



COMPARISON BETWEEN C-MAC VIDEOLARYNGOSCOPE V/S MACINTOSH LARYNGOSCOPE FOR INTUBATION IN EMERGENCY ICU

Anaesthesiology

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ABSTRACT

Introduction: The incidence of difficult endotracheal intubation is high in the ICU because of various factors. Most commonly used method for endotracheal intubation is direct laryngoscopy. Video Laryngoscopes are also helpful aids which provide a better laryngeal view in comparison to Direct Laryngoscope. We should aim at minimizing the time required to achieve a secure airway for ventilation in patients presenting to the Emergency Department/ICU. **Methods :** This was a prospective randomized study in Emergency ICU in a tertiary care hospital. A total of 90 patients requiring endotracheal intubation in Emergency ICU were included in the study and were randomly divided into two groups. Group A included patients intubated with the help of C-MAC Videolaryngoscope and Group B included patients intubated with Macintosh Laryngoscope. The primary outcome was to determine overall successful intubation rates. Secondary outcome was to measure first attempt successful intubation rates, time to intubation, requirement of External Laryngeal Manipulation, requirement of any intubating aids. **Results :** Patients in Group A and Group B showed an overall similar intubation success rate ($p=0.213$). Rate of first attempt intubation in Group A and Group B was similar ($p=0.120$). Average time to intubation with Group A and Group B was also similar ($p=0.0647$). Requirement of ELM was lesser with Group A as compared to Group B ($p=0.038$). The requirement of use of intubating aids was lesser in Group A vs Group B ($p=0.003$). **Conclusion :** The use of C-MAC video laryngoscope provided better glottis visualization but resulted in similar first attempt intubation rates, almost similar time to intubation. C-MAC group required lesser overall requirement of ELM and use of intubating aids when compared to the Macintosh Laryngoscope. Thus, C-MAC® Videolaryngoscopy seems to be a useful technique as the initial approach for endotracheal intubation in the ICU.

KEYWORDS

Macintosh Laryngoscope, C-MAC, Videolaryngoscope, Emergency ICU

INTRODUCTION

Airway management for critically ill patients in locations other than the operating room is challenging and frequently associated with various complications. The incidence of difficult endotracheal intubation is higher in the ICU than in the operating room. It is so because in the ICU, visualizing the glottis is often difficult due to the constraints of space, the position of the patient and the accompanying comorbidities. Increased number of attempts during intubation increase the risk of life-threatening complications, such as severe hypoxia, esophageal intubation, aspiration and cardiac arrest, which can be minimized by optimization of visualization of the glottis.⁽¹⁾

Most commonly used method for endotracheal intubation is direct laryngoscopy. Video Laryngoscope incorporate a camera at the tip of the blade, which provide a better laryngeal view in comparison to Direct Laryngoscope, and thus seem promising for airway management. The video picture is transferred to a monitor.^(1,3)

The C-MAC Videolaryngoscope resembles the Macintosh blade and that makes it more convenient for getting a good laryngoscopic view. Better visualization of glottic opening may result in the easy and quick endotracheal intubation while reducing the number of attempts and complication rates.⁽²⁾

Patients presenting to the Emergency department and the Emergency ICU usually are already compromised in respect to haemodynamics and oxygenation/ventilation and thus we should aim at minimizing the time required to achieve a secure airway for ventilation.

AIM AND OBJECTIVES

Aim

To compare the performance of C-MAC Videolaryngoscope to the Macintosh Laryngoscope for intubations done in Emergency ICU in emergency scenarios.

Objectives

To compare :

1. The rate of successful intubations between the two groups
2. The first attempt intubations
3. The time to intubation
4. The requirement of External Laryngeal manipulation
5. The requirement of any intubating aids for intubation (Bougie)

MATERIAL AND METHODS

This was a prospective randomized study in Emergency ICU in a tertiary care hospital. A total of 90 patients requiring endotracheal intubation in Emergency ICU of SRMS-IMS were included during a period of 6 months from April 2022 to September 2022. Patients of all sexes of age more than 16 years were included in the study and were randomly divided in to two groups (Group A / Group B). Group A included patients intubated with the help of C-MAC Videolaryngoscope and Group B included patients intubated with Macintosh Laryngoscope.

Patients those who refused to participate in the study, patients of age less than 16 years, patients having limited mouth opening (Mouth opening < 2FB/2.5cm), patients suspected of having cervical spine injury, patients having maxillo-facial trauma and patients having ongoing oral bleed or upper G.I (gastrointestinal) bleed were excluded from the study.

Study Protocol

Either a C-MAC or a DL was randomly selected through the use of sequentially numbered, opaque, sealed envelopes. The data was collected by the emergency ICU residents. The duration of intubation was measured by the nurses or paramedics preparing the intubation trolley and opening the envelopes. The operators were residents of the Emergency ICU.

The data pertaining to the study included the following information:

- ✓ Patient demographics (age, sex, estimated height, estimated weight, body mass index);
- ✓ Number of intubation attempts (an attempt was defined as an introduction of the laryngoscope into the mouth and its removal regardless of whether an ET tube was inserted);
- ✓ Number of operator(s) performing the procedure (in case of failed intubation);
- ✓ Need to switch to a different device or a different operator;
- ✓ Reasons for intubation failure on the first attempt (i.e. when the glottic opening could not be seen, ETT could not be directed, ETT could not pass the glottic opening, esophageal intubation, the presence of secretions and/or blood);
- ✓ Time taken for intubation (the duration of tracheal intubation was defined as the time taken from insertion of the blade between the

teeth until the lungs were inflated with a bag-valve mask).

Blades of size 3 and 4 of Macintosh Laryngoscope and D blade of C-MAC Videolaryngoscope size 4 were used. A stylete was used in ETT for all intubations.

ET tube placement was confirmed by traditional methods (auscultation, fogging in the tube, ETCO₂). The primary intubation method was rapid sequence intubation; only those patients in cardiac arrest were intubated with no medications as and when necessary. First pass success was defined as correct placement of the ETT in the trachea in a single attempt. The total time of tracheal intubation was documented, regardless of the number of attempts.

The primary outcome was to determine overall successful intubation rates. Secondary outcome was to measure first attempt successful intubation rates, time to intubation, requirement of ELM (External Laryngeal Manipulation), requirement of any intubating aids (Bougie).

RESULTS

	GROUP A	GROUP B	P-VALUE
Overall Intubation success rate	37/45 (82.22%)	32/45 (71.11%)	0.213
First attempt intubation rate	33/45 (73.33%)	26/45 (57.77%)	0.120
Average time to intubation	15±7.76 seconds	18±7.45 seconds	0.0647
Requirement of ELM	9/45 (20%)	18/45 (40%)	0.038
Requirement of intubating aids (Gum elastic Bougie)	5/45 (11.11%)	17/45 (37.77%)	0.003

Of the total 90 patients, patients in Group A showed an overall intubation success rate of 37/45 (82.22%) whereas Group B had 32/45 (71.11%) success rate 9 (p=0.213). Rate of first attempt intubation in Group A was 33/45 (73.33%) and in Group B was 26/45 (57.77%) which was statistically insignificant (p=0.120). Average time to intubation with Group A was approximately 15 seconds vs 18 seconds for Group B (p=0.0647). Requirement of ELM was lesser with Group A (9/45 (20%)) as compared to Group B (18/45(40%)) (p=0.038). The requirement of use of intubating aids was lesser in Group A vs Group B (5/45(11.11%) vs 17/45(37.77%)) (p=0.003).

DISCUSSION

This is a study to compare C-MAC Videolaryngoscope to Macintosh laryngoscope for intubating the patients in Emergency ICU.

According to the study, overall success rates and first attempt intubation rates were similar between the devices.

According to the previous studies, C-MAC provided better visualization of the glottic opening.⁽⁴⁾ Although glottic view is improved with the C-MAC VL, this was not translated into lesser duration of ET intubation when compared to Macintosh laryngoscope. Multiple studies have noted a better view of glottis with the VL but this was not always associated with successful intubations in all the patients.⁽⁵⁾

The difference in average intubation time between the Macintosh Laryngoscope and the C-MAC Videolaryngoscope (3 sec) did not appear clinically relevant. Other studies of videolaryngoscopes on contrast showed slightly longer intubation times with VL compared to Macintosh Laryngoscope (3-16secs)^(6,7)

Use of External Laryngeal Manipulation and/or use of Gum elastic Bougie was required less often in the C-MAC group compared to the Macintosh group. The capacity of the C-MAC VL to reduce the need of adjunctive intubation maneuvers expands the evidence on the superior performance of videolaryngoscopes compared with conventional direct laryngoscopes.⁽⁴⁾

Our study suggests that C-MAC provides better laryngoscopic view and familiar blade curvature of C-MAC blades eased intubation difficulty.

CONCLUSION

- The use of C-MAC video laryngoscope provided better glottis visualization but resulted in similar first attempt intubation rates,

almost similar time to intubation

- C-MAC group required lesser overall requirement of ELM and use of intubating aids when compared to the Macintosh Laryngoscope.
- Despite equivocal support for video and direct laryngoscopy, further studies involving laryngoscopists of different expertise are required to evaluate usefulness various available video laryngoscopes as compared to Macintosh laryngoscope.
- C-MAC® Videolaryngoscopy seems to be a useful technique as the initial approach for endotracheal intubation in the ICU.

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