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COMPARINGMODIFIEDMALLAMPATTIGRADEIN SITTING AND SUPINE POSITIONS IN PATIENTS UNDERGOING SURGERIES UNDER GENERALAND REGIONALANESTHESIA

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ABSTRACT

Background:

Modified Mallampatti Grade is the most commonly used airway assessment score in patients undergoing surgeries. MMP is assessed in pre anesthetic fitness. OtherthanMMP,mouthopening[MO],neckmovements[NM],thyromentaldistance[TMD], sternomental distance [SMD] are some of the factors to be considered. MMP test comprises a visual assessment of distance from the tongue base to the roof of the mouth.Itisanindirectwayofpredictinghowdifficultanintubationwillbe.Thescore is assessed by asking the patient to open their mouth and protrude the tongue as much aspossible.Theanatomyoftheoralcavityisvisualized.Specifically,theassessornotes whetherthebaseoftheuvula,faucialpillarsandsoftpalatearevisible.Mallampattiin sittingpositionisobservedduringpreanestheticfitness.Mallampattiinsupineposition is uncertain.Assessing of mallampatti in supineposition is seen in patients with lower limb fractures, patients posted for spine surgeries with difficult in sitting. The study helps in comparing MMP in sitting and supine positions thus, predicting airway assessmentdifficulty.Mallampattiinsupinepositionhasbetterpredictionofdifficulty in laryngoscopy and intubation.

Objective:

Theobjectiveofthisstudyistoobservethedifferenceof ModifiedMallampatti grade in sitting versus supine positions in patients undergoing surgery under general and regional anesthesia.

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Techniques:

An observational study was conducted in Chettinad hospital and research institute. Three sub groups- adults, old ages and paediatrics [greater than 7 years of age] undergoing surgery under general and regional anesthesia were evaluated. Mallampatti in sitting and supine positions were observed and recorded during pre anesthetic checkup or preoperatively in surgical ICU. Difference of MMP in sitting versus supine positions among the three sub groups is evaluated.

Result:

Asumof100patientswereassessed.30patientsareadult,48areoldagesand 22werepaediatrics.IrrespectiveoftheagegroupandBMItheMMPgradesignificantly detoriates in supine position as compared to that of sitting position.

Conclusion:

Mallampattigradesignificantlyworsensinsupinepositionincomparingtothat ofsittingposition.MMPgradeshouldbeanalternativeapproachforpredictingdifficult airway preoperatively. Airway assessment MMP in supine position can be routinely applied in bedridden patients and in patients requiring emergency intubation.

Keywords: Mallampattigrade,sittingand supine.

INTRODUCTION

Airway assessment is a critical component in predicting potential complications and ensuring patient safety during medical procedures, particularly in emergencies and preoperative settings. [1] It enables clinicians to detect abnormalities, anticipate difficulties, and develop effective management plans. Tools like the Mallampati score, first introduced by Seshagiri Mallampati in 1985, assess the risk of intubation by evaluating the oral cavity's anatomy. [2]The modified Mallampati grading, updated in 1987 by Samsoon and Young, divides patients into four classes based on the visibility of the oropharyngeal structures, aiding physicians in identifying challenging airways. Mallampati classes 1 and 2 are associated with easy intubation, while classes 3 and 4 often indicate difficult intubation due to poor visualization of the glottis.[3]

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The anatomy of the airway is divided into upper and lower segments, each contributing uniquely to ventilation and gas exchange. The upper airway includes the nasopharynx, oropharynx, and larynx, with structures like the epiglottis and vocal cords playing critical roles in speech and protection against aspiration. [4] The lower airway encompasses the trachea, bronchi, bronchioles, and alveoli, where gas exchange occurs. These structures are supported by cartilaginous, epithelial, and muscular tissues that maintain airway patency, humidify inspired air, and defend against pathogens.[5] Developmentally, the upper airway originates from pharyngeal arches, while the lower airway forms from the laryngotracheal groove during embryogenesis. Proper blood supply, lymphatic drainage, and neural innervation ensure the efficient functioning of the airway system.[6]

Various factors influence airway management, including physiological conditions, anatomical differences in pediatric and obese patients, and pregnancy-induced changes. Pediatric airways, characterized by a relatively larger head, smaller oral cavity, and a high glottic position, require careful assessment and technique adjustments.[7] Obese patients often present challenges like restricted neck mobility, reduced functional residual capacity, and redundant soft tissues that complicate mask ventilation and intubation. Pregnancy adds further complexity with airway edema, increased vascularity, and risks of rapid oxygen desaturation and gastric reflux, necessitating heightened vigilance and skill in airway management.[8]

The clinical significance of airway management extends beyond anatomical considerations. Assessment tools like the Mallampati score, "3-3-2" rule, and cricoid pressure techniques play pivotal roles in predicting and managing complex airways. Conditions such as airway narrowing, caused by edema or bronchoconstriction, can be identified through auscultation. Emergency procedures like cricothyroidotomy or tracheotomy become vital in scenarios where traditional intubation fails.[9] Additionally, pediatric airways, with their unique anatomy and physiology, demand tailored strategies to avoid complications like mucosal damage or airway resistance.

Effective airway management is indispensable in ensuring patient safety, particularly in high-risk populations and emergencies.[10] A thorough understanding of airway anatomy, developmental differences, and physiological variations allows clinicians to anticipate challenges and implement appropriate interventions.[11] Incorporating standardized

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assessment tools and leveraging anatomical knowledge enhances the ability to secure the airway successfully, reducing the risk of adverse outcomes and ensuring optimal patient care.[12]

MATERIALS AND METHODS

This observational study was conducted in the Department of Anesthesiology at Chettinad Hospital and Research Institute, Kelambakkam, Chennai, Tamil Nadu, over a period of five months. A total of 100 patients undergoing surgery were included, based on specific inclusion and exclusion criteria. Patients aged above 7 years and those undergoing surgery under general or regional anesthesia were included in the study. However, patients below 7 years of age, those with conditions like restricted neck movement, cervical spine fractures, maxillary or mandibular fractures, maxillofacial trauma, small mouth opening, reduced mandibular protrusion or compliance, or a short neck, were excluded.

After obtaining approval from the Institutional Human Ethics Committee (IHEC-I/2545/24) and informed consent from the patients, the study was carried out in the preoperative setting. The Modified Mallampati grade was assessed in both sitting and supine positions during the pre-anesthetic fitness evaluation or upon the patient's arrival in the Surgical Intensive Care Unit (SICU). Observations of the difference in Mallampati grades between the two positions were systematically recorded and analyzed.

RESULTS AND FINDINGS:

The study analyzed demographic and clinical characteristics of the study population, including gender, age, BMI, type of anesthesia, type of surgery, ASA grades, and Mallampati grades in sitting and supine positions. Among the 100 participants, 51% were male, and 49% were female, as represented in a pie chart. Age distribution for males showed 14 patients below 18 years, 13 in the 18–45 age group, and 24 above 45 years. For females, 8 were below 18 years, 17 in the 18–45 age group, and 24 above 45 years, as shown in bar graphs.

Table 1 : Age Distribution by Gender

Gender	Below 18 Years	18–45 Years	Above 45 Years
Male	14	13	24
Female	8	17	24

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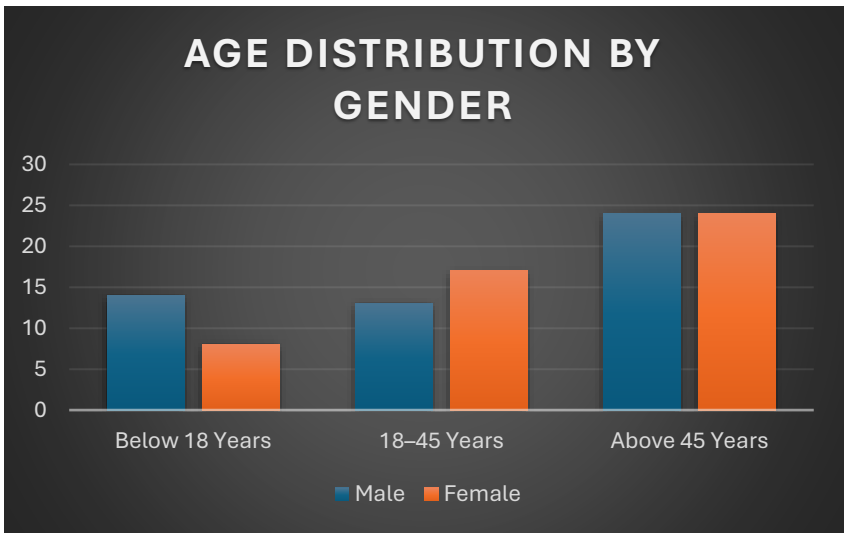

Figure 1 : Age Distribution by Gender

Table 2 : Parameters Distribution

Parameter	Categories	Number of Patients
Surgery Type	General Surgery	38
	Orthopedics	29
	ENT	21
	Obstetrics &Gynecology	11
	Dental	1
BMI Category (kg/m^2)	<18.5	18
	18.5–24.9	50
	25.0–29.9	27
	30.0–34.9	3
	35.0–39.9	2
	>40	0
ASA Type	ASA 1	35

Parameter	Categories	Number of Patients
	ASA 2	42
	ASA 3	23

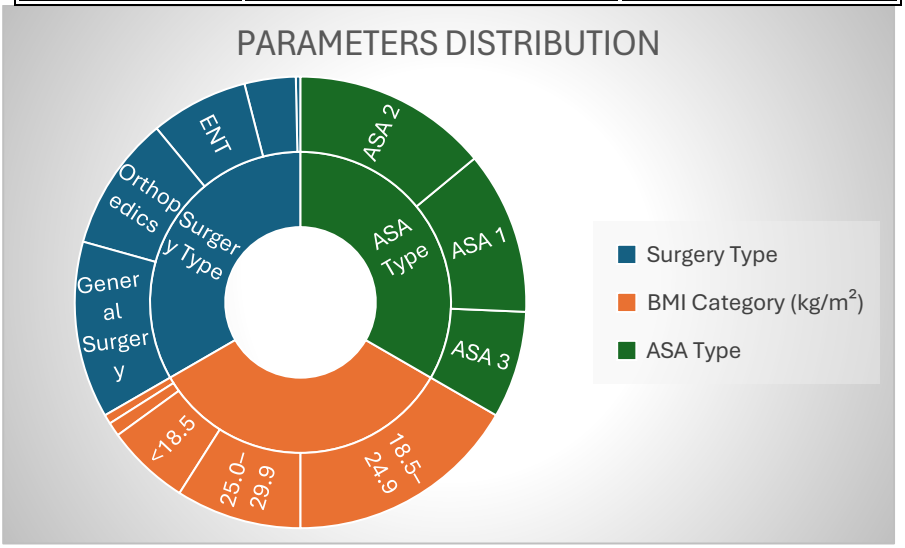

Figure 2 : Parameters Distribution

In terms of anesthesia type, 58 patients underwent general anesthesia, while 42 received spinal anesthesia. Surgery type distribution revealed 38 cases of general surgery, 29 orthopedic, 21 ENT, 11 obstetrics and gynecology, and 1 dental surgery. BMI categorization indicated 50 patients with normal BMI (18.5–24.9), while 27 were overweight (25.0–29.9), and 5 were obese (BMI ≥30). ASA grades were distributed as follows: ASA 1 (35 patients), ASA 2 (42 patients), and ASA 3 (23 patients).

Table 3 Mallampati Grade by Position

Position	Class 1	Class 2	Class 3	Class 4
Sitting	20	49	26	5
Supine	5	13	57	25

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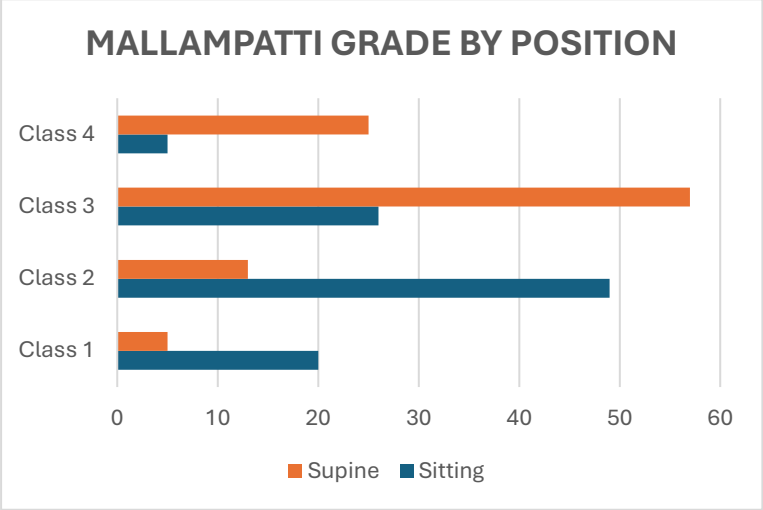

Figure 3 Mallampati Grade by Position

Table 4 Mallampati Grades in Sitting and Supine by Age Group:

Age Group	Position	Class 1	Class 2	Class 3	Class 4
Below 18	Sitting	2	5	2	1
	Supine	0	3	5	4
18–45 Years	Sitting	2	4	2	1
	Supine	0	0	9	12
Above 45 Years	Sitting	3	17	3	3
	Supine	5	2	7	8

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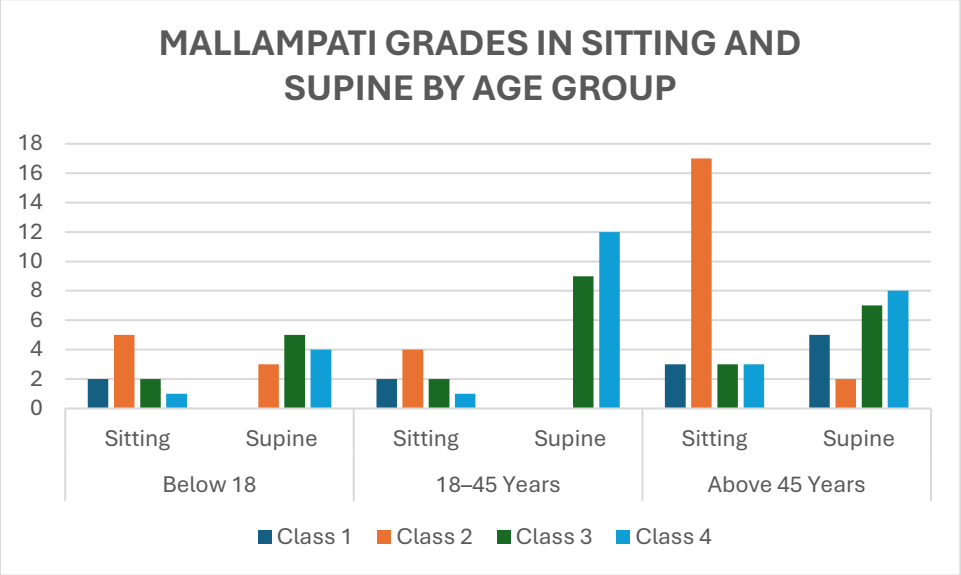

Figure 4 Mallampati Grades in Sitting and Supine by Age Group:

Mallampati grading in the sitting position showed 20 patients in Class 1, 49 in Class 2, 26 in Class 3, and 5 in Class 4. In the supine position, these distributions shifted significantly, with 5 patients in Class 1, 13 in Class 2, 57 in Class 3, and 25 in Class 4. Differences were observed across age groups, indicating positional influence on airway assessment.

Chi-square tests were performed to analyze differences between observed and expected values for Mallampati grades across different positions and age groups. Significant findings included altered distribution patterns in supine positions, particularly among patients above 45 years. The data demonstrates variability in airway classification due to positional changes, underscoring the importance of multiple assessments during anesthetic evaluation.

DISCUSSION

The study observed Mallampati Grade distribution changes in sitting and supine positions across a population of 100 individuals, categorized by age, gender, BMI, ASA grade, anesthesia type, and surgery type. Age groups included below 18 years (22 participants), 18–45 years (30 participants), and above 45 years (48 participants). Using descriptive statistical analysis and chi-square tests, the study highlighted significant variations between observed and expected values in Mallampati Grade distributions across positions and age groups.

For the under-18 group, chi-square values of 0.396 (sitting) and 0.478 (supine) indicated no significant deviations. In the 18–45 group, sitting posture showed minimal variance (chi-

square: 0.002), whereas supine posture exhibited some variability (chi-square: 0.148). For individuals over 45 years, sitting (chi-square: 0.006) and supine (chi-square: 0.099) postures demonstrated significant differences, particularly in Mallampati Classes 2 and 4.

These findings emphasize that posture and age significantly affect Mallampati Grade distributions, with older adults showing notable variability in supine positions. This aligns with studies by **Khatiwada et al. (2012)**[13]and **Chatterjee et al. (2021)**[14]**,** which suggest the supine position is more reliable for predicting difficult airways, while the sitting position offers better accuracy and specificity for airway assessment.

CONCLUSION

The study underscores the importance of considering age and posture in airway management. Significant changes in Mallampati Grades, especially in supine positions, suggest the need for tailored approaches in preoperative evaluations. Incorporating supine assessments alongside sitting evaluations can improve predictions of airway difficulty, ensuring better patient safety and outcomes in both elective and emergency settings.

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