

COMPARISON OF MODIFIED MALLAMPATI GRADING IN SITTING AND SUPINE POSITIONS FOR PREDICTION OF DIFFICULT LARYNGOSCOPY: A PROSPECTIVE OBSERVATIONAL STUDY

Anaesthesiology

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ABSTRACT

Background: Difficult airway assessment is an essential component of preoperative anaesthetic evaluation. Modified Mallampati grading is commonly performed in the sitting position; however, assessment in the supine position may be clinically useful in patients who cannot sit comfortably. This study aimed to compare Modified Mallampati grading in sitting and supine positions for prediction of difficult laryngoscopy. **Methods:** This prospective comparative observational study included 125 patients undergoing elective surgery under general anaesthesia with endotracheal intubation. Modified Mallampati grading was assessed in both sitting and supine positions and compared with Cormack–Lehane grading during laryngoscopy. CL Grade III–IV was considered difficult laryngoscopy. Diagnostic accuracy parameters were calculated for both positions. **Results:** Among 125 patients, difficult laryngoscopy was observed in 34 (27.2%) cases. Modified Mallampati grading in the sitting position showed higher sensitivity (94.1%) and NPV (96.7%), while supine grading showed higher specificity (93.4%), PPV (82.9%), and overall accuracy (91.2%). Both positions were significantly associated with Cormack–Lehane grading, but supine Modified Mallampati grading demonstrated better overall diagnostic performance. **Conclusion:** Supine Modified Mallampati grading showed better overall diagnostic accuracy than sitting grading for predicting difficult laryngoscopy, while sitting grading had higher sensitivity. Supine grading may be a more reliable bedside predictor during preoperative airway assessment.

KEYWORDS

INTRODUCTION

Airway assessment is one of the most important components of preoperative anaesthetic evaluation. Unanticipated difficult laryngoscopy and endotracheal intubation may lead to serious perioperative complications, including hypoxemia, airway trauma, aspiration, repeated intubation attempts, hemodynamic instability, and failed airway situations¹. Early identification of patients at risk allows the anaesthesiologist to plan appropriate airway management, arrange necessary airway equipment, and minimize preventable complications. Therefore, simple, rapid, and reliable bedside predictors are essential for safe conduct of general anaesthesia².

Modified Mallampati grading is among the most widely used bedside screening methods for predicting airway difficulty³. It assesses the visibility of oropharyngeal structures, including the soft palate, uvula, and faucial pillars, and indirectly reflects the relationship between tongue size and the oral cavity⁴. Traditionally, this grading is performed in the sitting position with the patient's mouth fully opened and tongue protruded without phonation. Higher Modified Mallampati grades are generally associated with poor laryngoscopic view and increased possibility of difficult laryngoscopy⁵. However, its predictive accuracy varies, and sitting assessment may not always be feasible in patients with pain, trauma, spine-related problems, poor general condition, or positioning limitations⁶.

In such situations, supine Modified Mallampati grading may be a practical alternative for preoperative airway assessment⁷. However, change in posture may alter tongue position, upper airway space, and visibility of oral structures, which can influence Mallampati grade and its predictive value. Cormack–Lehane grading during direct laryngoscopy is commonly used to assess the laryngoscopic view⁸, with Grade III–IV considered difficult laryngoscopy. Hence, the present study was conducted to compare Modified Mallampati grading in sitting and supine positions for predicting difficult laryngoscopy in patients undergoing elective surgery under general anaesthesia requiring endotracheal intubation⁹.

METHODOLOGY

This prospective comparative observational study was conducted in the Department of Anaesthesiology, SMS Medical College and Attached Group of Hospitals, Jaipur, among 125 patients undergoing elective surgery under general anaesthesia requiring endotracheal intubation. Patients aged 18 years and above, of either sex, who provided written informed consent and were able to cooperate with airway assessment were included. Emergency cases, patients with recent oral or maxillofacial surgery, restricted neck movement, inability to sit, cervical spine pathology, upper airway pathology,

edentulous status, or frontal tooth gap were excluded.

All enrolled patients underwent preoperative airway assessment using Modified Mallampati grading in both sitting and supine positions before induction of anaesthesia. Grade I–II was considered easy or low risk, while Grade III–IV was considered difficult or high risk. During direct laryngoscopy, Cormack–Lehane grading was recorded, with Grade I–II considered easy laryngoscopy and Grade III–IV considered difficult laryngoscopy. Data were analysed using appropriate statistical methods. Categorical variables were expressed as frequency and percentage, association was assessed using the Chi-square test, and sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy were calculated for both positions.

RESULT

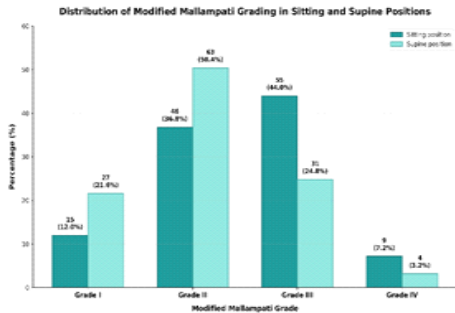
A total of 125 patients were analysed, of whom 34 (27.2%) had difficult laryngoscopy. Modified Mallampati grading in the sitting position showed higher sensitivity (94.1%) and NPV (96.7%), but lower specificity (64.8%) and accuracy (72.8%). In contrast, supine grading showed higher specificity (93.4%), PPV (82.9%), and overall accuracy (91.2%), indicating better diagnostic performance for predicting difficult laryngoscopy.

Table 1. Baseline demographic and airway characteristics of study participants

Variable	Category	(%)
Age group	≤30 years	(24.0)
	31–40 years	(32.0)
	41–50 years	(28.0)
	>50 years	(16.0)
Sex	Male	(48.8)
	Female	(51.2)
Oral hygiene	Good	(78.4)
	Poor	(21.6)
Artificial/loose teeth	Present	(14.4)
Mouth opening	Absent	(85.6)
	<3 cm	(16.8)
	≥3 cm	(83.2)

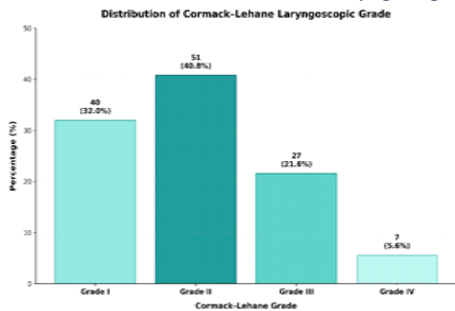
The above table shows that most patients were young to middle-aged, with the highest proportion in the 31–40 years age group (32.0%), followed by 41–50 years (28.0%). Females (51.2%) slightly outnumbered males (48.8%). Most participants had favourable airway characteristics, including good oral hygiene (78.4%).

Figure 1. Distribution of Modified Mallampati Grading in Sitting and Supine Positions



he above figure shows that Grade III was most common in the sitting position (44.0%), whereas Grade II was most common in the supine position (50.4%), indicating lower Mallampati grades in the supine position.

Figure 2: Distribution of Cormack–Lehane Laryngoscopic Grade



The above figure shows that Grade II was most common (40.8%), followed by Grade I (32.0%), while Grade III (21.6%) and Grade IV (5.6%) were less common.

Table 2. Association of Modified Mallampati grading with Cormack–Lehane grading

Modified Mallampati grading	CL difficult III–IV (%)	CL easy I–II n(%)	Total (%)	p-value
Sitting difficult III–IV	(25.6)	(25.6)	(51.2)	0.001
Sitting easy I–II	2 (1.6)	59 (47.2)	61 (48.8)	
Supine difficult III–IV	29 (23.2)	6 (4.8)	35 (28.0)	0.001
Supine easy I–II	5 (4.0)	85 (68.0)	90 (72.0)	

The above table shows that both sitting and supine Modified Mallampati grading were significantly associated with Cormack–Lehane grading. False-positive prediction was higher in sitting position (25.6%) compared to supine position (4.8%), indicating better predictive performance of supine grading.

Table 3. Diagnostic accuracy of Modified Mallampati grading in sitting and supine positions

Diagnostic parameter	Sitting position	Supine position
Sensitivity	94.10%	85.30%
Specificity	64.80%	93.40%
Positive predictive value	50.00%	82.90%
Negative predictive value	96.70%	94.40%
Accuracy	72.80%	91.20%

The above table shows that sitting grading had higher sensitivity (94.1%), while supine grading showed higher specificity (93.4%), PPV (82.9%), and accuracy (91.2%), indicating better overall diagnostic performance in the supine position.

DISCUSSION

Preoperative airway assessment is essential to anticipate difficult laryngoscopy and prevent airway-related complications. In the present study, difficult laryngoscopy, defined as Cormack–Lehane Grade III–IV, was observed in 27.2% of patients. Modified Mallampati

grading is a simple and commonly used bedside tool, but previous studies have shown that its predictive value may vary when used alone.^{1,2,3,4}

In this study, sitting Modified Mallampati grading showed high sensitivity (94.1%) and negative predictive value (96.7%), suggesting its usefulness as a screening method. However, its specificity (64.8%), positive predictive value (50.0%), and accuracy (72.8%) were lower due to a higher false-positive rate. Similar findings have been reported in earlier studies, where sitting Mallampati grading was useful but not sufficiently accurate as a single predictor.^{5,6,7}

Supine Modified Mallampati grading showed better specificity (93.4%), positive predictive value (82.9%), and overall accuracy (91.2%) compared with sitting grading. False-positive prediction was also lower in the supine position (4.8%) than in the sitting position (25.6%). These findings are consistent with studies by Bindra et al. and Hanouz et al., who reported better predictive performance of Mallampati assessment in the supine position.^{1,2,3} Thus, supine Modified Mallampati grading may be a more reliable predictor of difficult laryngoscopy, especially when sitting assessment is not feasible.⁵

CONCLUSION

Supine Modified Mallampati grading showed better overall diagnostic accuracy than sitting grading for predicting difficult laryngoscopy. Although sitting grading had higher sensitivity, supine grading had higher specificity, positive predictive value, and accuracy, making it a more reliable bedside predictor in preoperative airway assessment.

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