Comparing the Effect of Topical Lignocaine and Bupivacaine in Nasal Packs for Pain Relief in Post Operative Nasal Surgery Patients

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ABSTRACT
This randomized controlled trial compared the analgesic efficacy of lignocaine, bupivacaine, and placebo nasal packs in patients undergoing nasal surgeries, including septoplasty and functional endoscopic sinus surgery (FESS). A total of 100 patients, aged 18–60 years, were randomly assigned into three groups: lignocaine (n=34), bupivacaine (n=33), and placebo (n=33). Postoperative pain was assessed using the Visual Analog Scale (VAS) over 24 hours. Additional analgesic requirements, side effects, recovery time, and length of hospital stay were recorded. Bupivacaine provided significantly lower pain scores at all intervals compared to lignocaine and placebo ($p < 0.05$). The bupivacaine group had a lower need for additional analgesics (39.4%) compared to lignocaine (76.5%) and placebo (81.8%) ($p = 0.041$). Side effects such as nausea and vomiting were similar across all groups. The bupivacaine group experienced a shorter hospital stay (2.0 days) compared to the lignocaine (2.5 days) and placebo (3.0 days) groups ($p = 0.038$). In conclusion, bupivacaine-soaked nasal packs offer superior pain relief, reduce the need for additional analgesics, and shorten hospital stays, making it a preferable option for postoperative pain management in nasal surgeries.

1. Introduction

Postoperative pain management in nasal surgery is a crucial factor in patient recovery, particularly when nasal packing is employed. Nasal packing, a common practice in procedures such as septoplasty, rhinoplasty, and endoscopic sinus surgery, is used to control bleeding and provide structural support to the nasal cavity during the healing process (1). Despite its clinical benefits, nasal packing is often associated with significant discomfort, especially during the postoperative period and removal, causing pain, anxiety, and potential complications for patients. Effective analgesic strategies are therefore essential to alleviate this discomfort and improve patient outcomes (2).

Topical local anesthetics like lignocaine (lidocaine) and bupivacaine are frequently used to provide pain relief in nasal surgery patients (3). Lignocaine, an amide-type local anesthetic, is known for its rapid onset of action, typically within minutes, making it suitable for immediate postoperative pain control. However, its duration of analgesia is relatively short, usually lasting for only 1–2 hours, often requiring repeated administration to maintain effective pain control during the early stages of recovery (4). In contrast, bupivacaine, another amide-type anesthetic, has a slower onset but provides prolonged analgesia lasting up to 8 hours, potentially reducing the need for additional analgesics and improving patient comfort over an extended period (5).

While both agents are well-established in clinical practice, the choice between lignocaine and bupivacaine in the context of nasal packing remains under-explored. Existing literature highlights the effectiveness of lignocaine for short-term pain relief during nasal pack removal, but the potential long-lasting benefits of bupivacaine in managing postoperative discomfort throughout the recovery period have not been fully investigated (6,7). Moreover, a direct comparison of these anesthetics in terms of their pain-relieving efficacy, duration of action, and impact on patient satisfaction in nasal surgeries involving nasal packing is lacking.

This study aims to address this gap by conducting a comparative analysis of lignocaine and bupivacaine when incorporated into nasal packs for postoperative pain management. Key outcomes will include the intensity and duration of pain relief, the time to first additional analgesic requirement, and overall patient satisfaction. By evaluating these parameters, this research seeks to provide a clearer understanding of which local anesthetic is more effective in optimizing pain control, thereby improving patient recovery and comfort following nasal surgery.

2. Material and Methods:

This prospective, randomized controlled trial aimed to compare the analgesic effects of lignocaine, bupivacaine, and normal saline (placebo) nasal packs in patients undergoing nasal surgeries, including septoplasty and functional endoscopic sinus surgery (FESS). Ethical approval was obtained from the institutional review board, and informed consent was secured from all participants before the study commenced.

Study Population

A total of 100 patients, aged between 18 and 60 years, who were scheduled for elective nasal surgery, were included in the study. Patients were randomly allocated into three groups:

- Group A (Lignocaine, n=34): Nasal packs soaked in 5 ml of 2% lignocaine.
- Group B (Bupivacaine, n=33): Nasal packs soaked in 5 ml of 0.5% bupivacaine.
- Group C (Placebo, n=33): Nasal packs soaked in 5 ml of normal saline.

Inclusion criteria included patients with nasal obstruction due to a deviated nasal septum or chronic sinusitis, requiring postoperative nasal packing. Exclusion criteria were patients with known allergies to local anesthetics, previous nasal surgeries, chronic use of pain medications, or systemic conditions affecting pain perception.

Study Design

Patients were randomly assigned to one of the three groups using a sealed-envelope technique to ensure unbiased group allocation. Randomization was performed immediately before surgery. Both the patients and the clinicians assessing postoperative outcomes were blinded to the group allocation to minimize bias.

Surgical Procedure and Anesthetic Protocol

All surgeries were performed under general anesthesia. Anesthesia was induced with propofol (2-3 mg/kg) and fentanyl (100 mcg), and maintained with sevoflurane and nitrous oxide (50% N_2O in O_2). Before making the surgical incision, 2% lignocaine with adrenaline (1:100,000) was injected into the nasal mucosa to provide initial local anesthesia and minimize bleeding.

The surgical procedures included septoplasty, FESS, and turbinectomy in some cases. After the completion of surgery, nasal Merocel packs were placed in both nasal cavities. In Group A, the nasal packs were soaked in 5 ml of 2% lignocaine. In Group B, the packs were soaked in 5 ml of 0.5% bupivacaine. In Group C (placebo group), the packs were soaked in 5 ml of normal saline.

Postoperative Pain and Analgesic Requirement Assessment

Postoperative pain was assessed using the Visual Analog Scale (VAS) at multiple time points: 5 min, 10 min, 15 min, 20 min, 30 min, 1 hour, 2 hours, 4 hours, 8 hours, 16 hours, and 24 hours after surgery. The VAS scores ranged from 0 (no pain) to 10 (worst imaginable pain). A blinded observer was responsible for administering the VAS assessments to ensure consistent data collection across all patients.

The need for additional analgesics was documented. Paracetamol or diclofenac sodium was provided as rescue analgesics if the VAS score exceeded 4 or if the patient reported significant discomfort. The total number of additional analgesic doses required was recorded for each patient.

Additional Postoperative Outcome Measures

Postoperative side effects, such as nausea and vomiting, were assessed at each follow-up interval. The severity of nausea and vomiting was graded using the following 4-point scale:

0: No nausea or vomiting.

1: Mild nausea, no treatment needed.

2: Moderate nausea, requiring treatment.

3: Severe nausea, resistant to treatment.

The duration of pain relief was measured based on the patient-reported pain-free interval following the administration of rescue analgesics. Additionally, the total recovery time and the length of hospital stay were

recorded.

Statistical Analysis

Data were analyzed using SPSS version 25.0. Continuous variables were presented as median (minimum-maximum) values, and categorical variables were expressed as percentages. The VAS scores between the three groups were compared at different time points using non-parametric tests such as the Kruskal-Wallis test, with post-hoc pairwise comparisons when necessary to identify specific group differences. Categorical variables, such as the requirement for additional analgesics and the incidence of postoperative side effects, were compared using the Chi-square test or Fisher's exact test, as appropriate. A p-value of less than 0.05 was considered statistically significant.

3. Results:

Table 1: Patient Demographics and Clinical Characteristics

Characteristic	Group A (Lignocaine) (n=34)	Group B (Bupivacaine) (n=33)	Group C (Placebo) (n=33)	p-value
Mean Age (years ± SD)	34 ± 8.2	33 ± 7.5	35 ± 7.9	0.78
Gender Distribution (M/F)	20/14	21/12	19/14	0.81
BMI (kg/m² ± SD)	24.3 ± 2.1	23.8 ± 2.0	24.0 ± 1.9	0.71
Surgery Duration (minutes ± SD)	45 ± 7.8	47 ± 7.6	46 ± 8.0	0.81
Comorbidities (No. of patients)	10 patients	9 patients	8 patients	0.65
ASA Score (I/II)	26/8	25/8	24/9	0.55
Preoperative Medication Use (%)	33%	25%	30%	0.58

Table 1 outlines the patient demographics and clinical characteristics for the three study groups: Group A (Lignocaine, n=34), Group B (Bupivacaine, n=33), and Group C (Placebo, n=33). The mean age across the groups was similar, ranging from 33 to 35 years, with no significant difference ($p = 0.78$). Gender distribution and body mass index (BMI) were also comparable between the groups, as were the duration of surgery and the presence of comorbidities, with no significant differences in these parameters ($p > 0.65$). The ASA (American Society of Anesthesiologists) score distribution, which indicates the physical status classification, was also similar among the groups ($p = 0.55$). Additionally, preoperative medication use was comparable, with 33% in the lignocaine group, 25% in the bupivacaine group, and 30% in the placebo group ($p = 0.58$). Overall, the demographic and clinical characteristics were well-matched between the groups.

Table 2: Distribution of Surgical Procedures by Complexity

Surgical Procedure	Number of Patients	Percentage of Total (%)	Complexity Level
Septoplasty	40	40%	Low
Functional Endoscopic Sinus Surgery (FESS)	32	32%	Moderate
FESS + Septoplasty	12	12%	High
Inferior Turbinectomy	8	8%	Low
Septoplasty + Submucosal Diathermy	4	4%	Moderate
FESS + Turbinectomy	4	4%	High

The table 2 shows the distribution of surgical procedures performed on the 100 study patients. Septoplasty was the most common procedure, performed on 40 patients (40%) and classified as low complexity. Functional Endoscopic Sinus Surgery (FESS) was performed on 32 patients (32%) and considered moderately complex. A combination of FESS and septoplasty, performed on 12 patients (12%), was categorized as high complexity. Inferior turbinectomy, a less complex procedure, was carried out in 8 patients (8%). Additionally, septoplasty combined with submucosal diathermy (4%) and FESS combined with turbinectomy (4%) were performed in a smaller subset of patients and were considered moderate to high complexity, respectively.

Table 3: Analysis of Additional Analgesic Requirements in Postoperative Patients

Parameter	Group A (Lignocaine) (n=34)	Group B (Bupivacaine) (n=33)	Group C (Placebo) (n=33)	p-value
Patients Requiring Additional Analgesics	26	13	27	
Percentage of Patients Requiring Analgesics (%)	76.5%	39.4%	81.8%	0.041
Proportion Within Group (%)	60.0%	30.0%	70.0%	
Type of Analgesic Used				
Paracetamol	17 (50%)	8 (24.2%)	17 (51.5%)	0.05
Diclofenac Sodium	9 (26.5%)	5 (15.2%)	10 (30.3%)	0.07

Table 3 presents data on the requirement for additional analgesics among the three groups. Group B

(Bupivacaine) had significantly fewer patients requiring additional analgesics (39.4%) compared to Group A (Lignocaine) (76.5%) and Group C (Placebo) (81.8%), with a p-value of 0.041, indicating a statistically significant difference.

In terms of analgesic type, paracetamol was more frequently used across all groups, with 50% of patients in Group A and 51.5% in Group C using it, compared to 24.2% in Group B (p = 0.05). Diclofenac sodium was used by fewer patients overall, with slightly higher usage in Group C (30.3%) compared to Group A (26.5%) and Group B (15.2%), though this difference was not statistically significant (p = 0.07).

Table 4: Postoperative Side Effects Evaluation

Parameter	Group A (Lignocaine) (n=34)	Group B (Bupivacaine) (n=33)	Group C (Placebo) (n=33)	p-value
Incidence of Nausea (%)	32.4% (11 patients)	21.2% (7 patients)	39.4% (13 patients)	0.65
Incidence of Vomiting (%)	23.5% (8 patients)	15.2% (5 patients)	30.3% (10 patients)	0.72
Discomfort Level (VAS Score)	3.0 ± 0.8	2.0 ± 0.6	4.0 ± 0.9	0.048
Rescue Antiemetic Required	14.7% (5 patients)	9.1% (3 patients)	18.2% (6 patients)	0.45
Total Recovery Time (hours)	8.0 ± 1.2	7.5 ± 1.0	9.0 ± 1.3	0.52
Length of Hospital Stay (days)	2.5 ± 0.5	2.0 ± 0.3	3.0 ± 0.6	0.038

Table 4 shows that the incidence of nausea and vomiting was comparable across all groups, with no significant differences (p > 0.65). The discomfort level, measured by VAS scores, was significantly lower in the bupivacaine group (2.0 ± 0.6) compared to the lignocaine group (3.0 ± 0.8) and placebo group (4.0 ± 0.9), with a p-value of 0.048. Although rescue antiemetic use and total recovery time were similar across groups (p > 0.45), the bupivacaine group had a significantly shorter hospital stay (2.0 ± 0.3 days) compared to the lignocaine (2.5 ± 0.5 days) and placebo groups (3.0 ± 0.6 days) (p = 0.038). This suggests better overall recovery with the use of bupivacaine.

Table 5: Postoperative Pain (VAS) Scores and Time-Based Analysis

Time (hours)	Group A (Lignocaine) Median (Range)	Group B (Bupivacaine) Median (Range)	Group C (Placebo) Median (Range)	p-value
5 min	6.0 (2-8)	4.5 (1-7)	7.0 (3-9)	0.045
10 min	5.5 (3-7)	3.5 (2-6)	6.5 (3-8)	0.021
15 min	5.0 (2-7)	3.0 (1-5)	6.0 (3-7)	0.01
20 min	4.5 (1-6)	2.5 (0-4)	5.5 (2-6)	0.008
30 min	4.0 (1-5)	2.0 (0-3)	5.0 (2-6)	0.007
1 hour	3.5 (1-4)	1.5 (0-2)	4.5 (2-5)	0.005
2 hours	3.0 (1-4)	1.0 (0-2)	4.0 (2-5)	0.003
4 hours	2.5 (0-3)	0.5 (0-1)	3.5 (1-4)	0.001
8 hours	2.0 (0-3)	0.5 (0-1)	3.0 (1-4)	0
16 hours	1.5 (0-2)	0.5 (0-1)	2.5 (1-3)	0.001
24 hours	1.0 (0-2)	0.5 (0-1)	2.0 (1-3)	0.001

The table 5 compares pain scores (measured via the Visual Analog Scale) over 24 hours among the three groups: lignocaine, bupivacaine, and placebo. The bupivacaine group consistently showed lower pain scores at all time intervals compared to lignocaine and placebo, with significant differences observed as early as 5 minutes postoperatively (p = 0.045). By 8 hours, the median pain score in the bupivacaine group was 0.5, significantly lower than in the lignocaine (2.0) and placebo (3.0) groups (p < 0.001). These results demonstrate the prolonged and superior analgesic effect of bupivacaine compared to lignocaine and placebo across all time points.

4. Discussion

In this study, we evaluated the analgesic efficacy of lignocaine, bupivacaine, and placebo (normal saline) when used in nasal packs for postoperative pain management in patients undergoing nasal surgeries, including septoplasty and functional endoscopic sinus surgery (FESS). Our findings demonstrate that bupivacaine-soaked nasal packs provided superior pain relief compared to both lignocaine and placebo, particularly in the early postoperative period. Bupivacaine also reduced the need for additional analgesics and provided more prolonged pain relief, as evidenced by significantly lower pain scores and shorter hospital stays.

Patients in the bupivacaine group consistently reported lower pain scores measured by the Visual Analog Scale (VAS) across all time points compared to the lignocaine and placebo groups. For example, at 5 minutes postoperatively, the median VAS score in the bupivacaine group was 4.5, compared to 6.0 in the lignocaine group and 7.0 in the placebo group. This trend persisted throughout the 24-hour follow-up period, with the bupivacaine group reporting a median VAS score of 0.5 at 24 hours, compared to 1.5 for lignocaine and 2.0 for placebo. These findings are consistent with the results of Yilmaz et al. (2008), who reported the superiority of

bupivacaine in providing prolonged analgesia after nasal surgeries, particularly compared to lignocaine and other agents like ropivacaine (8).

The placebo group experienced significantly higher pain levels, especially in the first few hours post-surgery, with 81.8% of patients requiring additional analgesics within the first few hours of recovery. In contrast, only 76.5% of patients in the lignocaine group and 39.4% in the bupivacaine group required rescue analgesia. The difference between the bupivacaine and lignocaine groups in terms of additional analgesic requirements was statistically significant ($p = 0.041$), highlighting the prolonged duration of pain relief provided by bupivacaine.

Our study reinforces findings from Karnina et al. (2021), who noted the limited duration of pain relief offered by lignocaine due to its shorter half-life (9). While lignocaine provided adequate pain control immediately post-surgery, its analgesic effects diminished quickly, necessitating additional interventions. Bupivacaine, with its longer duration of action, offered more sustained pain relief, significantly improving patient comfort and reducing the need for rescue analgesia. This aligns with McClellan et al. (1998), who also found bupivacaine to be effective in providing extended pain control for up to six hours postoperatively (11).

Interestingly, despite the higher pain levels and greater need for analgesics in the placebo group, the incidence of side effects such as nausea and vomiting did not differ significantly between the groups. Nausea was reported in 32.4% of patients in the lignocaine group, 21.2% in the bupivacaine group, and 39.4% in the placebo group ($p = 0.65$). Vomiting occurred in 23.5% of patients in the lignocaine group, 15.2% in the bupivacaine group, and 30.3% in the placebo group ($p = 0.72$). These findings suggest that the use of nasal packs, whether containing local anesthetics or normal saline, has minimal impact on postoperative nausea and vomiting rates. This observation is consistent with previous studies showing that topical anesthetics used in nasal surgery generally have minimal influence on such side effects (12).

Another important finding of our study was the impact of effective pain control on recovery time and hospital discharge. The bupivacaine group experienced a significantly shorter hospital stay (2.0 ± 0.3 days) compared to the lignocaine (2.5 ± 0.5 days) and placebo (3.0 ± 0.6 days) groups ($p = 0.038$). This suggests that improved postoperative pain management not only enhances patient comfort but also accelerates recovery and reduces healthcare resource utilization. These results align with the findings of Apuhan et al. (2013), who demonstrated that effective postoperative pain management, particularly with the use of bupivacaine, can reduce the length of hospital stays after nasal surgeries (13).

5. Conclusion

This study provides strong evidence that bupivacaine-soaked nasal packs offer superior pain relief compared to lignocaine and placebo in the immediate postoperative period following nasal surgeries. Bupivacaine delivers sustained analgesia, reduces the need for additional analgesics, enhances patient comfort, and shortens the length of hospital stay. The placebo group, in contrast, experienced significantly higher pain scores and relied more heavily on rescue analgesics, highlighting the importance of effective pain management strategies in nasal surgeries. Based on these findings, bupivacaine should be considered the preferred local anesthetic for postoperative pain management in nasal surgeries requiring nasal packing.

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