

Comparing laryngeal view in neutral and sniff position during video laryngoscopy-guided intubation

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Abstract

Appropriate positioning of the head is a crucial step for a successful intubation. Laryngoscopy is a commonly used method to facilitate the intubation process. This study evaluated the quality of intubation and its difficulty in sniff and neutral position. This was a clinical randomized trial, conducted in 2021 in Aja university of medical sciences. 40 patients, meeting the inclusion criteria were randomly assigned to sniff and neutral group and were intubated with standard procedure. The required time, number of attempts, laryngeal view, cord status, and the need for maneuver were evaluated between the two positions. Overall, 60 patients were intubated in sniff and 60 in neutral position. 51 of them were male and 69 were female. The mean intubation time was $(17/15 \pm 8/00)$ and $(16/65 \pm 8/66)$ seconds in neutral and sniff position, respectively (p -value = 0.181). There was no statistically significant difference in the required time. Additionally, 45 patients were intubated in first attempt and 15 were intubated after the second attempt in each group. There was no difference in any difficulty-related parameter of the two groups. No significant difference between the required time, attempt, or any other parameter was detected between the sniff and neutral groups. Evidence suggests that there is no superiority regarding these two positions and the decision should be made by the physician on a case-by-case basis.

Key Words: Intubation; head position; laryngoscopy.

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Orotracheal intubation is an everyday challenge for anesthesiologists, in various neck, laryngeal or head conditions. Appropriate head and neck positioning is an important aspect of a successful intubation.¹ A complicated intubation with the multiple attempts yields to various traumas to the patient including lip, tongue, palate, teeth, and laryngeal trauma. Spinal cord is also an at-risk organ during the complicated intubations, as the vocal cords. Spinal cord trauma or multiple laryngeal stimulations can also yield to heart or respiratory rate alterations that can cause serious problems, as well.² Prolonged intubation and higher number of attempts can seriously increase these risks. Laryngoscopy is a facilitating process during intubation.³ The sniff position, defined as head extension and backward neck flexion, is traditionally considered as the golden position during intubation, because it can put the mouth, pharynx, and larynx in line.³ However, some studies suggest that the three organs are not always in line in sniff position.³ The findings besides the difficulty of positioning some patients, e.g., obese patients, is decreasing the popularity of sniff position among the anesthesiologists. Currently,

physicians prefer using video laryngoscopy in case of failure at the first attempt. Video laryngoscopy is a new approach in patients with failed first intubation attempt, including a video-laryngoscope with a camera at the distal of its blade, assisting the anesthesiologist for rapid intubation.⁴⁻⁶ Anyhow, successful video laryngoscopy-guided intubation (VL-I) is also dependent on appropriate positioning of the head and neck. As a result, inappropriate positioning yields to poorer outcomes also in VL-I.⁷ Various studies have aimed to evaluate different head and neck positions for VL-I. A study on the sniff and neutral position of 200 patients in VL-I using KingVision[®] and C-MAC[®] showed that the positions had similar difficulty in both devices, except for the laryngoscopy time.⁸ In contrast, a recent study has reported that glottal opening score is higher during VL-I in neutral position. However, the researchers claimed that the position did not affect the required time for intubation or the number of the required attempts.⁹ On the other hand, a multicentric study on sniff and simple extension position showed that patients in the sniff position had lower incidence of sore throat after. However, the researchers did not find any difference in the time,

Table 1. Demographic properties of the enrolled patients.

Variable	Intubation Position		p-value
	Sniff (N=60)	Neutral (N=60)	
Age (years)	34.75 (\pm 8.17)	35.6 (\pm 7.49)	0.476 ^a
Gender (Male)	30	21	0.097 ^b
BMI (kg/m ²)	24.87 (\pm 3.05)	25.12 (\pm 2.81)	0.569 ^a

a. Independent t Test; b. Chi Square Test.

number of attempts, other complications, or heart and respiratory rate alterations.¹⁰

Considering the diversity of the literature regarding the comparison of various positions during VL-I, this study aims to evaluate the sniff and neutral position of the head and neck on patients undergoing VL-I due to general anesthesia.

Materials and Methods

Study design

The present study was a randomized controlled trial conducted in Imam Reza Hospital, AJA University of Medical Sciences, Tehran, Iran. The methodology of the study was approved by the ethics committee of the AJA University of Medical Sciences with the ethics code IR.AJAUMS.REC.1400.217.

Inclusion and Exclusion criteria

Patients (18- to 70-year-old), receiving general anesthesia due to an elective surgery were included, after signing an informed consent. Patients not signing the written consent for undergoing VL-I were excluded as well as patients in need of awake or nasal intubation, those having oropharyngeal pathology or abnormality, cervical spine problem, pregnant women, and those with BMI higher than 40.

Data collection

Patients were monitored with electrocardiogram (ECG or EKG), Non-Invasive Blood Pressure (NIBP), pulse oximetry. They were randomly assigned to sniff or neutral position groups. After appropriate positioning, 500 cc of normal saline was infused to the peripheral intravenous (IV) access, as well as 0.01 mg/kg midazolam, 1.5 μ g/kg fentanyl, 4 mg/kg nesdonal, and 0.5 mg/kg atracurium. Patient were intubated using video laryngoscopy guide by a trained anesthesiologist after 3 minutes of oxygenation and the parameters were recorded.

Statistical analysis

Data were analyzed using descriptive statistics (mean), independent Mann-Whitney and chi-square. SPSS V.25

was used applied for statistical analysis. In all analyses, p-values less than 0.05 were considered significant.

Results

Overall, 120 patients were enrolled in this study, 60 intubated in sniff and 60 intubated in neutral position. The demographic data is shown in Table 1.

The mean intubation time was 16.65 (\pm 8.66) and 17.15 (\pm 8.00) seconds for the sniff and neutral position, respectively (p-value = 0.181). Details of intubation process are compared without significant differences in Table 2.

Discussion

Orotracheal intubation is an everyday challenge for the anesthesiologists, with multiple side effects and potential adverse events. The video laryngoscopy-guided intubation is a new approach for a faster intubation with less failed attempts and less trauma to the organs. However, appropriate positioning is a key for a successful intubation in both conventional laryngoscopy-guided intubation or the modern VL-I. The sniff position is traditionally known as the golden position for intubation but recent studies, besides the inconvenience of keeping the position in obese patients, have doubted this idea. This study evaluated the sniff and neutral head and neck position during VL-I in patients undergoing intubation for general anesthesia due to an elective surgery. Among the 120 patients, matching the inclusion criteria, 60 patients were intubated in either sniff or neutral position.

Park and colleagues (2019)⁹ captured pictures of the vocal cord view of 53 patients in both neutral and sniff positions. They reported that the sniff position improved the view in 31 patients, but made it worse in 13 of them. The researchers did not report any difference in the required intubation time in each position.⁹ Our results are consistent with the above study. The required intubation time was 16.65 (\pm 8.66) and 17.15 (\pm 8.00) seconds for the sniff and neutral position with no statistically significant difference (p-value = 0.181). Furthermore, no significant difference was reported in the view score of sniff and neutral positions (p-value = 1.000, Table 2).

Table 2. The intubation parameters among the sniff and neutral groups.

Variable	Intubation Position		p-value
	Sniff (N=60)	Neutral (N=60)	
Intubation Time (sec)	16.65 (± 8.66)	17.15 (± 8.00)	0.181 ^a
Attempts	First Attempt: 45 Second Attempt: 15	First Attempt: 45 Second Attempt: 15	1.000 ^b
Heart Rate Change (%)	8.35 (± 6.69)	8.45 (± 6.92)	0.923 ^a
Blood Pressure Change (%)	8.20 (± 6.54)	7.85 (± 6.13)	0.830 ^a
Cough	0	0	-
Laryngospasm	0	0	-
Cord Spasm	0	0	-
View Score	> 50%: 45 < 50%: 10 Epi: 5	> 50%: 44 < 50%: 13 Epi: 3	1.000 ^b
Need for Maneuver	17	15	1.000 ^b

a. Mann-Whitney U Test; b. Chi Square Test.

Another study on 70 patients compared the sniff and simple neck extension positions. The study showed that there was no difference in the Cormack score of the number of intubation attempts among the groups, but the intubation time was shorter in the simple extension group.¹¹⁻¹⁴ Accordingly, in the current study 45 patients were intubated at the first attempt, while 15 were intubated in the second attempt in each group. However, the intubation time was similar in the current study. The difference could be due to experience or training of the anesthesiologists. In this study heart rate change, blood pressure alteration, and need for maneuver were similar in both groups. No significant difference was seen among patients in sniff or neutral position. On the other hand, there are studies reporting higher incidence of sore throat in patients intubated in the sniff position.¹⁰ It is important to evaluate the non-immediate complications of the intubation, including sore throat or pneumonia in different positions. Low sample size is the main limitation of the current study. Furthermore, none of the immediate complications were recorded in either group. Larger samples can increase the chance of detecting potential complications. The intubations in the present study were performed by a single qualified anesthetist. However, the difficulty of intubation in each position by physicians with different levels of training needs to be evaluated in future studies. In conclusion, there seem to be no significant difference in the process of video laryngoscopy-guided intubation or its difficulty in sniff or neutral positions. Further studies are needed to evaluate the long-term effects and the differences among physicians with different training level.

List of acronyms

ECG - electrocardiogram
EKG - electrocardiogram
IV – intravenous
NIBP - Non-Invasive Blood Pressure
VL-I - video laryngoscopy-guided intubation

Contributions of Authors

UK, MRR, MA: Study conception and design. AM: Data collection. MA Data analysis and interpretation. MA, MN, AM: Drafting of the article. All authors participated in Critical revision of the Manuscript. All authors have read and approved the final edited typescript.

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Conflict of Interest

The authors declare no conflict of interests.

Ethical Publication Statement

We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

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