COMPARISON OF POST-OPERATIVE PAIN WITH AND WITHOUT INFILTRATION OF BUPIVACAINE HYDROCHLORIDE IN TONSILLECTOMY

Alina Acharya and Meera Bista

Department of ENT and Head Neck Surgery, Rapti Academy of Health Sciences, Ghorahi, Dang, Nepal

ABSTRACT

Tonsillectomy is the complete removal of a tonsil from its bed and is one of the most common procedures in Otorhinolaryngology. The intensity of post-operative pain is severe enough to cause dysphagia which subsequently leads to infection of the fossa and other complications. Several studies on pain management have been conducted but not a single standard protocol currently exist. This study aims to evaluate the intensity of post tonsillectomy pain and to assess the efficacy of infiltration of Bupivacaine on the tonsillar fossa following tonsillectomy. A comparative study was conducted at Kathmandu Medical College, ENT-HNS department for a period of 18 months (January 2018 to June 2019). Ninety three patients were included. 2.5 ml of 0.5% Bupivacaine was infiltrated in right tonsillar fossa after tonsillectomy in all patients. The lateralization and intensity of pain at various post-operative period was assessed using visual analogue scale. The requirement of extra analgesics at various post-operative period was recorded. The pain score on the Bupivacaine side on the first and second post-operative day was decreased as compared to the other side. The pain score on the fourth hour and third post-operative day on Bupivacaine side was more than that of the other side. Infiltration of Bupivacaine over the tonsillar fossa has provided a good result with a significant reduction of pain in first post-operative day and in early post-operative period. However, other multi-centered and double blinded study is requires to provide better results.

KEYWORDS

Bupivacaine, post tonsillectomy pain, tonsillectomy

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CORRESPONDING AUTHOR

Dr. Alina Acharya
Lecturer,
Department of ENT-HNS,
Rapti Academy of Health Sciences,
Ghorahi, Dang, Nepal
Email: acharyaalina16@gmail.com
Orcid No: https://orcid.org/0000-0002-6219-5136
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INTRODUCTION

Tonsillectomy is defined as the complete removal of tonsil from its bed. It is derived from the Latin word "*tonsilla*" which means a stake to which boats are tied, and the *Greek* word "*ektome*" which means excision.[1]

Tonsillectomy is one of the most frequently undertaken procedures in otolargngology.[2] Post-operative pain leading to dysphagia and subsequently infection of the fossa is a very common scenario.

Pain and dysphagia are normal in early post-operative period following tonsillectomy. Nerve irritation, inflammation and pharyngeal muscle spasm causes pain.[3] The median time for cessation of pain was 11 (3-24) days with median duration of analgesia taken of 12 (5 -25) days.[2] The median time for cessation of pain on drinking was 7 (1-18) days and eating solids 11 (1-20) days.[2] Patients reported the first normal night of sleep at 7 (1-18) days and return to normal daily activities at 12 (2-24) days.[1] Pain management is quite challenging following tonsillectomy. Various preoperative and post-operative systemic and topical administration of local anesthetics have been used to control the pain.

Bupivacaine is a commonly used amide linked local anesthetic to decrease post-operative pain in many operational site.[4] It blocks the nerve conduction by decreasing the entry of Sodium ions during upstroke of action potential.[5] Pre- and post-operative local anesthetics like bupivacaine has been used as an infiltration in the tonsillar fossa for pain control. Hence, the rationale of this study is to provide relief of pain following the procedure by infiltrating analgesics to local site which may lead to development of newer ways of reducing pain.

MATERIALS AND METHODS

This comparative study was conducted in the Department of Otorhinolaryngology and Head and Neck Surgery of Kathmandu Medical College Teaching Hospital (KMCTH), Sinamangal over a period of 18 months (January 2018 to June 2019). It was co-ordinated with anesthesiologist regarding use of analgesics during perioperative period. Ethical approval was taken from the Institutional Review Committee, KMCTH. All the respondents were informed about the study in detail and written consent was taken from every participant. A total of 93 patients were included in the study. The inclusion criterias were all patient over 10 years who went tonsillectomy. The exclusion criterias were hypersensitivity to bupivacaine, past history of arrhythmia, patients who take anticoagulants and antiplatelets and patients requiring extra analgesics during post-operative period.

A proper history including chief complaints, duration, recurrence was noted. A detailed past history, drug and allergy history was asked. Then the patient was planned for tonsillectomy under general anesthesia. Patient was operated under aseptic condition with painting and draping under General Anesthesia. Cold steel dissection method of tonsillectomy was used in all patients. Hemostasis was maintained by compression and bipolar diathermy. Hypersensitivity to Bupivacaine was tested. After tonsillectomy, 2.5 ml (12.5 mg of anhydrous Bupivacaine) of 0.5% Bupivacaine was infiltrated only in right tonsillar fossa at three regions: upper 1/3rd, middle 1/3rd and lower 1/3rd of tonsillar bed. Patient was extubated and then shifted to post-operative ward. In the post-operative ward, vitals were monitored every 15 minutes for the first one hour, then every 30 minutes for next one hour, then hourly for next two hours. The heart rate and rhythm was also assessed with the use of monitor. The patient was shifted to the ward after six hours of close observation in the post-operative ward. Then, visual analogue scale used to compare pain between right and left side.

Fig. 1: Bilateral tonsils with throat pack

Fig. 2: Tonsils specimen

During the post-operative period, the following medicines were given,

- Injection Cefotaxime in the dose of 50-100 mg/kg in two divided doses,
- Injection Metronidazole in the dose of 15-20 mg/kg in three divided doses,
- Injection Ketorolac in the dose of 0.5-0.75 mg/kg in three divided doses,
- Inj. Pantoprazole 40mg once daily,
- Povidone iodine germicide gargle 2% w/v, 10-12 times a day
- Hydrogen peroxide gargle 20% w/v were given, four times a day
- Nasal drop Oxymetazoline 3 drops on bilateral nostrils, thrice daily for 5 days
- Extra analgesics was also given on demand.

Post-operative pain and lateralization of pain was documented by patients. Visual analogue scale (VAS) method was used for each side at 4th hour following operation and on the 1st, 2nd and 3rd post-operative day. Analgesics were given to the patient when required.

The use of analgesics during perioperative period was noted. The data were collected and entered in the Microsoft excel and were exported to SPSS 17 version for analysis. Frequency, percentage, mean and standard deviation, paired t-test were calculated and used for statistical analysis.

RESULTS

A total of 93 patients undergoing tonsillectomy during the study period were included. Out of those patients, 85 (91.3%) patients underwent tonsillectomy for recurrent tonsillitis which was the most common indication for the procedure. Among the other patients, 3 (3.2%) patients of OSA, 3 (3.2%) patients of Bilateral tonsillolith, 2 (2.1%) patients of bilateral tonsillar cyst underwent tonsillectomy.

Table 1: Gender distribution of patients

Gender	n	%
Male	48	51.6
Female	45	48.3

Demographics: Out of 93 patients, 48 were (51.6%) were male and 45 (48.3%) were females. The mean age of patient undergoing Tonsillectomy was 25.61.

Visual Analogue Scale (pain) score on various post-operative days: The mean VAS pain score calculated at various hours showed least VAS score of 6.46 on right side on the 3rd post-operative day and maximum VAS score was 9.09 on the right side on 4th hour following the tonsillectomy (Fig. 3).

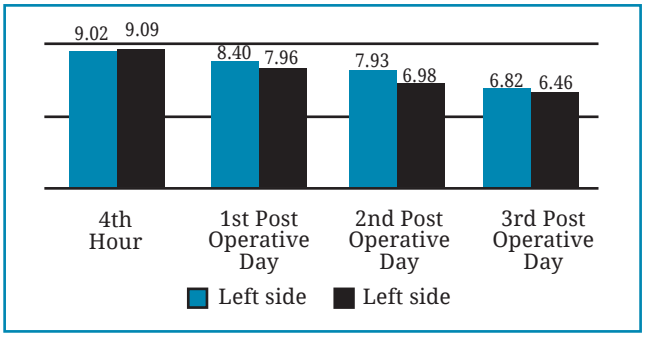

Fig. 3: Mean pain score at various post-operative period

Pain score at fourth hour of post-operative period: The mean VAS score was more on the right side at 4th hour following the tonsillectomy which was 9.09. The mean VAS score on the left side at same hour was 9.02. The mean VAS score of both sides were compared using paired t test which showed p value to be more than 0.05 which is statistically not significant (Table 2).

Table 2: Mean VAS score at 4th hour

Side	Mean pain score	P value
Left	9.02	>0.05
Right	9.09	

Pain scores at first post-operative day: The mean VAS score at first post-operative day on the right side was 7.9 which was less than that on the left side which was 8.4. The mean VAS of both sides were compared using paired sample t test which was statistically significant (Table 3).

Table 3: Mean VAS score on the 1st post operative day

Side	Mean pain score	P value
Left	8.4	<0.05
Right	7.9	

Mean VAS score on 2nd post-operative day: The Mean VAS score on the second post-operative day on the right side was 6.9 which was less as compared to the other side which was 7.9. The paired sample t test was used which was statistically significant (Table 4).

Mean VAS score on 3rd post-operative day: The Mean VAS score on the left side was 6.82 which was more than that of the right side which was 6.46. The data were evaluated using paired sample t test which was statistically insignificant (Table 5).

Table 4: Mean VAS scores on 2nd post-operative day		
Side	**Mean pain score**	**P value**
Left	7.9	<0.05
Right	6.9	

Table 5: Mean VAS scores on 3rd post-operative day		
Side	**Mean VAS score**	**P value**
Left	6.82	>0.05
Right	6.46	

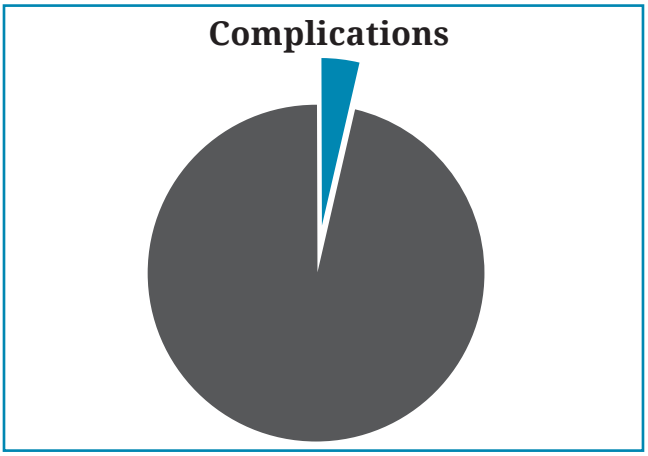

Fig. 4: Complications

Requirement of extra analgesics: A total of six (6.4%) patients demanded extra analgesics on the 3rd post-operative day, followed by three (3.2%) on the 2ndpost-operative day (Table 6).

Three out of 93 patients were found to have bleeding points over right tonsillar fossa at the site of infiltration of bupivacaine during period of extubation which required electrocautery for control of bleeding. None of the patients developed tachycardia, hypotension and arrhythmia in the post-operative period.

Table 6: Number of patients demanding extra analgesics		
Period of requirement of extra analgesics	**n**	**%**
4th hour of post-operative period	0	0.0
1st POD	1	1.0
2nd POD	3	3.2
3rd POD	6	6.4
Total	**10**	**10.6**

DISCUSSION

Tonsillectomy is associated with significant degree of pain in the post-operative period. Post-tonsillectomy pain remains a significant clinical problem despite advances in anaesthetic and surgical techniques[6] and may also lead to impaired swallowing and possible dehydration and increased risk of secondary haemorrhage and infection.[7]

Recently, Sorenson *et al*[8] have put forth the idea of intra-individual study design, in which the pain between the two sides of throat were compared. In this concept, the control side is the contralateral side of the study. The same idea has been used in this study. Thus, the inter-individual variation in pain assessment is eliminated and the masking effect of anesthesia is reduced.[7] The intra individual design avoids many variables like individual patient pain threshold, premedication, anesthetic techniques and variability in nurses analgesic administration.[9]

In contrast to the concept of our study, Cupero *et al*[10] could not find any significant difference in the degree of post-operative pain between the study and control sides using the intra-individual design.

This study differs from that of Sorensen *et al*[8] in which infiltration was done before tonsillectomy. The main disadvantage of the preincisional injection was that it cannot reach sufficiently to the posterior pillars and tonsillar bed especially in obstructive tonsils.[3]

The mean VAS pain score at the fourth hour following the Tonsillectomy in our study on the right side was 9.09 and on the left side (equivalent to control) was 9.02 which was statistically not significant. On the fourth hour following the tonsillectomy, there was no lateralisation of pain to any side in 90.3% of patients. Our results were similar to the results of study conducted by Somdas *et al*[11] in which there was no lateralization of pain to any side at fourth hour. The results obtained from the study done by Violaris and Tuffin[13] was that 80% of patients found the Bupivacaine side to be more uncomfortable on 4th-6th hour following tonsillectomy. However, the results of study done by Bameshki *et al*[12] showed that in the first six hours after surgery, almost half of the patients who received injections did not have any swallowing pain, while all the patients in the control group had swallowing pain. The mean VAS pain score at first post-operative day following the tonsillectomy in our study on the

right side was 7.9 and on the left side was 8.4 which was statistically significant.

The pain was lateralised to the left side in 54% of cases. Our results were similar to the results of the study done by Somdas *et al*[11] in which there was lateralisation to the placebo side in the 24th hour following tonsillectomy. In the study conducted by Kountakis,[13] the pain in the Bupivacaine group was less as compared to the saline group in the first two post-operative days. In the study done by Stewart *et al*[6] the results showed lower pain scores in the Bupivacaine group at ten minutes. However, at first hour, fourth hour and 24th hour there was no significant difference between the two groups.

In our study, the mean VAS score on the second post-operative day on right side was 6.9 and on the left side was 7.9 which was statistically significant. There was lateralization of pain to left side in 65.5%. In our study, the mean VAS score on the third post-operative day on the right side was 6.46 and on the left side was 6.82 which was statistically not significant. In a study conducted by Jebeles *et al*[14] the preincisional infiltration of Bupivacaine group showed subjective constant pain to be less than the control group on day one to day 5 which was statistically significant. However, in the study conducted by Nordahl *et al*[7] the results showed no significant differences in the long term experience between treatment group and control group after 20th hour of surgery.Although the duration of action of Bupivacaine is usually limited to few hours, it was suggested that the long- lasting pain relief might have been related to the phenomenon of neuroplasticity. This theory proposes that the pre-emptive blockage of the release of nociceptive neuromediators may contribute to the elimination of the hyperexcitable state responsible for the maintenance of post-operative pain.[15]

In our study, 10.6% of patients required extra analgesics during the post-operative period. Among them, 60% were females and 40% were males. This result was similar to the result of study done by Nordahl *et al*[7] in which female patients had used more analgesics than male patients. The high requirement of analgesics by female patients is supported by the study conducted by Bartley and Fillingim,[16] which showed increased pain sensitivity and risk for clinical pain commonly being observed among women.

In our study, 3.2% of patients had bleeding points over the right tonsillar fossa at the site of infiltration of Bupivacaine during the period of extubation which required bipolar electrocautery for control of bleeding. This may be assumed to be the traumatic effect by the injecting needle into the raw area of the Tonsillectomy fossa. In the study conducted by Newton *et al*[17] Bupivacaine has shown to do vasodilatation at clinical doses which may contribute to the visualisation of bleeding points after infiltration in tonsillectomy fossa. However, in the study done by Bameshki *et al*[12] the amount of bleeding in the first 30 minutes after surgery in recovery room was greater in the control group which may be due to vasoconstrictive effect of epinephrine combined with Bupivacaine.

The other complications of infiltration of local anesthetics into the tonsillar fossa were not observed in any patient in our study. The various complications of Bupivacaine are prolongation of QT interval, ventricular tachycardia and cardiac arrest. Infiltration of local anaesthetic into the peritonsillar tissue may have some risks. Reported complications are bilateral vocal cord paralysis lasting 5h, severe upper airway obstruction with pulmonary oedema due to vagal or hypoglossal block, life-threatening deep cervical abscess, and brain stem stroke due to cardiac asystole intra-operatively necessitating tracheotomy and gastrostomy tube.[18] These are seen especially after infiltration of a deeper and higher volume of local anaesthetics with vasoconstrictors into the tonsil.[18] None of these grave side effects were seen in our study.

In conclusion, the intensity of post tonsillectomy pain is very severe in early post-operative period. This morbidity has led to multiple studies on post-operative analgesia of various kinds. The infiltration of Bupivacaine in pain alleviation has provided a good result with a significant reduction of pain in the 1st post-operative day and even in early post-operative period.

LIMITATIONS: This is a single centered and single blinded study as only the patients were unaware of the side being infiltrated by Bupivacaine. Hence, a multi- centered study with a large scale of population is required to provide better results. If the principal investigator was also blinded, the results might have been superior as it would have become a double blinded study.

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