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Comparing the Outcomes of Lignocaine Spray and Solution in Reducing Pain and Discomfort During Flexible Nasopharyngolaryngoscopy

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ABSTRACT

Background

Flexible nasopharyngolaryngoscopy (NPL) is a vital diagnostic procedure in Otorhinolaryngology that is often associated with patient discomfort. Lignocaine, commonly used for topical anesthesia, is available in spray and solution forms, but evidence comparing their efficacy remains limited. This study compares the effectiveness and safety of lignocaine spray versus lignocaine solution in reducing pain and discomfort during flexible NPL.

Methods

A quasi-experimental, post-test only comparative study was conducted among 188 adult patients undergoing routine NPL at a tertiary hospital in Nepal. Participants were allocated into two groups based on their enrollment numbers: Group A received 10% lignocaine spray, and Group B received 4% lignocaine solution via cotton pledgets. Pain was assessed using a 100-mm Visual Analog Scale (VAS), and adverse effects (e.g., nasal pain and burning sensation, throat irritation and globus sensation, and unpleasant taste) were recorded immediately post-procedure.

Results

The mean VAS score was slightly lower in the spray group (28.04±14.26) than in the solution group (29.77±13.82); however, the difference was not statistically significant (p-value=0.401). Adverse effects occurred in 22.3% of participants overall, with a slightly higher incidence in the solution group (25.5%) than in the spray group (19.1%) (p-value=0.293). The most common adverse effects were nasal pain (9.0%), unpleasant taste (8.5%), and throat irritation (4.8%). No serious complications were reported.

Conclusions

Both lignocaine spray and solution offer comparable levels of comfort and safety during flexible NPL. Given the absence of significant differences in pain scores and adverse effects, either formulation may be chosen based on clinician preference, availability, and clinical context.

Keywords: nasopharyngoscopy; laryngoscopy; topical; lignocaine.

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INTRODUCTION

Flexible nasopharyngolaryngoscopy (NPL) is a commonly used diagnostic procedure in Otorhino-laryngology.[1] Patients often report significant discomfort during this procedure.[2,3] Lignocaine is the most commonly administered anesthetic for this procedure. It is available in either spray or solution form. Topical anesthesia plays a crucial role in improving patient tolerance and cooperation.[4] While the spray offers convenience and broad mucosal coverage, it may cause coughing, gagging, or a burning sensation in the nose and throat in some patients.[5] On the other hand, the solution allows for more controlled and localized application but may be less uniform and require more operator skill.[6,7] There is a lack of consensus on the optimal form of lignocaine to reduce pain and discomfort effectively while maintaining procedural efficiency. This study compares lignocaine spray and solution in reducing pain and discomfort during flexible NPL, with the aim of guiding best practices in topical anesthesia.

METHODS

This was a quasi-experimental, post-test only comparative study conducted to evaluate the outcomes of lignocaine spray versus lignocaine solution in reducing pain and discomfort during flexible NPL. Ethical approval for the study was obtained from the Institutional Review Committee of Chitwan Medical College (Ref. No. 081/82/120). Patients were randomly allocated into two intervention groups: Group A received lignocaine spray, whereas group B received lignocaine solution via cotton pledgets. The study was conducted at the Department of Otorhinolaryngology of Chitwan Medical College and Teaching Hospital (CMC-TH), a tertiary level referral center in central Nepal. Data collection was conducted over a two-month period, during which all eligible adult patients undergoing routine NPL and willing to participate were enrolled in the study. The study population consisted of adult patients aged 18 years or older who were scheduled to undergo flexible NPL for diagnostic or routine clinical evaluation. Participants were included if they provided written informed consent and met the age and procedural criteria. Patients were excluded if they had prior experience with NPL or were unable to reliably self-report pain or discomfort, ensuring accurate assessment of the intervention outcomes. Sample size was calculated using OpenEpi software, based on the difference in the proportion of pain-free individuals between the lignocaine spray and solution groups.[8] With a 95% confidence level and 80% power, the minimum required sample was 94 participants per group, totaling 188 participants.

Participants were assigned to two intervention groups based on their enrollment numbers using a predefined sequence, rather than complete randomization. Group A (Lignocaine Spray Group) received two puffs of 10% lignocaine spray in each nostril and the oropharynx, administered 10 minutes prior to the procedure. Group B (Lignocaine Solution Group) received 4% lignocaine solution applied via cotton pledgets[9] placed in each side of the nasal cavity for 10 minutes, along with a gargle using the same solution to anesthetize the oropharynx. Pentax fiber laryngoscope (EB-1575K) with outer diameter of 5.2mm was used for nasopharyngolaryngoscopic examination. Fiberscope was negotiated through the more patent nostril and the procedure was done in sitting position. Water-based jelly (KY-jelly) with no active medication was used for lubrication in all cases.

The primary outcome of the study was the level of pain experienced during NPL, assessed using a 100-mm Visual Analog Scale (VAS) immediately following the procedure, where 0 mm indicated “no pain” and 100 mm denoted the “worst imaginable pain.” Secondary outcomes included the presence of adverse effects such as nasal pain and burning sensation, throat irritation and globus sensation; and unpleasant taste, which were recorded as binary variables (Yes/No) using a structured checklist completed immediately after the procedure. Pain was assessed using the VAS, a validated tool for quantifying subjective pain intensity. Adverse events were documented using a researcher-developed checklist. All participants’ demographic and clinical data (age, sex, indication for NPL) were recorded using a structured proforma,

which was pilot-tested for clarity and feasibility.

All procedures and assessments were conducted by trained otorhinolaryngologists. Participants were approached in the outpatient and written informed consent was obtained. After allocation and intervention, the NPL was performed, followed by immediate assessment of pain and adverse effects. Data were analyzed using SPSS version 16. Descriptive statistics were employed to summarize participant demographics and clinical characteristics. To compare mean VAS scores between the two groups, independent samples t-tests were conducted. The occurrence of adverse effects between groups was compared using the chi-square test. A p-value of less than 0.05 was considered statistically significant, and 95% confidence intervals were reported for key estimates. The procedure (NPL) was part of routine clinical care, and both anesthetic methods were standard practice. Any adverse events were managed promptly, and no serious complications were reported.

RESULTS

The baseline sociodemographic and clinical characteristics of participants in the spray and solution groups were generally comparable, with no statistically significant differences observed between the two groups. The mean age of participants was slightly higher in the solution group (51.64±16.27 years) than in the spray group (46.45±17.09 years), but this difference was not significant. The majority of participants were aged 50 years or older, with 31.4% aged above 60 years overall. The distribution of gender was similar across groups, with nearly equal proportions of males and females (p-value=0.77). Educational status varied among participants, with primary and secondary education being the most common levels attained, and no significant difference was noted between groups (p-value=0.373). In terms of occupation, agriculture was the predominant occupation in both groups (34.0% each), followed by service sector jobs (25.0% overall). Other occupations, including daily wage work, business, driving, and student status, were distributed evenly without significant group differences (p-value=0.763). Regarding medical history, over half of the participants reported no known comorbidities, while chronic obstructive pulmonary disease (COPD), chronic liver disease, diabetes, hypertension, and thyroid disorders were the most frequently reported conditions. Overall, the baseline characteristics suggest that the spray and solution groups were well matched, minimizing potential confounding variables (Table 1).

Table 1. Demographic parameters of the patients at the time of enrollment. (n=94)

Variables	Spray n(%)	Solution n(%)	χ^2	p-value
Age (years)				
Mean ± SD	46.45±17.09	51.64±16.27		
18-29	20(21.3%)	10(10.6%)	5.14	0.273
30-39	15(16.0%)	13(13.8%)		
40-49	14(14.9%)	17(18.1%)		
50-59	20(21.3%)	20(21.3%)		
>60	25(26.6%)	34(36.2%)		
Gender				
Female	46(48.9%)	49(52.1%)	0.09	0.77
Male	48(51.1%)	45(47.9%)		
Education				
Bachelor	23(24.5%)	16(17.0%)	5.37	0.373
Higher Secondary	8(8.5%)	7(7.4%)		
Illiterate	10(10.6%)	5(5.3%)		
Master and above	8(8.5%)	14(14.9%)		
Primary	23(24.5%)	24(25.5%)		
Secondary	22(23.4%)	28(29.8%)		
Occupation				
Agriculture	32(34.0%)	32(34.0%)	3.35	0.763
Business	8(8.5%)	5(5.3%)		
Daily wage worker	11(11.7%)	11(11.7%)		
Driver	6(6.4%)	8(8.5%)		
Housewife	10(10.6%)	6(6.4%)		
Service	20(21.3%)	27(28.7%)		
Student	7(7.4%)	5(5.3%)		
Medical History				
COPD	10(10.6%)	11(11.7%)	10.9	N/A
Chronic liver disease	4(4.3%)	-		
Diabetes	13(13.8%)	5(5.3%)		
Heart Disease	1(1.1%)	3(3.2%)		
Hypertension	10(10.6%)	9(9.6%)		
None	48(51.1%)	61(64.9%)		
Thyroid disorders	8(8.5%)	5(5.3%)		

Comparison of age and VAS scores between the spray and solution groups is presented in the given table. The mean age was significantly lower in the spray group (46.45±17.09 years) compared to the solution group (51.64±16.27 years), with this

difference reaching statistical significance (t = -2.13, p-value=0.034). The mean difference in age was -5.19 years (95% CI: -9.99 to -0.39). In contrast, the mean VAS score during NPL was slightly lower in the spray group (28.04±14.26) compared to the solution group (29.77±13.82); but this difference was not statistically significant (t=0.84, p-value=0.401). The 95% confidence interval for the mean difference in VAS scores included zero (-2.32 to 5.77), indicating no significant difference in perceived discomfort between groups (Table 2).

Table 2. Descriptive statistics and independent samples t-test results comparing lignocaine spray and solution for age and pain scores. (n=94)

Variables	Mean ± SD	t	p-value	95% CI	
				Lower	Upper
Age					
Spray	46.45±17.1	-2.1	0.034	-9.99	-0.39
Solution	51.64±16.3				
VAS score (during NPL)					
Spray	28.04±14.26	0.84	0.401	-2.32	5.77
Solution	29.77±13.82				

Figure 1 shows the distribution of VAS scores during NPL clustered by treatment group (lignocaine spray and solution) and gender. Overall, both treatment groups demonstrated similar median VAS scores, with slightly higher variability observed among females. In both groups, the interquartile ranges overlapped considerably between males and females, indicating no substantial difference in discomfort levels by gender. A few mild outliers were noted in both treatment groups. The boxplot illustrates that while median scores were marginally higher among males in the solution group compared to the spray group, the difference was not statistically significant.

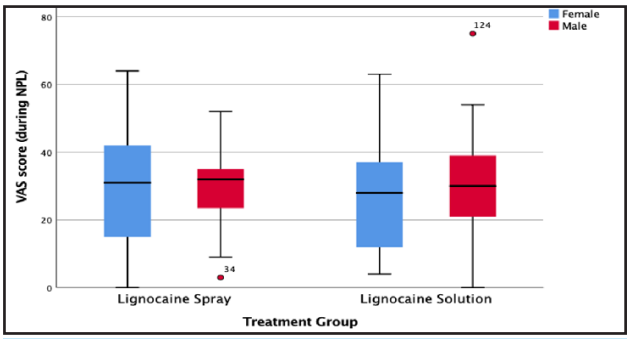

Figure 1. Clustered boxplot of VAS score by treatment group and gender.

A total of 42 participants (22.3%) experienced at least one adverse effect during the procedure, with a slightly higher proportion in the lignocaine solution group (25.5%) compared to the spray group (19.1%); however, this difference was not statistically significant (p-value=0.293). The most commonly reported adverse effects across both groups were nasal pain or burning sensation (9.0%), unpleasant taste (8.5%), and throat irritation (4.8%). The distribution of these individual adverse effects was similar between the groups, and no serious adverse events were noted (Table 3).

Table 3. Frequency and types of adverse effects reported in spray and solution groups. (n=94)

Adverse Effect	Spray n(%)	Solution n(%)	χ^2	p-value
Any adverse effect	18(19.1)	24(25.5)	0.381	0.293
None	76(80.9)	70(74.5)		
Major adverse effects (n=42)				
Nasal pain/burning sensation	7(7.4)	10(10.6)	0.034	N/A
Unpleasant taste	7(7.4)	9(9.6)		
Globus sensation/ Throat irritation	4(4.3)	5(5.3)		

DISCUSSION

This study compared the outcomes of lignocaine spray and lignocaine solution in reducing pain and discomfort during flexible NPL. Our findings demonstrate that both forms of topical lignocaine produce comparable levels of patient-reported discomfort, with no statistically significant difference in mean VAS scores or rates of minor adverse effects. Both treatment groups exhibited similar median VAS scores, indicating comparable levels of discomfort. The statistically significant difference in mean age between the spray group and the solution group (46.45 vs. 51.64 years) may have influenced pain perception, as younger patients are generally thought to report lower discomfort levels during endoscopic procedures, possibly due to higher pain tolerance and fewer comorbidities. However, Seccia et al. observed that increased age was associated with lower pain perception during flexible nasendoscopy, highlighting that the relationship between age and procedural discomfort may not be linear and could

be influenced by additional patient or procedure related factors.[2] Variability in scores was slightly higher among females, but the interquartile ranges for both genders overlapped significantly, suggesting no substantial gender differences in discomfort. These results support the clinical flexibility of using either method according to clinician preference and patient suitability.

In our study, the mean VAS score was slightly lower in the spray group (28.04±14.26) than in the solution group (29.77±13.82) on a 0-100 scale, though this difference was not statistically significant. When standardized to a 0-10 scale, both groups report a mean VAS around 3.0-3.1, representing mild to moderate discomfort. This aligns closely with findings by Bonaparte et al., who assessed pain during flexible nasolaryngoscopy and found that adding a pre-procedural mouthwash did not significantly reduce discomfort beyond standard topical lignocaine spray, both anesthetics provided similar effects, with minimal patient discomfort during the procedure.[10] The utilization of cotton pledgets (soaked in lignocaine solution), while potentially causing minor discomfort to patients, has been deemed to exhibit greater efficacy according to some scholars.[11,12] Conversely, the methodology of topical aerosol application is similarly deemed ineffective according to other studies.[13,14] Previous studies have reported better outcomes with lignocaine spray compared to solution.[9,15] Amornyotin et al. found that lignocaine spray resulted in slightly better patient satisfaction and lower gag reflex incidence than viscous solution during unsedated esophagogastroduodenoscopy (mean VAS 1.39 vs. 2.02, p-value<0.001).[16] Conversely, Şahin et al. observed no significant benefit of lignocaine spray over placebo in reducing discomfort during nasal endoscopy, suggesting that other factors such as patient anxiety and operator technique may play equal or greater roles.[17]

Regarding safety, the overall frequency of adverse effects was low and comparable between groups (19.1% in the spray group vs. 25.5% in the solution group). In contrast to our finding that minor adverse effects such as nasal pain, throat irritation, and unpleasant taste occurred with no significant difference between groups (p-value=0.293), Amornyotin et al. reported a significantly lower rate of adverse effects in the lignocaine spray group compared to the viscous solution group, alongside higher patient and surgeon satisfaction.[16]

Interestingly, our findings also align with the broader consensus that the method of delivery (spray vs. solution) may not strongly impact adverse effect profiles if dosing is consistent. This finding is consistent with other literatures.[12,18] Taken together, our study reinforces that both lignocaine spray and solution are safe and acceptable for use in flexible NPL, providing similar patient comfort and minimal risk of complications. These results, consistent with the broader literature, suggest that clinicians may select the anesthetic form based on availability, ease of application, and either patient or clinician preference. However, our study has some limitations. The sample size, while sufficient to detect moderate differences, may not be large enough to reveal smaller effects. Future multicenter studies with larger samples could better assess subgroup differences, including those related to age or gender.

Limitations

This study was conducted in a single tertiary center, which may limit the generalizability of the findings. Additionally, although procedures were standardized, variability in operator experience was not assessed, which could influence outcomes such as pain perception and procedural comfort.

CONCLUSIONS

In summary, this study demonstrates that both lignocaine spray and lignocaine solution provide comparable patient comfort and safety during flexible nasopharyngolaryngoscopy. Although the mean VAS score was slightly lower in the spray group, this difference was not statistically significant, and minor adverse effects were similar in both groups. These results suggest that either form of topical lignocaine can be effectively selected based on clinician preference and practical considerations. Larger

multicenter studies are recommended to confirm these findings and to investigate any subtle differences in specific patient subgroups.

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