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Original Research Article

# Role of Surface Application or Infiltration of Ropivacaine in Post Tonsillectomy Pain: A Randomized Control Study

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**Abstract:**

**Introduction:** The purpose of this study was to examine the role of surface application or infiltration of ropivacaine on severity of post tonsillectomy pain, start of oral intake, hospital stay and to investigate any complication associated with use of ropivacaine.

**Material and Method:** A randomized single blind control study was carried on 100 patients to evaluate the effects of ropivacaine on post tonsillectomy pain. They were categorized into 2 equal groups(50 each).In group 1 ropivacaine was used in the form of surface application or infiltration. In group 2,50 patients were taken as control without use of ropivacaine. Ropivacaine infiltration was done before tonsillectomy and ropivacaine surface application in tonsillar fossa was done after tonsillectomy.

**Result:** It was found that ropivacaine infilteration or surface application has a definite role in reducing pain score, early start of oral intake, reducing post operative stay in hospital and reducing analgesia requirement in post tonsillectomy patients without any significant harm to the patient.

**Conclusion:** Ropivacaine infilteration or surface application has a definite role in reducing pain score, early start of oral intake, reducing post operative stay in hospital and reducing analgesia requirement in post tonsillectomy patients without any significant harm to the patient.

**Keywords:** Ropivacaine, Post Tonsillectomy Pain, Randomized Control Study.



## Introduction

Tonsillectomy is a 3,000-year-old surgical procedure in which, traditionally, each tonsil is removed from a recess in the side of the pharynx called the tonsillar fossa. Celsus described tonsillectomy in "De Medicina" by using hook and "bistoury" (Spencer et al, 1935) [1]. Morrel Mckenzie popularized tonsillectomy by using snares and "guillotines (MacKenzie M, 1880) [2]. The procedure is performed in response to repeated occurrence of acute tonsillitis, sleep surgery for obstructive sleep apnea, nasal airway obstruction, diphtheria carrier state, snoring and peritonsillar abscess. There are wide variations in the rate of tonsillectomy by geographical region (Blair et al, 1996) [3].

The following complications have been reported in the medical literature. This list is not meant to be inclusive of every possible complication. They are listed below:

1. Failure to alleviate every episode of sore throat or resolve subsequent or concurrent ear or sinus infections/nasal drainage(Van Staaij et al, 2004; Van Staaij et al, 2005) [4]. possible need for additional surgery.
2. Bleeding-blood loss during tonsillectomy can be considerable and may constitute over 10% of total circulating blood volume (Alaas N et al, 2006) [5]. In very rare situations there may be a need for blood products or a blood transfusion.
3. Infection, dehydration, prolonged pain and/or impaired healing that could lead to the necessity for hospital admission for fluids and/or pain control. Most children require at least a week to resume normal functioning and average return to school or work place is 1 to 2 week (Blair et al, 1996) [3].
4. A permanent change in voice or nasal regurgitation (rare).
5. Failure to improve the nasal airway or resolve snoring, sleep apnea or mouth breathing.

Different methods have been used to reduce post tonsillectomy pain including use of opioids, non-steroidal anti-inflammatory drugs, paracetamol, sucralfate and local anaesthetics. Local anaesthetics in the form of pre incisional or post incisional peritonsillar infiltration and also topical post incisional spray or packing are one of the most

effective methods for post tosillectomy pain management although some studies refute their use. This is hyposthesized that local anaesthetics act by impeding noxious stimulation of C- fiber afferent neurons diminishing excitability of dorsal horn neurons. This action leads to prolonged analgesia even upto10 days after the surgery according to some studies. Ropivacaine is a long acting amide local anaesthetic agent and first produced as a pure (s) enantiomer (Dene Simpson et al., 2005) [6]. It produces effects similar to other local anaesthetics via reversible inhibition of sodium ion influx in nerve fibers. Ropivacaine is less lipophilic than bupivacaine and is less likely to penetrate large myelinated motor fibers resulting in a relatively reduced motor blockade. Thus ropivacaine has a greater degree of motor sensory differentiation which could be useful when motor blockade is undesirable. The reduced lipophilicity is also associated with decreased potential for central nervous system toxicity and cardiotoxicity (Knudsen et al, 1995 [7]; Stewart et al, 2003 [8]; Wolfgang Zink et al, 2004) [9]. The drug displays linear and dose proportional pharmacokinetics(upto 80 mg administered intravenously). It is metabolized extensively in the liver and excreted in urine.

## Material and Methods

The study was carried out on 100 patients presenting with chronic tonsillar pathologies in department of Otorhinolaryngology. The patients were divided into two groups.

**Group 1:** This included 50 cases with 0.75% ropivacaine use. After induction of general anaesthesia, tonsillar fossa of 25 cases were randomly infiltrated with ropivacain in either tonsillar fossa with 3ml of 0.75% ropivacaine before tonsillectomy (Group 1A) and tonsillar fossa of 25 cases were randomly packed with a gauze piece soaked in 3ml of 0.75% ropivacaine for 5 minutes after tonsillectomy (Group 1B).

**Group 2:** 50 post tonsillectomy cases without use of ropivacaine were taken as control. This was a prospective randomized single blind control study design.

Detailed clinical history of each case was taken regarding age, sex, complaints, family history, personal history (smoking, alcohol intake),history of previous diseases (hypertension, diabetes, tuberculosis) and any bleeding or coagulation disorders. Proper menstrual history of female patients of fertile age group was taken. General physical examination and systemic examination were performed. Complete blood count, differential blood count, platelet count, ESR(erythrocyte sedimentation rate),liver function test, renal function test,serum electrolytes, bleeding time, clotting time, prothombin time and INR(international normalized ratio) were done. X-ray nasopharynx was taken for pediatric age group.

After following proper anaesthetic protocols tonsillectomy was performed under general anaesthesia. Group 1A (n=25) cases were infiltrated with 3ml of 0.75% ropivacaine in either tonsillar fossa while tonsillar fossae of group 1B(n=25) cases were packed with gauze soaked in 3ml of 0.75% ropivacaine for 5 minutes after tonsillectomy. Group 2(n=50) cases underwent tonsillectomy without use of ropivacaine. Following tonsillectomy, the pain intensity was documented by assessing pain in both groups on a Behaviour Observational Pain Scale[BOPS] at 1, 2, 4 and 8 hours. Observations were tabulated and statistically evaluated to come to the conclusion.

**Flacc Behaviour Observational Pain Score (BOPS):** The FLACC scale was developed by Sandra Merkel, Terri Voepel- Lewis and Shobha Malviya at Michigan university of health system.(Merkel et al, 1997) [10].

| Categories | Score 0 | Score 1 | Score 2 |
|---|---|---|---|
| **Face** | No particular expression or smile | Occasional grimace or frown, withdrawn, dis-interested | Frequent to constant frown, clenched jaw, quivering chin |
| **Legs** | Normal position or relaxed | Uneasy, restless, tense | Kicking or legs drawn up |
| **Activity** | Lying quietly, normal posi-tion, moves easily | Squirming, shifting back and forth, tense | Arched, rigid, or jerking |
| **Cry** | No cry (awake or asleep) | Moans or whimpers, occasional complaint | Crying steadily, screams or sobs, frequent complaints |
| **Consolability** | Content, relaxed | Reassured by occa-sional touching, hug-ging or being talked to,distractable | Difficult to console or comfort |

**Interpreting the Behaviour Score:** Each category is scored on the 0–2 scale, which results in a total score of 0–10.

**0** - Relaxed and comfortable

**1–3** - Mild discomfort

**4–6** - Moderate pain

**7–10** - Severe discomfort or pain or both

## Results

In present study, oral intake started in 86% (43) patients at 4th hour postoperatively and in 14% (7) patients at 8th hour postoperatively in group 1 while it started in 12% (6) patients at 4th hour and in 88% (44) patients at 8th hour postoperatively in group 2 and the difference between group 1 and group 2 was statistically highly significant ($p<0.001$) (Table 1). Average of postoperative stay (in days) in hospital was 1.74 in group1 and 3.42 in group 2 and the difference between group 1 and group 2 was statistically highly significant ($p<0.001$) (Table 2). Only 12% (6) patients needed rescue analgesia in group1 while in group 2, 24% (12) patients required rescue analgesia. The difference between group 1 and group 2 was statistically significant ($p<0.05$) (Table 3). The average of pain score using Behaviour Observational Pain Scale at 1st, 2nd, 4th and 8th hour after surgery was 0.30, 0.70, 1.1 and 1.64 respectively in group 1 while in group 2 it was 1.18 at 1st hour, 1.74 at 2nd hour, 2.44 at 4th hour and 3.14 at 8th hour postoperatively. The difference between group 1 and group 2 was statistically highly significant ($p<0.001$) (Table 4).

**Table 1: Start Of Oral Intake (N=100)**

| S. No. | Patients | Average post operative stay (days) |
|---|---|---|
| 1 | Group 1 | 1.74 |
| 2 | Group 2 | 3.42 |

**Table 2: Average of Post Operative Stay in Hospital (N=100)**

| S. No. | Patients | 4th hour oral intake (number of subjects/%) | 8th hour oral intake (number of subjects/%) |
|---|---|---|---|
| 1 | Group 1 | 43(86%) | 7(14%) |
| 2 | Group 2 | 6(12%) | 44(88%) |

**Table 3: Rescue Analgesia Requirement (N=100)**

| S. No. | Patients | Used (number of subjects/%) | Not used (number of subjects/%) |
|---|---|---|---|
| 1 | Group 1 | 6(12%) | 44(88%) |
| 2 | Group 2 | 12(24%) | 38(76%) |

**Table 4: Comparison of Pain Score(N=100)**

| S. No. | Patients | Pain score 1sthour | Pain score 2ndhour | Pain score 4thhour | Pain score 8thhour |
|---|---|---|---|---|---|
| 1 | Group1 | 0.30 | 0.70 | 1.1 | 1.64 |
| 2 | Group2 | 1.18 | 1.74 | 2.44 | 3.14 |

## Discussion

In present study, oral intake started in 86%(43) patients at 4th hour postoperatively and in 14%(7) patients at 8th hour postoperatively in group1 while it started in 12% (6) patients at 4th hour and in 88% (44) patients at 8th hour postoperatively in group 2.The difference between group1 and group 2 was statistically highly significant ($p<0.001$) (Table 1). This is in accordance with study conducted by Arikan OK et al [11] (2006) who found that oral intake started significantly earlier in ropivacaine group than non-ropivacaine group in post tonsillectomy patients. In this study, average of postoperative stay (in days) in hospital was 1.74 in group 1 and 3.42 in group 2. The difference between group 1 and group 2 was statistically highly significant ($p<0.001$) (Table 2). Similarly, Giannoni et al [12] (2001) found significantly reduced post operative stay in hospital($p=0.03$) in post tonsillectomy patients with ropivacaine application. In this study only 12% (6) patients needed rescue analgesia in group 1 while in group 2, 24% (12) patients required rescue analgesia. The difference between group1 and group 2 was statistically significant($p<0.05$). (Table 3). Giannoni et al [12] (2001), Apostolopoulosetal [13] (2003), Akogluet al14(2006), Yusuf Unal et al1 [5] (2007) and Arikan OK et al [11] (2008) found significantly reduced analgesia requirement ($p<0.05$) in post tonsillectomy patients with ropivacaine infilteration. In present study, the average of pain score using Behaviour Observational Pain Scale at 1st, 2nd, 4th and 8th hour after surgery was 0.30, 0.70, 1.1 and 1.64 respectively in group 1 while in group 2 it was 1.18 at 1st hour, 1.74 at 2nd hour, 2.44 at 4th hour and 3.14 at 8th hour postoperatively. The difference

between group 1 and group 2 was statistically highly significant ($p<0.001$)(Table 4). Oghan F et al [16] (2008) and MK Gautham et al [17] (2013) found the result to be in favour of this study that is post tonsillectomy pain score was significantly reduced in ropivacaine group.

## Conclusion

Thus it can be concluded that ropivacaine infilteration or surface application has a definite role in reducing pain score, early start of oral intake, reducing post operative stay in hospital and reducing analgesia requirement in post tonsillectomy patients without any significant harm to the patient.

## Declarations

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**Conflict of interest:** None declared.

**Ethical approval:** The study was approved by Institutional Ethics Committee.

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