

TO STUDY THE CORRELATION BETWEEN SONOGRAPHIC MODIFICATION OF CORMACK LEHANE SCORING WITH ACTUAL CL GRADING DURING DIRECT LARYNGOSCOPY

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Abstract

Background: Airway assessment is an essential aspect of preanaesthetic assessment. Presently, prediction of difficult airway is based on clinical assessment of airway.

Methods: Prospective Observational conducted at Department of Anesthesiology, Dr. RPGMC Kangra at Tanda, Himachal Pradesh.

Results: It was observed that 44% patients (n=88) were in grade 2 followed by 27 % (n=54) in grade 1, grade 3 was observed in 24.5% patients (n=49) whereas Cormack Lehane grade 4 was seen in 4.5% patients (n=9)

Conclusion: The thyromental distance was more than 6.5 cm in the majority of patients (87.5%) while 12.5% had a thyromental distance less than 6.5 cm. There was a significant difference in Thyromental distance between different Cormack Lehane grades (P=0.001)

Keywords: Ultrasound, endotracheal intubation, direct laryngoscopy

Introduction

Airway management is an essential component of clinical anaesthesia, and involves maintenance of a patient airway to facilitate gas exchange via mask ventilation or airway device. An important aspect of airway management is assessment of the patient's airway to predict the likelihood of ease or difficulty with bag mask ventilation or with laryngoscopy and intubation, enabling the anaesthesiologist to prepare for this challenging clinical scenario. Several bedside physical airway assessment tests are available, but have a high inter-observer variability and moderate to fair sensitivity and specificity.³ There are many anatomical parameters for evaluating the feasibility of tracheal intubation, one that can reliably predict a difficult intubation is the Cormack-Lehane classification obtained during direct laryngoscopy⁴. This is an invasive procedure that cannot be performed in an awake patient or for pre-anesthetic airway assessments in patients with no prior history of tracheal intubation. However, despite careful airway assessment; direct laryngoscopy sometimes results in unanticipated poor laryngeal views. Ultrasound (US) imaging technique has recently emerged as a novel, simple, portable, non-invasive

tool helpful for pre-operative airway assessment and management⁴.

Material and Methods

Type of Study- Prospective Observational

Place of Study—Department of Anesthesiology, Dr. RPGMC Kangra at Tanda, Himachal Pradesh

Study Population— After approval by institutional ethics committee and obtaining informed consent, prospective and observational study was carried out over the period of one year.

Inclusion criteria

1. Males and females between the age group 18-60 years.
2. ASA physical class I-II.
3. BMI 18.5-29.9.

Exclusion criteria

1. Patient's refusal to participate in the study
2. Rapid-sequence induction of anesthesia
3. Inability to open the mouth due to existing trauma or medical condition, preexisting neck or facial disease-causing distortion of the airway, edentulous, and/or a history of difficult intubation

4. Altered level of consciousness, confusion, or inability to follow commands
5. Preexisting limitation or pain with cervical spine movement. Patients requiring rapid-sequence induction are already at high risk for aspiration; the airway should be rapidly secured with an endotracheal tube and not subjected to repeated or delayed assessment as might occur in the study.

Blinding

The interpreter reliability was double-blinded, that is, the anesthesiologist assessing glottic exposure and the investigator recording the observations were blinded to the preoperative sonographic airway assessment results.

Methodology

The enrolled patients underwent sonographic assessment of airway by the anesthesiologist in the pre-operative holding area. The ultrasound view of the airway of all study patients was assessed with a high-frequency linear probe or low frequency curved probe (SonoSite® MicroMaxx® ultrasound system (SonoSite INC, Bothell, WA). The following measurements were obtained with the patient in supine position and head and neck in a neutral position:

1. A curved low-frequency (5-MHz) transducer was used to visualize the tongue and shadows of the hyoid bone and mandible. The mentum and hyoid bone appear in midsagittal scans as hyperechoic structures with hypoechoic shadowing. The hyomental distances in the neutral and head-extended positions were measured from the upper border of the hyoid bone to the lower border of the mentum in the neutral and extended head positions.
2. The thicknesses of anterior neck soft tissue at the hyoid bone and the thyrohyoid membrane were obtained transversely across the anterior surface of the neck with a 13–6 MHz linear array ultrasound probe attached to a SonoSite S-nerve machine (SonoSite Inc., Bothell, WA, USA). At hyoid bone level, the minimal distance from the hyoid bone to the skin surface (DSHB) was measured and at thyrohyoid membrane level, the distance from skin to epiglottis midway (DSEM) between the hyoid bone and thyroid cartilage was measured.
3. The following measurements were obtained with the oblique-transverse ultrasound view of the airway: (a) the distance from the epiglottis to the midpoint of

the distance between the vocal folds, (b) the depth of the pre-epiglottic space

After intravenous induction with midazolam 0.04 mg/kg, propofol 2–2.5 mg/kg, fentanyl 2µg/kg, and atracurium besylate 0.5 mg/kg, endotracheal intubation was carried out by anesthesia providers with a minimum of 2 years experience in endotracheal intubation with the patient in a neutral position without neck overextension or over-bending. The Macintosh blades were used to expose the target larynx, and no external laryngeal pressure was used to facilitate this process. Classification of laryngoscopic views was based on the method described by Cormack and Lehane.² Grade I is full view of the glottis. Grade II is a partial view of the glottis or arytenoids. Grade III is the only epiglottis seen. Grade IV is neither glottis nor epiglottis visible. Grade I and II are categorized as easy laryngoscopy. Grade III or IV are categorized as difficult laryngoscopy.

Real-time tracheal ultrasonography was performed during the intubation with the transducer placed transversely just above the suprasternal notch, to assess for endotracheal tube positioning and exclude esophageal intubation. The position of trachea was identified by a hyperechoic air-mucosa (A-M) interface with posterior reverberation artifact (comet-tail artifact). The endotracheal tube position was considered as endotracheal if single A-M interface with comet-tail artifact was observed. Endotracheal tube position was defined as intra-esophageal if a second AM interface appeared, suggesting a false second airway (double tract sign).

A standard protocol was followed for auscultation with the investigator first auscultating over the epigastrium, then in the right and left lung in that order. Unchanged ETCO₂ levels and capnography after six ventilations were regarded as final proof of endotracheal intubation. Time measurement was started when the laryngoscope blade was introduced into the mouth to confirmation of the tube placement by sonographically, auscultation and capnography.

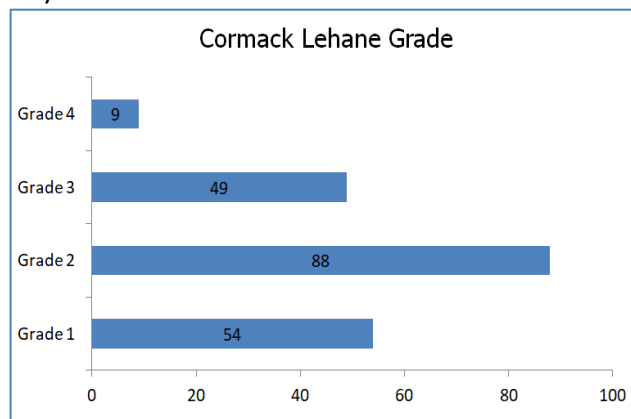
Statistical analysis

Data were presented as frequency, percentages or mean \pm SD, wherever applicable. Categorical variables between the groups were compared using Chi-square test. Quantitative variables between the groups were compared using student t-test. A P

values less than 0.05 considered significant. Statistical analyses were performed using SPSS trial version 21.

Results

The present study was aimed to preoperative assess airway by the point of care USG in patients undergoing surgery under general anesthesia. The prospective observational study was conducted for a period of one year in Department of Anesthesiology, Dr. RPGMC, Kangra at Tanda, Himachal Pradesh. A total of 200 patients were included in the study after they fulfilled inclusion criteria.



The patients were classified according to Cormack Lehane grading system. It was observed that 44% patients (n=88) were in grade 2 followed by 27 % (n=54) in grade 1, grade 3 was observed in 24.5% patients (n=49) whereas Cormack Lehane grade 4 was seen in 4.5% patients (n=9)

Table 1: Sex

		Sex		P Value
		Male (n=47)	Female (n=153)	
Cormack Lehane Grade	Grade 1 (n=54)	9 (16.7%)	45 (83.3%)	0.010
	Grade 2 (n=88)	16 (18.2%)	72 (81.8%)	
	Grade 3 (n=49)	17 (34.7%)	32 (65.3%)	
	Grade 4 (n=9)	5 (55.6%)	4 (44.4%)	

In the present study, the majority of the patients (76.5%) were female while 23.5% were males. Table 2 shows the sex-based distribution of patients in different grades. We found that there were more females than males in grade 1 (45 vs. 9), 2 (72 vs. 16), and 3 (32 vs. 17) while in grade 4, there were more males than females. This was a significant difference in sex distribution between different grades (P=0.010)

Table 2: Thyromental distance-based distribution of patients in different Cormack Lehane grades

		Thyromental Distance		P Value
		<6.5 cm (n=25)	>6.5 cm (n=175)	
Cormack Lehane Grade	Grade 1 (n=54)	3	51	0.001
	Grade 2 (n=88)	7	81	
	Grade 3 (n=49)	11	38	
	Grade 4 (n=9)	4	5	

The thyromental distance was more than 6.5 cm in the majority of patients (87.5%) while 12.5% had a thyromental distance less than 6.5 cm. There was a significant difference in Thyromental distance between different Cormack Lehane grades (P=0.001)

Table 3: Mallampatti-based distribution of patients in different Cormack Lehane grades

		Mallampatti Scoring			P Value
		I (n=68)	II (n=79)	III (n=53)	
Cormack Lehane Grade	Grade 1 (n=54)	28 (51.9%)	21 (38.9%)	5 (9.3%)	0.000
	Grade 2 (n=88)	29 (33%)	40 (45.5%)	19 (21.6%)	
	Grade 3 (n=49)	11 (22.4%)	16 (32.7%)	22 (44.9%)	
	Grade 4 (n=9)	0	2 (22.5%)	7 (77.8%)	

In the present study, the majority of the patients (39.5%) had Mallampatti score of II followed by the score I (34%), and score III (26.5%). A statistically significant difference in Mallampatti score between different Cormack Lehane grades (P=0.000) was observed in this study.

Table 4: ASA-based distribution of patients in different Cormack Lehane grades

		ASA grade		P Value
		Grade I (n=165)	Grade II (n=35)	
Cormack Lehane Grade	Grade 1 (n=54)	52 (96.3%)	2 (3.7%)	0.012
	Grade 2 (n=88)	70 (79.5%)	18 (20.5%)	
	Grade 3 (n=49)	37 (75.5%)	12 (24.5%)	
	Grade 4 (n=9)	6 (66.7%)	3 (33.3%)	

Table 4 shows the ASA-based distribution of patients in different Cormack Lehane grades. In the present

study, the majority of the patients (82.5%) were in ASA grade I while 17.5% were in grade 2. There was a statistically significant difference in ASA grade in different Cormack Lehane grades

DISCUSSION

Visualization of the glottis as assessed by CL grading during laryngoscopy depends on several factors, including the extension of the head at the occipital atlantal and atlanto axial joints. The hyomental distance ratio is defined as the ratio of the hyomental distance in the neutral position with that at the extreme of head extension. When the occipitoatlantal-atlantoaxial complex is extended, the mentum moves away from the hyoid bone, increasing the hyomental distance.

The patients were classified according to Cormack Lehane grading system. It was observed that 44% patients (n=88) were in grade 2 followed by grade 1 (27%), grade 3 (24.5%), and grade 4 (4.5%). In the present study, the incidence of difficult laryngoscopy was 21%.

Andruszkiewicz et al⁵ evaluated the validity of the models of combined sonographic and clinical tests in predicting difficult laryngoscopy. This study analyzed a sample of 199 patients who were categorized as having easy (grades 1 and 2) or difficult (grades 3 and 4) laryngoscopy during general anesthesia with endotracheal intubation based on the laryngoscopic criteria of Cormack and Lehane. Twenty-two patients (11.1%) were categorized as having difficult

laryngoscopy. Parameswari et al found 9.2% incidence of difficult laryngoscopy.⁶

CONCLUSION

The thyromental distance was more than 6.5 cm in the majority of patients (87.5%) while 12.5% had a thyromental distance less than 6.5 cm. There was a significant difference in Thyromental distance between different Cormack Lehane grades (P=0.001)

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