

## Comparison of Peritonsillar Infiltration of Lidocaine and Bupivacaine for Management of Postoperative Pain of Tonsillectomy

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### Abstract

**Background:** Postoperative pain following tonsillectomy is a common problem of this surgical procedure.

**Purpose:** To compare the effects of preincisional peritonsillar infiltration of lidocaine and bupivacaine on post tonsillectomy pain in patients older than 8 years old.

**Methods:** A double blind randomized clinical trial was conducted in patients undergoing elective tonsillectomy or adenotonsillectomy. The patients randomly allocated into three groups. Peritonsillar infiltrations with bupivacaine, lidocaine and normal saline were applied in group 1 2 and 3 respectively. In 5th, 10th and 20th postoperative hours, the severity of pain was evaluated by visual analogue scale (VAS).

**Results:** The patients in the bupivacaine group experienced a significantly milder pain in all postoperative hours comparing with the other groups. This effect was more obvious in male sex. The difference in pain sensation between lidocaine and saline groups was not significant.

**Conclusion:** Peritonsillar infiltration of bupivacaine decreases pain in the first post-operative day after tonsillectomy whereas lidocaine does not show a similar effect.

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### INTRODUCTION

Tonsillectomy is one of the most commonly performed surgical procedures (1). Postoperative improvements in quality of life and behavior have been observed in children and adult patients (1, 2). The main complications of tonsillectomy are pain, hemorrhage, nausea, vomiting and dehydration (3). In an attempt to decrease post tonsillectomy pain, various perioperative adjuvant therapies such as local anesthetics, steroids, analgesics and antibiotics have been implemented (4). Tonsillar fossa is very sensitive, because it is well innervated by trigeminal and glossopharyngeal nerves. Local anesthetics can block the nerve conduction when applied to peritonsillar fossa (5). Bupivacaine is a member of the amino amide group of local anesthetics that block the generation and conduction of nerve impulses similar to that of lidocaine (6). The aim of this

study is to compare these two local anesthetics in a controlled and double blind study.

### PATIENTS and METHODS

Study was a double- blinded, randomized clinical trial. Sixty patients aged 8 to 40 years (mean=13.3±3.4) who were candidate for elective tonsillectomy or adenotonsillectomy enrolled in this study. The cases with severe inflammatory condition such as acute pharyngitis or peritonsillar abscess, the ones with a history of bronchial asthma, cardiopulmonary disease, liver diseases, kidney diseases, hematologic diseases and coagulopathy and the known cases with allergy to bupivacaine or lidocaine excluded from the study. Sixty patients met the inclusion criteria. Using randomized block design the patients were allocated into 3 groups with 20 patients each. The aim and method of study were explained for all patients or their parents and informed consent was obtained. The patients

were blind about the group in which there were enrolled. All patients received standard general anesthetic technique including induction with propofol and fentanyl and then oxygen, nitrous oxide and isoflurane for maintenance. Monitors included electrocardiography, pulse oximetry, blood pressure measurement and capnography. Before initiation of tonsillectomy, the peritonsillar area was infiltrated with a compound which was 0.5% bupivacaine with 0.001% epinephrine in the first group, 2% lidocaine with 0.001% epinephrine in the second group and normal saline (NaCl 0.9%) with 0.001% epinephrine in the third (control) group. The surgeon just before the initiation of the surgery infused an appropriate volume of drug to cover all the peritonsillar fossa. All operations performed by one surgeon using sharp cold dissection. All patients received acetaminophen 10mg/kg (500 mg maximum) every 6 hours after surgery. At the 5, 10 and 20 hours after the operation, the patients were asked to explain their pain intensity using a visual analogue score in which 0 indicated no pain and 10 was the most imaginable severe pain. They were also asked to drink 100 ml of cold water and pain was measured again 5 minutes afterward. An interrogator blinded to the study documented this information. The data was analyzed statistically using SPSS version 18. The student's paired t-test and ANOVA were used to analyze the result.

A p-value less than 0.05 was considered to be statistically significant.

## RESULTS

Between July and December 2013, sixty patients who underwent adenotonsillectomy or tonsillectomy met the inclusion criteria of our study. Out of these, 28 (46.7%) were male and 32 (53.3%) were female and mean age was  $13.3 \pm 3.4$ . Adenotonsillectomy was performed in 47 (78.3%) and tonsillectomy was performed in 13 (21.7%) cases. The mean age, weight and height were similar in three groups (table 1). No major complication such as hemorrhage, airway obstruction or dehydration happened. The pain intensity declined over time in all three groups in different extents (figure 1). The difference in pain scores between adenotonsillectomy and tonsillectomy cases in each group was not significant ( $p\text{-value} > 0.05$ ) (table 2). Pain intensity scores between lidocaine and saline group were not statistically significant neither before nor after drinking water ( $p\text{-value} > 0.05$ ). The analysis also performed for each sex and the results showed that difference in pain score in males was significant between bupivacaine and saline group in all postoperative hours whereas, this was not significant in females (table 3).

**Table 1:** Demographic data in three groups; AT/T (adenotonsillectomy ,tonsillectomy).

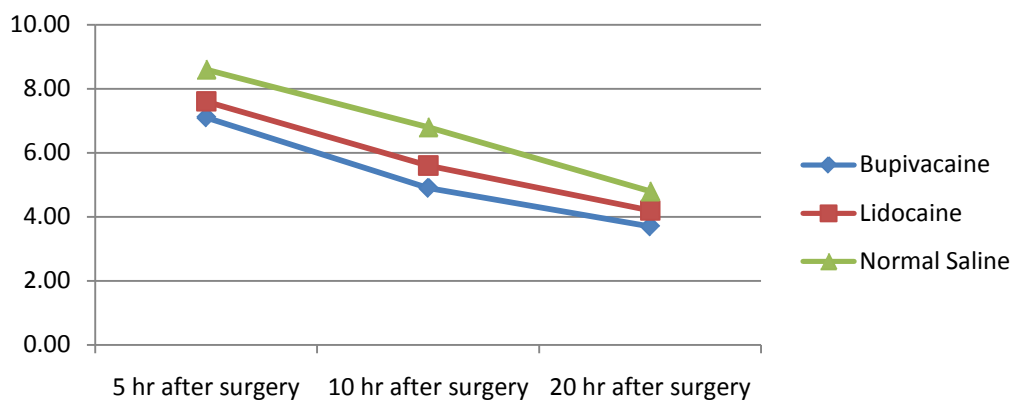
	Bupivacaine Group	Lidocaine Group	Saline Group
Age	$12.4 \pm 6.5$	$13.2 \pm 7.2$	$14.2 \pm 7.05$
Sex(M/F)	11/9	9/11	8/12
Weight(Kg)	$37 \pm 15.2$	$40.1 \pm 18.2$	$39.8 \pm 13.9$
Height(Cm)	$137.5 \pm 16.1$	$138.4 \pm 15.8$	$140 \pm 15.7$
AT/T	16/4	16/4	15/5

**Table 2:** Pain scores in adenotonsillectomy and tonsillectomy cases of each group. + Drink= after drinking cold water.

		Post-operative hours					
		5	10	20	5+Drink	10+Drink	20+Drink
Bupivacaine	Adenotonsillectomy	7	4.75	3.6	5.6	3.9	2.3
	Tonsillectomy	7.7	5.5	4	6.2	4.5	3.25
	p-Value	0.2	0.1	0.4	0.3	0.3	0.07
Lidocaine	Adenotonsillectomy	7.6	5.5	4.2	5.5	4	3.1
	Tonsillectomy	7.7	6.2	4	5.7	4.7	3.2
	p-Value	0.7	0.5	0.6	0.6	0.2	0.8
Normal Saline	Adenotonsillectomy	8.5	6.7	4.8	6.1	4.2	3.3
	Tonsillectomy	8.5	7	4.7	6.8	5	3.6
	p-Value	0.9	0.6	0.8	0.08	0.1	0.2

**Table 3:** Pain score in three groups for each sex and in total. +Drink= after drinking cold water, p= p-value (The p-value< 0.05 means statistically significance).

		Post-operative hours					
		5	10	20	5+Drink	10+Drink	20+Drink
Bupivacaine	Male	6.5±1.3	4.8±1.4	3.8±0.9	5.4±1.3	4.1±1	3.1±0.8
		P=0.001	P=0.0001	P=0.047	P=0.5	P=0.6	P=0.3
	Female	7.9±1.9	5±2.7	3.5±1.8	6±2.1	4±2.1	3±1.7
		P=0.05	P=0.2	P=0.4	P=0.6	P=0.7	P=0.8
	Total	7.1±1.7	4.9±2	3.7±1.4	5.7±1.7	4.1±1.6	3±1.2
		P=0.007	P=0.004	P=0.05	P=0.4	P=0.5	P=0.5
Lidocaine	Male	7.7±1.9	5.5±2.4	4.2±2	5.2±1.7	4.1±2.1	3.1±2.3
		P=0.10	P=0.06	P=0.2	P=0.4	P=0.6	P=0.6
	Female	7.54±2.6	5.72±1.9	4.2±2.18	5.8±1.9	4.1±1.8	3.1±2.4
		P=0.02	P=0.06	P=0.7	P=0.4	P=0.8	P=0.9
	Total	7.6±1.9	5.6±2.1	4.2±2	5.5±1.8	4.1±1.9	3.1±2.3
		P=0.09	P=0.8	P=0.3	P=0.3	P=0.6	P=0.7
Normal Saline	Male	8.8±0.8	7.7±1.4	5.3±2.1	5.8±1.3	4.5±1.6	3.6±1.7
	Female	8.4±1.7	6.1±1.72	4.4±1.97	6.5±2.6	4.3±2.1	3.2±1.8
	Total	8.6±1.4	6.8±1.8	4.8±2	6.2±2.3	4.4±1.8	3.3±1.7

**Figure 1:** Mean postoperative pain scores over time.

## DISCUSSION

Tonsillectomy is a very common operation. It can cause severe post-operative pain (7). Due to hyperexcitable states during surgery, pain impulses are conducted into the central nervous system in spite of general anesthesia. Blockage of these impulses by perioperative infiltration of local anesthetic agents theoretically must have the significant analgesic effect (8). The aim of this study is to examine the effect of peritonsillar infiltration of bupivacaine and lidocaine on post-operative pain. Perioperative infiltration of local anesthetic agent in peritonsillar fossa for improvement of postoperative pain has been the subject of some other studies. A meta-analysis by Sun et al. stated that peritonsillar infiltration of bupivacaine is a safe and significantly effective method for relief of post tonsillectomy pain (9). Jebeles et al. found that peritonsillar infiltration of bupivacaine and epinephrine decreased post tonsillectomy pain (10, 11). Another study by Nordahl et al. demonstrated that females reported more pain and used more analgesics than males after tonsillectomy (12). Hydri et al. found bupivacaine application in peritonsillar fossa to be not effective for pain relief after tonsillectomy (1). Ozkiris et al indicated that administration of bupivacaine and ropivacaine were effective in decreasing post tonsillectomy pain but peritonsillar infiltration of lidocaine was not statistically effective (2). Fikret and colleagues revealed that bupivacaine and levobupivacaine were effective in reducing early post tonsillectomy pain whereas, bupivacaine had slightly longer effect (5). Heiba and colleagues reported that peritonsillar infiltration of tramadol to provide pain control in the first 6 hours post-tonsillectomy, which was comparable to effects of lidocaine (13). Some authors have reported some complications of local anesthetic injection in the tonsillar bed. Lijesk stated that bupivacaine infiltration may lead to upper air way obstruction and pulmonary edema (14). This finding is not confirmed by other studies. Other

authors have occasionally reported vocal cord paralysis due to vagal block, deep cervical abscess and even brain stem stroke due to cardiac asystole (4). It is not clear if these complications are directly related to the application of local anesthetics or not. Nevertheless, no large study has shown considerable complications related to local anesthetics injection. We also did not encounter any major or minor complications in our study in this regard. Considering the previous studies, it is difficult to build a uniform recommendation for the surgeons for use of local anesthetics prior to tonsillectomy. It was not clear, which agent to use and who are better candidates of perioperative local anesthetic injection. In this study, we found that bupivacaine infiltration before tonsillectomy is effective for reduction of postoperative pain during the first day after surgery. In males, this effect was statistically significant but in females, although a considerable degree of relief observed, the effect did not meet the statistical significance criteria. The lidocaine made a decrease in pain scores in all patients but this effect was not statistically significant. In this way, we can strongly recommend the preoperative injection of bupivacaine for decreasing of postoperative pain in the first day after surgery, especially in males. Some authors have used dynamic pain assessment (after drinking water or opening the jaw). The time of mobilization and request for additional analgesia are also used as indicators of pain (15, 16). In our study, we selected the patient older than 8 years because these patients already have learned the numbers and gave us more accurate answer when they are asked about pain intensity. We believe this can improve the accuracy of the results. We also used dynamic pain assessment by measuring the pain scores after drinking some water. The factors that could conflict our results include surgical methods applied for tonsillectomy, the technique of local anesthetic application (topical or infiltration), dose and volume of local anesthetic, premedication, design of the

study and assessment methods. We tried to minimize these effects by equalization of the surgical technique, method of anesthetic application and use of blinding for patients, surgeon and interrogator. In all groups, sufficient volume of the agent was used to completely infuse the tonsillar bed. The exact amount of volume is dependent to the surgeon's expectation. Since, a single surgeon performed all the surgeries in this study, we can assume that a roughly equal volume of agent per surface area of tonsillar bed was injected in all patients. The technique of surgery and all the prescribed drugs before, during and after surgery other than the local anesthetic agents were similar in all patients to prevent or reduce the bias.

## CONCLUSION

Peritonsillar infiltration of bupivacaine provided pain control in the first day post tonsillectomy whereas; lidocaine was not effective for reduction post tonsillectomy pain.

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None to declare.

## CONFLICT of INTEREST

The authors declare no conflict of interest.

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