

Success of Tracheal Intubation under Vision Using the LMA C-Trach, A New Laryngeal Mask Airway: Evaluation in 30 Patients

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Abstract: *Aim: The aim of study was to assess airway by direct laryngoscopy with macintosh laryngoscope using Cormack-lehane score and correlation of this score with intubation attempts using LMA Ctrach. Material and method: A observational study has been done in Surat Municipal Institute of Medical Education And Research, Gujarat. 30 patients of, either sex, aged between 20 – 60 yrs, ASA I & II were evaluated. Airway assessment done. After induction, Patients underwent direct laryngoscopy by Macintosh laryngoscope and Cormack-Lehane scores were recorded. LMA C- Trach was inserted using one hand rotation technique. Endotracheal tube was introduced through LMA C Trach under vision and ventilation through endotracheal tube was confirmed. Attempts were made to improve the image of vocal cord on LCD monitor by manoeuvres. Hemodynamic parameters, ETCO₂ and SpO₂, Cormack-lehane grade, intubation attempts, Time for intubation, need of manoeuvres and airway trauma were assessed. Results: In present study, 33% patients of C-L score I, 20% patients of C-L score II, 33.33% patients of C-L score III and 13.33% of patients of C-L score IV were obtained. All patients having C-L score I and IV were intubated at first attempt with mean intubation time 65.4±4.11sec and 70.±2.58sec respectively. 33% of patients of C-L score II and 20% of patients of C-L score III were intubated at second attempt with mean intubation time was 88±5.65 sec and 93±7.07 sec respectively. 20% of patients of C-L score III were intubated after third attempts using adjusting maneuvers with mean intubation time 134±2.82 sec. Dental trauma and mucosal injury were seen in 30% patients having C-L score III during intubation with LMA C-Trach. Endotracheal intubation at first attempt can be achieved by LMA ctrach even in difficult airway having cormack-lehane grading IV. Conclusion: We concluded that successful endotracheal intubation at first attempt can be achieved by LMA C-trach even in difficult airway situation like Comack-Lehane score IV which was assessed by macintosh laryngoscope with less airway trauma. Successful tracheal intubation can be achieved by LMA C-Trach even in difficult airway situation which was assessed by cormack-lehane scores. The LMA C-Trach may provide high success rate for intubation in patients of difficult airway management.*

Keywords: Equipment LMA C-Trach, Equipment Macintosh laryngoscope, Cormack-lehane grading, Airway management

1. Introduction

Airway management is primarily responsibility of anaesthesiologist. Laryngoscopy and tracheal intubation is an essential skill to be acquired by an anaesthesiologist to maintain patent airway during surgical procedures [2]. Tracheal intubation is a life saving process also. For performing rapid intubation successfully, conventional technique is still the gold standard for airway management. But many difficult intubations are not recognized until after the induction of general Anesthesia and constitute a major problem like airway damage, airway edema and hence poor glottis visualization in subsequent intubation attempts.

Video-assisted technique can be used to enhance the success of intubation if conventional technique fails. The ILMA is an established supraglottic device designed to facilitate ventilation and guided tracheal intubation, in anticipated or unexpected difficult airway situations. One of its advantages is the ability to provide ventilation between intubation attempts. Recent advances in video technology and fiber optic system, has resulted in the development of video laryngoscopes and LMA C-Trach.

LMA C-Trach was introduced in clinical practice in 2005. It is a modified version of LMA fast -trach with two built

in fiber optic channels attached to the tip of the airway tube. It has detachable LCD screen that provide continuous video images during tracheal intubation. ET can be passed through LMA C-Trach, has an atraumatic tip and is designed to enter the trachea at the correct angle.

Our hypothesis is that visualization of glottis improves first attempt success rate of tracheal intubation through a laryngeal mask conduit even in difficult airway situations.

The present study aimed to correlate Cormack-Lehane score obtained by direct laryngoscope using Macintosh laryngoscope during endotracheal intubation done by LMA C Trach in terms of intubation success, time to intubation, adjusting maneuver requirement and airway trauma.

2. Material and Method

Patients enrolled in the study were first informed and then their written and verbal consents were obtained. A total of 30 patients of ASA I and II aged between 20 to 60 year undergoing elective surgery under general Anesthesia were enrolled in the study. Following patients were excluded from the study i.e. patients of Body mass index >35 kg/m², Patient having history of Gastroesophageal reflux, H/o Respiratory disease causing dyspnea on mild

exertion, Pregnant patient, Patients that not fasted preoperatively for atleast 6 hours, patients of Temporomandibular joint ankylosis, Inter incisor distance <3 cm were excluded from study.

In the preoperative examination age, gender, weight, anatomical structure of teeth, mouth opening, neck movement and mallampatti scores were recorded.

In all patients, standard monitoring was performed by pulse, NIBP, Peripheral o2 saturation (Spo2) and ECG in lead II. Patients were premedicated with Inj gly copyrrolate 0.003mg/kg and inj Pentazocine 0.5mg/kg IM 30 min before surgery. Preoxygenation was done with 100% oxygen for 3-5 min before induction. All patients were induced with inj propofol 2mg/kg mix with lignocaine 0.5mg/kg and after check ventilation, inj Atracurium 0.5mg/kg IV was given. After 2-3 min of oxygenation by facemask patients underwent DLs copy by Macintosh laryngoscope which was performed by sr. anasthesia residents and C-L scores were recorded. Cormack-lehane grade was assessed by (fig.1):

- Grade 1: Full view of epiglottis
- Grade 2a: Partial view of the glottis

2b: Arytenoids or posterior part of the vocal cords only just visible

- Grade 3: Only epiglottis visible
- Grade 4: Neither glottis nor epiglottis visible

Thereafter the patients were ventilated by mask for one minutes. Subsequent airway intervention was performed by senior teacheres who had performed 4-5 times endotracheal intubation using LMA C-trach.

LMA C- Trach was inserted into oropharynx after its dorsal surface was covered with lubricating jelly using one hand rotation technique and connected to the Anesthesia circuit once cuff was inflated. Size of LMA C Trach was decided according to patient's body weight. After the ventilation was confirmed by inspection and auscultation, LMA C-Trach LCD viewer was placed on the connection point. Attempts were made to improve the image by correcting procedures and then intubation was performed. We optimized the LMA C-Trach placement and view of glottis using the up down maneuver to correct epiglottic down folding, partial withdrawal if the LMA C-Trach was too deeply inserted, complete removal and cleaning of LMA when secretions caused failed view and increase the light intensity on the viewer. ET was introduced through LMA C Trach and ventilation through ET was confirmed and connected to ETCO2 monitor and than Anesthesia circuit. LCD Monitor was removed and LMA C-Trach cuff was deflated. At the time of weaning from mechanical ventilator, connector of the tube was removed from the ET tube and with the assistance of tube changer, LMA C_Trach was removed. The connector was reattached and patient was connected to mechanical ventilator.

C-L scores that were obtained by Direct laryngoscopy were recorded in each patients. In addition, time to intubation, no of intubation attempts, requirement of optimizing maneuvers and airway trauma were recorded.

Time of intubation is defined as time between insertions of blade of macintosh laryngoscope in patient's mouth to the detection of ETCO2 on monitor. Patients with three failed intubation attempts using LMA C-Trach were considering as failure rate in this study. Peripheral hemodynamic parameters and peripheral oxygen saturation were recorded before induction, after induction and just after intubation and than 10 min apart.

Statistical analysis:

Data were presented as mean \pm SD, Percentage, Median (Minimum-Maximum). Analysis of data was done using unpaired t-test with open EPI software. Level of significance was considered as $P < 0.05$.

3. Results

We studied 30 patients, 12 male and 18 female, with mean age of 46.3yrs and mean weight of 55.24kg. The mean duration of surgical procedures was 70min. There were 11, 7 and 12 patients with modified Mallampatti grade I, II and III respectively. In all these patients, the neck movement and mouth opening were adequate. The BMI of all patients were within normal limit (BMI 25.6kg/m²). The demographic data is shown in table-1. The intubation difficulty scores were assessed with macintosh laryngoscope using Cormack-lehane score.

Classification of the patients according to C-L scores are presented in detail in fig.2. In present study, 33% patients of C-L score I, 20% patients of C-L score II, 33.33% patients of C-L score III and 13.33% of patients of C-L score IV were obtained.

While comparing intubation difficulty score with rate of successful intubation, in present study it was observed that we could intubated at first attempt in 100% patients who had C-L score I and IV. In patients of C-L score II, 66.66% of patients were intubated at first attempt and 33.34% of patients at second attempts. Patients of C-L score III, 60% were intubated at first attempt, 20% at second attempt and 20% at Third attempt. (Table -2)

The quality of vocal cord view was obtained with chandy maneuver, up down and forward maneuver. Adjusting maneuver was required in those patients who had C-L score II, III and IV. Out of all these patients, 50% patients of C-L score II, 50 % patients of C-L score III and 25% patients of C-L score IV required adjusting maneuver to visualize vocal cord for intubation. None of the patients of C-L score I required adjusting maneuver. (Table-3)

Mean intubation time by LMA C-Trach was shown in Table no 4. Patients of C-L score I and IV could be intubated at first attempt and mean intubation time was 65.4 \pm 4.11sec and 70. \pm 2.58sec respectively. Patients having C-L score II and III, second attempt for intubation

was required and mean intubation time was 88 ± 5.65 sec and 93 ± 7.07 sec respectively. Third attempt was required in patients of C-L score III and mean intubation time was 134 ± 2.82 sec. so patients having C-L score III, took longer time for intubation than having C-L score IV.

Desaturation was not observed in any group of patients in the study. Dental trauma and mucosal injury were seen in patients of C-L score III(30%) during intubation with LMA C-Trach.(Table5)

4. Discussion

Tracheal intubation may not always be successful even in patients, in whom intubation is not thought to be difficult. It is necessary to prepare alternative difficult intubation equipments (LMA, LMA fastrach, video laryngoscope) before induction in case anticipated difficult airway might be encountered or in patients who are expected to have difficult intubation based on physical examination^[9]. The aim of this study was to improve visualization of laryngeal structure and correlation of C-L score with success rate of endotracheal intubation by LMA C-trach.

Timmerman et al^[10] conducted a study using LMA C-trach. They first determined C-L score by direct laryngoscopy then tried using LMA C-trach for successful intubation. They reported that tracheal intubation could be successful performed even view score were III and IV. Findings of this study were consistent with present study.

In present study, all patients of C-L score I and IV were intubated at first attempt with faster intubation time(65.4 ± 4.11 sec and $70.\pm 2.58$ sec respectively). 33% of patients of C-L score II and 20% of patients of C-L score III were intubated at second attempt with mean intubation time was 88 ± 5.65 sec and 93 ± 7.07 sec respectively. 20% of patients of C-L score III were intubated after third attempt using adjusting maneuver with mean intubation time was 134 ± 2.82 sec.

In present study, patients can be intubated at first attempts even their C-L score was IV. Glottis is not able to visualize with conventional direct laryngoscopy using macintosh laryngoscope, when C-L score is IV. when we encounter such situation in clinical practice, we try to intubate these patients blindly using either bougie, stylet or change to trupti's blade. Sometime, we are not able to negotiate ET tube further in trachea due to difficulty in alignment of axis. Incidence of airway trauma and bleeding are more which further increases the failure rate of intubation.

We found higher success rates of glottis visualization and first attempt tracheal intubation with LMA C-Trach in patients with C-L scores I and IV compared to C-L scores II and III. LMA C-Trach is designed in such a way that intubation success rate is increased in those patients where difficult airway is suspected. Here LMA C-Trach conduit guides the ET tubes to the glottis and passage of the ET tube through the glottis can be visualized. Clear image of the larynx is displayed in real time once the viewer is switched on and placed in the magnetic connector. The ET

tubes can be visualized as it enters the glottis and trachea. LMA C-Trach conduit once place into oropharynx, prevent accidental passage of tube into oesophagous. It also enables ventilation during intubation attempts which permit more time for intubation without hypoxic damage. We could be intubated in second attempts in 33% of patients having C-L score II and even at third attempts in 20% of patients having C-L score III successfully without oxygen desaturation.

Liu et al^[6] carried out a study in 100 patients and investigated the success rate of intubation with LMA C-trach. They found the time to intubation to be 166 sec with LMA C-trach and mean time for intubation was 118 sec in majority of patients by correcting maneuver.

In present study we used storz LMA C-trach and glottis view for Cormack Lehane score was obtained by macintosh direct laryngoscope. 100% successful intubation was obtained by LMA C-trach in this study by applying correcting maneuvers. According to present study, after assessing difficult intubation scale, intubation with LMA C-trach was at first attempts and easier in C-L grade I and IV which might be difficult with macintosh laryngoscope.

5. Conclusion

We concluded that successful tracheal intubation at first attempt can be achieved by LMA C-trach even in difficult airway situation like C-L score IV which was assessed by macintosh laryngoscope with less airway trauma.

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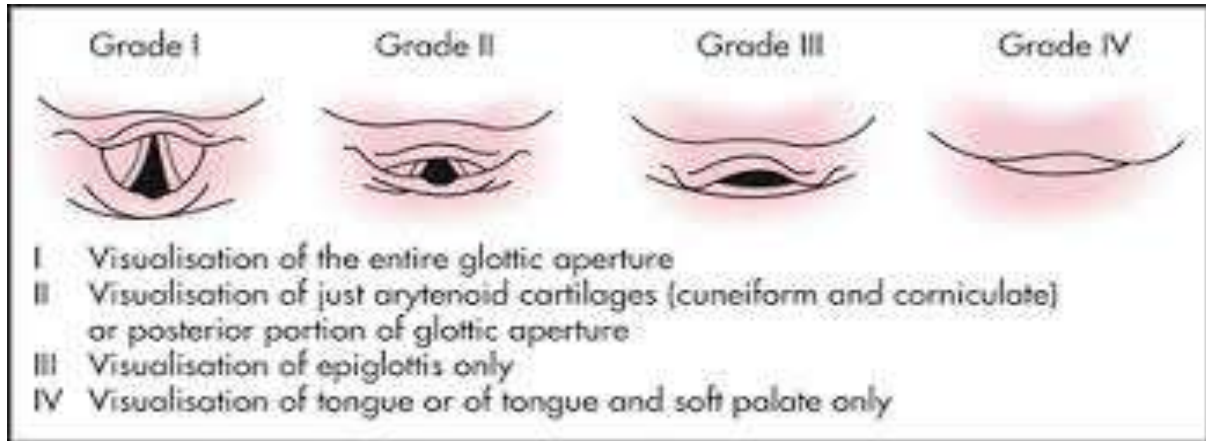


Figure 1: CORMACK-LEHANE GRADE

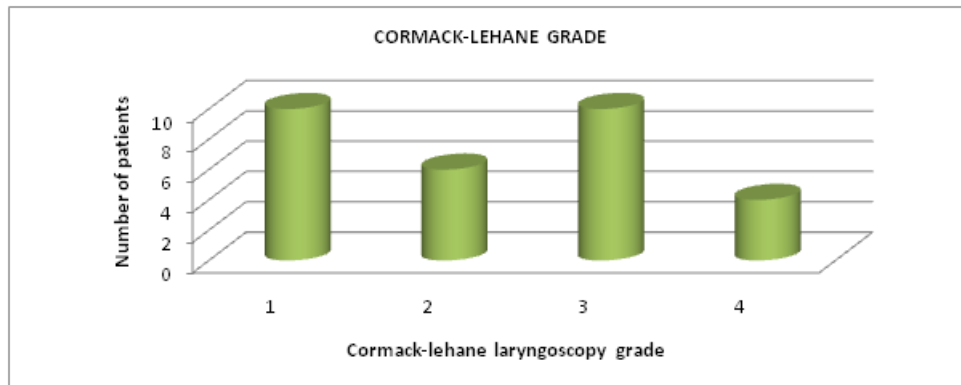


Figure 2: Assessment of Cormack-Lehane Scores

Table 1: Demographic data

Age (Years) (Mean±SD)	46.3±12.6 (20-60 years)		
Gender (M/F) No (%)	12/18 (40/60)		
Body weight (kg) (Mean±SD)	55.24±16.2 (30-80 kg)		
Duration of surgery (min) (Mean±SD)	126±20.4 (100-200 min)		
Mallampatti grade (no of patients)	I	II	III
	11	7	12

Table 2: Comparison of number of intubation attempts with C-L Scores

MEAN INTUBATION TIME(sec) (Mean±SD)	CORMACK-LEHANE SCORES			
	I (n=10)	II (n=6)	III (n=10)	IV (n=4)
First attempt Time (sec)	10 (100%)	4 (66.66%)	6 (60%)	4 (100%)
Second attempt Time (sec)		2 (33.33%)	2 (20%)	
Third attempt Time (sec)			2 (20%)	

Table 3: Requirement of maneuver

Cormack-Lehane scores	View after Maneuvers (Number of patients)			
	Forward maneuver	Light intensity adjustment	Chandy maneuver	Up-Down Maneuver
I (n=10)	NO MANEUVERS REQUIRED			
II (n=6) (50%)	2			1
III (n=10) (50%)	1	1	1	2
IV (n=4) (25%)				1

Table 4: Mean intubation time

MEAN INTUBATION TIME(sec) (Mean±SD)	CORMACK-LEHANE SCORES			
	I	II	III	IV
	(n=10)	(n=6)	(n=10)	(n=4)
First attempt Time (sec)	10 (100%) 65.4±4.11	4 (66.66%) 65.5±4.43	6 (60%) 66.33±5.12	4 (100%) 71±2.58
Second attempt Time (sec)		2 (33.33%) 88±5.65	2 (20%) 93±7.07	
Third attempt Time (sec)			2 (20%) 134±2.82	

Table 5: Complications

Cormack-Lehane score	Complications		
	Dental And Airway trauma (no of patients)	Blood on laryngoscope Blade (no of patients)	Minor Laceration
I (n=10)	-	-	-
II (n=6)	-	-	-
III (n=10) (30%)	2	1	-
IV (n=4)	-	-	-