The Effects of Topical Anesthesia With Lidocaine 10% Spray Compared to Trans Tracheal and Glossopharyngeal Nerve Block in Hemodynamic Stability During Awake Intubation: A Randomized Controlled Trial

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Abstract- Hemodynamic changes is of great concern during awake intubation, particularly in patients with underlying medical conditions. As heterogeneities exist in regard to the best anesthesia drugs and techniques, herein, we aimed to investigate the effects of Lidocaine 10% spray compared to trans tracheal glossopharyngeal nerve block in hemodynamic stability in patients undergoing awake intubation. A total of 62 patients were included in this randomized clinical trial. Using a longitudinal interventional design, hemodynamic measures were statistically compared before intubation, one minute after intubation, and five minutes after intubation. The first group underwent topical anesthesia with Lidocaine 10% sprayed on the base of tongue and tonsillar pillar while the second group underwent trans tracheal and glossopharyngeal nerve block with simultaneous injection of Lidocaine 2%. Our results indicated that all hemodynamic parameters except for the pulse rate in both groups were significantly reduced after the intubation, which indicates the effectiveness of the interventions. However, the reduction in SBP, DBP, and MAP was significantly lower in the nerve block group compared to the Lidocaine spray group. Regarding the pulse rate, despite the significant decrease in the group of patients undergoing nerve block, those undergoing anesthesia with Lidocaine spray experienced a significant increase in the heart rate in the first minute after the operation. Finally, our research provides substantiation that employing a glossopharyngeal nerve block and trans tracheal block constitutes an efficacious method for local anesthetic during conscious intubation and can be a promising technique.

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Keywords: Hemodynamic changes; Lidocaine spray; Tracheal intubation

Introduction

Laryngoscopy and tracheal intubation are known to increase sympathetic activity that may be detrimental to patients with preexisting cardiovascular conditions and some vascular diseases. As certain hemodynamic parameters significantly increase with age (1,2), maintaining hemodynamic parameters is even more crucial in the elderly population. It is considered remarkably challenging to maintain the balance between patient comfort and good intubating conditions while providing proper ventilation and a patent airway. Many drug combinations and anesthesia techniques have been described, but there is very little in the literature to help guide the practitioner to choose between them (3). Certain groups of patients with laryngeal cancer are in particular considered a difficult intubation group and therefore, securing the airway is of importance in this group of patients (4). Topical anesthetics in conjunction with sedative benzodiazepines are commonly employed for anesthetic management in patients. Nevertheless, sedation can lead to complications affecting the respiratory and cardiovascular systems. Elderly individuals and those with underlying cardiopulmonary conditions may face heightened risks during procedures, particularly when large quantities of intravenous sedatives are administered (5,6).Consequently, there has been a pursuit for anesthetic approaches that minimize

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complications while ensuring satisfaction for both the patient and the anesthesiologist (7). Alternative topical anesthetic methods, such as sprays, lollipops, and inhalers, have been investigated with varying outcomes. Despite their use, these agents may still pose risks of gagging, vomiting, and apnea. The glossopharyngeal nerve block presents a viable alternative for anesthesia. Given the superficial nature of the glossopharyngeal nerve, it effectively blocks sensation in the posterior portion of the tongue and the vallecula. This technique's complications are infrequent and typically mild. The small amounts of local anesthetic used in this block reduce the likelihood of systemic effects due to intravascular injection (8). Still, certain heterogeneities exist in the literature concerning whether using glossopharyngeal nerve block yields better results in terms of maintaining the hemodynamic parameters. Therefore, in this clinical randomized trial, we aimed to longitudinally compare the effects of topical anesthesia with Lidocaine 10% spray with transtracheal and glossopharyngeal nerve block in maintaining the hemodynamic parameters of our patients with laryngeal cancer undergoing awake intubation.

Materials and Methods

Participants and design

Using a clinical randomized trial design, a total of 64 patients were enrolled and were randomly allocated to each intervention group with randomized number table. The first group underwent topical anesthesia with Lidocaine 10% sprayed on base of tongue and tonsillar pillar while the second group underwent transtracheal 4 cc and glossopharyngeal nerve block with 2 cc each side simultaneous injection of Lidocaine 2%. In the first group, two patients were excluded due to adverse events during the intubation, and therefore, a total number of 32 patients underwent glossopharyngeal nerve block and 30 cases received topical anesthesia using Lidocaine 10% spray.

Measurements and definitions

Hemodynamic parameters were defined as systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and pulse rate (PR) and were non-invasively measured using barometric monitoring.

Statistics

Continuous variables are shown as mean with standard deviation and categorical variables as numbers (percentage). For repeated data GLM (general linear model) and analysis of variance (ANOVA) was used to compare the hemodynamic factors statistically before intubation, one minute after intubation, and five minutes after intubation with time as a within-subject factor and the group of intervention as a between-subjects variable. We performed data analysis using SPSS , version 25.0 . *P* less than 0.05 was noticed significant, statically.

Ethical considerations

After taking ethical code (66581579) from ethic committee study was started anda all patients signed informed consent to take participate in this research. Furthermore, this study is ethically affirmed by the ethics committee of Tehran University of medical sciences and is conducted in agreement with the Declaration of Helsinki, 1964.

Results

62 cases were enrolled in total. The ratio of male to female was 37 to 25. Demographic information and individual characteristics are summarized in Table 1. ANOVA two-way repeated measures yielded significant ($P<0.001$) regarding all hemodynamic parameters. The mean and SD of each parameter are illustrated in Table 2, 3, 4 and 5 and a visual illustration is also available in Figures 1, 2, 3 and 4. Our results indicated that all hemodynamic parameters except for the pulse rate in both groups were significantly reduced after the intubation, which indicates the effectiveness of the interventions. However, the reduction in SBP, DBP, and MAP in the nerve block group was significantly reduced compared to the group of Lidocaine. Regarding pulse rate, despite the remarkable reduction in the group of patients undergoing nerve block, those undergoing anesthesia with Lidocaine spray experienced a remarkable increase in heart rate after one minute of the operation.

Table 1. Baseline characteristics and study results of participants (N=62)

Demographics		Total
Number		62
Age (Years)		54.74±14.07
Gender	**Male**	37 (59.7%)
	Female	25 (40.3%)
ASA grade	**I**	35 (56.5%)
	II	20 (32.3%)
	III	7 (11.3%)
T grade	**0**	9 (14.5%)
	1	43 (69.4%)
	2	10 (16.1%)
Tumor Site	**Glottic**	35 (56.5%)
	Subglottic	13 (21%)
	Supraglottic	14 (22.6%)

Data are presented as mean±standard deviation or number (percentage)

Table 2. Descriptive statistics of systolic blood pressure (SBP) before, one minute after, and 5 minutes after intubation in both Lidocaine spray and nerve block groups

	Group	Mean	Std. Deviation	N
Systolic before Intubation	**Block**	133.13	16.068	32
	Lido spray	134.40	23.557	30
	Total	133.74	19.886	62
Systolic 1min after Intubation	**Block**	107.63	17.316	32
	Lido spray	126.00	32.882	30
	Total	116.52	27.425	62
Systolic 5 min after Intubation	**Block**	101.38	16.200	32
	Lido spray	101.30	20.675	30
	Total	101.34	18.346	62

Table 3. Descriptive statistics of diastolic blood pressure (DBP) before, one minute after, and 5 minutes after intubation in both Lidocaine spray and nerve block groups

	Group	Mean	Std. Deviation	N
Diastolic before Intubation	Block	85.88	6.231	32
	Lido spray	89.60	19.013	30
	Total	87.68	13.968	62
Diastolic 1min after Intubation	Block	72.63	13.649	32
	Lido spray	79.00	14.513	30
	Total	75.71	14.322	62
Diastolic 5 min after Intubation	Block	70.00	12.464	32
	Lido spray	67.30	15.966	30
	Total	68.69	14.212	62

Table 4. Descriptive statistics of Mean Arterial Pressure (MAP) before, one minute after, and 5 minutes after intubation in both Lidocaine spray and nerve block groups

	Group	Mean	Std. Deviation	N
Mean arterial Pressure before Intubation	Block	107.63	13.295	32
	Lido spray	107.80	22.490	30
	Total	107.71	18.174	62
Mean arterial Pressure 1min after Intubation	Block	87.25	14.895	32
	Lido spray	96.80	23.013	30
	Total	91.87	19.690	62
Mean Arterial Pressure 5 min after Intubation	Block	84.50	13.228	32
	Lido spray	80.50	16.720	30
	Total	82.56	15.030	62

Table 5. Descriptive statistics of pulse rate (PR) before, one minute after, and 5 minutes after intubation in both Lidocaine spray and nerve block groups

	Group	Mean	Std. Deviation	N
Pulse rate before intubation	Block	85.75	13.127	32
	Lido spray	83.00	17.050	30
	Total	84.42	15.089	62
Pulse rate 1min after intubation	Block	74.13	11.556	32
	Lido spray	88.30	19.733	30
	Total	80.98	17.435	62
Pulse rate 5 min after intubation	Block	73.38	12.841	32
	Lido spray	79.20	16.914	30
	Total	76.19	15.114	62

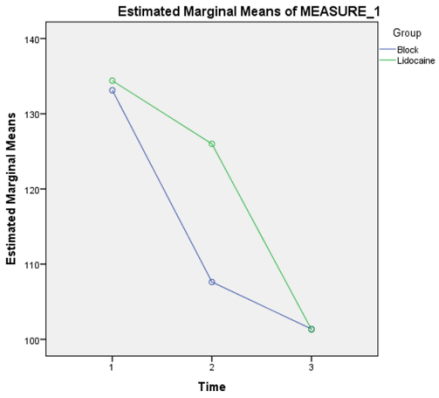

Figure 1. SBP

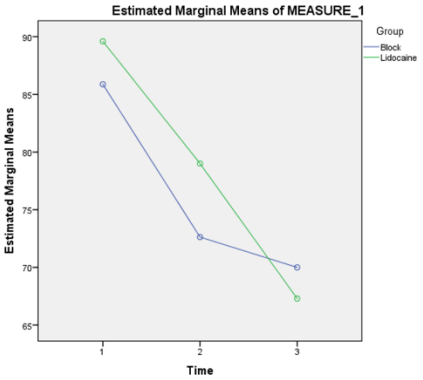

Figure 2. DBP alterations

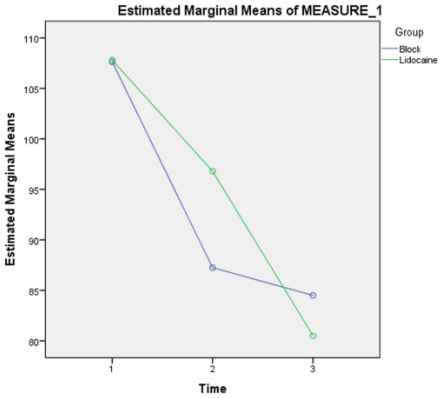

Figure 3. MAP

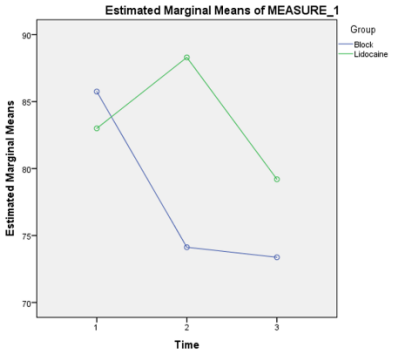

Figure 4. Pulse rate alterations

Discussion

We aimed to investigate the effects of Lidocaine 10% spray compared to trans tracheal glossopharyngeal nerve block in hemodynamic stability in patients undergoing awake intubation in this research. The method of choice for airway management in patients with cervical injury is awake fiber optic bronchoscopy (FOB) guided intubation. In order to ensure patient comfort and cooperation, it is necessary to sufficiently anesthetize the upper airway before the performance of awake FOB-guided intubation (9).

The gold standard of airway management in the difficult airway situation is awake fiber-optic bronchoscopy-guided intubation which needs effective airway anesthesia to increase patient comfort and acceptance. One research has suggested that combination of SAYGO and IV dexmedetomidine is more effective than trans tracheal block and IV fentanyl for awake fiber-optic intubation in parameters of vocal cord position ,intubating conditions, comfort during intubation ,cough severity and postoperative contentment of patients with significant reduction of post intubation hemodynamic changes and better saving of respiration through time of endoscopy (10).

Our results indicated that all hemodynamic parameters except for the pulse rate in both groups were significantly reduced after the intubation, which indicates the effectiveness of the interventions. However, the reduction in SBP, DBP, and MAP was remarkably reduced in the nerve block group compared to the Lidocaine group. Regarding the pulse rate, despite the significant decrease in the group of patients undergoing nerve block, those undergoing anesthesia with Lidocaine spray experienced a significant increase in the heart rate in the first minute after the operation. This finding is in accordance with previous research suggesting that the airway nerve blocks provide more adequate airway anesthesia in respect of cough and gag scores, comfort score, cord visibility, intubating condition grade, and hemodynamic conditions compared to atomization and nebulization with local anesthetics (11).

For conclusion, this study shows prove that utilizing of glossopharyngeal nerve block is an effective route of local anesthesia in awake intubation. The results present evidence that the glossopharyngeal nerve block can be considered as a promising anesthetic method when it comes to lowering the use of sedation and preserve hemodynamic parameters better and reduce potential complications. As a restriction of this method, glossopharyngeal nerve block could not be done in patients with sensitivity to local anesthetics. However, it may be a promising technique, particularly in awake intubation in elderly patients or patients with unstable hemodynamic condition.

References

1. Bullington J, Mouton Perry SM, Rigby J, Pinkerton M, Rogers D, Lewis TC, et al. The effect of advancing age on the sympathetic response to laryngoscopy and tracheal intubation. Anesth Analg 1989;68:603-8.
2. Khan ZH, Samadi S, Ameli S, Emir Alavi C. Lidocaine as an Induction Agent for Intracranial Aneurysm Surgery: A Case Series. Anesth Pain Med 2016;6:e33250.
3. Johnston KD, Rai MR. Conscious sedation for awake fibreoptic intubation: a review of the literature. Can J Anaesth 2013;60:584-99.
4. Moorthy SS, Gupta S, Laurent B, Weisberger EC. Management of airway in patients with laryngeal tumors. J Clin Anesth 2005;17:604-9.
5. Mulcahy HE, Kelly P, Banks MR, Connor P, Patchet SE, Farthing MJ, et al. Factors associated with tolerance to, and discomfort with, unsedated diagnostic gastroscopy. Scand J Gastroenterol 2001;36:1352-7.
6. Ross R, Newton JL. Heart rate and blood pressure changes

during gastroscopy in healthy older subjects. Gerontology 2004;50:182-6.

7. Fisher NC, Bailey S, Gibson JA. A prospective, randomized controlled trial of sedation vs. no sedation in outpatient diagnostic upper gastrointestinal endoscopy. Endoscopy 1998;30:21-4.
8. Kaeder CS, Hirshman CA. Acute airway obstruction: a complication of aluminum tape wrapping of tracheal tubes in laser surgery. Can Anaesth Soc J 1979;26:138-9.
9. Gupta B, Kohli S, Farooque K, Jalwal G, Gupta D, Sinha S. Topical airway anesthesia for awake fiberoptic intubation: Comparison between airway nerve blocks and nebulized lignocaine by ultrasonic nebulizer. Saudi J Anaesth 2014;8:S15-9.
10. Kumar MP, Patro M, Panigrahy S, Samal S, Kartheek BS. Comparison between intravenous dexmedetomidine and spray as you go with 4% lignocaine versus intravenous fentanyl and transtracheal injection of 4% lignocaine for awake nasotracheal intubation with flexible vedioscope–A randomized single-blind prospective study. Anesth Essays Res 2021;15:213-9.
11. Sinha S, Chakraborty S, Mondal A, Shaik ME, Ghosh B, Majumder D, et al. comparative study of nebulisation, airway nerve block and atomisation with lignocaine in topical airway anaesthesia for awake fibre-optic intubation. JEBMH 2019;6:1882-6.

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