Section: Anaesthesiology

Original Research Article

COMPARATIVE EFFICACY OF LIGNOCAINE NEBULIZATION VS. AIRWAY NERVE BLOCKS FOR AWAKE FIBEROPTIC NASOTRACHEAL INTUBATION: A RANDOMIZED STUDY

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Abstract

Background: Awake fiberoptic intubation (AFOI) is a critical technique in managing difficult airways, providing a secure and visually guided method for tracheal intubation. **Objective:** This study aims to compare the efficacy of lignocaine nebulization and airway nerve blocks (ANBs) for achieving adequate airway anesthesia before AFOI-guided nasotracheal intubation. **Materials and Methods:** The randomized study involved 60 adult patients divided into two groups: Group N (n=30) receiving 10 ml of 4% lignocaine nebulization and Group A (n=30) undergoing ANBs with 2 ml of 2% lignocaine for bilateral superior laryngeal nerve block at hyoid & transtracheal instillation of 4ml of 2% lignocaine at the cricothyroid membrane. Parameters assessed included intubation time, ease of intubation, patient comfort, hemodynamic stability, and post-operative satisfaction. **Results:** The findings indicated no significant differences in demographic variables (age, gender, BMI, ASA status) between the groups. However, the mean intubation time was significantly shorter, and intubating conditions were better in Group B compared to Group N. Additionally, patient comfort and overall satisfaction were higher in Group B, with fewer instances of coughing and gag reflex. **Conclusion:** In conclusion, while both methods are effective for airway anesthesia, ANBs provide superior conditions for AFOI with enhanced patient comfort and reduced intubation time. The study suggests that while lignocaine nebulization is a viable alternative, ANBs may be preferable for optimal airway management. Further large-scale and multicentric studies are recommended to validate these findings and refine airway anesthesia techniques.

INTRODUCTION

Managing unexpected difficult airways remains a significant challenge in anesthesia practice.[1] Awake fiberoptic intubation (AFOI) is preferred due to its high safety margin, especially in patients with anticipated difficult airways.[2] Effective airway anesthesia is crucial for the success of AFOI, traditionally achieved through topical anesthesia or nerve blocks.[3,4] This study compares lignocaine nebulization, a less invasive method, with airway nerve blocks, the standard technique, in terms of efficacy and patient comfort.

MATERIALS AND METHODS

A single-blinded randomized study was conducted at Andhra Medical College from October 2022 to May 2024.

Inclusion Criteria: Patients undergoing oral surgeries with difficult airways, Patients aged 18 to 65 years, Male and female patients who provided informed consent to participate in the study, Patients with ASA status I and II.

Exclusion Criteria: Those are not willing to give consent, Patients not satisfying inclusion criteria, Patients on anticoagulants, Pregnant and lactating

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women, Patients with known allergies to lignocaine, Patients with hepatic, neurological, heart disease.

Sixty patients scheduled for oral surgeries with difficult airways were randomly assigned to two groups: Group A (ANB) and Group N (lignocaine nebulization). Group A: 30 patients received 2 ml of 2% lignocaine bilateral superior laryngeal nerve block at hyoid & transtracheal instillation of 4ml of 2%lignocaine at the cricothyroid membrane. Group N: 30 patients received 10 ml of 4% lignocaine nebulization. Patient's demographics, ASA status, and baseline vitals were recorded. Intubation was performed using a 5.0-mm flexible fiber-optic bronchoscope with appropriate size Flexo-metallic Endotracheal Tube. Primary outcomes included intubation time and ease of intubation. Secondary outcomes assessed were hemodynamic stability, patient comfort, and post-operative satisfaction. The statistical tests applied to determine the statistical significance of differences include 1) Student t-test - to compare intubation time, BMI, and hemodynamic parameters (MAP and HR) 2) Chi-square test - to compare gender distribution, ASA status, intubating conditions, vocal cord visibility, presence of cough, gag reflex, and patient comfort during intubation and 3) Mann-Whitney U test - to assess patient satisfaction and comfort scores.

RESULTS

There were no significant differences in demographic data, BMI, and ASA status between the two groups. Group A exhibited significantly shorter intubation times (114.6 ± 3.2 sec) compared to Group N (212.7 ± 1.6 sec, $p<0.0001$). Intubating conditions were optimal in 60% of Group A compared to 33% in Group N ($p=0.116$). Hemodynamic parameters (MAP and HR) were more stable in Group A at 1, 3, 5, and 15-minutes post-intubation. Cough severity was higher in Group N ($p=0.045$), and patient comfort during intubation was significantly better in Group A ($p=0.001$).

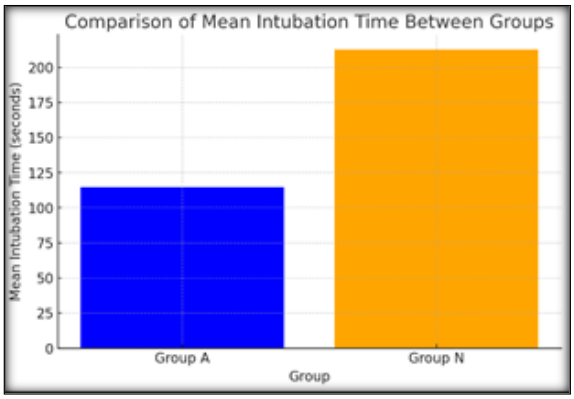

Figure 1: Comparison of Mean Intubation Time between Group A & Group N

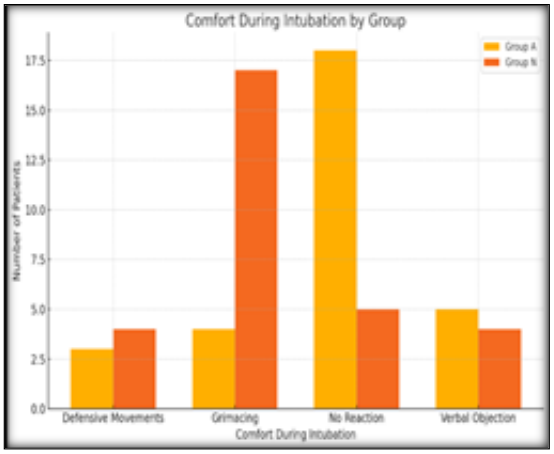

Figure 2: Comparison of Comfort During Intubation between Group A & Group N

Table 1: Age of Patients

Group	N	Mean (years)	Variance	Std Dev	t Value	p Value
A	30	46.8	52.99	7.28	0.62	0.5354
N	30	45.47	84.19	9.18	---	---

Table 2: Gender of Patients

Group	Female	Male	Total	Chi-Square	p Value
A	10	20	30	0.6345	0.4257
N	13	17	30	---	---
Total	23	37	60	---	---

Table 3: BMI of Patients

Group	N	Mean (kg/m²)	Variance	Std Dev	t Value	p Value
A	30	23.83	1.94	1.39	0.09	0.9285
N	30	23.80	2.17	1.47	---	---

Table 4: ASA Status of Patients

Group	ASA I	ASA II	Total	Chi-Square	p Value
A	17	13	30	1.8315	0.1760

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N	22	8	30	---	---
Total	39	21	60	---	---

Table 5: Intubation Time

Group	N	Mean (seconds)	Variance	Std Dev	t Value	p Value
A	30	114.63	9.96	3.16	-151.64	<0.0001
N	30	212.67	2.57	1.60	---	---

Table 6: Intubating Conditions

Group	Difficult	Optimal	Suboptimal	Total	Chi-Square	p Value
A	1	18	11	30	4.3087	0.1160
N	2	10	18	30	---	---
Total	3	28	29	60	---	---

Table 7: Vocal Cord Visibility

Group	Adducted	Partially Relaxed	Relaxed	Total	Chi-Square	p Value
A	2	13	15	30	11.3671	0.0034
N	13	10	7	30	---	---
Total	15	23	22	60	---	---

Table 8: Cough Among Patients

Group	No Cough	Cough	Total	Chi-Square	p Value
A	25	5	30	4.0219	0.0449
N	18	12	30	---	---
Total	43	17	60	---	---

Table 9: Gag Reflex Among Patients

Group	No Gag	Gag	Total	Chi-Square	p Value
A	23	7	30	1.9255	0.1652
N	18	12	30	---	---
Total	41	19	60	---	---

Table 10: Comfort During Intubation

Group	Defensive Movements	Grimacing	No Reaction	Verbal Objection	Total	Chi-Square	p Value
A	3	4	18	5	30	15.6494	0.0013
N	4	17	5	4	30	---	---
Total	7	21	23	9	60	---	---

Table 11: Post Intubation Assessment

Group	Cooperative	Restless	Severe Resistance	Total	Chi-Square	p Value
A	16	10	4	30	1.9259	0.3818
N	11	12	7	30	---	---
Total	27	22	11	60	---	---

Table 12: Mean Arterial Pressure (MAP) at Various Intervals

Interval	Group	Mean (mmHg)	Variance	Std Dev	t Value	p Value
1 min	A	98.4	1.35	1.16	11.70	<0.0001
	N	105.8	10.65	3.26	---	---
3 min	A	97.9	2.78	1.67	10.87	<0.0001
	N	105.8	13.06	3.61	---	---
5 min	A	97.9	2.58	1.60	9.92	<0.0001
	N	105.2	13.52	3.68	---	---
15 min	A	83.2	68.86	8.30	5.66	<0.0001
	N	93.2	24.72	4.97	---	---

Table 13: Heart Rate (HR) at Various Intervals

Interval	Group	Mean (bpm)	Variance	Std Dev	t Value	p Value
1 min	A	88.53	6.33	2.52	3.99	0.0002
	N	91.4	9.14	3.02	---	---
3 min	A	87.4	9.97	3.16	1.29	0.2028
	N	88.5	4.67	2.16	---	---
5 min	A	88.03	5.00	2.24	2.48	0.0161

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DISCUSSION

This study demonstrates that airway nerve blocks (ANBs) provide superior airway anesthesia for awake fiberoptic bronchoscopy-guided nasotracheal intubation (AFOI) compared to lignocaine nebulization. The significantly shorter intubation times and better hemodynamic stability observed in Group A (ANB) support the use of ANBs as the preferred method for airway management in patients with difficult airways. These findings are consistent with previous studies indicating the efficacy of ANBs in improving intubating conditions and patient comfort.

Rekha Nilesh et al,[5] conducted a prospective study comparing lignocaine nebulization and airway nerve blocks in 60 adults undergoing oral cancer surgeries and found that airway nerve blocks provided better intubating conditions and patient comfort, similar to our findings.

Yadav et al,[6] investigated the efficacy of airway nerve blocks versus atomized lignocaine in patients with difficult airways and reported that nerve blocks provided faster intubation and better intubating conditions, corroborating our findings.

Hassanein et al,[7] evaluated the combination of lignocaine nebulization and airway nerve blocks for nasal awake intubation and concluded that adding nerve blocks to nebulization improved intubation conditions and patient comfort.

Gaikawad et al,[8] compared lignocaine nebulization with and without dexmedetomidine for awake nasal intubation. They found that adding dexmedetomidine improved intubating conditions and patient satisfaction.

Future research should explore the combination of ANBs with other anesthetic agents like dexmedetomidine,[9] or different concentrations of lignocaine,[10,11] and also investigating the use of ultrasound guidance,[12] for nerve blocks which may improve the precision and efficacy of airway anesthesia.

CONCLUSION

Airway nerve blocks offer superior efficacy and patient comfort compared to lignocaine nebulization for awake fiberoptic bronchoscopy-guided nasotracheal intubation. Further large-scale and multicentric studies are warranted to confirm these findings and optimize airway management protocols.

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