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Сравнительное исследование сложности интубации трахеи в положении пациента, «вдыхающего утреннюю свежесть» и при сгибании головы под углом 25 градусов

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РЕЗЮМЕ

Введение. Процедура эндотрахеальной интубации является неотъемлемой частью современной медицины, она необходима для оказания неотложной помощи, проведения хирургических вмешательств и элементов интенсивной терапии.

Цель. Оценить влияние положения со сгибанием головы под углом 25° на обзор голосовой щели и сложность интубации по сравнению с классическим положением пациента, «вдыхающего утреннюю свежесть». Пациентам проводили общую анестезию с интубацией трахеи.

Материалы и методы. Сравнительное клиническое исследование проведено в военном госпитале Аль-Хуссейн (Багдад, Ирак) в период с 1 января 2022 г. по 1 января 2023 г. В исследование включены 150 пациентов в возрасте 18–60 лет, I или II класса по ASA, которым проводили плановую операцию в условиях общей анестезии. Эти пациенты были распределены на 2 группы. В группу «А» включены 75 пациентов, которым интубацию трахеи проводили в положении «вдыхающего утреннюю свежесть». Группа «В» состояла из 75 пациентов, которым интубацию проводили в положении со сгибанием головы под углом 25°.

Результаты. Не было выявлено существенной разницы между сравниваемыми положениями в отношении необходимости использования дополнительных маневров и вспомогательного оборудования (p = 0,583 и p = 0,151 соответственно). Обзор голосовой щели был значительно лучше при сгибании головы под углом 25° в соответствии с критерием Кормака–Лихана (p = 0,001), и при значительно меньшей сложности интубации в соответствии со шкалой сложности интубации (p = 0,008). Среднее время интубации в положении со сгибанием головы под углом 25° меньше по сравнению с положением «вдыхающего утреннюю свежесть».

Заключение. Исходное положение со сгибанием головы под углом 25° лучше, чем положение «вдыхающего утреннюю свежесть» с точки зрения визуализации голосовой щели, сложности интубации и времени интубации. Возраст, пол и индекс массы тела не оказывают существенного влияния на визуализацию голосовой щели в обоих положениях пациента.

Ключевые слова: интубация трахеи, обзор голосовой щели, сравнительное клиническое исследование, ларингоскопия

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Comparative study of the difficulty of endotracheal intubation in sniffing and 25-degree backup positions

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ABSTRACT

Introduction. The endotracheal intubation procedure is integral to modern medicine and essential to emergency care, surgical practice and intensive care procedures.

The **objective** was to evaluate the effect of the 25° backup position on glottic view and difficulty of intubation compared to the sniffing position in adult patients receiving general anaesthesia with endotracheal intubation

Materials and methods. The comparative clinical study was conducted in Al-Hussain Military Hospital, Baghdad, Iraq during the period from 1st of January 2022 to 1st of January 2023. A convenient sample of 150 patients who aged 18–60 years, were classified according to the American Society of Anesthesiologists as I or II, and underwent elective surgery under general anaesthesia was included in this study. These patients were allocated into two groups. Group A consisted of 75 patients who were anaesthetized in the sniffing position. Group B consisted of 75 patients who were anaesthetized in 25° backup position.

Results. There was no significant difference between the sniffing position and 25° backup position regarding the number of patients who needed ancillary manoeuvres and ancillary equipment (P-values were 0.583 and 0.151, respectively). The glottic view was significantly better in the 25° backup position than the sniffing position according to the Cormack–Lehane ($p = 0.001$) with a significantly lower difficulty in intubation according to the intubation difficulty scale ($p = 0.008$).

Conclusion. The 25° backup position is better than the sniffing position in glottic visualization, the difficulty of intubation and the time of intubation. Age, gender, and body mass index have no significant effects on the visualization of the glottis between the 25° backup position and the sniffing position. There was no significant difference between two regarding the number of patients who needed ancillary manoeuvres and ancillary equipment. The glottic view is significantly better in the 25° backup position than sniffing position according to the Cormack–Lehane. The mean of the time of intubation is lower in the 25° backup position compared to the sniffing position.

Key words: endotracheal intubation, glottic view, comparative clinical trial, laryngoscopy

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Introduction

Maintenance of a patent airway is a fundamental responsibility of an anesthesiologist; tracheal intubation remains one of the commonest means of establishing patent airway [11]. The endotracheal intubation procedure is integral to modern medicine and essential to emergency care, surgical practice and intensive care procedures [3]. It is usually a semi-urgent procedure. Before attempting intubation, a brief «pre-assessment» of the patient should be performed including numerous anatomic and clinical aspects and covering any potential airway difficulties, aspiration risk, and concomitant disorders in the identification of potentially difficult laryngoscopy [6, 7].

For direct laryngoscopy, the epiglottis is an important marker [2]. The hyoepiglottic ligament, which suspends the epiglottis from the hyoid bone, is pressed up against the laryngoscope blade when it is in the vallecula [5].

Various techniques and airway adjuncts have been proposed to help improve the safety profile of emergent endotracheal intubation including patient position to help facilitating oxygenation and ventilation. One of the most important components of successful laryngoscopy and endotracheal intubation is good patient positioning [14]. Proper positioning of the head is essential for optimal laryngeal visualization during direct laryngoscopy [1].

Sniffing position has been commonly advocated as a standard head positioning for direct laryngoscopy which is achieved by flexion of the neck on the chest and extension of the head at the atlanto-occipital joint [12]. Although, the superiority of the sniffing position for laryngoscopy has been questioned. The sniffing position does not achieve alignment of the axes of the mouth, pharynx, and larynx in awake subjects [11].

The 25° back-up position achieved by flexion of the torso at the hips was described by Chevalier Jackson almost a century ago [12]. The head and shoulders are elevated above the lower body and may also include approximating the ear and sternal notch in the same horizontal plane or the sniffing position [10]. The 25° back-up position may improve the line of sight for the anesthesiologist standing behind the patient's head. There is currently equipoise regarding the impact of ramped positioning on laryngeal views and endotracheal intubation success [10, 12].

The objective of the study was to evaluate the effect of the 25° backup position on glottic view and difficulty of intubation compared to the sniffing position in adult patients receiving general anaesthesia with endotracheal intubation.

Materials and methods

The comparative clinical study was conducted in Al-Hussain Military Hospital, Baghdad, Iraq during the period from 1st of January 2022 to 1st of January 2023. A convenient sample of 150 patients who aged 18–60 years, were classified according to the American Society of Anesthesiologists as I or II, and underwent surgery under general anaesthesia was included in this study. These patients were allocated into two groups with randomization and matching regarding age and body mass index: a) group A: consisted of 75 patients who were anaesthetized in the sniffing position; b) group B: consisted of 75 patients who were anaesthetized in the 25° backup position.

Age and gender were recorded in addition to the examination of weight and height for each patient before admission to the operating room. According to the weight and height, the body mass index (BMI) was calculated according to the formula: BMI = weight (Kg) / hieght (m^2) [13].

After the induction of anaesthesia, the entire group A patients were in the sniffing position. Group B patients were placed in the 25° backup position. The glottic visualization during laryngoscopy using a modified Cormack-Lehane classification without external laryngeal manipulation [12], and the difficulty of intubation using the intubation difficulty scale were measured (it is the sum of N1 to N7. Score 0 = no difficulty at all. Score 1–5 = mild difficulty. Score > 5 = moderate to severe difficulty [13]. In addition, the intubation time and the use of ancillary manoeuvres and equipment including was recorded for each patient.

Statistical analysis. The data was entered and analyzed by the statistical package of social science (SPSS), version 22. Descriptive data were presented as frequencies and percentages and were applied to explain the characteristics of participants. Continuous data were presented as mean and standard deviation. The study groups were compared by t-test and Chi-Square test for statistical significance. A P-value less than 0.05 was considered statistically significant.

Ethical approval and informed consent. Written informed consent was obtained from each patient before their enrollment. The study was conducted under the principles of the Declaration of Helsinki.

Results

A total of 150 patients were enrolled in the current study. There was no significant difference between the study groups regarding age, gender, and body mass index (table 1).

There was no significant difference between the sniffing position and 25° backup position regarding the number of patients who needed ancillary manoeuvres and ancillary equipment ($p = 0.583$ and 0.151, respectively), although a lower number was recorded in the 25° backup position, as shown in table 2.

The glottic view was significantly better in the 25° backup position than sniffing position according to the Cormack-Lehane ($p = 0.001$) with a significantly lower difficulty in intubation according to the intubation difficulty scale ($p = 0.008$), as shown in table 3.

The mean of the time of intubation was significantly lower in the 25° backup position compared to the sniffing position ($p < 0.001$), as shown in figure.

Table 1. **Distribution of age, gender, and body mass index according to the study groups**

Variables		Groups		Total	*p*-value
		Sniffing position N (%)	25° backup position N (%)		
Age group	< 30	18 (24.0)	14 (18.7)	32 (21.3)	0.262
	30–39	30 (40.0)	40 (53.3)	70 (46.7)	
	40–60	27 (36.0)	21 (28.0)	48 (32.0)	
Gender	Male	67 (89.3)	65 (86.7)	132 (88.0)	0.615
	Female	8 (10.7)	10 (13.3)	18 (12.0)	
BMI, kg/m^2	Normal weight (19.5–24.4)	32 (42.7)	41 (54.7)	73 (48.7)	0.142
	Obese (≥ 24.5)	43 (57.3)	34 (45.3)	77 (51.3)	

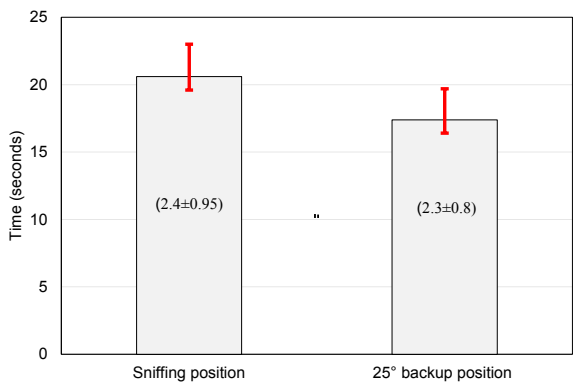
Table 2. **Ancillary manoeuvres and ancillary equipment needed in the study groups**

Ancillary types		Groups		Total	*p*-value
		Sniffing position N (%)	25° backup position N (%)		
Ancillary Manoeuvres	Yes	56 (74.7)	53 (70.7)	109 (72.7)	0.583
	No	19 (25.3)	22 (29.3)	41 (27.3)	
Ancillary Equipment	Yes	57 (76.0)	49 (65.3)	106 (70.7)	0.151
	No	18 (24.0)	26 (34.7)	44 (29.3)	

Table 3. **Glottic visualization scores**

Glottic visualization scores		Groups		Total	P-value
		Sniffing position N (%)	25° backup position N (%)		
Cormack-Lehane	Grade I	42 (56.0)	60 (80.0)	102 (68.0)	0.001
	Grade II	20 (26.7)	15 (20.0)	35 (23.3)	
	Grade III	8 (10.7)	0 (0.0)	8 (5.3)	
	Grade IIII	5 (6.7)	0 (0.0)	5 (3.3)	
Intubation difficulty scale	0	48 (64.0)	54 (72.0)	102 (68.0)	0.008
	1–5	18 (24.0)	21 (28.0)	39 (26.0)	
	> 5	9 (12.0)	0 (0.0)	9 (6.0)	

N o t e: Chi-Square test.



Time of intubation

Discussion

Optimization of the patient's head and neck position for the best laryngeal view is the most important step before laryngoscopy and intubation [4]. This study was among others that tried to evaluate the different positions during endotracheal intubation.

The first finding of the current study was no significant difference between the study groups regarding the number of patients with needed ancillary laryngeal manoeuvres or ancillary equipment. In agreement, a systematic review and meta-analysis study reported that there were no differences found between sniffing and 25° backup positions [14]. In contrast, another study revealed that the number of patients who needed was significantly lower in the 25° backup position compared to the sniffing position [13].

In the current study, the glottic view was significantly better in the 25° backup position than the sniffing position with significantly lower difficulty intubation. This agreed with the results of the metanalysis study included seven studies and revealed that ramping position benefits surgical patients undergoing endotracheal intubation by improving laryngeal exposure [15]. The same results were obtained in another study that was done by B. J. Lee et al. [8]. In agreement, Nandhakumar et al. revealed that the 25° backup position was significantly associated with between glottic view and less difficult intubation [9].

In contrast, another study revealed that no significant difference was obtained between the sniffing position and the 25° backup position regarding the glottic view and difficulty of the intubation [13].

The current study revealed that the time of intubation was significantly lower in the 25° backup position compared to the sniffing position. The same

results were obtained in another study that was done by J. Nandhakumar et al. [9]. These results agreed with another study that was done by R.M. Reddy et al. [12].

Conclusion

The 25° backup position is better than the sniffing position in glottic visualization, the difficulty of intubation and the time of intubation. Age, gender, and body mass index have no significant effects between the 25° backup position arm and the sniffing position. There was no significant difference between two regarding the number of patients who needed ancillary manoeuvres and ancillary equipment. The glottic view is significantly better in the 25° backup position than sniffing position according to the Cormack-Lehane. The mean of the time of intubation is lower in the 25° backup position compared to the sniffing position.

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Conflict of Interests. The author state that they have no conflict of interests.

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