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EFFECTS OF POSITION AND PHONATION ON OROPHARYNGEAL VIEW AND CORRELATION WITH LARYNGOSCPIC VIEW

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ABSTRACT
Objective: To evaluate the effects of phonation and various head and body positions on oropharyngeal view (Mallampati score), and the correlation of these with laryngoscopic view, using the Cormack and Lehane score.

Methodology: Four hundred (390) consecutive patients were evaluated in the wards during preoperative anaesthetic review. During airway assessment, the patients were placed in various head and body positions to determine oropharyngeal structures visualized , with and without phonation, according to the Mallampati test score. In the operating theatre, laryngoscopic view scores (according to Cormack and Lehane) were recorded, and the various scores analyzed.

Results: Phonation consistently improved the Mallampati scores in all the head and body positions. The scores were better in the supine position compared to the sitting position. The best correlation of the Mallampati score with the Cormack and Lehane score was in the siiting, head maximally extended position, without phonation. Extention of the head improved the score in the sitting position, but not in the supine position. Phonation reduced the correlation of the scores in all the positions.

Conclusion: We conclude that the best position to conduct the Mallampati test is sitting, head maximally extended, without phonation.This correlated best with laryngoscopic view score in our study.

Key Words: Oropharyngeal view, Mallampati test, phonation, position, Cormack and Lehane score.
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INTRODUCTION
Difficulty with airway management, especially during tracheal intubation is a major cause of morbidity and mortality in anaesthesia practice [1]. In 1985, Mallampati and colleagues proposed a classification system (Mallampati score) to correlate the view of the oropharyngeal space with the view of direct laryngoscopy and tracheal intubation [2]. They classified the airway according to the visible structures on oropharyngeal inspection. Mallampati et al. [2] described three classes, while Samsoon and Young described a fourth class [3]. Both the Mallampati and Samsoon and Young assessments were performed with the patient in the sitting position, head held in the neutral and sniffing positions respectively, the mouth maximally opened and tongue maximally protruded without phonation and eyes held level with the observer.

During clinical practice, situations may arise in which it may not be convenient or advisable for the patient to sit up for assessment of the airway. Moreover, it is claimed that phonation during airway inspection, changes the view of the pharyngeal structures and alters the score [4, 5]. The original Mallampati test and the Samsoon and Young modification were done without phonation. It is not clear whether oropharyngeal view scores obtained with phonation, offers better predictive value of laryngoscopic view or not. Also, the effects of various head and body positions on the Mallampati test scores, is a subject of debate. This study is intended to evaluate the effects of phonation and various head and body positions on oropharyngeal view, and the correlation of these with the laryngoscopic view, using the Cormack and Lehane score [6].

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PATIENTS AND METHODS
The study was carried out over 3 months, at the University of Benin Teaching Hospital, in adult patients scheduled for elective surgical procedures. The patients were visited in the wards for preoperative anaesthetic review. During airway assessment, each patient was placed in various head and body positions to determine oropharyngeal structures visualized thus:

1. Patient sitting, neck in neutral position, mouth maximally opened, tongue maximally protruded and eye level with the observer.

2. Patient sitting, neck maximally extended, mouth maximally opened, tongue maximally protruded.
3. Patient supine, neck in neutral position, mouth maximally opened and tongue maximally protruded.
4. Patient supine, neck maximally extended, mouth maximally opened and tongue maximally protruded.

Structures visualized on oropharyngeal inspection were assessed using the Mallampati test score [2], first with the patient phonating (say "ah"), and not phonating. Anaesthetic premedication drug was prescribed in each case.

In the operating theatre, anaesthesia was induced in each patient with the appropriate dose of propofol and suxamethonium. Laryngoscopy was performed and the laryngoscopic view was graded according to the Cormack and Lehane score [6]. The values recorded during the various oropharyngeal and laryngoscopic assessments were analysed and the results presented as simple mean values and correlation coefficients.

RESULTS

A total of 390 patients were examined, consisting of 242 (62.1%) males and 148 (37.9%) females. The mean age of the patients was 35.33 years (s.d. 14.64). The demographic characteristics of the patients (age and sex distribution) are shown in table 1. Our results show that oropharyngeal view (Mallampati test score) is affected by both position and phonation. The score is consistently improved in all the positions by phonation. Maximal extension of the neck in the sitting position improves the score compared with the neck in neutral position. Changing from the sitting to the supine position improves the score. Extending the neck in the supine position did not alter the score compared with neck in the neutral position. These scores are shown in table 2.

The correlation coefficient (r) of oropharyngeal view (Mallampati test score) with laryngoscopic view (Cormack-Lehane score), showed that the sitting, neck maximally extended position without phonation, had the highest correlation (r = 0.73). This was followed by the supine, neck maximally extended position, without phonation (r = 0.70). The lowest correlation coefficient value without phonation, was the sitting, neck in neutral position (r = 0.59). Phonation reduced the correlation of the scores in all the positions. Results of the correlation of the Mallampati and Cormack-Lehane scores are shown in table 3.

The results thus showed that the best oropharyngeal view is obtained in the supine, neck in the neutral position, with phonation. However, the best correlation with laryngoscopic views were obtained with patient in the sitting or supine positions, with neck extension, but without phonation.

Table 1: **Age and sex distribution of patients.**

Age (yrs.)	Male	Female	Total (%)
10-20	7	3	10 (2.6)
21-30	80	70	150 (38.5)
31-40	70	10	80 (20.5)
41-50	30	30	60 (15.4)
51-60	15	5	20 (5.1)
61-70	30	10	40 (10.3)
71-80	10	20	30 (7.7)
Total	**242 (62.1%)**	**148 (37.9)**	**390 (100)**

Table 2: **Mean oropharyngeal view scores in different positions.**

Position	Mean oropharyngeal view score (± sd).	
	Without phonation	With phonation
Sitting, neck in neutral position	2.1 (± 0.8)	1.4 (± 0.7)
Sitting, neck maximally extended	1.8 (± 0.7)	1.4 (± 0.5)
Supine, neck in neutral position	1.6 (± 0.7)	1.3 (± 0.5)
Supine, neck maximally extended	1.6 (± 0.7)	1.4 (± 0.5)

Table 3: **Correlation of oropharyngeal view scores in different positions with laryngoscopic view scores.**

Position	Correlation coefficient (r)	
	Without phonation	With phonation
Sitting, neck in neutral position	0.59	0.55
Sitting, neck maximally extended	0.73	0.55
Supine, neck in neutral position	0.65	0.58
Supine, neck maximally extended	0.70	0.54

DISCUSSION

The main purpose of preoperative airway assessment is to predict the ease or otherwise of laryngoscopy and/or intubation. Our study showed that the sitting position with full head extension without phonation, best correlate with laryngoscopic view amongst all

the head and body positions evaluated. This agrees in part with the study of Lewis et al. [7], which reported that the best way to perform the Mallampati test for predicting difficult laryngoscopy, is putting the patient in sitting position, with the head in full extension, tongue out and with phonation. However, in our own study while phonation improved oropharyngeal view (Mallampati score)[2], it reduced correlation with laryngoscopic view (Cormack-Lehane score)[6]. It is however, noteworthy that the original Mallampati test[2] and the Samsoon and Young modification[3] were performed with the patient seated, head in the sniffing or neutral positions respectively,and without phonation. In evaluating the value of the different head and body positions in oropharyngeal view, the degree of head extension affordable seem pertinent. In their study of "predictors of difficult intubation", Vasudevan and Badhe [8] found the degree of head extension to have the highest strength of association with predictability of difficult intubation, among the studied variables, including the Mallampati grades (3 & 4).

The value of phonation in oropharyngeal view assessment is not very clear. While there is unanimity of opinion that phonation improves oropharyngeal assessment and improves Mallampati grading, the correlation of such grading with laryngoscopic view score is equivocal. While Oates et al. [9] reported that phonation improves the predictability of laryngoscopic view, our study showed that Mallampati grading with phonation reduced the correlation coefficient with laryngoscopic view score. This may be related to the low specificity and sensitivity of the Mallampati test itself.

Our study also showed that assumption of the supine position from the sitting position improves the Mallampati score. This contrasts with the study of Tham et al.[10] who reported that moving to the supine posture produced a small, systematic, non-significant worsening of the Mallampati view. A systematic review by Lee et al.[11] of 42 relevant studies showed that the included studies very often, did not specifically document the way (position) the Mallampati test was performed. This seriously limits the ability to make a categorical statement on the effect of the supine position on oropharyngeal assessment.

The overall reliability of the Mallampati tests to predict the difficult airway has been a subject of debate. The test is subject to inter-observer variation [10]. Used alone, it correctly predicts about 50% of difficult laryngoscopies and has a false positive rate of up to 90% [12-15]. However, if the Mallampati test is combined with other bedside airway assessment tests, the predictive value is significantly improved [16]. In actual fact, Shiga et al. [16] in a meta-analysis of five bedside airway screening tests, reported that a combination of the Mallampati test and thyromental distance is the most useful bedside test for predicting the difficult airway.

From the foregoing, it can be concluded that currently available screening tests (including the Mallampati test) for predicting difficult airway have poor to moderate discriminative power when used alone. Combinations of tests add some incremental diagnostic value, compared to each test alone. The clinical value of bedside screening tests for predicting the difficult airway remains limited. The search for more accurate predictive tests will continue.

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