ORIGINAL ARTICLE

Role of Bupivacaine Infiltration into Tonsillar Fossa in Post-tonsillectomy Analgesia

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Received on: 24 May 2019; *Accepted on:* 14 May 2020; *Published on:* 20 March 2023

Abstract

Aim: To assess pain with local infiltration with bupivacaine into tonsillar fossa post tonsillectomy by measuring pain on the subjective and objective pain scales.

Materials and methods: A prospective comparative double-blind study was done on 70 patients undergoing tonsillectomy/adenotonsillectomy. Patients were divided into two groups: Group I received infiltration into the tonsillar fossa following tonsillectomy with 0.5% bupivacaine, and group II received normal saline. Objective pain analysis was done using the behavioral observational pain scale (BOPS) and subjective scoring using visual analog scale (VAS).

Results: Overall pain was comparatively less in group I when compared with group II up to 12 hours postoperatively.

Conclusion: Post-tonsillectomy infiltration of bupivacaine into the tonsillar fossa following tonsillectomy reduces pain significantly up to 12 hours.

Clinical significance: Reduction of pain in the early postoperative period significantly improves patient satisfaction and early oral intake and reduces the need for analgesics.

Keywords: Bupivacaine infiltration, Palatine tonsil, Tonsil, Tonsillectomy.

Otorhinolaryngology Clinics: An International Journal (2022): 10.5005/jp-journals-10003-1434

Introduction

Tonsillectomy is one of the most commonly performed surgical procedures and is often associated with postoperative pain. It is associated with severe pain on the first postoperative day. This pain can affect the patient's nutrition, ability to return to work or school, discharge from hospital, and overall satisfaction with the procedure.[1]

Pain after tonsillectomy has been regarded as major morbidity in the early postoperative period as the oropharynx and tonsillar fossae are very sensitive.

Many studies have been done in an effort to reduce post-operative pain, like infiltration of local anesthetic agent prior to surgery or intraoperative packing of tonsillar fossa.[2–5]

In this study, we aim to assess pain with local infiltration with bupivacaine into tonsillar fossa post tonsillectomy by measuring pain on subjective and objective pain scales.

Materials and Methods

The study was a prospective comparative blind study conducted on 70 patients undergoing tonsillectomy/adenotonsillectomy.

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How to cite this article: Narasimhadevara N, Kamath PSD. Role of Bupivacaine Infiltration into Tonsillar Fossa in Post-tonsillectomy Analgesia. Int J Otorhinolaryngol Clin 2022;14(3):103–107.

Compliance with ethical standards: An informed consent was taken from all the patients for participating in the study after ethical committee certification.

Source of support: Nil

Conflict of interest: None

Informed consent was obtained from all individual participants included in the study after approval of the protocol from the ethical committee. All patients above the age of 5 were included in the study, and patients who were sensitive to bupivacaine were excluded.

Score	*Facial expression*	*Verbalization*	*Body position*
0	Neutral/Positive facial expression, composed, calm	Normal conversation, laugh, cry	Inactive, laying relaxed with all extremities or sitting, walking
1	Negative facial expression, concerned	Completely quiet sobbing and/or complaining, but not because of pain	Restless movements, shifting fashion, and/or touching wound or wound area
2	Negative facial expression, grimace, and distorted face	Crying, screaming and/or complaining about of pain	Lying rigid and/or drawn up with arms and legs to the body
Total			

All tonsillectomies were performed using the standard dissection and snare technique, and hemostasis was achieved either by ligature or cautery. The aim of the study was to assess the effect of bupivacaine in postoperative pain following tonsillectomy.

Patients were divided into two groups, group I receiving 0.5% bupivacaine infiltration into the tonsillar fossa, and group II receiving normal saline.

At the end of tonsillectomy, tonsillar fossa was infiltrated with 2.5 mL of bupivacaine or normal saline into each fossa, a total of 5 mL at four points: superior, inferior, medial, and lateral parts of tonsillar fossa.

Postoperatively, VAS[6] was used as the subjective analysis of pain, and BOPS[7] was used as objective analysis of pain.

Visual analogue scale was graded from 0 to 10 by the patient at the 3rd, 6th, and 12th hour.

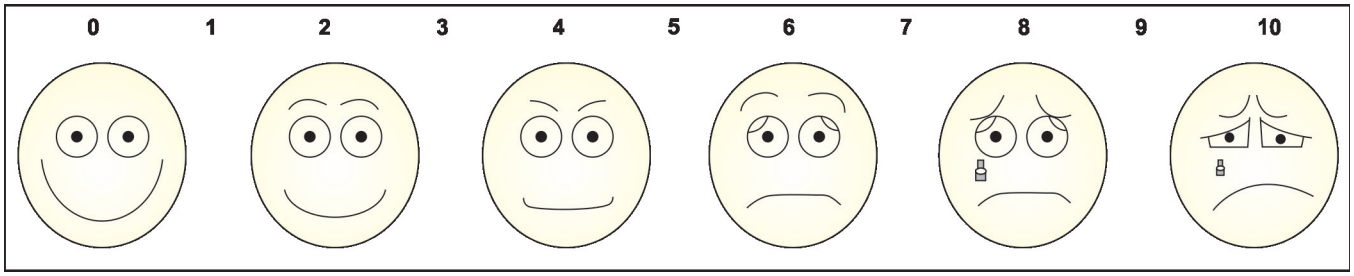

Table 1: Objective pain comparison between the two groups

	Group	*N*	*Mean*	*Std. deviation*	*Median*	*IQR*	*Mann–Whitney test p-value*	
3 hr	Group I	35	2.57	1.01	3.00	(2–3)	0.156	Not significant
	Group II	35	3.06	1.43	3.00	(2–4)		
6 hr	Group I	35	2.43	1.40	2.00	(1–4)	0.000	Highly significant
	Group II	35	3.77	1.21	4.00	(3–5)		
12 hr	Group I	35	2.54	1.22	2.00	(2–4)	0.000	Highly significant
	Group II	35	3.97	1.38	4.00	(3–5)		

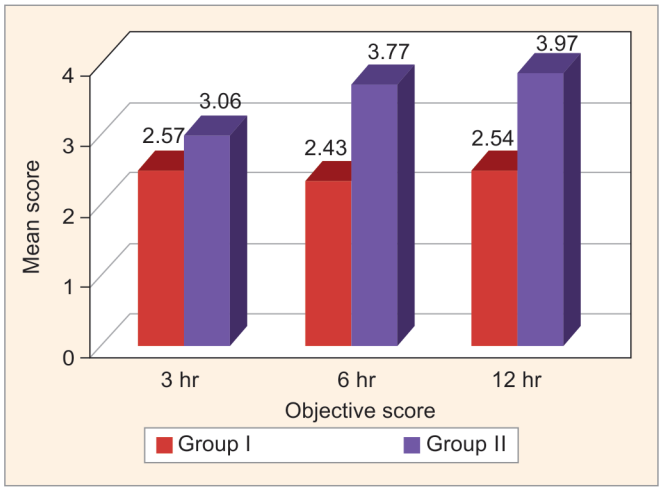

Fig. 1: Objective pain comparison between the two groups

Behavioral observational pain scale was calculated based on the patient's facial expression, verbalization, and body position (maximum score being 6).

Results

Majority of the patients were below 10 years, 42 patients. Males were 38 and females were 32.

Operative pain score was measured using BOPS and VAS as subjective indicators, and pain was assessed at 3 hours, 6 hours, and 12 hours postoperatively.

Objective pain comparison of the two groups was compared using Mann–Whitney test, and *p* value was compared (Table 1).

Table 1 and Figure 1 compare objective pain reception at the 3rd hour between group I and group II that was not statistically significant, but comparing the pain reception at the 6th hour and 12th hour, group I had significantly less pain as compared with group II.

Subjective pain analysis was done using VAS and *p* value was compared between the two groups. Pain reception was significantly more in group II than group I at the 3rd hour (*p*-value = 0.0.12, significant). At the 6th hour and 12th hour, group II patients experienced more pain when compared with group I (*p*-value = 0.005 and 0.002, respectively, highly significant) (Table 2 and Fig. 2).

The method used to control bleeding, ligature, or cautery was also compared between the two groups in relation to the pain perceived by the patients (Table 3).

It was observed that in objective scoring of pain at the 3rd hour in group I, patients in which cautery was used had significantly more pain. But overall, pain perception between the use of ligature or cautery was not statistically significant.

Patients were also compared based on the need for rescue analgesia at the 3rd hour, 6th hour, and 12th hour (Table 4).

Table 2: Subjective pain comparison between the two groups

	Group	*N*	*Mean*	*Std. deviation*	*Median*	*IQR*	*Mann–Whitney test p-value*	
3 hr	Group I	35	3.51	2.01	3.00	(2–4)	0.012	Significant
	Group II	35	4.86	2.17	5.00	(3–7)		
6 hr	Group I	35	4.06	2.03	4.00	(2–5)	0.005	Highly significant
	Group II	35	5.34	1.55	6.00	(4–6)		
12 hr	Group I	35	4.14	1.12	4.00	(3–5)	0.002	Highly significant
	Group II	35	5.17	1.81	5.00	(4–6)		

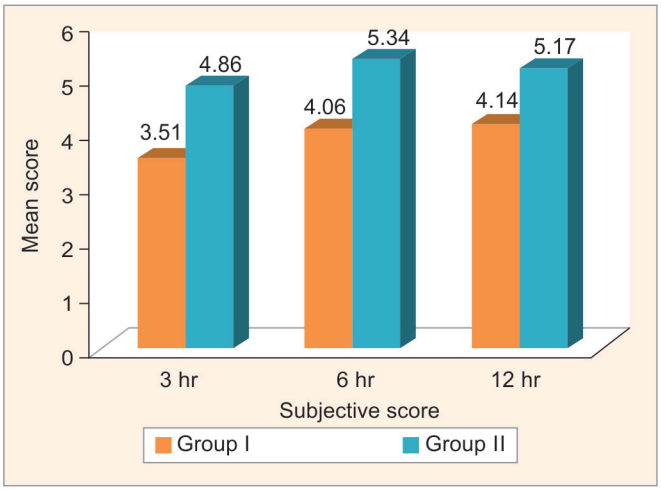

Fig. 2: Subjective comparison of pain between both the groups

Table 3: Comparison of pain between the two groups based on the method used to control bleeding

			Ligature/ Cautery	*N*	*Mean*	*Std. deviation*	*Median*	*IQR*	*Mann–Whitney test p-value*	
Objective score	Group I	3 hr	Cautery	23	2.87	0.920	3.00	(2–3)	0.014	Significant
			Ligature	12	2.00	0.953	2.00	(1–2.75)		
		6 hr	Cautery	23	2.57	1.376	2.00	(1–4)	0.385	Not significant
			Ligature	12	2.17	1.467	2.00	(1–4)		
		12 hr	Cautery	23	2.70	1.329	3.00	(2–4)	0.297	Not significant
			Ligature	12	2.25	0.965	2.00	(2–3)		
	Group II	3 hr	Cautery	23	3.09	1.474	3.00	(2–4)	0.901	Not significant
			Ligature	12	3.00	1.414	3.00	(2–4)		
		6 hr	Cautery	23	3.83	1.114	4.00	(3–5)	0.744	Not significant
			Ligature	12	3.67	1.435	4.00	(2.25–4.75)		
		12 hr	Cautery	23	4.00	1.314	4.00	(3–5)	0.591	Not significant
			Ligature	12	3.92	1.564	4.00	(2.25–4.75)		
Subjective score	Group I	3 hr	Cautery	23	3.74	2.200	4.00	(2–5)	0.416	Not significant
			Ligature	12	3.08	1.564	3.00	(2–4)		
		6 hr	Cautery	23	4.30	2.141	5.00	(2–6)	0.340	Not significant
			Ligature	12	3.58	1.782	4.00	(1.5–5)		
		12 hr	Cautery	23	4.30	1.185	4.00	(4–5)	0.158	Not Significant
			Ligature	12	3.83	0.937	3.50	(3–5)		
	Group II	3 hr	Cautery	23	4.83	2.229	5.00	(3–7)	0.972	Not significant
			Ligature	12	4.92	2.151	4.50	(3–7)		
		6 hr	Cautery	23	5.30	1.490	5.00	(5–6)	0.618	Not significant
			Ligature	12	5.42	1.730	6.00	(3.25–6.75)		
		12 hr	Cautery	23	4.96	1.821	5.00	(4–6)	0.278	Not significant
			Ligature	12	5.58	1.782	6.00	(3.5–6.75)		

Table 4: Comparison based on the need for rescue analgesia

		Group					
		Group I		Group II		Total	
		Count	Column N%	Count	Column N%	Count	Column N%
3 hr	Given	5	14.3	11	31.4	16	22.9
	Not given	30	85.7	24	68.6	54	77.1
	Total	35	100.0	35	100.0	70	100.0
6 hr	Given	11	31.4	7	20.0	18	25.7
	Not given	24	68.6	28	80.0	52	74.3
	Total	35	100.0	35	100.0	70	100.0
12 hr	Given	22	62.9	32	91.4	54	77.1
	Not given	13	37.1	3	8.6	16	22.9
	Total	35	100.0	35	100.0	70	100.0

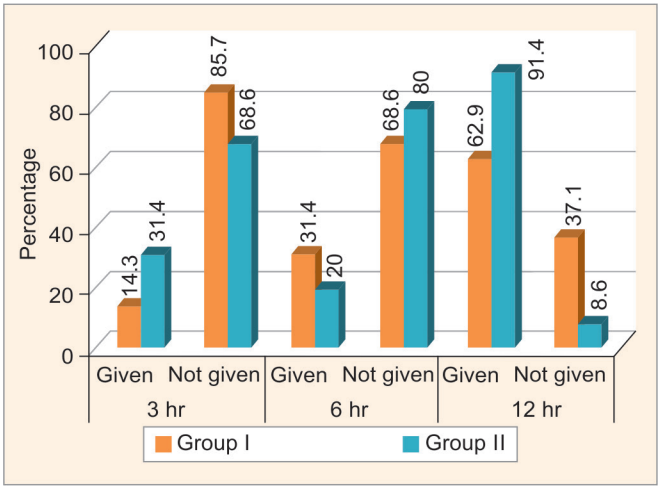

Fig. 3: Comparison of rescue analgesia required between the two groups in percentage

In Table 4 and Figure 3, it was observed that at the 3rd hour, only 5 patients in group I, whereas, 11 patients in group II, required rescue analgesia that was not statistically significant.

At the 6th hour, 11 patients in group I and 7 patients in group II required rescue analgesia that was not statistically significant.

At the 12th hour, 22 patients in group I and 32 patients in group II were given rescue analgesia that was statistically significant (using Chi-square test, $p = 0.004$).

Overall, group II required more rescue analgesia when compared with group I, which suggests the effect of nociceptive blockage of bupivacaine in the postoperative period. But overall, at 12 hours postoperatively, most of the patients required rescue analgesia.

Discussion

Reduction in postoperative pain following tonsillectomy is not only important for patients' comfort but also important as early food intake improves the general well-being of the patient.

Tonsillectomy results in large areas of exposed muscle in the oropharynx, causing considerable pain from muscle, spasm, and irritation of nerve endings. Excessive dissection and use of cautery for hemostasis may produce even larger amount of postoperative pain and inflammation.

Various studies have been done in order to reduce the postoperative pain following tonsillectomy. Most of the studies done used pre-incisional infiltration or post-tonsillectomy fossa packing with bupivacaine.[2–5]

Similar study was done by Hassen[3] on 47 patients undergoing tonsillectomy where each patient was infiltrated with 0.5% bupivacaine with 1/200,000 adrenaline in the right tonsillar fossa and normal saline in the left as a control. Using VAS, he observed that there was significantly less pain in the site infiltrated with bupivacaine when compared with, normal saline within the first 24 hours.

In our study we used post-tonsillectomy fossa infiltration with 0.5% bupivacaine in 4 points—superior, inferior, medial, and lateral part of tonsillar fossa in both tonsillar fossae, and observed that objective pain at the 3rd hour between group I and group II was not statistically significant, but comparing the pain reception at the 6th hour and 12th hour, group I had significantly less pain as compared with group II. Subjective pain reception was significantly more in group II than in group I at the 3rd, 6th, and 12th hour (Tables 1 and 2).

Wong et al.[2] did a study to compare post-tonsillectomy bupivacaine spray into tonsillar fossa versus peritonsillar infiltration and observed that peritonsillar infiltration had comparatively less postoperative pain as well as required less opioid analgesics.

Golianu and Krane[6] observed the effect of bupivacaine by packing the tonsillar fossa with 0.5% bupivacaine-soaked gauze in the right fossa and left was packed with normal saline. They observed that severity of pain using VAS was lower for the site that was packed with bupivacaine during all the intervals.

Patients in which cautery was used, had pain comparatively more at the 3rd hour, but it was not statistically significant. Patients were also compared based on the need for rescue analgesia at the 3rd hour, 6th hour, and 12th hour.

Overall, group II required more rescue analgesia when compared with group I, which suggests the effect of nociceptive blockage of bupivacaine in the postoperative period. But overall, at 12 hours postoperatively, most of the patients required rescue analgesia.

This study demonstrates that local infiltration of bupivacaine in the tonsillar fossa effectively reduces postoperative pain, especially up to 12 hours of immediate postoperative period. Local effect of bupivacaine can last from 6 to 9 hours, but analgesic effect lasted beyond expected duration. This can be explained by

neural blockage that prohibits nociceptive impulses from entering the nervous system immediately following surgery. This is due to the effect on membrane-associated proteins that can inhibit the release of prostaglandins and lysosomal enzymes that stimulate inflammation.[8]

Conclusion

Post-tonsillectomy infiltration of bupivacaine into the tonsillar fossa following tonsillectomy reduces pain significantly up to 12 hours, reducing the use of rescue analgesia.

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