

## The use of local anesthesia with bupivacaine in tonsillectomy

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### Abstract

**Aim:** To assess whether blockade of nociceptive input with bupivacaine during tonsillectomy can decrease post-operative pain.

**Methods:** This study was carried out during 2009-2012 and included 347 Albanian children aged 2.5-16.0 years who received either pre-incisional peritonsillar infiltration with lidocaine 0.2% 4-5mg/kg+ epinephrine 0.001% (group I), or pre-incisional peritonsillar infiltration with bupivacaine 0.25% 1-2mg/kg+ epinephrine 0.001% (group II) as a method of relieving post-operative (tonsillectomy) pain. Post-operative pain was assessed using a four-point system. T-test and chi-square test were used to compare the results between the two study groups.

**Results:** In this study, pre-incisional Bupivacaine infiltration into the tonsillar fossa resulted in better and longer pain free periods compared to lidocaine use of local anesthesia.

**Conclusions:** Pre-incisional Bupivacaine infiltration into the tonsillar fossa could effectively reduce the post-operative pain in Albanian children following tonsillectomy.

**Keywords:** Albania, bupivacaine, lidocaine, pain relief, post-operative pain, tonsillectomy.

## Introduction

Pain management after tonsillectomy is a challenge to anesthesiologists, especially among children because in this population group the assessment of pain is rather more difficult compared to adults (1). Furthermore, the classical way of treating post-operative pain induced after tonsillectomy, such as the use of codeine (2) or a combination of codeine with acetaminophen (3), has resulted in an increase of severe adverse effects (4), including death. A recent paper found that tonsillectomy continues to be associated with a significantly high mortality risk due to malpractice, including those related to codeine use (4). Also, the use of opioid analgesics is associated with a number of other adverse effects among children (5).

Because of the risks associated with use of codeine as a pain-reliever after tonsillectomy, alternative ways of pain-control have been used. There is evidence that the use of non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen to relieve pain after tonsillectomy in children is safe (6), and their use is not associated with increased bleeding (6). Also, the use of NSAIDs is associated with less nausea and vomiting compared to other analgesics (6). A recent systematic review warned that, even though the use of NSAIDs was associated with a non-significant increase in the risk of bleeding, still there is no conclusive evidence to exclude such an increased risk of NSAIDs use in children tonsillectomy (7). However, another systematic review concluded the use of NSAIDs might be considered as a safe method of pain relief among children undergoing tonsillectomy (8).

Bupivacaine is a local anesthetic belonging to the amino amide group (9). Bupivacaine infiltration has been used as a method of relieving post operative pain by blocking nociceptive impulses from entering the central nervous system (9,10). There are indications that the administration of bupivacaine can reduce post-operative pain in patients after tonsillectomy (10,11). Bupivacaine infiltrations are considered superior in pain control compared to spray-way of administration (12). Lidocaine has

also been used as a pain-controlling agent after tonsillectomy but its effect of pain relief usually last for short periods of time (13). Other studies have suggested that lidocaine sprays resulted in better pain control and were more preferable compared to bupivacaine after tonsillectomy (14).

There is no information about the effectiveness of bupivacaine administration for relieving pain among children undergoing tonsillectomy in Albania. In this context, the aim of this study was to test the hypothesis that bupivacaine infiltrations during tonsillectomy could reduce post-operative pain in children and to compare the pain-relieving effects of bupivacaine and lidocaine infiltrations.

## Methods

During a 3-year period, 2009-2012, we decided to compare two groups of patients undergoing tonsillectomy. The age ranges from 2.5-16.0 years old. The total number of patients included in this study was 347 and they were divided into two groups: (1) Group I (184 children): preincisional peritonsillar infiltration with lidocaine 0.2% 4-5mg/kg+ epinephrine 0.001%; Group II (163 children): preincisional peritonsillar infiltration with bupivacaine 0.25% 1-2mg/kg+ epinephrine 0.001%.

All the patients underwent general anesthesia induced with propofol 3mg/kg, norcuronium 0.1mg/kg and fentanyl 1-2  $\mu$ g/kg; oxygen 40%, nitrous oxide 60%, sevofluran 1.5-3 vol%.

The pain was monitored by an independent anesthesiologist, unaware of the local anesthetic used, every 15 min from the beginning of the operation, at 0 min (at awakening moment), at 15<sup>th</sup>; 30<sup>th</sup>; 45<sup>th</sup> minute; at the first hour; second; fourth; sixth, and after 24 hours.

The efficacy of the anesthesia was estimated by means of a four pain-points system: no pain; insignificant pain; moderate pain; strong pain.

Postoperative pain was treated with algotropil (acetaminophen+prometasine) 10-15 mg/kg and tramadol 1-2mg/kg only in the cases when the patient complained of pain (usually at point 3).

The quality of anesthesia was estimated based on

the behavior and the activity of the children using a system of 1-2 points: the child is quiet; the child is irritable and nervous, and according to the baby's facial expressions as well.

Intraoperative and postoperative monitoring consisted of: ECG; Heart Rate; Blood Pressure; SatO<sub>2</sub>

The efficacy of the intraoperative analgesia was estimated based on the changes in the Heart Rate and Blood Pressure.

As for the data analysis, t-test and chi square test were performed using SPSS software, version 15.0.

## Results

The two groups were comparable according to age, weight and sex. The mean age in group I was

5.8±1.3 years, while in group II it was 6.5±0.4 years.

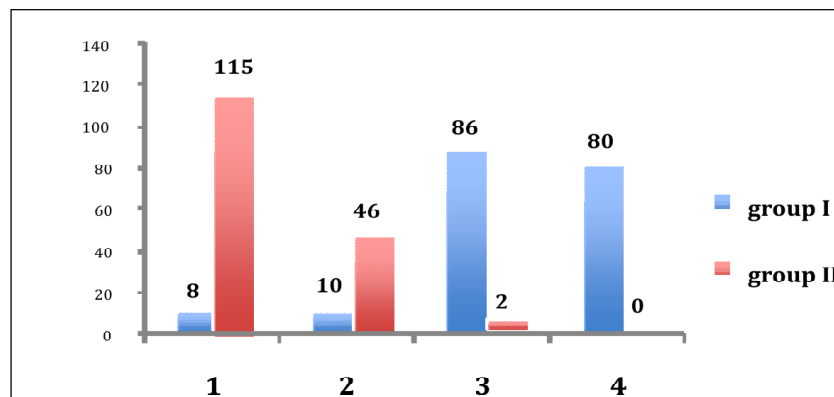
During the operation there were no significant differences among the groups according to: SatO<sub>2</sub>; blood pressure; or heart rate.

Thirty minutes after the operation, the values of the HR and BP increased 20% in the patients of group I, but only 4% in the patients of group II.

The first hour after the operation: The quality of the postoperative analgesia was better in group II. The children in this group had better reactions.

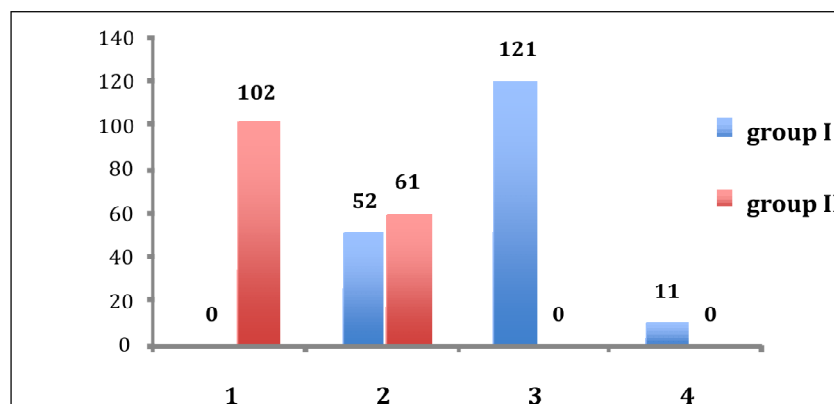
In group I the majority of patients had points 3 and 4 (pain-points system). Conversely, in group II the majority of patients had points 1 and 2 (pain-point system) (figure 1).

**Figure 1. Pain level in the study groups one hour after the operation procedure (1=no pain; 4=strong pain)**



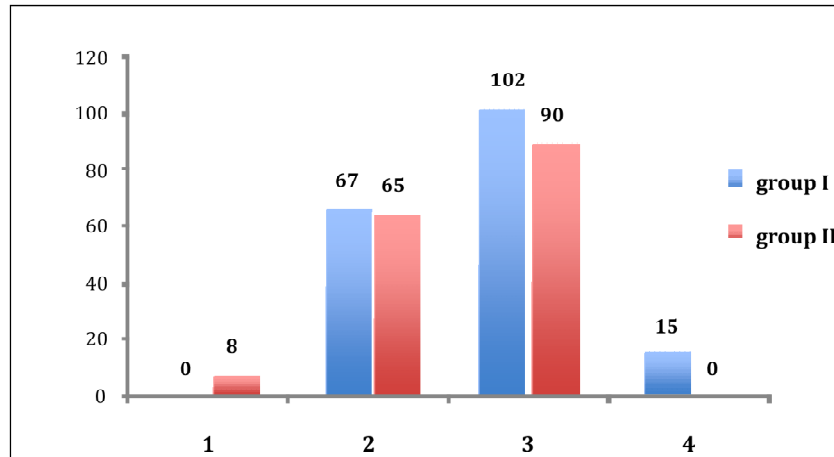
In the third hour after the operation, in group I most of the children had point 1, and a small number had point 2. In group II, most of the children had point 1, and a small number had point 2. On the other hand, no patients had point 3 (figure 2).

**Figure 2. Pain level in the study groups three hours after the operation procedure (1=no pain; 4=strong pain)**



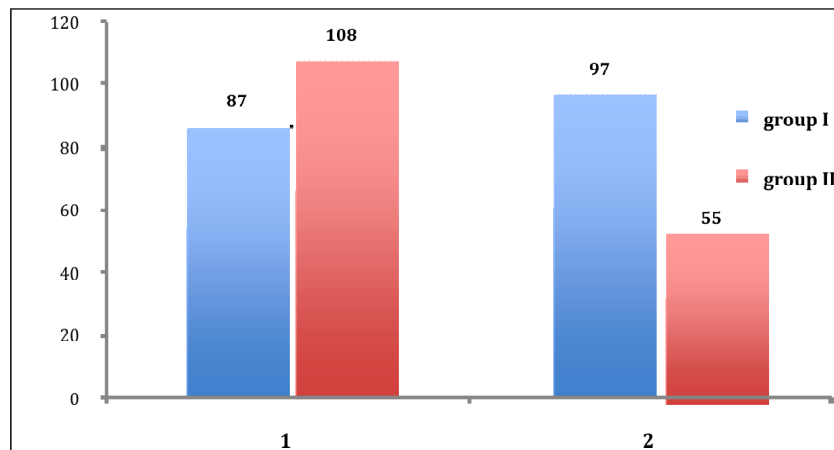
In the sixth hour, most of the patients from group I and group II had point 2 and 3 in the pain-point system. The results in this period were comparable between the two groups (figure 3).

**Figure 3. Pain level in the study groups six hours after the operation procedure (1=no pain; 4=strong pain)**



The quality of analgesia after the first and the third hour of the operation were much more satisfactory in the patients of group II (with most of the children being quiet) compared to the patients in group I (where most of the children were irritable and nervous) (figure 4).

**Figure 4. Quality of analgesia after the first and the third hour of the operation (1=child is quiet; 2=child is irritable)**



Algotropil, or Tramadol was used in the first hour after operation in 92% of the cases in group I and in 15% of the cases in group II .

The level of pain, estimated according to the child's facial expression, was significantly less evident in the children of group II ( $P < 0.01$ ).

## Discussion

The present study showed that infiltrations with bupivacaine offer a better pain management, pain control and pain relief after tonsillectomy among children compared to lidocaine infiltrations. The majority of patients receiving bupivacaine infil-

trations had pain scores of 1 and/or 2 (lower pain) whereas the majority of patients receiving lidocaine infiltrations had pain scores of 3 and/or 4 (higher pain) during the first hour after intervention. Also, in the third hour after tonsillectomy patients receiving bupivacaine infiltrations had lower pain compared to those receiving lidocaine infiltrations. However, six hours after the intervention the pain level was similar in both groups under study even though in patients receiving infiltrations of bupivacaine the pain was lower compared to the other group.

The tonsillectomy causes broad areas of exposed muscle in oropharynges, resulting in considerable pain originating from the muscle, the irritation of the nervous fibers, deep dissection, or the use of cauterization for hemostasis. All the above mentioned reasons cause big inflammation and strong post-operative pain. It is thus obvious that there is a need for administration of analgesic agents in order to manage post-intervention pains.

**Conflicts of interest:** None declared.

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As mentioned earlier, various analgesic agents belonging to different pharmacological groups have been used to relieve pain after tonsillectomy (2,3,6-8,10-14).

The results of our study conducted among 347 children patients during a three year period 2009-2012 are very similar with those of other studies coming from other clinics in international arena, such as the study conducted by Wong et al. (12) and Stuart et al. (15), which similarly suggested that peritonsillar infiltration of bupivacaine was very useful in relieving the post-operative pain following tonsillectomy.

## Conclusion

The combination of the general anesthesia with the preoperative peritonsillar local bupivacaine anesthesia resulted in better pain relief at the 1<sup>st</sup> hrs, 3<sup>rd</sup> hrs and at 6<sup>th</sup> hrs intervals in this sample of Albanian children. It also resulted in less usage of analgesics such as algotropil, or tramadol.

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