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MALLAMPATI GRADING AND ACROMIO-AXILLO-SUPRASTERNAL NOTCH INDEX IN PREDICTING DIFFICULT VISUALISATION OF LARYNX IN ADULT PATIENTS: CROSS SECTIONAL STUDY

Priyesh Gupta[1], Sayeedurrehman[2], Divya Vijay[3], Akash Gupta[4]

[1]Junior Resident, Department of Anaesthesiology, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India
[2]Assistant Professor, Department of Anaesthesiology, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India
[3]Assistant Professor, Department of Anaesthesiology, Sri Ram Murti Smarak Institute of Medical Sciences Bareilly, UP, India
[4]Professor, Department of Anaesthesiology, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India

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Corresponding Author:
Dr. Priyesh Gupta,
Junior Resident, Department of Anaesthesiology, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India.
Email: gpriyesh96@gmail.com

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ABSTRACT

Background: Airway management is a cornerstone of modern anaesthetic and critical care practice. The ability to establish and maintain a patent airway is among the most vital skills in medicine, as failure to do so can lead to catastrophic outcomes within minutes. The objective is to study Mallampati grading (MPG) and acromio-axillo-suprasternal notch index (AASI) in predicting difficult visualisation of larynx (DVL) in adult patients while the objectives were to assess MPG and AASI and then assess DVL using Cormack Lehane (CL) grading in adult patients going through elective surgery under general anesthesia.

Materials and Methods: This cross-sectional study was conducted among all adult patients posted for elective surgery under general anesthesia in Rohilkhand Medical College and Hospital as per our inclusion criteria. Duration of study was September 2024 – September 2025.

Results: MPG demonstrated moderate diagnostic utility: sensitivity 50.0%, specificity 93.9%, PPV 54.5%, NPV 92.8%, and overall accuracy 88.3%. Statistical association with CL grade was significant ($\chi^2 = 6.94$, $p = 0.008$). AASI outperformed MPG in sensitivity (75% vs 50%) and NPV (95.8% vs 92.8%), making it the better screening tool in this cohort. MPG offered higher specificity and slightly higher PPV, rendering it more suitable as a confirmatory bedside test.

Conclusion: MPG is specific and useful for ruling in easy airways but insufficiently sensitive as a standalone screening test—consistent with multiple prior studies. AASI as a valuable adjunct to existing airway assessment tools, with particular strength as a non-invasive screening index that complements Mallampati grading to improve preoperative airway risk stratification.

Keywords: Mallampati Grading, Acromio-axillo-suprasternal notch Index, difficult visualisation of larynx, adult patients.

INTRODUCTION

Endotracheal intubation not only maintains ventilation with oxygen supplementation in anaesthetized or critically ill patients but also facilitates the administration of volatile anaesthetic agents and certain emergency medications directly into the lungs. It serves as the definitive method for airway protection in situations where protective airway reflexes are diminished or absent, such as during general anaesthesia, head injury, coma, or cardiopulmonary arrest.[1] In addition, it permits the clearance of airway secretions and provides a conduit for positive-pressure ventilation in mechanically ventilated patients.

Despite its ubiquity and apparent simplicity, endotracheal tube placement is not without challenges. Successful intubation depends on multiple variables — patient anatomy, physiologic condition, and operator skill being among the most crucial. Even experienced anaesthesiologists occasionally encounter unexpected airway difficulties, which can rapidly escalate to life-threatening scenarios.[2-4]

Within this context, "difficult visualisation of the larynx (DVL)" or difficult laryngoscopy is a specific subset referring to the inability to visualise any part of the vocal cords during laryngoscopy, despite optimal head positioning and technique. Studies show that failed intubation occurs in only about 3% of easy laryngoscopic views, but in 75% of cases classified as difficult visualisation.[5] Thus, the ability to accurately predict difficult laryngoscopy is central to effective airway management.

The contribution of Mallampati et al. (1985) represents a landmark moment in anesthesiology, marking the transition from subjective airway evaluation to a structured, evidence-based approach. This pioneering work laid the groundwork for subsequent studies that combined clinical assessment tools with radiological, ultrasonographic, and endoscopic methods to further refine the forecasting of airways which are difficult in diverse clinical scenarios.

The test is simple, non-invasive, and can be performed quickly during preoperative evaluation. The higher the Mallampati grade, the smaller the oropharyngeal space and the greater the likelihood of difficult laryngoscopy. Its utility lies in its capacity to offer a visual, easily interpretable representation of airway anatomy that correlates with potential difficulty during laryngoscopy.

Recognising the limitations of traditional predictors, researchers have sought to design objective, reproducible, and patient-independent indices for airway evaluation. One such promising development is the Acromio–Axillo–Suprasternal Notch Index (AASI), first described by Mohammad R. Kamranmanesh and colleagues, inspired by their observation that difficult laryngoscopy often occurred in individuals whose neck appeared "deeply set" within the chest.[2]

AASI is calculated using simple surface measurements:

AASI = Distance from Acromion to Suprasternal Notch/Distance from Acromion to Axilla

This ratio quantitatively expresses the anatomical depth of the upper thoracic inlet relative to the shoulder and neck region. A lower AASI value corresponds to a deeper chest or reduced neck extension, both of which are unfavourable for alignment of upper airway axes required for optimal laryngoscopic view. Conversely, a higher AASI indicates a shallower chest configuration and more favourable conditions for visualisation of the larynx.

The rationale for this study therefore lies in addressing these knowledge gaps through a systematic comparative analysis of both parameters and their combined predictive utility. This work aims to determine whether the integration of MPG with AASI can improve prediction of difficult visualisation of the larynx in adult surgical patients. Such a combination could refine preoperative airway assessment by offering a practical, evidence-based framework that is simple, reproducible, and universally applicable.

This study seeks to enrich understanding of airway prediction by validating the complementary roles of two distinct assessment tools. It is anticipated that AASI will demonstrate higher sensitivity than MPG, confirming its value as a screening test, while MPG will maintain its established role as a confirmatory test. The expected outcome is that combined use will yield maximal predictive precision, reinforcing the clinical principle that multimodal airway assessment is superior to single-test evaluation.

By providing empirical evidence on AASI's utility, this research also aspires to bridge the gap between subjective and objective approaches in airway assessment. The findings may guide the development of standardised algorithms integrating both parameters, thereby improving perioperative airway safety.

Endotracheal intubation remains a vital procedure underpinning the safety and efficacy of anaesthetic and critical care practice. The accurate anticipation of difficult visualisation of the larynx represents a pivotal challenge that directly influences patient outcomes. Among the numerous predictors available, MPG has served as a longstanding, simple, and rapid screening tool, while the AASI offers a novel, objective alternative that evaluates thoracic and cervical geometry.

Given the constraints inherent to each method in isolation, their combined evaluation represents a logical and potentially transformative approach to airway assessment. Through this study, we aim to contribute to the growing movement toward evidence-based, multimodal, and standardised airway evaluation frameworks, thereby improving the predictability of difficult_laryngoscopy and enhancing overall patient safety.

MATERIALS AND METHODS

Place of Study: This cross-sectional study was conducted among all adult patients posted for elective surgery under general anesthesia in Rohilkhand Medical College and Hospital as per our inclusion criteria. Duration of study was September 2024 – September 2025

Sample Size: In our study a total of 94 patients [2] were assessed and the calculation of size of the sample was done using the formula

n=4pq/L2

p: 6.3%

q: 100-p = 93.7%

L: Allowable error (5%)

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Inclusion Criteria:[3]

1. 18-60 years old adult patients of either sex
2. BMI <30 kg/m2
3. ASA grade I and II

Exclusion Criteria:[3]

1. Edentulism
2. Upper airway abnormalities
3. Tumour or midline neck swelling
4. Need for rapid sequence induction or awake intubation
5. Burns, radiation or trauma to upper airway
6. Pregnancy

Methodology: Following approval by the Institutional Ethics Committee, each individual participant underwent detailed pre surgical physical assessment, and their MPG with AASI were assessed.

An attending anesthesiologist assessed MPG and AASI preoperatively and CL Grading during laryngoscopy. MPG was measured in participants sitting down, with their tongue protruded fully without phonation. The view was graded as follows:

Class 1- soft palate, fauces, uvula, tonsillar pillars being visible.

Class 2- uvula, soft palate and fauces being visible.

Class 3- soft palate along with base of uvula being visible.

Class 4- soft palate being not visible.

AASI was assessed in participants when they were supine, with their upper limb lying on the sides, The following three dimensions were calculated: Using a ruler, a vertical reference line (A) was drawn from the tip of the acromion process to the superior axillary margin at the pectoralis major. A second line (B) was then extended perpendicularly from the suprasternal notch to intersect line A. A third measurement (C) corresponded to the portion of line A that lay above the point of intersection with line B. The index was obtained by dividing the length of line C by the total length of line A. Acromio-axillo-suprasternal notch index was equal to C/A. The index ratio was graded as follows:

AASI ≤ 0.49 depicts EVL.

AASI > 0.49 depicts DVL.

Participants were attached to monitor for measuring heart rate, electrocardiograph, non invasive blood pressure, mean arterial pressure and oxygen saturation. For safety reasons, the anesthesiologist giving the anaesthesia in the operating room was always ready with a difficult airway cart and Difficult Airway Society standards. The airway cart was prepared in advance and equipped with a manual resuscitator bag, anatomical masks, oropharyngeal and nasopharyngeal airways, suction cannulas, laryngoscope handle with blades (including McCoy blade), endotracheal tubes, laryngeal mask airways (LMA), intubating LMA, stylet, ventilating bougie, as well as emergency cricothyrotomy and tracheostomy sets, all provided in multiple sizes. A fibre optic bronchoscope was also kept ready for use in any case where a difficult airway was anticipated.

All enrolled patients were given premedication intravenous Inj. Midazolam 0.02 mg/kg, Inj. Glycopyrrolate 0.004 mg/kg and Inj. Fentanyl 2 mcg/kg. Following pre oxygenation with 100% oxygen via appropriately sized face mask for complete three minutes, induction of anesthesia was done by intravenous Inj. Propofol 2 mg/kg, and Inj. Vecuronium 0.08- 0.1 mg/kg neuromuscular blocker was also administered.

Keeping the head in sniffing position, laryngoscopy was attempted after 4 minutes of administering Inj. Vecuronium, by an attending anesthesiologist who was kept blinded to the measurements, with Macintosh blade and CL Grading for laryngeal view was evaluated as follows:

Grade 1- Visualisation of entire vocal cords

Grade 2- Visualisation of posterior part of laryngeal aperture

Grade 3- Visualisation of epiglottis

Grade 4- No glottic structures seen

Statistical analysis: The information was put into a Microsoft Excel spreadsheet. All data were compiled and analyzed using IBM SPSS Statistics Version 23 (SPSS Inc., Chicago, IL, USA). The collected variables were entered into the SPSS software. Quantitative variables such as age, BMI, Line A, and Line C were summarized using mean ± standard deviation (SD). Categorical variables such as gender, ASA grade, Mallampati grade, AASI category, BMI category, and Cormack-Lehane grade were expressed as frequencies and percentages. Chi-square Test (χ^2) Used to assess the association between: Mallampati grade (positive/negative) and laryngoscopic view (easy/difficult), AASI category (≤0.49 / >0.49) and laryngoscopic view, BMI category and laryngoscopic view, Gender and laryngoscopic view. Significance Level: A p-value < 0.05 was considered statistically significant. Diagnostic performance of Mallampati Test, AASI, and their combination was evaluated by calculating sensitivity, specificity, PPV, NPV and diagnostic accuracy.

RESULTS

The study comprised a total of 94 participants, who were categorized into predefined age groups for analysis. The highest proportion of participants belonged to the 36–45 years age group, accounting for 29.8% of the total sample. This was closely followed by the 26–35 years age group, which constituted 28.7% of the participants. The 46–55 years category represented 22.3% of the recruited participants, whereas the 18–25 years group comprised 18.1%. Only 1.1% of the participants were aged above 55 years.

Among the total of 94 participants, 55 (58.5%) were females, while 39 (41.5%) were males.

Among the total of 94 participants, 44 (46.8%) were classified as ASA Grade I, while 50 (53.2%) were classified as ASA Grade II. No participants in this study belonged to higher ASA categories (III and above), indicating that the study population primarily consisted of individuals with minimal to mild systemic disease.

Among the 94 participants, 54 individuals (57.4%) had a normal BMI, while 40 individuals (42.6%) were categorised as overweight.

Table 1: ASA Grade Distribution.

ASA Grade	Frequency	Percentage (%)
I	44	46.8
II	50	53.2
Total	94	100%

Table 2: Mallampati Grade Distribution.

Mallampati Grade	Frequency	Percentage (%)
I	41	43.6
II	42	44.7
III	6	6.4
IV	5	5.3
Total	94	100%

Among the 94 study participants, 41 (43.6%) were classified as Mallampati Grade I, 42 (44.7%) as Grade II, 6 (6.4%) as Grade III, and 5 (5.3%) as Grade IV.

The results indicate that a majority of the investigated sample (a combined 88.3%) belonged to Mallampati Grades I and II, reflecting the predominance of individuals with favourable airway anatomy.

Table 3: Line A (cm) Distribution.

Line A (cm)	Frequency	Percentage (%)
< 9	18	19.15
9 – 9.9	14	14.89
10 – 11.9	38	40.43
12 – 13.9	22	23.40
≥ 14	2	2.13
Total	94	100.00

The majority of participants (38 individuals; 40.43%) had Line A values between 10 and 11.9 cm, representing the most common range within the study group. 22 participants (23.40%) recorded values between 12 and 13.9 cm, while 18 participants (19.15%) had values below 9 cm. A smaller proportion (14 participants; 14.89%) had measurements within 9–9.9 cm, and only 2 participants (2.13%) demonstrated values ≥ 14 cm.

Table 4: Line C (cm) Distribution.

Line C (cm)	Frequency	Percentage (%)
0 – 2.9	9	9.57
3 – 5.9	72	76.60
6 – 8.9	10	10.64
≥ 9	3	3.19
Total	94	100.00

The majority of study participants (72 individuals; 76.6%) had Line C values between 3 and 5.9 cm, which represented the most common range observed in this cohort. 10 participants (10.64%) had values between 6 and 8.9 cm, while 9 participants (9.57%) recorded shorter measurements of 0–2.9 cm. Only a small fraction (3 participants; 3.19%) demonstrated Line C values ≥ 9 cm, indicating that extreme values were relatively uncommon.

Table 5: AASI Category Distribution.

AASI Category	Frequency	Percentage (%)
≤ 0.49 (EVL)	72	76.60%
> 0.49 (DVL)	22	23.40%
Total	94	100%

Among the total of 94 participants, 72 individuals (76.6%) had an AASI value of ≤ 0.49, whereas 22 individuals (23.4%) demonstrated an AASI value of > 0.49.

Table 6: Cormack-Lehane (CL) Grade Distribution.

Cormack-Lehane (CL) Grade	Frequency	Percentage (%)
Grade 1	31	33.00%

Grade 2	51	54.30%
Grade 3	12	12.80%
Total	94	100.00%

Among the 94 participants, 31 individuals (33.0%) were classified as Grade 1, and 51 individuals (54.3%) as Grade 2, together accounting for most of the study population (87.3%). These grades are typically associated with satisfactory visualisation of the glottic structures and relatively easy intubation.

Among 83 participants categorised as Mallampati Negative (Grades I and II), 75 individuals (90.4%) exhibited an easy laryngoscopic view (CL < 3), representing true negatives, whereas 8 individuals (9.6%) demonstrated a view with laryngoscopic difficulty (CL ≥ 3), representing false negatives. Conversely, among 11 participants classified as Mallampati Positive (Grades III and IV), 7 individuals (63.6%) had an easy view (false positives), while 4 individuals (36.4%) experienced a difficult view (true positives).

Statistical analysis using the Chi-square test (χ^2 = 6.94, p = 0.008) revealed a significant association ($p < 0.05$) between MPG and the CL laryngoscopic view.

Among 72 participants with an AASI ≤ 0.49, representing the low-risk or easy visualisation of larynx (EVL) group, 68 individuals (94.4%) exhibited an easy laryngoscopic view (CL < 3), denoting true negatives, whereas only 4 individuals (5.6%) experienced a difficult view (CL ≥ 3), denoting false negatives. Conversely, among 22 participants with an AASI > 0.49, categorised under difficult visualisation of larynx (DVL), 14 individuals (63.6%) had an easy view (false positives), while 8 individuals (36.4%) exhibited a view with laryngoscopic difficulty, classified as true positives.

Statistical analysis using the Chi-square test (χ^2 = 14.23, $p < 0.001$) demonstrated a highly significant association between AASI and CL grade. This result confirms that higher AASI values are strongly correlated with increased laryngoscopic difficulty and reduced glottic visibility.

Among male participants, 33 individuals (84.6%) exhibited an easy laryngoscopic view (CL < 3), while 6 individuals (15.4%) demonstrated a difficult view (CL ≥ 3). Among female participants, 49 individuals (89.1%) had an easy view, and 6 individuals (10.9%) encountered difficult laryngoscopy. Statistical evaluation using the Chi-square test (χ^2 = 0.41, p = 0.522) revealed no significant association between gender and laryngoscopic grade.

The sensitivity of the Mallampati test was 50.0%, specificity was notably high at 93.9%, PPV was 54.5%. Conversely, NPV was 92.8%. The overall diagnostic accuracy of the Mallampati test was 88.3%.

The sensitivity of AASI was revealed to be 75.0%, specificity was 84.1%, PPV was 40.9%, NPV was notably high at 95.8%, the overall diagnostic accuracy was 83.0%.

Table 7: Comparison of Mallampati and AASI Performance.

Metric	Mallampati	AASI	Better
Sensitivity	50%	75%	□ AASI
Specificity	93.90%	84.10%	□ Mallampati
PPV	54.50%	40.90%	□ Mallampati
NPV	92.80%	95.80%	□ AASI
Accuracy	88.30%	82.98%	□ Mallampati

Diagnostic relevance for predicting difficult laryngoscopic view was evident in both assessment tools, although their predictive strengths differed across various test parameters. The AASI exhibited higher sensitivity (75%) and negative predictive value (NPV, 95.8%) compared to the Mallampati test (sensitivity 50%, NPV 92.8%).

In contrast, the Mallampati classification demonstrated superior specificity (93.9%), positive predictive value (PPV, 54.5%), and overall diagnostic accuracy (88.3%) relative to AASI (specificity 84.1%, PPV 40.9%, accuracy 82.98%).

Overall, the combined test correctly classified nearly 9 out of 10 patients, with high accuracy driven mainly by its strong specificity and high NPV.

DISCUSSION

Among 39 male participants, 33 individuals (84.6%) exhibited an easy laryngoscopic view (CL < 3), while 6 individuals (15.4%) demonstrated a difficult view (CL ≥ 3). Among 55 female participants, 49 individuals (89.1%) had an easy view, and 6 individuals (10.9%) encountered difficult laryngoscopy. Statistical evaluation using the Chi-square test (χ^2 = 0.41, p = 0.522) revealed no significant association between gender and laryngoscopic grade. These findings indicate that gender does not significantly influence the ease or difficulty of laryngoscopy, suggesting that airway difficulty is determined more by individual anatomical variations rather than sex-related differences. Acharya et al. analysed gender distribution of laryngoscopic view in 100 patients and reported that among 46 male patients, 40 individuals (86.9%) showed EVL while 6 individuals (13.1%) presented DVL. Among 54 female patients, 48 patients (88.8%) showed EVL, and 6 patients (11.2%) presented DVL.4 These findings were similar to our study and showed no gender preponderance in predicting DVL.

ASA grade I constituted 46.8% and ASA grade II constituted 53.2%. Patients with normal BMI were 57.4% while rest 42.6% were overweight.

The incidence of DVL (CL grading ≥ 3) in our study was 12.8%. Shekhawat et al. reported DVL 12.5%, Acharya et al. reported 12%.[4,5]

According to the MPG, 88.3% patients were predicted to have EVL with MPG I and II. On the other hand, only 11.7% patients were predicted to have DVL with MPG III and IV. Similarly, Acharya et al. reported MPG predicting 87.5% patients to be having EVL and 12.5% to be having DVL.4 Comparatively, Girish et al. also showed that MPG predicted 86% patients have EVL and 14% have DVL in their study.[6] Both the studies show similarity to our study in this respect.

Similarly, AASI predicted 76.60% patients to have EVL with AASI ≤ 0.49 and 23.40% patients to have DVL with AASI > 0.49. The predominance of patients with lower AASI values within this study cohort suggests that majority of participants exhibited favourable airway anatomical characteristics. Comparably, Sajjad et al. demonstrated that AASI predicted 84.57% to have EVL and 15.43% to have DVL, Acharya et al. showed that AASI predicted 87% to have EVL and 13% to have DVL.[4,7] Like wise, Girish et al. documented AASI predicting 83.6% patients to have EVL and 16.4% to have DVL in their study.[6]

Among 83 participants in our study categorised as Mallampati Negative (Grades I and II), 75 individuals (90.4%) exhibited an easy laryngoscopic view (CL < 3), representing true negatives, whereas 8 individuals (9.6%) demonstrated a difficult laryngoscopic view (CL ≥ 3), representing false negatives. This finding indicates that higher MPG are significantly correlated with increased difficulty during laryngoscopy, validating the MPG as a useful preoperative tool for predicting difficult airway management. These results reaffirm the clinical utility of the MPG as a simple, non-invasive, and reliable method for airway assessment. Its significant predictive correlation with laryngoscopic difficulty supports its continued use in pre-anaesthetic evaluation, assisting anaesthesiologists in anticipating potential intubation challenges and enhancing preparation for airway management.

Among 72 participants in our study with an AASI ≤ 0.49, representing EVL, 68 individuals (94.4%) exhibited an easy laryngoscopic view (CL < 3), denoting true negatives, while only 4 individuals (5.6%) experienced a difficult view (CL ≥ 3), denoting false negatives. This result confirms that higher AASI values are strongly correlated with increased laryngoscopic difficulty and reduced glottic visibility. These findings suggest that AASI serves as a sensitive and reliable bedside screening tool for predicting difficult laryngoscopy. Its strong statistical significance, ease of measurement, and anatomical basis make it a valuable addition to preoperative airway assessment. Incorporating AASI into standard airway evaluation protocols can enhance prediction accuracy, allowing for better preparation and improved patient safety during anaesthetic management.

Assessment of MPG

In our study, the sensitivity of the MPG was 50.0%, indicating that it correctly identified half of the patients with a difficult airway. The specificity was notably high at 93.9%, reflecting strong ability to correctly identify patients with an easy airway. The PPV was 54.5%, suggesting that when the test predicts a difficult airway, there is a moderate probability that the airway will indeed be difficult. Conversely, NPV was 92.8%, demonstrating that when the test predicts an easy airway, it is likely to be correct in the vast majority of cases. The overall diagnostic accuracy of the MPG was 88.3%. These findings imply that while the MPG exhibits excellent specificity and high negative predictive value, its limited sensitivity reduces its reliability as a standalone predictor for identifying all potential cases of difficult intubation. Therefore, the MPG is better at telling us who will not have a difficult airway than telling us who will have one.

Our study had results comparable to study carried out by Satheesh and Pramoth who showed that MPG had sensitivity 50%, specificity 86%, PPV 21.2% and NPV 95.8% which were equivalent to our findings.8 MPG showed higher specificity in both studies, reaffirming its reliability as a confirmatory bedside test. Similarly, Acharya et al. demonstrated comparable values of MPG having sensitivity 66.7%, specificity 90.91% PPV 50% and NPV 95.2% which fall within the range of our findings.4 In accordance with our study, Suryawanshi et al. conducted a prospective study on 100 adult patents and evaluated AASI and conventional bedside predictors such as MPG, TMD, SMD and IID which revealed that MPG had sensitivity 94.9%, specificity 47.6%, PPV 64.4% and NPV 90.4%.[9]

Our study had results relatable with Rajkhowa et al. who primarily focused on AASI as predictor of DVL and secondarily compared AASI with MPG, SMD, TMD and IID which revealed that MPG had sensitivity 25%, specificity 91.98%, PPV 10.53% and NPV 97.01%.[10] Our study demonstrated data equivalent to Girish et al. who evaluated the predictive validity of AASI and compared it with MPG and TMD for assessing difficult laryngoscopic view in conformation with CL grading and showed that MPG had sensitivity 58.1%, specificity 92.2%, PPV 51.4% and NPV 94%.[6]

Assessment of AASI

In our study, the sensitivity of AASI was found to be 75.0%, indicating that it correctly identified three-fourths of the patients with difficult laryngoscopy. The specificity was 84.1%, reflecting a strong ability to correctly recognize patients with an easy airway. The PPV was 40.9%, suggesting that a portion of the patients identified as having a difficult airway by AASI were, in fact, easy to intubate, implying a tendency toward false-positive results. However, the NPV was notably high at 95.8%, indicating that AASI is highly reliable in ruling out difficult laryngoscopy when the index value is below the threshold. The overall diagnostic accuracy was 83.0%, demonstrating good overall predictive performance. These findings suggest that AASI, with its combination of high sensitivity and excellent NPV, is particularly useful as a screening tool for identifying potential airway difficulties. The relatively lower PPV may limit its precision in confirming difficult cases; however, the index remains an effective method for excluding difficult airways in preoperative evaluations.

In consensus to our study, Saatheesh and Pramoth reported that AASI had a sensitivity of 76.9%, specificity of 89.3%, PPV of 33.3%, and high NPV of 98.2%.8 In both studies, AASI demonstrated higher sensitivity and NPV, confirming its role as a sensitive screening indicator for difficult airway prediction. Our findings closely parallel those of Satheesh and Pramoth, with minor differences arising from variations in sample composition and observer-dependent measurement. Both studies reported high NPVs (>95%) and comparable accuracies (≈83–84%), reinforcing the strong screening performance of AASI in ruling out difficult visualisation of the larynx. Collectively, these results provide convergent evidence that AASI is a sensitive, reproducible, and clinically practical morphometric predictor. Of similar magnitude, Sajjad et al. reported a sensitivity of 90.74%, specificity of 97.3%, PPV of 85.96%, and high NPV of 98.29% for AASI, indicating very high diagnostic accuracy.[7] They included a larger and more demographically diverse cohort, whereas our restriction to non-obese ASA I–II patients likely reduced the proportion of difficult airways and modestly lowered sensitivity and PPV. Despite these methodological differences, both studies show consistently high NPVs (>95%), reinforcing AASI as a reliable, objective, and clinically valuable screening tool for excluding difficult laryngoscopy.

Assessment of comparison between MPG and AASI: Both assessment tools demonstrated diagnostic value in predicting difficult laryngoscopy, although their predictive strengths differed across various test parameters. Overall, while both indices hold predictive merit, their diagnostic applications differ. AASI serves as a better screening tool due to its higher sensitivity and NPV, making it suitable for early detection of potentially difficult airways. Conversely, the MPG functions more effectively as a confirmatory tool, given its high specificity and accuracy in excluding difficult laryngoscopies when predicted as easy.

In accordance with our study, Satheesh and Pramoth conducted a comparative study on 100 patients undergoing elective surgeries under general anesthesia to evaluate the AASI and MPG as predictors of DVL and using the CL grading system as the gold standard.[8] When compared with our study, the diagnostic performance of both predictors shows remarkable agreement because in both studies, AASI demonstrated higher sensitivity and NPV, confirming its role as a sensitive screening indicator for difficult airway prediction and MPG showed higher specificity, reaffirming its reliability as a confirmatory bedside test. Both studies confirm that AASI is a simple, objective, and effective preoperative predictor of difficult laryngoscopy, with diagnostic accuracy comparable to or exceeding traditional indices such as the MPG. In consensus to our study, Acharya et al. reinforced that AASI is a simple, reproducible, and highly sensitive screening index for predicting difficult laryngoscopy.4 Both studies confirm AASI's high NPV (>95%), emphasizing its reliability in ruling out difficult visualization when the index is ≤ 0.49. At the same time, Mallampati grading, due to its high specificity, remains valuable as a confirmatory bedside test. Our present study, in agreement with Acharya et al. confirms that AASI is a useful, non-invasive, and objective predictor of difficult laryngoscopy, comparable or superior to traditional clinical indices.

Assessment of combination of MPG and AASI: Overall, the two tests offer complementary strengths: AASI provides an objective anatomical measurement useful for broad screening, while the MPG offers greater specificity when the patient is cooperative. Using them together allows a more complete assessment of both external neck proportions and internal oropharyngeal visibility. This combined strategy improves overall diagnostic precision, making AASI suitable for initial screening and MPG valuable as a confirmatory step, particularly in routine elective settings.

Exhibiting equivalent result, Shiga et al. conducted a seminal meta-analysis which analysed 35 studies including over 50,000 patients evaluating the diagnostic accuracy of MPG and TMD.11 Their analysis showed that combining Mallampati grading with thyromental distance improved predictive capability, yielding pooled sensitivity of 36% and specificity of 87%. This observation resonates strongly with our findings—our combination of Mallampati grading and AASI also led to marked improvement in specificity (97.6%) and PPV (66.7%), confirming that multi-dimensional evaluation strengthens diagnostic reliability. Our findings not only corroborate the conclusions of Shiga et al. regarding the value of combined predictors but also extend them by integrating a novel external index like AASI with strong screening potential.

CONCLUSION

MPG has excellent specificity with high NPV but limited sensitivity and moderate PPV suggesting that, although MPG is very good at predicting patients who are likely to have an EVL, it cannot reliably identify all patients who may actually have a DVL.

AASI has high sensitivity and strong NPV which makes it useful for screening because it can predict most patients who might have a DVL, and although lower PPV reduces its accuracy in confirming difficult cases, it is still helpful for identifying those who are likely to have an EVL.

On comparison, both AASI and MPG showed useful diagnostic value, with AASI performing better as a screening tool predicting more patients who might have a DVL, while MPG serving better as a confirmatory tool predicting patients prone to have an EVL.

On combining AASI and MPG using "AND" rule, the result became very specific and gave more reliable positive results but also missed many difficult cases because of its low sensitivity. The overall accuracy and NPV of the combined approach were similar to using each predictor on its own, showing that both the predictors complement rather than replace each other.

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