

A Prospective Observational Study Comparing Acromio-Axillo-Suprasternal Notch Index with Modified Mallampatti Class and Neck Circumference / Thyromental Distance Ratio in Predicting Difficult Visualisation of Larynx

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Abstract: *Introduction:* The prediction of difficult visualization of larynx (DVL) is very important in airway management. A new test, the Acromio-Axillo-Suprasternal notch index (AASI) has been found to be superior to conventional predictors. In this study we have compared the accuracy of AASI with Modified Mallampatti Class (MMPC) and Ratio of Neck Circumference to Thyromental Distance (NC/TMD) among patients from our institution. *Methodology:* A total of 100 patients of ASA 1 and 2 (18 – 50yrs), who were candidates for tracheal intubation in elective surgery were enrolled in this Prospective observational study. Pre-operative airway assessment was carried out with AASI, MMPC, NC/TMD. After induction of anesthesia, direct laryngoscopy was done and the laryngeal view was recorded according to Percentage Of Glottic Opening (POGO) scoring system. *Results:* The positive predictive values, negative predictive values, sensitivity and specificity of AASI vs MMPC vs NC/TMD are 87 vs 80 vs 21 %, 85 vs 85 vs 68 %, 83 vs 78 vs 46 %, 88 vs 86 vs 41 % respectively. Thus, AASI has better Sensitivity, Specificity, Positive and Negative Predictive values compared to MMPC and NC/TMD. *Conclusion:* This study concludes that AASI can be used as a predictive tool for “Difficult Visualization of Larynx” (DVL). As no single test predicts DVL precisely, AASI can be used in conjunction with standard tools like MMPC, TMD, NC to increase the validity.

Keywords: Difficult Airway, Acromio – Axillo - Suprasternal Notch Index (AASI), Mallampatti Class, Percentage Of Glottic Opening (POGO), Laryngeal view

1. Introduction

Unanticipated difficult intubation leads to hazardous consequences including arrhythmias, hypoxia and cardiac arrest. The prediction of difficult visualization of larynx (DVL) is very important in airway management. There have been many bedside predictors of difficult airway of which none have been perfect. A new test, the Acromio-Axillo-Suprasternal notch index (AASI) has been found to be superior to conventional predictors. In this study we have compared the accuracy of AASI with Modified Mallampatti Class (MMPC) and Ratio of Neck Circumference to Thyromental Distance (NC/TMD) among patients from our institution.

2. Methodology

A total of 100 patients of ASA 1 and 2 (18 – 50yrs), who were candidates for tracheal intubation in elective surgery were enrolled in this Prospective observational study. Pre-operative airway assessment was carried out with AASI, MMPC, NC/TMD. After induction of anesthesia, direct laryngoscopy was done and the laryngeal view was recorded according to Percentage Of Glottic Opening (POGO) scoring system.

Cormack-Lehane and Percentage of Glottis Opening (POGO) scores

Cormack-Lehane Score	Description	POGO Scores (%)
1	Full view of the cords	100
2	Most of the Larynx visible	50-75
	Only posterior part of the larynx visible	25-50
3	Only epiglottis visible	0
4	Epiglottis and glottis not visible	0

Inclusion Criteria

- Patients aged between 18 – 60 years with ASA I/II scheduled to undergo elective surgery needing endotracheal intubation were enrolled

Exclusion Criteria

- Anatomical abnormality of head, neck and thorax
- Use of cervical collar or having cervical spine abnormality
- History of head and neck surgery
- Any Previous H/o difficult airway
- Obese patients (BMI >30kg/m²)
- Obstetric patients
- Patients with inability to open mouth

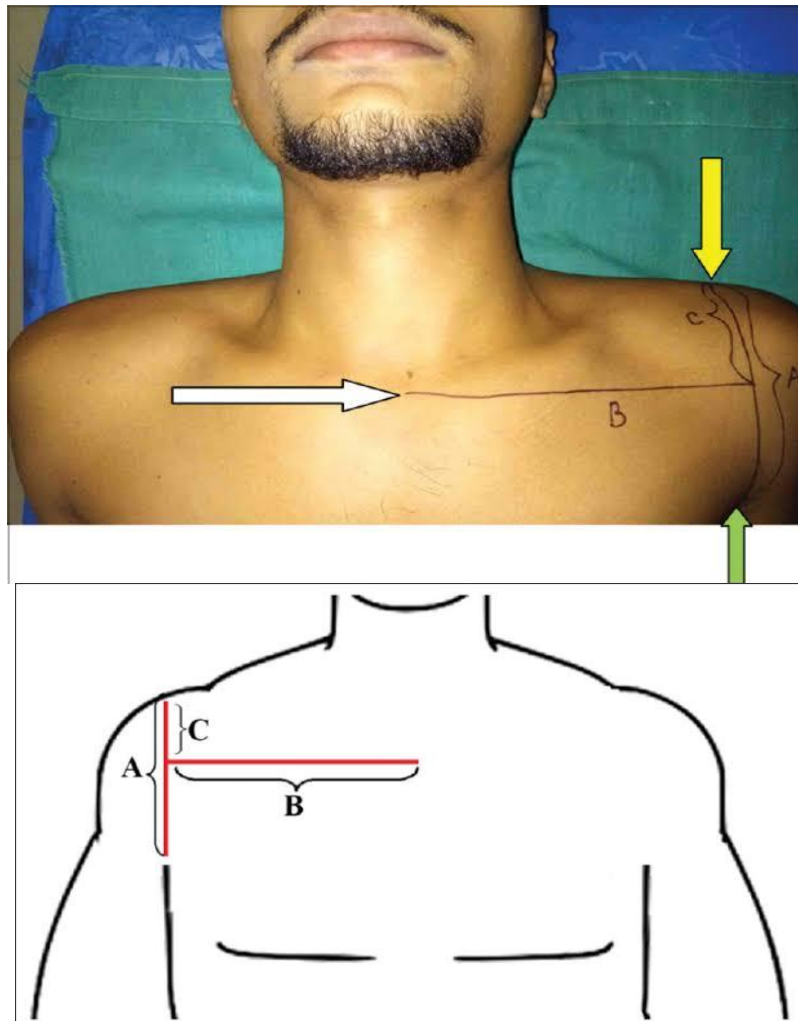
Acromio-Axillo-Suprasternal Notch Index (AASI):

AASI was calculated by asking the patient to lie in supine position with the upper limbs resting by the sides of the body. AASI was calculated based on the following measurements:

- 1) Line A outlined from top of acromion process to upper border of axilla using a ruler
- 2) Line B marked perpendicular to Line A from the jugular or suprasternal notch
- 3) The portion of Line A that lied above the point at which line B intersected Line A was termed Line C.

AASI was calculated by dividing the length of line C by that of line A ($AASI = C/A$)

$AASI > 0.5$ was considered as DVL



- **Modified Mallampatti Class**– Measured while patients were sitting in upright position with mouth open as wide

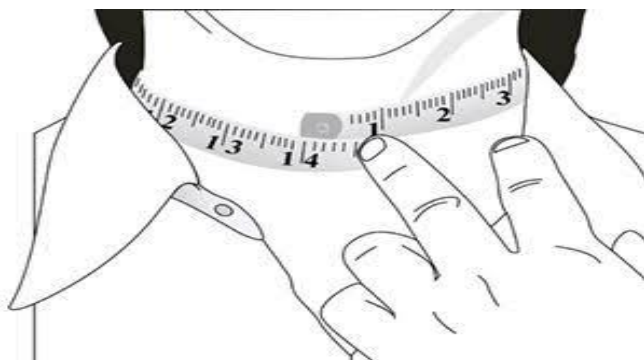
as possible with tongue protruded and without phonation with head in neutral position. Pharyngeal structures inspected from the patient's eye level



- **Thyromental Distance**– With the help of a ruler, Calculated by measuring the distance from the mentum to the thyroid notch, while the patients neck is fully extended, and mouth closed. A TMD < 6.5cm was regarded as predictor for DVL



- **Neck Circumference**– With the head in neutral position and patient looking straight with shoulders down but not hunched, using an inch tape, at a point just below the larynx (Thyroid Cartilage) and perpendicular to the long axis of neck(tapeline in front of neck at same height as the tape line in the back of neck)



- **Ratio of Neck Circumference to Thyromental Distance (NC/TMD) >5.0 is regarded as a Predictor for DVL**

3. Results

The positive predictive values, negative predictive values, sensitivity and specificity of AASI vs MMPC vs NC/TMD are 87 vs 80 vs 21 %, 85 vs 85 vs 68 %, 83 vs 78 vs 46 %, 88 vs 86 vs 41 % respectively. Thus, AASI has better Sensitivity, Specificity, Positive and Negative Predictive values compared to MMPC and NC/TMD.

Airway Assessment Tests	Positive Predictive Value	Negative Predictive Value	Sensitivity	Specificity
AASI	87%	85%	83%	88%
MMPC	80%	85%	78%	86%
NC/TMD	21%	68%	46%	41%

4. Discussion

- As AASI is done in supine position, it is of great value in patients who cannot be seated for MMPC testing. Hence it can also be used in critically ill patients in ICU who need intubation. Moreover, patient cooperation is also not needed for estimation of its values.
- Acromion process is at the lateral most end of clavicle. The line joining acromion process and superior border of axilla (Line A) represents the ‘arm chest junction’. Line A can be regarded as a representative measurement of the portion of the chest that continues as the arm. On the ventral side, the ‘neck’ extends caudally to the clavicles and suprasternal notch. Suprasternal notch lies caudal to the acromion. Thus, the length from ‘acromion process to suprasternal notch’ may represent the ‘part of neck that lies ‘deep in the chest’. To quantify the degree by which the ‘neck is situated deep into chest’ it is necessary to obtain the ratio C/A
- **Thus, the higher the C/A, the deeper the neck is situated into the chest**

A good predictor should have a high sensitivity with reasonable specificity and hence, AASI can be used as a predictor tool for DVL

5. Limitations

- The grading of laryngeal view was performed by different anesthesiologists
- Laryngeal view is influenced by many factors, namely technique, posture while performing and height of operating table.
- Thus, there is chance of inter-observer bias.
- Sample size was less
- We did not evaluate the combination of different airway predictors
- Although combination of tests, results, in larger positive predictive values compared to individual airway predictors however, this is accomplished at the cost of reduced sensitivity and a greater incidence of false negative predictions.

6. Conclusion

This study concludes that AASI can be used as a predictive tool for “Difficult Visualization of Larynx” (DVL). As no single test predicts DVL precisely, AASI can be used in conjunction with standard tools like MMPC, TMD, NC to increase the validity.

References

- [1] Hagberg and Benumof’s Airway Management 4th Edition

- [2] Kamranmanesh MR, Jafari AR, Gharaei B, et al. Comparison of acromio-axillo-suprasternal notch index (a new test) with modified Mallampati test in predicting difficult visualization of larynx. Acta Anaesthesiol Taiwan 2013
- [3] Rajkhowa T, Saikia P, Das D. An observational prospective study of performance of acromioaxillosuprasternal notch index in predicting difficult visualization of larynx. Indian Journal of Anaesthesia 2018