor diet when compared with blunt dissection technique.<sup>23</sup> Atallah N et al. have also compared the sharp dissection snare technique with electrocautery.<sup>24</sup> We used the dissection and snare technique exclusively in this study.

The probable reasons for unexpected decreased pain control with bupivacaine in our study were unclear. One possibility is that we did not use a large enough sample size to detect a more favorable result with bupivacaine. Another reason may be the problem of bupivacaine dose, applied in small accommodative tonsillar fossae. Finally the evaluation of pain was carried out on VSA as it is deemed one of the most accurate and reproducible pain scales. Although validated for children as young as 3 years, the VAS scale for pain can be confusing for children to use. No complication occurred in this study due to use of bupivacaine, as supported by other study.<sup>13</sup>

An overview of past studies suggested that higher patient numbers per study, higher doses of local anesthetic, and addition of adrenaline to local anesthetics were potentially associated with positive preemptive effects.<sup>25</sup>

## LIMITATION

The present study is limited because of the small study group. A large sized, prospective, randomized and a multi centre study is recommended to study the efficacy of topical application of 0.5% bupivacaine in relieving pain in tonsillectomy patients.

## CONCLUSION

Topical application of 0.5% bupivacaine provides no significant pain relief in post-tonsillectomy patients in

first 8 hours.

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### AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

- MIK:** Conception and design; acquisition, analysis and interpretation of data; Final approval of the version to be published
- SFS:** Critical Revision & Final approval of the version to be published
- M:** Drafting the manuscript & Final approval of the version to be published
- KI:** acquisition of data; Final approval of the version to be published

### CONFLICT OF INTEREST

Authors declare no conflict of interest

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