International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Website: https://ijmpr.in/

Original Article

Efficacy of topical 10% Lidocaine spray on the Tonsillar fossa for post-operative pain management among Adeno-tonsillectomy and Tonsillectomy patients

Dr Alfer Antony A[1], Dr Omar Mohammad Shafi[2], Dr Abdul Hamid Dar[3], Dr Nazrana Farooq[4*]

[1]Resident Department of Anesthesiology Government JLNM Hospital Rainawari Srinagar J&K,
[2]Consultant Department of ENT, Government JLNM Hospital Rainawari Srinagar J&K.
[3]Assistant Professor, Community Medicine, GMC Baramula J&K,
[4]Senior Resident Department of ENT, GMC Baramula J&K,

Corresponding Author:

Dr Nazrana Farooq
Senior Resident Department of ENT, GMC Baramula J&K, 193101
Email-
drnazrana.ent@gmail.com

Received: 12-03-2026
Accepted: 05-04-2026
Published: 16-04-2026

ABSTRACT

Background: Postoperative pain following adeno-tonsillectomy and tonsillectomy is often severe, especially in children, leading to delayed oral intake, increased analgesic requirements, and caregiver burden. This study aimed to evaluate the efficacy of topical 10% lidocaine spray applied to the tonsillar fossae in reducing early postoperative pain in patients undergoing these procedures. Primary Objective: To compare the postoperative pain scores between patients receiving topical 10% lidocaine spray and those not receiving.

Methods: This prospective, observational study included 100 ASA I–II patients aged 4–18 years undergoing adeno-tonsillectomy or tonsillectomy. Patients who received 10% lidocaine spray (20 mg per tonsillar fossa) after surgical hemostasis were labelled as Group L (50 patients), while patients who didn't receive were labelled as Group C (50 patients). Pain was assessed using the Wong-Baker FACES Pain Rating Scale at multiple intervals (30 min, 1, 2, 4, 6, 12, and 24 hours postoperatively). Secondary outcomes included time to first oral intake, requirement for rescue analgesia, incidence of adverse effects, and caregiver satisfaction.

Results: Patients in the lidocaine group experienced significantly lower pain scores at all time points ($p < 0.001$). Time to first oral intake was shorter (3.6 ± 1.4 hours vs. 5.2 ± 1.6 hours; $p < 0.001$), and fewer patients required rescue analgesia (22% vs. 60%; $p < 0.001$). No serious adverse effects were reported in either group. Caregiver satisfaction was significantly higher in the lidocaine group ($p < 0.001$).

Conclusion: Topical 10% lidocaine spray provides effective, safe, and easily administered postoperative analgesia in patients undergoing adeno-tonsillectomy and tonsillectomy, significantly improving early recovery outcomes.

Keywords: *Lidocaine spray, pain management, Adeno-tonsillectomy, Pediatric population, Wong-Baker FACES scale.*

INTRODUCTION

Tonsillectomy and adeno-tonsillectomy are among the most commonly performed otolaryngological surgeries in both pediatric and adult populations, typically indicated for recurrent tonsillitis, obstructive sleep apnea, and chronic adeno-tonsillar hypertrophy [1]. Despite being routine, these procedures are frequently associated with moderate to severe postoperative pain, especially during the first few days after surgery [2]. The intensity of pain is often significant enough to impact oral intake of food, prolong hospital stays, increase caregiver burden, and in some cases, result in dehydration and delayed recovery [3]. Pain following tonsillectomy is multifactorial, arising from mucosal trauma, exposure of pharyngeal musculature and nerve endings, and the inflammatory cascade triggered by surgical dissection [4]. This pain is typically most intense in the immediate postoperative period and may persist for up to ten days, with peak severity occurring between the first and third postoperative days [5]. Conventional pain management strategies include systemic analgesics such as paracetamol, NSAIDs and opioids. However, the use of systemic medications, especially opioids, is often limited in pediatric patients due to the risk of respiratory depression and nausea [6]. Topical anesthetics offer a promising alternative or adjunctive modality for localized pain relief with fewer systemic side effects. Lidocaine, an amide-

type local anesthetic, exerts its analgesic action by reversibly blocking voltage-gated sodium channels, thereby inhibiting nociceptive signal transmission [7]. Topical application of lidocaine to the surgical site provides rapid-onset analgesia, with minimal systemic absorption and a favorable safety profile. The 10% lidocaine spray formulation is especially advantageous due to its ease of administration and immediate effect, making it a potential candidate for intraoperative or immediate postoperative use in tonsillar surgeries [8]. This study is designed to evaluate the efficacy of 10% topical lidocaine spray applied to the tonsillar fossae in reducing postoperative pain in patients undergoing adeno-tonsillectomy and tonsillectomy. The findings are expected to add value to clinical practice by identifying a simple, effective and well-tolerated approach to enhance postoperative recovery and patient satisfaction.

Aim of the Study

To evaluate the efficacy of topical 10% lidocaine spray applied to the tonsillar fossae in reducing postoperative pain among patients undergoing adeno-tonsillectomy and tonsillectomy.

Primary Objective

To compare the postoperative pain scores between patients receiving topical 10% lidocaine spray and those receiving standard care (0.9% normal Saline topical application) following adeno-tonsillectomy and tonsillectomy.

Secondary Objectives

- To compare the time to first oral intake postoperatively between patients receiving topical 10% lidocaine spray and those receiving standard care (0.9% normal Saline topical application) following adeno-tonsillectomy and tonsillectomy.
- To compare the need for rescue analgesics between patients receiving topical 10% lidocaine spray and those receiving standard care (0.9% normal Saline topical application) following adeno-tonsillectomy and tonsillectomy.
- To determine the incidence of adverse effects (e.g., local irritation, bleeding, or allergic reactions) associated with the use of 10% lidocaine spray.
- To determine the patient and/or caregiver satisfaction among patients receiving topical 10% lidocaine spray and those receiving standard care (0.9% normal Saline topical application) following adeno-tonsillectomy and tonsillectomy.

METHODS

This prospective, observational study was conducted at Government JLNM Hospital Rainawari, Srinagar in the department of Otorhinolaryngology. The study included patients aged 4 to 18 years of either sex, with American Society of Anesthesiologists (ASA) physical status I or II, scheduled to undergo elective adeno-tonsillectomy or tonsillectomy under general anaesthesia.

Written informed consent was obtained from the parents or legal guardians of all participants. Patients with neurological disease, active infection, or peritonsillar abscess were excluded from the study.

Some of the consultants in the department prefer to use 10% lidocaine spray instead of standard care (0.9% normal Saline topical application) during adeno-tonsillectomy and tonsillectomy procedures. This study was planned to compare the postoperative period of such patients with those who don't receive 10% lidocaine spray. Patients who received 10% lidocaine spray (2 sprays, approximately 20 mg per tonsillar fossa) applied topically to the tonsillar fossae after achieving surgical haemostasis were labelled as Group L, while as patients who received an equivalent volume of 0.9% saline spray in the same manner were labelled as Group C.

Sample size: Sample size was calculated using Openepi software for comparing two proportions in a cohort study. Postoperative pain score using the Wong-Baker scale at 1 hour was taken as Primary Endpoint. With a 95 % CI and power of 80%, the total sample size came to be 100 participants, with half of participants in each group (9).

Non-probability quota sampling technique was used and participants were recruited into Group L or Group C consecutively after assessing them against inclusion and exclusion criteria. Patients were recruited as long as desired sample was achieved (50 participants in Group L & 50 participants in Group C). All patients received standardized general anaesthesia and postoperative analgesia, including paracetamol (15 mg/kg) every six hours. Rescue analgesia in the form of ibuprofen (10 mg/kg) was administered if the pain score exceeded 4 on the Wong-Baker FACES Pain Rating Scale. Pain scores were recorded at predetermined intervals: 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours, and 24 hours postoperatively using the Wong-Baker scale, a validated tool suitable for children aged ≥3 years. Additional outcomes assessed included time to first oral intake, number of patients requiring rescue analgesia within 24 hours, incidence of adverse effects, and caregiver satisfaction regarding pain control (rated as excellent, good, fair, or poor).

Outcome Measures

Primary Outcome: Postoperative pain scores using the Wong-Baker FACES scale.
Secondary Outcomes:

- Time to first oral intake (hours post-surgery).
- Requirement of rescue analgesics within 24 hours.
- Incidence of adverse effects (bleeding, allergic reaction, local irritation).
- Caregiver-reported satisfaction regarding pain control (rated as excellent, good, fair, or poor).

Statistical analysis was performed using SPSS version 23.0. Continuous variables were presented as mean ± standard deviation (SD) and compared using the Student's t-test. Categorical variables were expressed as frequencies & percentages and compared using the Chi-square test and Fisher's exact test as appropriate. A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 100 patients were enrolled in the study with 50 study participants receiving lidocaine spray (Group L) & another 50 receiving NS (Group C). Both groups were comparable in terms of age (mean age 9.2 ± 2.8 years in Group L vs. 9.5 ± 3.1 years in Group C; p = 0.62), gender distribution (male/female: 28/22 in Group L vs. 26/24 in Group C; p = 0.68), and type of surgery performed (42% underwent tonsillectomy alone and 58% underwent adeno-tonsillectomy in Group L; 38% and 62% respectively in Group C; p = 0.68).

Table 1: Demographic Characteristics

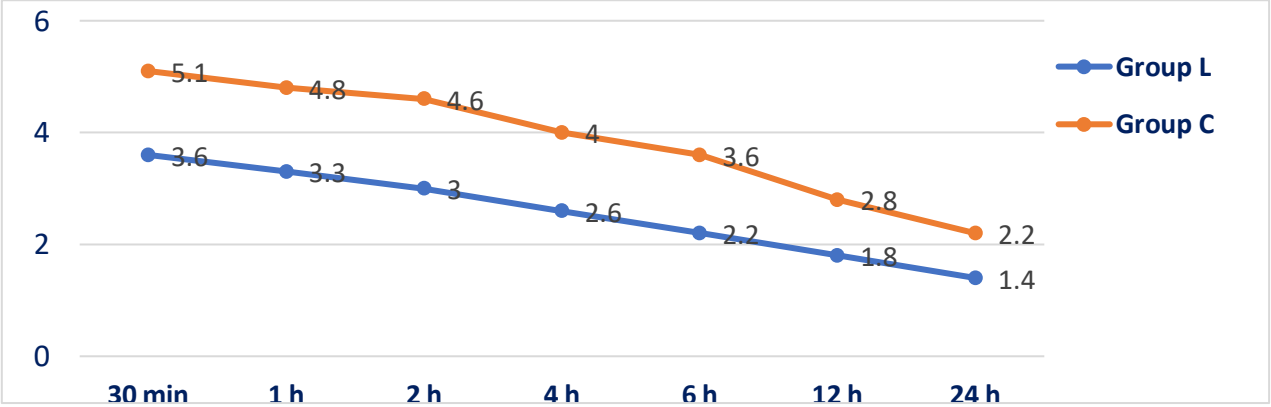
Parameter	Group L	Group C	p-value
Age (years, mean ± SD)	9.2 ± 2.8	9.5 ± 3.1	0.62
Gender (M/F)	28/22	26/24	0.68
Type of Surgery: Tonsillectomy only n (%)	21 (42)	19 (38)	0.68

Postoperative pain, assessed using the Wong-Baker FACES Pain Rating Scale, was significantly lower in Group L at all measured time intervals. At 30 minutes postoperatively, the mean pain score was 3.6 ± 1.1 in Group L compared to 5.1 ± 1.2 in Group C (p < 0.001). Similar statistically significant differences were observed at 1 hour (3.3 ± 1.0 vs. 4.8 ± 1.3), 2 hours (3.0 ± 1.2 vs. 4.6 ± 1.4), 4 hours (2.6 ± 1.1 vs. 4.0 ± 1.2), 6 hours (2.2 ± 1.0 vs. 3.6 ± 1.1), 12 hours (1.8 ± 0.9 vs. 2.8 ± 1.2), and 24 hours (1.4 ± 0.7 vs. 2.2 ± 1.0); all comparisons yielded p < 0.01.

Table 2: Wong-Baker FACES Pain Scores

Time	Group L (mean ± SD)	Group C (mean ± SD)	p-value
30 min	3.6 ± 1.1	5.1 ± 1.2	<0.001
1 h	3.3 ± 1.0	4.8 ± 1.3	<0.001
2 h	3.0 ± 1.2	4.6 ± 1.4	<0.001
4 h	2.6 ± 1.1	4.0 ± 1.2	<0.001
6 h	2.2 ± 1.0	3.6 ± 1.1	<0.001
12 h	1.8 ± 0.9	2.8 ± 1.2	0.001
24 h	1.4 ± 0.7	2.2 ± 1.0	0.002

Figure 1: Wong-Baker FACES Pain Scores



Secondary Outcomes: Patients in Group L resumed oral intake significantly earlier than those in Group C (3.6 ± 1.4 hours vs. 5.2 ± 1.6 hours; p < 0.001). Requirement for rescue analgesia was also lower in Group L, with only 11 patients (22%) needing additional analgesics compared to 30 patients (60%) in Group C (p < 0.001). No major adverse events were reported in either group. Mild transient throat irritation was noted in 2 patients (4%) in Group L and 1 patient (2%) in Group C (p = 0.56), which resolved without intervention. Caregiver satisfaction with postoperative pain control was significantly higher in Group L, with 68% rating their experience as "excellent" compared to 36% in the control group (p < 0.001). The full distribution of satisfaction ratings is shown in Table 3.

Table 3: Secondary Outcomes

Outcome	Group L	Group C	p-value
Time to first oral intake (h)	3.6 ± 1.4	5.2 ± 1.6	<0.001
Rescue analgesia required n (%)	11 (22)	30 (60)	<0.001
Adverse effects n (%)	2 (4)	1 (2)	0.56
Caregiver satisfaction (Excellent/Good/Fair/Poor)	34/13/3/0	18/16/12/4	<0.001

DISCUSSION

The present study evaluated the efficacy of topical 10% lidocaine spray in reducing postoperative pain following adeno-tonsillectomy and tonsillectomy. The results demonstrated that patients who received lidocaine spray had significantly lower pain scores across all observed postoperative time points compared to those who did not receive lidocaine spray. Additionally, early resumption of oral intake, reduced need for rescue analgesia, and higher caregiver satisfaction were observed among those patients receiving lidocaine spray. Postoperative pain is a major concern in tonsillar surgeries and can have substantial implications on recovery and quality of life, especially in children [10]. The localized trauma and inflammatory response in the tonsillar fossae make the site particularly sensitive. While systemic analgesics remain the mainstay of postoperative pain control, their limitations in terms of delayed onset, gastrointestinal side effects, and sedation—particularly in pediatric populations—necessitate adjunctive modalities [11]. Topical lidocaine, as an amide-type local anesthetic, offers the advantage of rapid onset of action and localized effect without significant systemic involvement [12]. In this study, the application of 10% lidocaine spray directly to the tonsillar fossae significantly attenuated pain in the first 24 hours postoperatively. This supports findings from earlier studies by Mohamed et al. and Koshy et al., who reported similar benefits of topical lidocaine in pediatric tonsillectomy patients [13,14]. The Wong-Baker FACES pain scale provided a simple and effective method for quantifying pain in children and was well understood by all participants. The pain scores were consistently lower in the lidocaine group, especially in the early postoperative hours (first 6 hours), indicating the short-acting but effective analgesic benefit of lidocaine when applied topically. Furthermore, the lidocaine group showed a significantly shorter time to first oral intake, suggesting improved comfort and functionality, which may help reduce postoperative complications such as dehydration. The reduced requirement for rescue analgesics also reflects the effectiveness of lidocaine in minimizing pain without the need for stronger medications such as NSAIDs or opioids, which carry additional risks [15]. No serious adverse effects were noted in either group, and lidocaine spray was well tolerated. Mild local irritation was reported in two patients, but this did not require medical intervention. Importantly, caregiver satisfaction was notably higher in the lidocaine group, emphasizing the clinical relevance of improving postoperative comfort in pediatric surgical care. While the findings of this study are promising, a few limitations should be acknowledged. The study was limited to the immediate 24-hour postoperative period; the long-term effects of lidocaine application on pain and wound healing were not studied. Also, the patients who received postoperative analgesia for pain relief were expected to distort the objective of study during future follow-ups. This bias was addressed by skipping such patients from analysis while comparing the pain scores at further follow-ups. Additionally, pain is subjective, and although the Wong-Baker scale helps standardize reporting, individual variability may still exist. Despite these limitations, this study adds to the growing body of evidence supporting the use of topical lidocaine as a safe, effective, and easily administered option for postoperative pain control in tonsillar surgeries.

CONCLUSION

This study demonstrates that the topical application of 10% lidocaine spray to the tonsillar fossae significantly reduces postoperative pain in patients undergoing adeno-tonsillectomy and tonsillectomy. Patients in the lidocaine group experienced lower pain scores across all measured time intervals within the first 24 hours postoperatively, resumed oral intake earlier, and required fewer rescue analgesics compared to the control group. Additionally, caregiver satisfaction was notably higher, and no major adverse effects were observed. The use of 10% lidocaine spray is simple, cost-effective, and easily implementable in routine clinical practice. It provides a safe and effective adjunct to conventional pain management strategies, particularly in the pediatric population, where minimizing opioid use is of critical importance.

Ethics declarations

Ethics approval

Ethical approval was obtained from the Institutional Ethical Review Committee and each patient gave an informed consent before taking part in the study.

Availability of data and materials

The datasets used and/or analyzed during this study are available from the corresponding author on a request.

Competing interest

The authors declared that they have no competing interests.

Funding

No funding agency was used for the conduct of study

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