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Comparison of Mean Time to Endotracheal Intubation with 25° Back-Up Position with Horizontal Supine Sniffing Position in Patients Undergoing Elective Surgery



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ABSTRACT

Background: Endotracheal intubation using rapid sequence intubation (RSI) is the cornerstone of emergency airway management. The decision to intubate is sometimes difficult. Clinical experience is required to recognize signs of impending respiratory failure. The horizontal supine sniffing position for intubation aligns the oral axis with pharyngeal and laryngeal axis allowing the line of sight on the glottis. Several methods exist to quickly assess the probability of success during tracheal intubation. **Objective:** To compare the meantime to intubation with 25° back-up position with horizontal supine sniffing position in patients undergoing elective surgery **Material & Methods Study Design:** Randomized control trial **Setting:** DHQ Teaching Hospital Gujranawala DHQ Teaching Hospital Sargodha **Duration:** June 2019 to Dec 2019 **Data collection:** After meeting the inclusion criteria (Age between 20 to 60 year, ASA1 & 2, Elective surgeries) 200 patients were enrolled. The patients with BMI>30kg/m², difficult intubation, emergency surgery were excluded from the study. Then patients were randomly divided into two groups. Group A managed with 25° back-up position and group B with horizontal supine sniffing position. Direct laryngoscopy was performed using an adult Macintosh blade. The time between the beginning of laryngoscopy and detection of end-tidal CO₂ after the successful placement of the endotracheal tube was recorded. **Results:** In 25° back-up group the meantime of intubation was 23.84±2.004 seconds while in control group was 26.82 ± 2.64 seconds (p-value<0.05). **Conclusion:** Intubation with 25° back-up position increases the ease of intubation than to intubation in horizontal supine sniffing position.

INTRODUCTION:

The horizontal supine sniffing position for intubation aligns the oral axis with pharyngeal and laryngeal axis allowing the line of sight on the glottis.¹ This position has been traditionally considered to be the optimal head position for direct laryngoscopy and is preferred by most anesthetists. However, in conjunction with alignment of the relevant anatomical structures, it is important that the intubating anesthesiologist's line of sight falls easily and comfortably on the glottic aperture.

The back-up position achieved by flexion of the torso at the hips was described by Chevalier Jackson almost a century ago; such a position may improve the line of sight for anaesthetist standing behind the patient's head.² In a 25° back-up position less force is required to elevate and move the tongue and other tissues out of the line of sight³.

In clinical practice, the back-up position has been successfully used in obese surgical patients.^{4, 5} It has shown to improve efficiency of pre-oxygenation and so increase in the duration of apnoea period during intubation.^{6, 7} Consequently, if the back-up position aids glottic views in situations where intubation is anticipated to be difficult, using such a position routinely may also be advantageous if it aids to bring the line of sight onto the glottis more easily.

In a study that included seven hundred eighty one patients scheduled for non-emergency surgery, the time from beginning of laryngoscopy to insertion of tracheal tube was 14% shorter (median time 24+3s versus 28+3s, p=0.031) in the back-up position⁸.

The aim of this study is to test whether a 25°back-up position improves laryngeal views and makes intubation easier as compared to the standard horizontal sniffing position in our population.

MATERIALS AND METHODS:

After approval of Hospital ethical Committee and taking informed consent, two hundred patients undergoing elective surgery and fulfilling the inclusion criteria were recruited in the study. The demographic information of each patient was recorded along with their baseline hemodynamic indices. The patients were randomly allocated into 2 groups using random numbers. The patients in both groups were given midazolam (0.02 mg/kg IV) as

premedication. Standard ASA monitoring was applied to all patients such as continuous electrocardiography (ECG), pulse oximetry, capnography, and noninvasive blood pressure. General anaesthesia was standardized in both groups using propofol (1.5-2 mg/kg), Atracurium (0.5 mg/kg) and Tramadol (1 mg/kg).

Group A: Patients in group A undergo intubation in 25°back-up position (n=100) which was accomplished by flexion of the operating table at the hips.

Group B: Patients in group B undergo intubation in horizontal supine sniffing position (control group) (n=100)

Direct laryngoscopy was performed using an adult Macintosh blade (size 3 or 4) by trained anaesthesiologist. The time between the beginning of laryngoscopy and detection of end-tidal CO₂ after the successful placement of the endotracheal tube was recorded. Anaesthesia was maintained with Isoflurane and FiO₂ of 40%. At the end of surgery, all patients were shifted to post-anaesthesia care unit.

Data Analysis:

The data collected was analyzed using SPSS version 20. Statistics was calculated to examine the comparability of both groups. Age and time to endotracheal intubation were presented as mean + Standard Deviation. Groups were compared for the outcome of difference in mean time to intubation by applying t-test. A p-value of <0.05 was considered as significant. Data was stratified for age and gender. Post-stratification t-test was applied and p-value <0.05 was considered significant.

RESULTS:

Total 200 patients were enrolled in this study. In 25°back-upgroup the mean age of the patients was 41.40±12.24 years while in control group the mean age of the patients was 43.59±12.53 years. **Table 1**

In 25°back-upgroup 61(49.2%) patients were male and 39(51.3%) were females. Similarly in control group, 63(50.8%) patients were male and 37(48.7%) were females. **Table 2**

In 25°back-upgroup the meantime of intubation of the patients was 23.84±2.004 seconds while in control group the meantime of intubation of the patients was 26.82±2.64 seconds. This difference was statistically significant i.e. (p-value=<0.001). **Table 3**

There is statistically significant difference was found between the comparison of meantime intubation and study group stratified by age & gender i.e. p-value<0.05. **Table 4**

Table No. 1: Summary statistics of age (years) between study groups

		Study Groups	
		25°back-up	Control Group
Age (years)	n	100	100
	Mean	41.40	43.59
	Std. Deviation	13.34	12.53
	Std. Error Mean	1.33	1.25

Table No. 2: Frequency distribution of gender between study groups

		Study Groups		Total
		25°back-up	Control Group	
Sex	Male	61 49.2%	63 50.8%	124 100.0%
	Female	39 51.3%	37 48.7%	76 100.0%
Total		100 50.0%	100 50.0%	200 100.0%

Table No. 3: Comparison of time of intubation (seconds) between study groups

		Study Groups		p-value
		25°back-up	Control Group	
Time of intubation (seconds)	n	100	100	<0.001
	Mean	23.84	26.82	
	Std. Deviation	2.004	2.64	

Table No. 4: Comparison of time of intubation (seconds) between study groups stratified by age and gender

		Study Groups	Time of intubation (seconds)		p-value
			Mean	Standard Deviation	
Age (Years)	≤40	25°back-up	24.12	2.076	<0.001
		Control Group	26.64	2.62	
	>40	25°back-up	23.56	1.907	
		Control Group	26.95	2.66	
Gender	Male	25°back-up	23.80	1.96	<0.001
		Control Group	26.95	2.50	
	Female	25°back-up	23.89	2.087	
		Control Group	26.59	2.87	

DISCUSSION:

This present randomized control trial was carried out in the operation theaters of DHQ Teaching Hospital Gujranawala and DHQ Teaching Hospital Sargodha to compare the meantime to intubation with 25° back-up position compared to horizontal supine sniffing position in patients undergoing elective surgery.

Glottis visualization is key to the success of direct laryngoscopy and intubation. Optimal position of the patient's head and neck at the time of laryngoscopy and intubation can improve the outcome.⁹ Various studies in the last decade have challenged the need for sniffing position during intubation. One such study by Schmitt and Mang found that elevating the head higher than what is needed for a conventional Sniffing position may improve laryngeal exposure in some patients¹⁰.

In this study in 25° back-up group, the meantime of intubation of the patients was 23.84±2.004 seconds while in control group the meantime of intubation of the patients was 26.82±2.64 seconds. So according to this study 25°back-up group showed significant ease of intubation than to control group, i.e. p-value<0.05. Some of the studies are discussed below showing their results in favor of our study and few showed contrary results.

Lee et al. examined laryngeal exposure in the head-flat position and the 25° backup position in 40 non obese adult patients³. The authors reported an improvement in the POGO score from 42.2% in the head-flat position to 66.8% in the backup position. However, glottic exposure alone may not be a complete representative for intubation difficulty.

In a study that included seven hundred eighty one patients scheduled for non-emergency surgery, the time from beginning of laryngoscopy to insertion of tracheal tube was 14% shorter (median time 24+3s versus 28+3s, $p=0.031$) in the back-up position⁸.

The back-up position achieved by flexion of the torso at the hips was described by Chevalier Jackson almost a century ago²; such a position may improve the line of sight for anaesthetist standing behind the patient's head. In a 25° back-up position less force is required to elevate and move the tongue and other tissues out of the line of sight. Comparing the two positions, mean POGO scores increased significantly from 42.2 (27.4)% in supine position to 66.8 (27.6)% in 25 degrees back-up position ($P < 0.0001$). During laryngoscopy, the laryngeal view, as assessed by POGO scores, improves significantly in the 25 degrees back-up position when compared with the flat supine position³.

In clinical practice, the back-up position has been successfully used in obese patients^{4, 5} and shown to improve efficiency of pre-oxygenation and so increase the duration of 'safe' apnoea during intubation⁷.

Sniffing position is traditionally considered as a standard position for intubation. Horton et al. measured the angle of neck flexion in standard Sniffing position¹¹. The mode value of angle was 35° to the horizontal.

In a cadaveric study, Levitan suggested that increasing elevation of the head (relative to the horizontal) may reduce the required directional force along the laryngoscope handle and improve the operator's line of sight down the laryngoscope blade¹².

Lebowitz and others concluded that shoulder and head elevation by any means that brings the patient's sternum onto the horizontal plane of the external auditory meatus and maintains or improves laryngoscopic view significantly more often than it hinders it¹³.

One more study by N Khandelwal et al showed that based on the data from elective surgical patients, positioning patients in a back-up head-elevated position for preoxygenation and tracheal intubation can improve patient safety¹⁴.

On the other hand Akhtar et al. showed that simple head extension was associated with increased difficulty in intubation as compared to the sniffing position.¹⁵ A similar study by Ambardekar et al evaluated sniffing position and simple head extension and found that

laryngoscopy was difficult in 1.67% in sniffing position and 5.67% in simple head extension, hence concluding that sniffing position improves laryngoscopic view¹⁶.

CONCLUSION:

Our study concluded that the endotracheal Intubation with 25° back-up position increases the ease of intubation as compared to intubation in horizontal supine sniffing position.

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