

First Attempt Intubation Success Rate with Video Laryngoscope after Failed Direct Laryngoscopy

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ABSTRACT

Objectives: Several unsuccessful intubation attempts prompted the authors of this study to investigate the efficacy of the C-MAC video laryngoscope.

Methods: After first attempts with a Macintosh direct laryngoscope were unsuccessful, patients were ultimately able to be intubated with the help of C-MAC laryngoscopes. It was determined whether or not there was a correlation between the positive outcome of C-MAC catheterization and the laryngeal photographs that were produced by the device.

Study design: Descriptive Cross sectional Study

Settings: Department of Anesthesia, Jinnah Postgraduate Medical Centre Karachi

Study duration: January 2021 to January 2022

Results: Cormack and Lehane gave the Macintosh laryngoscope ratings of III and IV, however CMAC gave scores of I to 13 patients, II to 7 patients, and III to one patient. Tracheal intubation with CMAC was successful in 16 patients (76.2% percent) on the first try, and in 5 patients on the second attempt (23.8% percent). Only a trace of blood was discovered on the blades of three patients (14 percent).

Conclusion: During routine anaesthetic treatment, a C-MAC video laryngoscope can successfully overcome unsuccessful intubations. The C-MAC video laryngoscope is a key recovery instrument that is both efficient and safe in the case of an intubation failure.

INTRODUCTION

An anesthesiologist's ability to accurately identify a patient's condition and control the patient's airway efficiently during an operation is critical. Despite strategic breakthroughs in anticipating difficult airway circumstances prior to surgery, standard preoperative diagnostics continue to be ineffective¹. Complications from laryngoscopy and tracheal intubation are a leading cause of anesthesia-related death and morbidity². While intubation is a challenging procedure with a definite failure rate, it can have detrimental consequences like; hypoxia, tachycardia, hypertension, raised intracranial/intraocular pressure, aspiration, and, in certain circumstances, cardiac arrest³.

During difficult intubations the American Society of Anesthesiologists (ASA) recommends a change in approach rather than continuing to employ the same procedure to minimize airway complications⁴. When conventional laryngoscopes are unable to offer adequate view of the larynx, video laryngoscopes can be used⁵. The C-MAC® video laryngoscope consists of a Macintosh steel blade which incorporates a small digital camera and provided with a high power light source and extended to a video display monitor for use during laryngological procedures⁶.

This device enables observational evidence of the glottis with the unaided eye, in contrast to standard video laryngoscopes with acutely angulated blades. Additionally, this device enables indirect surveillance of the glottis via the display, utilizing microscopic cameras mounted to the blade tips⁷. Following direct laryngoscopy, C-MAC has been demonstrated to improve laryngeal vision. Additionally, the usage of a C-MAC in tricky laryngoscopy situations has been demonstrated to be effective⁸. Studies on C-MAC's efficacy and their associated complications, such as unexpected intubation failures, have been lacking.

Objectives: Patients who have experienced tracheal intubation in operating rooms while under general anesthesia will be evaluated to see whether the C-MAC video laryngoscope is helpful in resolving those patients' previously encountered airway difficulties. When regular laryngoscopy suggests a difficult intubation we use C-MAC in our operating room.

METHODOLOGY

After getting approval from the Institutional review committee, this study was done in the surgical units of a tertiary care hospital on patients who had general anesthesia between January 2021 and

January 2022. The study was set up as a prospective cohort study. Following unsuccessful attempts at orotracheal intubation with a Regular Macintosh laryngoscope, the C-MAC video laryngoscope was used (Heine instruments Germany). A Mallampati score of 3 was used in conjunction with an airway assessment to identify patients who are over 18 years of age and do not possess the history of problematic intubation or airway difficulty yet failed an intubation attempt following anaesthetic induction.

Our department keeps track of patients who unexpectedly fail to intubate, as well as the therapies they received on a proforma, after including all intubation attempts, and the use of stylet or bougies, external laryngeal manipulations, intubation success and failures, as well as the anesthetic strategy and difficult facemask ventilation. Cormack and Lehane score provides the best guidance for future attempts. A failed attempt is considered when an endotracheal tube is placed into the patient's oropharynx and tracheal intubation cannot be achieved. Two of the most common errors committed by healthcare providers are tube retraction and inadvertent esophageal intubation.

Because our department only has one video laryngoscope (C-MAC) equipped with a no. 3 blade, C-MAC was not used by us in every difficult laryngoscopic case that arises. Our department is still working on C-MAC familiarity, as we are making progress. Due to the resources and training required, not all anesthesiologists employ the C-MAC video laryngoscope. A gum elastic bougie is used to track the endotracheal tube during a difficult laryngoscopy.

Inclusion Criteria; Every adult patient receiving elective surgery who requires endotracheal intubation.

Exclusion Criteria

- 1 Age less than 18 years
- 2 Emergency and obstetric surgery
- 3 Mallampatti IV on preoperative assessment

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Outcome Measures

The most significant outcomes were successful C-MAC intubation during direct laryngoscopy and challenging intubation instances. Cormack–Lehane views obtained via direct laryngoscopy and C-MAC were used as secondary outcome measures.

Data Analysis: SPSS for Windows 26.0 was used to conduct the statistical analysis (SPSS Inc., Chicago, IL). To compare data

received from the same patient using two distinct devices, the Wilcoxon signed-rank approach was utilized. The mean, standard deviation, and range of the data were calculated using the normal distribution (from minimum to maximum). Counts and percentages were employed to represent variables categorically. Significant p value score will be 0.05

RESULTS

Our department performed endotracheal intubations on 5307 individuals who had normal preoperative airway exams during the research period. In 21 patients, the rescue tracheal intubation tool used was an emergency C-MAC laryngoscope (0.4 percent).

Table 1: summarizes the demographic and clinical features of the patients. Following anaesthetic induction, ventilation of all patients was achieved with a bag-mask ventilation.

Demographics	(n)
Number of patients	21
Gender (M/F) ratio	14 (66.7%)/07(33.3%)
Age in years (Mean± SD)	45.8 ±12.4
Weight in kg (Mean± SD)	82.2 ±12.5
Height in cm (Mean± SD)	171.0 ±8.0
BMI (Mean± SD)	28.2 ±7.8
ASA class (I/ II/ III) ratio	11/07/03
Mallampati class (I/ II/III) ratio	02(9.52%)/14 (66.7%)/05(23.8%)
Thyromental distance in mm (Mean± SD)	72.0 ±8.4
Mouth Opening in mm (Mean± SD)	39.7 ±5.5
Muscle relaxant (n)	
Rocuronium	05 (23.8%)
Cisatracurium	16 (76.2%)
Surgical specialty (n)	
Neuro surgery	02 (9.52%)
General surgery	11 (52.38%)
Urologic surgery	01 (4.76%)
Orthopedic surgery	02(9.52%)
Otorhinolaryngological surgery	03 (14.28%)
gynecology	02(9.52%)

Direct laryngoscopy with a Macintosh revealed Cormac Lehane grades III (80.95 percent) and IV (19.04 percent) in 21 patients.

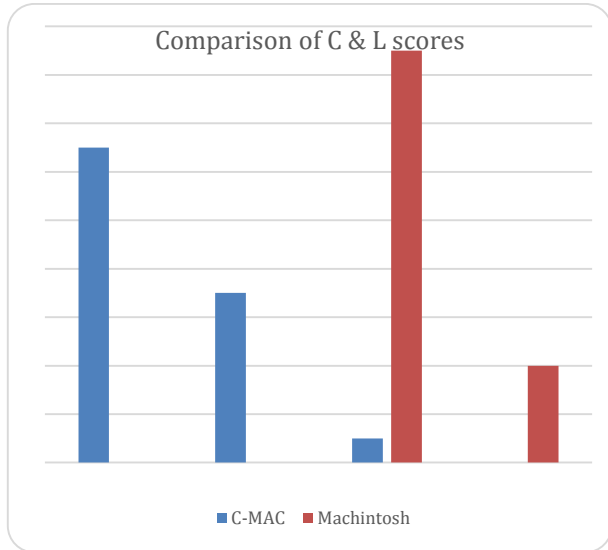


Fig 1:

For 20 patients, using a C-MAC after Macintosh laryngoscopy resulted in improved laryngeal pictures (95.2

percent). In 13 of the patients (61.9 percent), views improved by one or two CL grades. Only one patient (4.76 %) had CL 3 laryngeal views, whereas 07 patients (33.33%) had CL II laryngeal views and 13 patients (61.9 percent) had CL I laryngeal views. In one patient, the intubation was successful even though the C-MAC laryngoscope has not improvised the laryngeal view.

After Macintosh blade intubations failed, all 21 patients had successful tracheal intubations using C-MAC. When C-MAC was utilized, in a first attempt a tube was implanted in 16 patients (76.2%) and in five patients (23.8%) on the second attempt. All patients undergoing direct laryngoscopy required gum elastic bougies, while only five (23.8%) required it who underwent video laryngoscopy. The C-MAC attempted intubations needed external laryngeal manipulation on only seven patients (33.33 percent), despite the fact that all patients required it who had indirect laryngoscopy. There were just three (14.28 percent) incidents of minor injury (blood on the blade).

DISCUSSION

In our study, the use of video laryngoscopy with C-MAC improved glottic vision and increased the success rate of tracheal intubations. In this typical clinical setting, patients who had multiple unsuccessful attempts at intubation were, on average, successfully intubated on the first try with no significant issues. A successful intubation is more likely when a C-MAC is used, as has been shown in previous studies.⁹

In a study by Piepho et al. a C-MAC laryngoscope was utilized to treat 52 patients who had previously had Macintosh laryngoscopy and had CL grade 3 or 4 laryngeal images. C-MAC was successfully employed to intubate 49 patients (94 percent) in their research, indicating a considerable improvement in laryngeal vision.⁷

Aziz et al. revealed that C-MAC intubation had a higher success rate than direct laryngoscopy, 93 percent success rate versus an 84 percent success rate.⁸

Byhahn et al. discovered that when rigid cervical immobilization collars were used to simulate a difficult airway, Bonfils intubation fiberoptic intubations were successful in 88 percent of patients (38 out of 43 patients)¹⁰.

McGrath¹¹ and GlideScope¹² Videolaryngoscopes, for example, have been proven to improve glottis visibility and intubation success rates in prior trials. Only in 5% of patients they were unable to insert a tube accurately during a trial of the McGrath Series 5 video laryngoscopes. One-fifth of patients were unable to be intubated despite using a GlideScope to ensure proper laryngeal views¹³. By increasing the blades' curvature, the intubation tube can make contact with the trachea's front wall¹⁴. Because the C-MAC blade is narrower and has a smaller region between the incisors, an epiglottis-lifting crank technique is easier to do¹⁵. The physical and formal characteristics of the C-MAC blade make it easier to push the tube further during difficult laryngoscopy than blades with steeper angles do¹⁶. Our study suggest that the use of C-MAC Video laryngoscope increases the rate of successful intubation while also improving laryngeal views.

When utilized in difficult airway situations, stylets can have serious consequences such as trauma of the palate, trachea, or neck. This study revealed that, C-MAC reduces the need for stylets while causing only little bleeding. Individual cases can be compared correctly because the same patient had laryngoscopies with the Macintosh and C-MAC blades and was treated by the same anesthesiologists in both procedures. Numerous patients with poor laryngeal views, as defined by Macintosh, had C-MAC used as a supplemental airway device, resulting in a reduced risk of intubation failure than would be expected in routine practice.

CONCLUSION

If intubation fails by a conventional Macintosh laryngoscope, the C-MAC video laryngoscope can be utilized as a main rescue device. The study discovered that video laryngoscopy can be employed in

routine anesthetic care to handle unsuccessful intubations and is both efficient and safe.

The video laryngoscope should be used as frequently as possible by anesthesiologists with at least 2 years of experience and formal training.

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