RESEARCH

COMPARATIVE STUDY OF ACROMIOAXILLOSUPRASTERNAL NOTCH INDEX WITH MODIFIED MALLAMPATI TEST IN PREDICTING DIFFICULT VISUALIZATION OF LARYNX

Received : 14/07/2022
Received in revised form : 10/09/2022
Accepted : 19/09/2022

Keywords:
Acromioaxillosuprasternal notch index, Modified mallampati test, Visualization of larynx, Laryngoscopy

Corresponding Author:
Dr. C.C Pramoth,
Email: pramothmbbs@gmail.com
ORCID: 0000-0001-9469-6149

DOI: 10.47009/jamp.2022.4.4.119

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2022; 4 (4); 609-612

P Satheesh[1], C.C. Pramoth[2]

[1]Senior Resident, Department of Anesthesiology, Govt Medical College, Ramanathapuram, Tamilnadu, India.
[2]Assistant Professor, Department of Anesthesiology, Govt Theni Medical College, Ramanathapuram, Tamilnadu, India.

Abstract

Background: The anesthesiologist's main role is to manage the airway. Endotracheal intubation continues to be the gold standard for definitive airway maintenance and is traditionally accomplished by direct laryngoscopy. The modified mallampati (MMP) test is a commonly used tool for evaluating the airway; however, its low sensitivity is always a concern. The Acromioaxillosuprasternal notch index (AASI), a novel test, has been shown to outperform established predictors. As a result, the current research compared the AASI and MMP tests to predict problematic larynx vision. **Materials and Methods:** This prospective, comparative, observational research included 200 adult patients, male or female, aged 20 to 65 years, with an ASA 1 and 2 who had elective surgery under general anaesthesia necessitating tracheal intubation. AASI was utilized to examine the airway before surgery. AASI's sensitivity and specificity were determined. The chi-square test was used to analyze the data in this research. A significance level of 0.05 was judged statistically significant. **Result:** Sensitivity, specificity, positive predictive value, and negative predictive value of AASNI against MMP are, respectively, 76.9 vs 50, 89.3 vs 86, 33.3 vs 21.2, and 98.2 vs 95.8 percent. Thus, AASNI outperformed MMP in sensitivity and negative predictive value but fell short of MMP in specificity and positive predictive value. **Conclusion:** The present study concludes that AASI can be used as a predictor tool for "Difficult Visualization of Larynx" (DVL).

INTRODUCTION

Airway management skills are critical in every medical speciality. The anesthesiologist's job is to maintain the airway and provide oxygenation to minimize morbidity and death associated with difficult intubation. Preoperative airway screening is essential to reduce the danger associated with poor larynx visibility. Anatomical abnormalities of the tongue, teeth, vocal cords and epiglottis may lead to poor laryngoscopy or viewing of the larynx. Therefore, while performing a pre-anaesthetic examination, anatomical anomalies should be noted.[1,2]

The specificities and sensitivity of many approaches for preoperative prediction of difficult intubation have been tried, including the MMP, Thyro-Mental Distance (TMD), upper lip bite test, and sternomental distance test. However, no one can guarantee 100% sensitivity, a relatively recent criterion for difficult intubation. The supraglottic airway device, the laryngeal mask airway, plays a significant part in today's practice of airway management.[3,4]

Difficult laryngoscopy refers to the difficulty of seeing any region of the vocal chords after repeated attempts at laryngoscopy. A difficult airway is when an experienced anesthesiologist has trouble intubating the patient. If the anesthesiologist is unable to intubate and ventilate the patient, it may result in life-threatening scenarios. Preoperative airway evaluation is critical to prevent such situations since failure to do so may result in cerebral injury, brain death, or cardiac arrest.[5]

Endotracheal intubation is the greatest option for protecting the patient's airway. Atlanto-occipital joint motion is critical for the patient to acquire the sniffing posture. Direct laryngoscopy enables endotracheal intubation; other methods include tracheal intubation through a fibreoptic bronchoscope or intubating a laryngeal mask airway. As a result, it is vital to evaluate the airways

and anticipate issues during breathing or intubation. The preoperative airway evaluation detects problematic airways and preparedness, including the following: I Appropriate facility selection and airway procedures ii) Obtain extra adjuvants for airways and iii) Involve a skilled anesthesiologist in care necessary.[6]

Preparedness and foresight helped to mitigate catastrophic catastrophes caused by challenging airways. Numerous research studies have determined the best predictor of difficult tracheal intubation. It has been noticed that individuals with a neck deep within the chest have a greater likelihood of DVL. To assess the difficulty of seeing the larynx, the region of the chest-arm junction above the suprasternal notch may be utilized as an indication.[7] According to previous research, individuals with an AASI larger than 0.5 had a greater probability of experiencing difficulty with larynx vision. Our research makes the premise that an AASI larger than 0.5 indicates difficulty seeing the larynx. Thus, the research will assess the specificity, sensitivity, and positive and negative predictive values of the AASI in predicting difficult larynx visibility.

The objective of the present study is to predict the 'difficult larynx visualization' by measuring the relatively new method, i.e., the AASI test and evaluating it against the traditional method of MMT.

MATERIALS AND METHODS

The present study is an observation and perspective involving 200 patients with an ASA 1and 2 (20–65 yrs) subjects for tracheal intubation during elective surgery. AASI and MMP tests were used to examine the airway before surgery.

Inclusion Criteria

Patients with an ASA 1 and 2 were included if they were between the ages of 20 and 65 and were scheduled to have elective surgery that required endotracheal intubation.

Exclusion Criteria

Patients with upper airway abnormality. Patients with recent head & neck surgery with ASA III-IV and the patient's disability to open the mouth were excluded from the study.

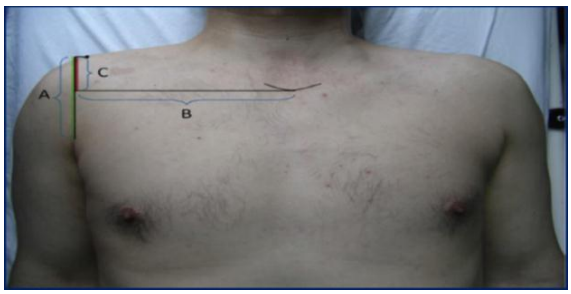

Figure 1: Acromio axillo suprasternal notch index measurement

Method for measuring the AASI

A is the vertical distance between the superior face of the acromion process and the superior boundary of the axillary region, B denotes the perpendicular line connecting the suprasternal notch to line A, and C denotes the part of line A above the cross-section between lines A and B. AASI is defined as the product of C and A (AASI = C/A) [Figure 1].

All patients were given midazolam (0.03 mg/kg) and fentanyl (2 mcg/kg) as premedication. Succinylcholine (1.5 mg/kg) and sodium thiopental (5 mg/kg) were used for anesthesia. Following 100% oxygen ventilation of the lungs, laryngoscopy was tried blinded to the measurements with the head in the sniffing position. A Mackintosh blade (No. 3) was used for laryngoscopy, and Cormack-Lehane grading was conducted. Grades I and II were classified as easy visibility of the larynx (EVL), whereas Grades III and IV were classified as difficult visualization of the larynx (DVL).

If the initial effort at intubation failed due to difficulties, intubation was performed by adjusting the external laryngeal pressure and head position.

Statistics

The proportions of patients with DVL and EVL were compared using the Chi-square test and the t-test for continuous independent variables. A two-sided $p< 0.05$ was used to determine statistical significance.

RESULTS

The demographic parameters of all 200 patients are shown in Table 1. There was no statistically significant difference among CL 1, 2 and CL 3, 4 groups regarding demographic parameters. The average age, weight, height and BMI were reported to be 32± 16.7 years, 71.2± 13.6 kg, 168.7± 9.5 cm and 24.9± 4.8, respectively.

Table 1: Demographic parameters of all patients

Parameters	All	CL -1 & 2	CL 3 & 4	p value
AGE (yrs)	32 ± 16.7	31 ± 16.8	32 ±16.6	0.826
WEIGHT (kg)	71.2 ± 13.6	70.9 ± 13.5	75.1 ± 16.1	0.015
HEIGHT (cm)	168.7 ± 9.5	168.7 ± 9.6	168.0 ± 8.9	0.741
BMI	24.9 ±4.8	24.8 ± 4.3	26.9 ± 5.4	0.07

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Twelve of the 200 participants in the research had a laryngoscopic image of Cormacke Lehane Grades III (10) and IV (2). A whopping 6.3 percent of people had a rough laryngoscopy. AASI 0.49cm was the optimal cut-off value for difficult intubation using discriminating analysis.
With an AASI of 0.49cm, 76.9% of patients who underwent direct laryngoscopy with problems were properly recognized. 89.3 % of patients who had direct laryngoscopy without difficulty anticipated their results properly with ease [Table 2].

Table 2: AASI and MMP score predictive values for the incidence of severe laryngoscopy (CormackeLehane Grade III, IV).

Test	TP	FP	TN	FN	Sensitivity	Specificity	PPV	NPV
AASI	10	20	167	4	76.9	89.3	33.3	98.2
MMP	7	26	160	7	50	86	21.2	95.8

Compared to MMP, AASI demonstrated stronger predictive values and a reduced false-negative rate. There were statistically significant variations in sensitivity, positive predictive values, and accuracy between the two tests (p 0.05), with AASI scoring better. There were no significant variations in specificity and negative predictive values between the two tests.

DISCUSSION

Maintaining a patent airway during general anaesthetic induction is unquestionably the most important priority for an anesthesiologist. Numerous investigators have attempted to predict difficult intubation in preoperative evaluation using simple bedside physical examinations based on anatomical landmarks such as the modified Mallampati test (MMP), thyromental distance (TMD), sternomental distance, upper lip bite test, hyomental distance ratio, all of which have shown varying sensitivities and specificities.[2,3,4] Individuals with a neck that was deep in the chest had difficult visibility of the larynx (DVL) (i.e., with a sloping clavicle).
According to our findings, the region of the arm-chest junction above the suprasternal notch might be utilized to determine DVL. AASI exhibited better predictive values (sensitivity, specificity, positive predictive value, negative predictive value) and a lower false-negative rate than MMP, according to our research. Although there is no one test with acceptable sensitivity and a low false-positive rate for predicting difficult intubation before surgery, it would be highly valuable.[8]
Variation in the incidence of difficult intubation has been attributed to various factors, including population differences in anthropomorphic characteristics, intubation protocols, degree of muscle relaxation, different grades of laryngeal view, head position, application of cricoid pressure, and blade type or size.[9]
Our data showed no significant weight, height, or BMI variations between EVL and DVL patients. In research involving 1956 patients, Cattano and colleagues discovered that the Mallampati classification alone is inadequate for predicting difficult intubation.[10] EVL may be defined as a value of less than 0.5cm, while DVL is more than 0.5cm. Because there is no one valid test that can predict DVL, anesthesiologists must use a combination of existing assays.

Limitations of Study: The present is associated with the below-listed limitations.

1. There is a risk of inter-observer bias since the laryngeal view is influenced by a range of factors, including technique, posture while executing, and the height of the operating table.
2. The sample size was less
3. We did not study the combination of different airway predictors

CONCLUSION

AASI, a new diagnostic test, was shown to be a good predictor of DVL compared with MMP. Therefore, airway evaluation using AASI with a cut-off>0.49 can be well applied to predict difficult intubation. Furthermore, AASI is accurate with high sensitivity & specificity values, also not dependent on patient position & hence proving to be a reliable & accurate tool for predicting difficult airways.

REFERENCES

1. Chou HC, Wu TL. Thyromental distance--shouldn't we redefine its role in the prediction of difficult laryngoscopy? Acta Anaesthesiol Scand. 1998;42(1):136-7. doi: 10.1111/j.1399-6576.1998.tb05096.x.
2. Rose DK, Cohen MM. The airway: problems and predictions in 18,500 patients. Can J Anaesth. 1994;41(5 Pt 1):372-83. doi: 10.1007/BF03009858.
3. Frerk CM. Predicting difficult intubation. Anaesthesia. 1991;46(12):1005-8. doi: 10.1111/j.1365-2044.1991.tb09909.x.
4. Khan ZH, Mohammadi M, Rasouli MR, Farrokhnia F, Khan RH. The diagnostic value of the upper lip bite test combined with sternomental distance, thyromental distance, and interincisor distance for prediction of easy laryngoscopy and intubation: a prospective study. Anesth Analg. 2009;109(3):822-4. doi: 10.1213/ane.0b013e3181af7f0d.
5. Huh J, Shin HY, Kim SH, Yoon TK, Kim DK. Diagnostic predictor of difficult laryngoscopy: the hyomental distance ratio. Anesth Analg. 2009;108(2):544-8. doi: 10.1213/ane.0b013e31818fc347.
6. Apfelbaum JL, Hagberg CA, Caplan RA, Blitt CD, Connis RT, Nickinovich DG, et al. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology. 2013;118(2):251-70.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

7. Cook TM. A new practical classification of laryngeal view. Anaesthesia. 2000;55(3):274-9. doi: 10.1046/j.1365-2044.2000.01270.x.
8. Rajkhowa T, Saikia P, Das D. An observational prospective study of performance of acromioaxillosuprasternal notch index in predicting difficult visualisation of the larynx. Indian J Anaesth. 2018;62(12):945-950. doi: 10.4103/ija.IJA_480_18.
9. Jacobsen J, Jensen E, Waldau T, Poulsen TD. Preoperative evaluation of intubation conditions in patients scheduled for elective surgery. Acta Anaesthesiol Scand. 1996;40(4):421-4. doi: 10.1111/j.1399-6576.1996.tb04463.x.
10. Cattano D, Panicucci E, Paolicchi A, Forfori F, Giunta F, Hagberg C. Risk factors assessment of the difficult airway: an italian survey of 1956 patients. Anesth Analg. 2004;99(6):1774-1779. doi: 10.1213/01.ANE.0000136772.38754.01.

ISSN (O): 2687-5365; ISSN (P): 2753-6556