

## COMPARATIVE ASSESSMENT OF LARYNGOSCOPIC VIEW IN SNIFFING AND NEUTRAL POSITIONS

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### Abstract

Head positioning is an important factor for successful endotracheal intubation during general anesthesia. The sniffing position, i.e. lower cervical flexion and atlanto-occipital extension, has been regarded as the ideal position for direct laryngoscopy. In this study, the sniffing and neutral head positions were compared for the laryngoscopic view using Cormack–Lehane (CL) grading system.

This comparative study was a randomized study at POF Hospital, Wah Cantt from March to July 2026. The patients were randomly divided into two groups: Sniffing Position (Group A, n=55) and Neutral Position (Group B, n=55) of general anesthesia. Demographic data and airway parameters such as age, gender, BMI, ASA classification, Mallampati classification and neck mobility were noted. The data were analyzed using SPSS version 25, Chi-square test, and Independent Samples t-test.

There were no differences in baseline characteristics between the groups ( $p > 0.05$ ). The sniffing position group (60.0%) had more Grade I laryngoscopic view than the neutral position group (10.9%). The sniffing group had a higher proportion of patients with favorable laryngoscopic views (92.7% vs. 67.3% in the neutral group). The neutral group had more poor views (32.7% vs. 7.3%). The difference was highly significant ( $\chi^2 = 31.113$ ,  $p 0.001$ ). The sniffing position should be used when performing a direct laryngoscopy because it offers the best laryngoscopic views.

### INTRODUCTION

The head position is a crucial aspect of a successful intubation. Laryngoscopy is a frequent method of intubation. The researchers compared the success and difficulty of intubation in sniff and neutral position. The success of endotracheal intubation depends on having a good laryngoscopic view during direct and video laryngoscopy. The “sniffing position” has been suggested for many years as being the best head and neck position to

visualize the glottis because it aligns the oral, pharyngeal and laryngeal axes to facilitate this view.<sup>1,2</sup> But recent research has challenged the idea that the neutral head position might provide equally good or even superior laryngoscopic views, and intubation outcomes in some patients.<sup>1,3,4</sup>

Laryngoscopy refers to the process of visualizing or examining the larynx by diverting the upper airway structures, usually to facilitate tracheal

intubation and management of the airway in current anesthesia and critical care practice and many trauma situations<sup>1</sup>. Positioning of the head is an essential key step to a successful intubation. Laryngoscopy is a technique that is commonly used to help intubate. In this study, the quality of intubation and difficulty of the intubation was assessed in sniff and neutral position<sup>2</sup>. The successful intubation in the operating room or critical care setting relies largely on a good laryngoscopic view during either direct or video laryngoscopy<sup>2</sup>. The “sniffing position” has been a widely taught head and neck position for years in order to maximize glottic exposure<sup>2,3</sup> and line up the oral, pharyngeal and laryngeal axes. Recent studies, however, have challenged the notion that the neutral head position may be equivalent or superior to laryngoscopic views and intubation characteristics in some clinical situations<sup>2,4,5</sup>. There are standardized systems of laryngoscopic view for research and documentation in clinical settings.

**The most widely used is the Cormack-Lehane classification, which divides the view into four grades:**

Grade 1: full view of the glottis. Grade 2: partial view of the glottis. Grade 3: only the epiglottis is visible.

Grade 4: neither glottis nor epiglottis is seen<sup>6</sup>. A different numerical value is the Percentage of Glottic Opening (POGO) score, which indicates the percentage of the glottic opening that can be seen when the larynx is being examined by a laryngoscope (0 to 100%).<sup>7</sup> The higher the POGO score, or the lower the Cormack-Lehane grade, the better the visualization of the larynx and associated with easier, safer and more successful intubation<sup>6,7</sup>. The position of the head and neck on the operating table has a dramatic effect on the laryngoscopic view<sup>8,9</sup>, although the blade or camera is the first instrument to see the glottis. The goal of proper positioning is to position the oral, pharyngeal, and laryngeal axes parallel to each other to allow the operator to view the vocal cords along a straight or nearly straight line instead of around a sharp bend<sup>8,9</sup>.

Deviation from any of these axes may lead into a lack of visibility and repeated attempts, causing

trauma of the airway and prolonged apnea, potentially leading to hypoxia, aspiration and other complications<sup>9,10</sup>. Throughout the years the neutral position as well as a simple head extension and the sniffing position<sup>8,9</sup> have been described and compared with the head and neck positions. Often, the choice of position is dictated by the patient's anatomy, the clinical setting (OR vs ICU) and the laryngoscope used (direct Macintosh vs video-assisted)<sup>11,12</sup>. These positions have an important impact on the visualization of the larynx and understanding the effect of these positions is essential to evidence-based airway management<sup>11,13</sup>. The sniffing position is a traditional head and neck position which has been recommended as the best position for direct laryngoscopy<sup>8,9</sup>. In this position, a pillow or ramp is under the occiput (back of the head) to flex the neck and extend the head slightly at the atlanto occipital (back of head to neck) junction<sup>8,9</sup>. This posture is said to be in the likeness of someone snapping, and thus is called “sniffing position”<sup>9</sup>. The rationale behind the sniffing position is that it supposedly tends to align the oral, pharyngeal and laryngeal axes to improve exposure of the glottis and facilitate lifting of the epiglottis with the laryngoscope blade<sup>8,9</sup>. There are several landmark publications that show the sniffing position can lead to a better Cormack-Lehane grade and easier intubation than simple head extension, especially in certain types of patients, such as obese patients or those with restricted neck mobility<sup>8,10</sup>. The neutral position is more likely to resemble the anatomical neutral position of the head and neck, with the head and neck positioned almost parallel to the bed and minimal or no flexion or extension of the head and neck<sup>13</sup>. Practically, this may involve a low or absent pillow, and a cervical spine in a more straight or neutral position<sup>21</sup>. For instance, a recent randomized trial with fiberoptic bronchoscopy found that the neutral position improved the POGO score in many patients, but there were no significant differences in intubation time and difficulty between the neutral and sniffing positions<sup>7</sup>. Another randomized study comparing the sniffing and neutral positions when using video laryngoscopes

(KingVision® and C-MAC®) found no difference in intubation difficulty with small variation in time to laryngoscopy<sup>13</sup>. This indicates that the neutral position might also be as successful as the sniffing position at glottic view and intubation, especially in the use of modern video assisted tools<sup>7,13</sup>. Although these discoveries were made, there are still conflicting results and questions about the superiority of the sniffing position over the neutral position in terms of laryngoscopic view<sup>9,12</sup>. The ability of the sniffing position to provide superior view has been demonstrated with Macintosh-type direct laryngoscopes, but others have suggested that a neutral position is superior or at least equivalent in optical or channelled video laryngoscopes<sup>11,12,14</sup>.

## METHODOLOGY

The purpose of this randomized comparative study was to assess and compare the laryngoscopic view of in both positions. The study was conducted according to the ethical standards in place and informed written consent was obtained from all the patients included in the study before the beginning of the study. The study was conducted at POF Hospitals Wah Cant over a period of March 2026 to July 2026. A total of 110 were enrolled and subsequently divided into two positional groups:

Group A (n=55) Sniffing Position. Group B (n=55) Neutral Position.

Patients aged 18–90 years. Patients undergo surgery under general anesthesia. Patient with

sniffing or neutral position. Patients with Cormack–Lehane classification grade I and II were included in this study and Patients undergoing procedures under regional or local anesthesia, patients with respiratory disorder (e.g. asthma, COPD), pregnant or lactating female and Patient with Cormack–Lehane classification iii and iv were excluded from this study.

All selected patients were assessed preoperatively, and relevant demographic and airway-related variables were recorded before the procedure. Patients were then observed during laryngoscopy, and the laryngoscopic view was assessed in the assigned head position according to the study protocol. The airway view obtained during laryngoscopy was graded using the Cormack–Lehane grading system. Data were collected through a slightly modified predesigned Performa. Patients undergoing general anesthesia were monitored perioperatively, and baseline airway assessment findings were recorded, including Mallampati score, ASA physical status, and neck mobility. Relevant demographic details such as age, gender, weight, and BMI were also documented. The position used during laryngoscopy and the corresponding Cormack–Lehane grade were recorded for each patient. The study will be conducted after successful approval from institutional ethical committee and ethical approval from University of Haripur. Data analysis will be done through SPSS 25th version and M.S. EXCEL 2024. Descriptive statistics, Chi square test, and Independent Sample T-test will be used for statistical analysis.

## RESULTS

**Table 1: Comprehensive Summary of Statistical Results**

Variable	Sniffing (n=55)	Neutral (n=55)	Chi <sup>2</sup>	p-value
Mallampati I+II (%)	63.6%	72.7%	3.845	0.279
Neck Mobility (%)	80.0%	85.5%	0.254	0.614
Grade I	33 (60.0%)	6 (10.9%)		
Grade II	18 (32.7%)	31 (56.4%)	31.113	0.001
Grade III	3 (5.5%)	12 (21.8%)		
Grade IV	1 (1.8%)	6 (10.9%)		
Favourable (I+II)	51 (92.7%)	37 (67.3%)	9.602	0.002

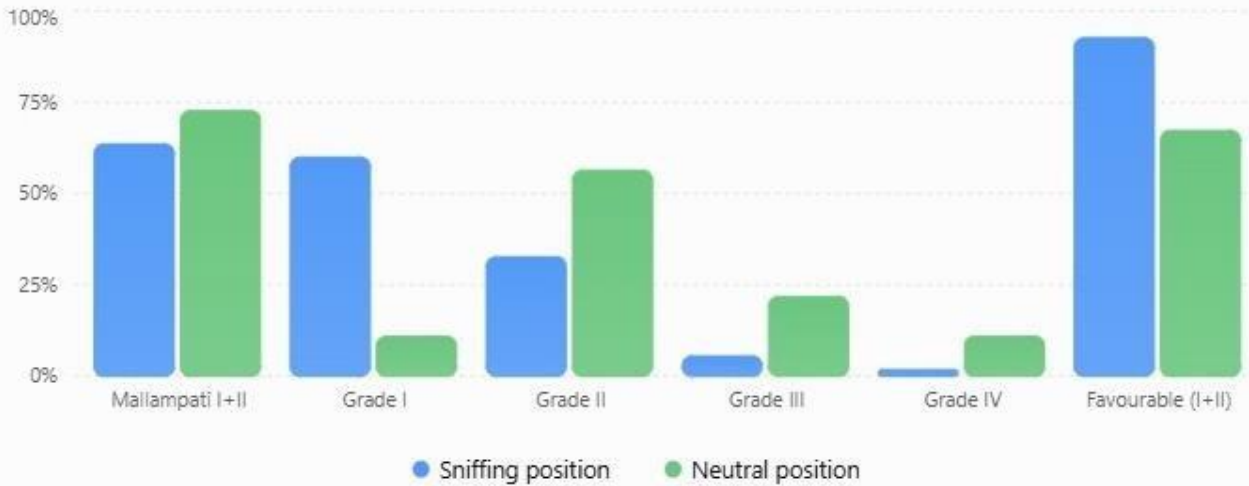
The results of the baseline demographics, airway assessment parameters and primary laryngoscopic findings are shown in Table:1 and a detailed statistical comparison is performed between the Sniffing position and Neutral position groups. The baseline parameters such as gender, ASA physical status, mallampati score, and neck mobility had no statistically significant difference between the two groups with all the p values > 0.05. This means that, at the outset, both groups were similar and that these variables would not be expected to affect the final laryngoscopic result.

However, there was a significant difference between the distribution of the Cormack–Lehane (CL) grades between these two positions. The Sniffing position had a significantly greater number of Grade I laryngoscopic view (60.0%) than the Neutral position (10.9%). Likewise, the percentage of good laryngoscopy views (Grade I +

II) was significantly higher in the Sniffing group (92.7%) compared with the Neutral group (67.3%). However, poor laryngoscopic views (Grade III + IV) were more common in the Neutral position indicating a relatively more difficult laryngoscopic view in that group.

There was a very significant difference between the two groups in the overall distribution of their CL grades ( $\chi^2 = 31.113$ , p 0.001), and a significant difference between the two groups in terms of the favorable versus unfavorable views ( $\chi^2 = 9.602$ , p = 0.002). The results of this study clearly showed that Sniffing position allowed for a much more favorable laryngoscopic view during direct

laryngoscopy than the Neutral position and was also correlated with a greater success rate of an easy and favorable intubating view.



**Figure 1: Comparison of laryngoscope outcomes in Sniffing and Neutral position**

This grouped bar chart compares the Sniffing and Neutral position groups with regard to the results of airway assessments and laryngoscopy. The percentages of Mallampati I+II were relatively similar in both groups along with neck mobility, which indicated similar baseline airway characteristics. But there was a clear difference in the Cormack–Lehane grades. The Sniffing position had a much higher proportion of Grade I views (60.0%) than the Neutral position (10.9%), which was related to increased glottic

visualization. In contrast, the Neutral group had higher frequencies of Grade II, Grade III, and Grade IV views (poorly exposed laryngoscopy). Similarly, the Sniffing group had significantly more favourable laryngoscopic views (Grade I + II) than the Neutral group (92.7% vs 67.3%). The entire bar chart illustrates that during direct laryngoscopy the Sniffing position gives a better laryngoscopic view than the Neutral position.

## DISCUSSION

A total of 110 patients were included in this study, of which 55 were in Sniffing Position and 55 were in the Neutral Position. During direct laryngoscopy, the Cormack-Lehane (CL) grade was assessed to assess the quality of laryngeal visualization. Both groups were similar with no significant differences between them in baseline characteristics ( $p > 0.05$ ): age, gender, BMI, ASA status, Mallampati classification, and neck mobility. A homogeneity of demographics and clinical variation in this study further supports the validity of the study design, excluding confounding parameters and allowing for differences in laryngoscopic views to be attributable only to differing head positions.

Some important predictors of airway difficulty are Mallampati classification and neck mobility. In the present study, both variables were also evenly distributed between both groups, making it unlikely that differences in airway anatomy affected the observed results. Thus the improved laryngoscopic view in Sniffing Position is definitely due to the positioning technique.

The conclusion of this study was that the Sniffing Position, which is the head position used for the laryngoscopy, led to significantly better laryngoscopic visualization than the Neutral Position. The Sniffing Position allowed grade I laryngoscopic view in 60.0% of the patients whereas the Neutral Position did so in 10.9%. In addition, 92.7% of the patients in the Sniffing Position had favorable laryngoscopic views (Cormack-Lehane Grades I or II) compared with 67.3% of patients in the Neutral Position. However, the poor laryngoscopic views (Grade III and IV) were more frequent in Neutral Position group (32.7%) than in Sniffing Position group (7.3%). These results suggest that the Sniffing Position significantly enhances glottic exposure and makes direct laryngoscopy easier.

Our results coincide with those of Chauhan et al. who showed a significant improvement in glottic visualization and easier intubation in patients intubated in the sniffing position versus general head extension<sup>15</sup>. In the same way, Pal et al. reported better Cormack-Lehane grades and less intubation difficulty scores for patients intubated

in the 'sniffing position', suggestive of improved success and ease of endotracheal intubation. The findings of the present study are similar to these findings and support further the use of sniffing position in routine, direct laryngoscopy<sup>16</sup>.

Takenaka et al. also tested the efficacy of sniffing position in adult surgical patients, and the present findings are consistent with this previous report. They found no significant difference in the overall distribution of CL grades, but the sniffing position significantly decreased intubation difficulty and increased the ease of tracheal intubation. In this context, even if the difference in laryngoscopic grading is not significant, the sniffing position could offer practical clinical benefits during airway management<sup>17</sup>.

Furthermore, Park et al. have shown that sniffing position better visualized the larynx and provided glottic exposure in Direct laryngoscopy. They concluded patient positioning is crucial for maximizing airway alignment and facilitating intubation. When compared to the results of the present study, the consistency of their results with the results of the present study further supports their claim that sniffing position is superior<sup>18</sup>.

Physiological explanation for these findings is based on axis of the airways. Sniffing position is a combination of cervical flexion plus extension at the atlanto-occipital joint and provides superior alignment of the oral, pharyngeal and laryngeal axes. This orientation will give a more direct line of sight to the glottis, which will facilitate laryngoscopic visualization. The neutral position, on the other hand, does not optimize airway alignment and frequently provides a less desirable laryngoscopic view. In clinical situations, poor laryngoscopic views are linked with an increased difficulty during intubation, longer time for airway manipulation, hypoxia and airway damage. Thus, to ensure safe and effective airway management, it is necessary to achieve a favorable laryngoscopic view.

This study, although successful, had certain limitations. First, it was done at one tertiary care center, so that the results may not be generalizable to other centers and patients. Secondly, the evaluation of the Cormack-Lehane grade is subjective and can be subject to inter-

observer variation. Third, the experience and skill of the anaesthetist conducting laryngoscopy was not standardised, this could have influenced the grading of the laryngoscopic views. In addition, patients with extreme obesity, severe cervical spine disease and patients with expected difficult airways were not analyzed individually. Lastly, the study did not assess video laryngoscopy or other advanced airway devices, so the results of the study cannot be directly translated to those devices.

The Sniffing Position should be the recommended head position during direct laryngoscopy and tracheal intubation in routine anesthetic practice, according to the results of this study. Larger sample sizes in future multicenter investigations are advised to validate these results and enhance their generalizability. The efficacy of the sniffing posture in high-risk groups, such as obese patients, patients with limited neck mobility, and people with Mallampati Class III or IV airways, should be further studied. The relevance of patient placement in contemporary airway treatment may be better understood through comparative research using video laryngoscopy.

## CONCLUSION

The study's findings unequivocally show that, when performing direct laryngoscopy, the Sniffing Position offers a noticeably better laryngoscopic view than the Neutral Position. In contrast to just 67.3% in the Neutral group, 92.7% of patients in the Sniffing group had a favorable opinion (Grade I+II). Poor views were 4.5 times more common in the Neutral posture, and Grade I sights were 5.5 times more common in the Sniffing position. The statistical significance of this difference was considerable ( $\text{Chi}^2 = 31.113$ ,  $p 0.001$ ). This improvement in laryngoscopic view can only be attributed to the head position because other baseline characteristics were equal in both groups. Therefore, the Sniffing Position is recommended as the standard and preferred head position for direct laryngoscopy and tracheal intubation, as it optimizes laryngoscopic view, improves intubation success rate, and ultimately enhances

patient safety during airway management.

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