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## Effect of Local Bupivacaine Infiltration on Post-Tonsillectomy Pain

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### ABSTRACT

**Background:** Tonsillectomy is still one of the most common surgeries in the world which is accompanied by severe pain post-operatively. Although analgesic drugs are used orally or parenterally to control post-tonsillectomy pain, it is still one of the complications of this procedure especially in adults. Regarding the controversy in the role of injection of local analgesic drugs in tonsillectomy and the high prevalence of this procedure, the present study was performed to evaluate the effect of local bupivacaine infiltration, as an analgesic drug on pain after tonsillectomy in patients older than 9 years of ages.

**Materials and Methods:** A double-blind experimental clinical trial was performed during a 3-year-period of time. One hundred and seven patients over 9 years old who were candidates for tonsillectomy because of recurrent tonsillitis (more than 6 times in a year or more than 3 times for at least two consecutive years), were selected. All patients underwent tonsillectomy by dissection/snare technique, and suturing the bleeding sites. The method of anesthesia was similar in all individuals. For each patient, 5 ml of 0.5% bupivacaine was injected into one tonsil, as the case, and 5 ml of normal saline was injected into the other one, as the control. Neither the surgeon nor the patient was aware of the content of these two injectable materials. The type of material was randomly selected for each tonsil. The intensity of post-tonsillectomy pain at each side was measured 4, 8, and 24 hours and one week post-operatively by numeric pain intensity scale (NPS) in 107 patients. Data were analyzed by SPSS software and paired t-test with 95% confidence interval.

**Results:** This study showed that the difference in the mean level of post-tonsillectomy pain was significant between the case and the control groups regardless of age ( $p < 0.001$  for 4, 8 and 24 hours and  $p < 0.1$  for a week postoperatively). Furthermore, there was a statistically significant difference in the mean level of pain after tonsillectomy among the male patients regardless of age between the two groups 4, 8 and 24 hours, postoperatively ( $p < 0.001$ ). This difference was not significant one week after surgery ( $p < 0.02$ ). In females, the difference in the mean level of post-tonsillectomy pain regardless of age was statistically significant between the two groups in four different times of evaluation ( $p < 0.02$ ).

**Conclusion:** To reduce the post-tonsillectomy pain, 5 cc of 0.5% bupivacaine solution can be injected into the tonsillar bed 5 minutes preincisionally. (Tanaffos 2006; 5(1): 45-49)

**Key words:** Pain, Tonsillectomy, Bupivacaine

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## INTRODUCTION

Tonsillectomy is still one of the most common operations in the world which is accompanied by severe pain postoperatively.

This pain affects the nutrition, changing the time of coming back to work or school and discharging the hospital. The advantages of decreasing the pain are shorter recovery period, lower risk of postoperative bleeding, shorter hospitalization stay, and returning to a normal dietary regimen and a status of activity which is appropriate for the patient and his/ her parents sooner (1, 2, 3, 4).

Although analgesic drugs are used orally or parenterally for the management of post-tonsillectomy pain, this pain is still considered as one of the important complications especially in adults (2, 3, 5). Various researches have been performed for reducing the post-tonsillectomy pain. So many efforts have been made in regard to reducing the post-tonsillectomy pain such as administration of improved analgesic drugs during anaesthesia, use of corticosteroids, improvements in surgical procedures, e.g. radiofrequency and local or systemic use of analgesics (3, 5, 6, 7, 8, 9). Regarding the controversy in the role of local injection of analgesic drugs in tonsillectomy and high prevalence of this procedure, the present study was performed to evaluate the effect of local bupivacaine infiltration, as an analgesic drug on pain after tonsillectomy.

## MATERIALS AND METHODS

A double-blind experimental clinical trial was performed on 117 patients of 9 yrs. and over who had undergone surgery between the year 2003 and 2005. Those patients who were candidates for tonsillectomy because of recurrent tonsillitis (more than 6 times in a year or more than 3 times for at least two consecutive years), were selected. Consent was taken from each patient and his/her parents. Exclusion criteria included acute infection, malignancy, allergy, bleeding disorders, regular use

of analgesic drugs underlying diseases like tuberculosis and diabetes mellitus.

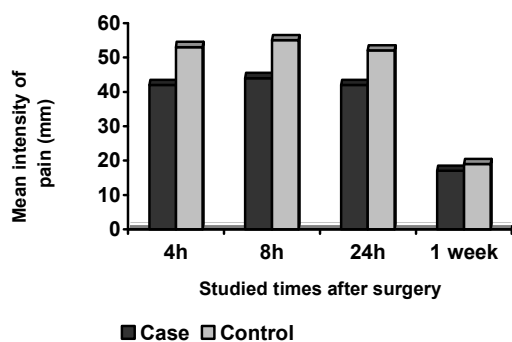
All selected patients underwent tonsillectomy by dissection and incision of tonsillar pillars using snare and suturing the bleeding sites. All procedures were done by a assistant under direct observation of three surgeons. Technique of anesthesia was similar for all patients. Midazolam, atropine and fentanyl were used in the premedication phase, thiopental and atracurium in the induction phase, halothane in the maintenance phase, and neostigmine and atropine in reverse phase. For each person 5 ml of 0.5% bupivacaine was injected into one tonsil, as the case, and 5 ml of normal saline was injected into the other one, as the control just 5 minutes pre-incisionally. Neither the surgeon nor the patient was aware of the content of these two infiltrative materials. Type of material was randomly selected for each tonsil. The intensity of post-tonsillectomy pain at each side was measured at 4 and 8 hours, one day and one week after surgery by numeric pain intensity scale (NPS) by an observer (other than the responsible surgeon) who was unaware of the type of the injected material. In NPS method, a horizontal scaled (0-100 mm) line is used and the patient is requested to show the degree of his/ her pain on this line with a number ranging from zero (no pain) to 100 (very severe pain). The patients should be able to count to 100 and understand the concept of them; therefore, literate patients older than 9 years were selected. Since 4 patients were unconscious after the surgery and 6 did not understand the concept of NPS, they were excluded from the study. Therefore, 107 patients (214 locations of tonsillectomy) were studied. Data were analyzed by SPSS software and paired t-test with 95% confidence interval.

## RESULTS

The mean age ( $\pm$ SD) of patients was 15.1 ( $\pm$ 4.2) years ranging 9-41 years. The most important

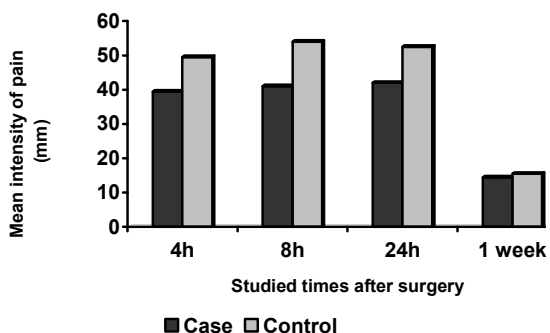
findings were as follows:

1) Mean ( $\pm$ SD) intensity of pain after tonsillectomy in the case group regardless of age and sex was 42.8 ( $\pm$ 20.6) mm, 45.2 ( $\pm$ 19.2) mm and 42.9( $\pm$ 17) mm 4, 8 and 24 hours after surgery, respectively. In the control group, it was 54.9 ( $\pm$ 21.7), 56.7( $\pm$ 20) and 54.5( $\pm$ 17.9) in the abovementioned times, respectively ( $p < 0.001$ ). The mean ( $\pm$ SD) of NPS, one week after surgery was 16.9 ( $\pm$ 13.3) mm in the case group and 20.2 ( $\pm$ 14.7) mm in the control group ( $p < 0.05$ ) (figure 1).



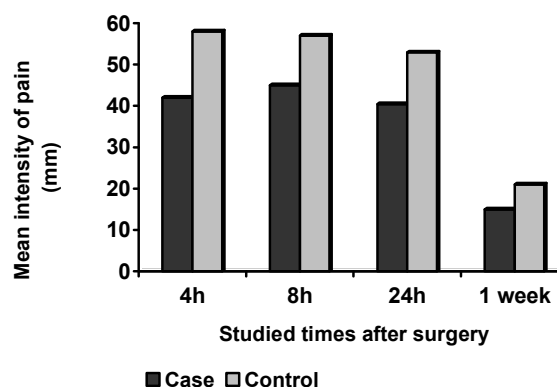
**Figure 1.** Mean intensity of pain (mm) in the case and control groups in 4,8,24 hours and 1 week after tonsillectomy.

2) There was a significant difference in mean intensity of pain in men between the case and control 4, 8, and 24 hours post-operatively ( $p < 0.001$ ). This difference was not significant one week after surgery ( $p < 0.2$ ) (figure 2).



**Figure 2.** Mean intensity of pain (mm) in the case and control groups (men) in 4,8,24 hours and 1 week after tonsillectomy.

3) There was a significant difference in mean intensity of pain in women between the case and control 4, 8, and 24 hours ( $p < 0.001$ ) and one week after surgery ( $p < 0.02$ ) (figure 3).



**Figure 3.** Mean intensity of pain (mm) in the case and control groups (women) in 4,8 and 24 hours and 1 week after tonsillectomy.

**DISCUSSION**

Bupivacaine as well as other local analgesics act via inhibiting stimulation of fiber-c afferent neurons resulting in decreased stimulation of dorsal horn neurons of spinal cord. Inducted stimulation by pain stimulator may have a role in postoperative pain even when the procedure is performed under general anesthesia(2).The dosage of bupivacaine for peripheral blockage is 5-20 ml of 0.25% solution that lasts 4-24 h (mean: 8 h), but its effect may last for up to 1 week after surgery because of pre-emptive analgesia mechanism. There is a controversy regarding the efficacy of bupivacaine as a local analgesic on pain after tonsillectomy.

Hung et al. studied on 99 patients (3-16yrs.) 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 1, 3, and 6 hours post-operatively in the case group. The long- lasting effect of this drug was not evaluated (10).

Johansen et al. evaluated 26 patients in 1996. They injected 5ml of 0.25% bupivacaine solution in the case group and equal amount of normal saline in the control group. Afterwards, they assessed the pain after surgery by visual analogue score (VAS) and compared the efficacy of oral analgesic after surgery between the two groups. Findings were consistent with less pain and lower use of analgesics in the case group ( $p < 0.001$ ) but the study population were not enough (11).

Studies by Alvarez et al.(12). Wong et al. (13) and Jebeles et al. (9) showed the efficacy of pre- incisional injection of this drug around tonsillar tissues in reducing the pain after surgery. However, the most important problem in these studies was their small sample size.

In a study by Kountakis et al. on 34 patients, injection of 10 ml of 0.5 bupivacaine in the case group and 10 ml of normal saline in the control group were performed. There was no significant difference in post operative pain between the two groups (14). In this study the sample size was small as well.

Nordahl et al. (15), strub et al. (16), Orntoft et al. (17) and Schoem et al. (18) did not find a correlation between injection of bupivacaine and pain after tonsillectomy. The dosages of bupivacaine in different studies were in the pharmacological range. Complications of bupivacaine have been rarely reported in the studies.

Bean-Lijewski reported two cases of upper-airway obstruction following pre-tonsillar injection of bupivacaine. He believed that the cause would be related to very deep injection of this drug resulting in blockage of recurrent laryngeal nerve branches and upper airway obstruction. Superficial submucosal injection of this drug diminishes this risk (19). Fradis et al. reported a deep cervical abscess and a brain stem stroke following simultaneous injection of epinephrine and bupivacaine (20).

Regarding the prevalence of tonsillectomy, controversy about the effect of bupivacaine on

reducing the pain after tonsillectomy, and absence of a classic study in our country in this regard, the present study was performed. This study showed that injection of bupivacaine during tonsillectomy reduced the post-operative pain. Mean intensity of pain 4, 8 and 24 hours after operation showed significant difference between the case and control group. Therefore, injection of 5cc of 0.5% bupivacaine solution just 5 min before surgery can reduce the pain after tonsillectomy. The cause of this reduction in pain 1 week after surgery in women in comparison with man may be related to difference in perception of pain between men and women. Men feel the pain physically and women perceive it emotionally; thus, perception of pain in women is more severe than in men. One week after surgery, there was no effect of bupivacaine. Therefore, there was no significant difference in men regarding the intensity of pain between incision sites. (physical perception). Women had a better memory of perception of pain in the site of bupivacaine injection; thus, one week after surgery they had less pain at the injection site.

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