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Original Research Article

# Efficiency of Intubation between Mcgrath MAC Laryngoscope and C-MAC Video Laryngoscope in Patients Undergoing Elective Surgery

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**Abstract**

**Introduction:** Tracheal intubation using Direct Laryngoscopy (DL) is a well-established and favored technique for opening the airway. Video laryngoscopy (VL) is crucial in the treatment of patients who experience unexpected airway problems or unsuccessful tracheal intubation. Because it allows for an enhanced view of the glottis without the need for a direct line of sight, indirect VL has grown to be widely acknowledged as a technique for learning the methods of airway management. The difficult airway task force of the American Society of Anesthesiologists (ASA) advises having a VL on hand as the first rescue device for all patients undergoing intubation.

**Aims and Objectives:** To compare the efficiency between McGrath MAC Laryngoscope and C-MAC Video Laryngoscope in terms of the success of endotracheal intubation in elective surgery.

**Methods:** A prospective randomized comparative study was conducted on the patients of ASA-I and ASA-II status, who were planned for endotracheal intubation under general anaesthesia. These patients were divided into two groups and baseline characteristics and grading were determined and analyzed.

**Results:** The laryngoscopic views of grade I, IIa, IIb, III in both ML and CL were 57.7%, 26.9%, 11.5%, 3.8%, and 48.1%, 32.7%, 15.4%, 3.8% respectively. It has a p-value of 0.384 showing a difference between both the groups to facilitate is statistically not significant. In grade, I patients the time taken for intubation in CL was 22.04±3.63 and in ML was 33.6±14.79 secs. The requirement of aids in CL was 10 out of 52 (19.2%). Out of this 1.9& require bougie, 9.6% require ELM, and 7.7% require bougie plus ELM, whereas in ML patients 30.7% require air intubations out of which 7.7% require bougie, 11.5% require ELM, and 11.5% require both.

**Conclusion:** The study concludes that the MCGrath MAC VL provides a better view in laryngoscope compared to C-MAC. For the endotracheal tube intubation, the time is comparable in both groups.

**Keywords:** Endotracheal Intubation, Video Laryngoscope, Elective Surgery, Airway Problem



## Introduction

In emergencies and clinical anaesthesia practice, tracheal intubation using Direct Laryngoscopy (DL) is a well-established and favoured technique for opening the

airway [1]. Oropharyngeal-laryngeal axes must be aligned for the best visibility of the glottis during DL. Because it allows for an enhanced view of the glottis without the need for a direct line of sight, indirect VL has grown to be widely acknowledged as a technique for learning the methods of airway management [2]. As a result, VL is crucial in the treatment of patients who experience unexpected airway problems or unsuccessful tracheal intubation [3]. Airway issues are less common in clinical emergencies and anaesthetic practice, when VL is used. The length of tracheal intubation could be extended and intubation efforts can fail despite the optimized glottis visualization [4]. The learning curve for the video laryngoscope is much steeper than for DL. The shape of the curvature or angulated blades, the size of the display of the monitor, and the functionality of the tiny camera on the blade tip vary across different types of video laryngoscopy [5].

A Macintosh-based blade, similar to that found in the Macintosh laryngoscope, is a feature of the portable, reasonably priced McGrath MAC video laryngoscope. To benefit from the oropharyngeal mismatch, it offers both a direct line of sight of the glottis and an indirect picture on the monitor display. We chose the McGrath video laryngoscope specifically because of the following factors: [6,7]

1. McGrath's curved blade is similar to the Macintosh blade in design.
2. When tracheal intubation is carried out by a less-experienced clinician, McGrath's video display enables the operator to see the glottis and allows a consultant to educate or study while also doing measurements.
3. The McGrath enables a quick shift to treat many patients concurrently and comes with disposable blades in various diameters.

A relatively recent advancement in airway management called VL aims to increase the effectiveness of tracheal intubation. VL has tiny cameras included that let the user see the glottis from a distance [8-11].

VL positions an imaging tool near the laryngoscope blade's distal end. This avoids the need for a straight line of vision to the glottis by shifting the provider's viewpoint past the tongue [12]. The difficult airway task force of the American Society of Anesthesiologists (ASA) advises having a VL on hand as the first rescue device for all patients undergoing intubation [13]. Numerous studies have revealed that VL increases the success of intubation and enhances the ability to view the larynx. Several VL has developed during the past 20 years, offering several benefits over DL [14,15]. A large LCD screen is mounted to the handle of the McGrath MAC video laryngoscope, which has a thin, disposable blade that is transparent and regularly shaped like a Macintosh blade. Tracheal intubation might be simpler and quicker using it because it is less in mass and has a smaller screen and handles [16-18]. The integrated optical lens system of the Trueview video laryngoscope includes a special angulated blade that offers the best indirect view of the glottis [19].

## Methods and Materials

A prospective randomized comparative study was conducted on 104 patients to compare McGrath MAC and C-MAC video laryngoscope for laryngoscopic view and the time taken for the endotracheal intubation. Patients of ASA-I and ASA-II status were planned for endotracheal intubation under general anaesthesia. These patients were divided into two groups.

**Group CL:** in this group, C-MAC video laryngoscope is used for tracheal intubation.

**Group ML:** in this group, McGrath MAC video laryngoscope is used for tracheal intubation.

The baseline characteristics were determined among the groups and also the grading was analyzed.

### Inclusion criteria

1. For elective surgery, patients are scheduled to receive general anaesthetic and endotracheal intubation.
2. Patients who give informed consent.
3. ASA I and II
4. Modified classification of Mallampati I, II
5. Patients of age > 8 years and <70 years.
6. BMI ≤ 30 kg/m$^2$
7. Patients who are negative for SARS COV2 RT-PCR.
8. HRCT chest- CORADS 1,2

### Exclusion criteria

1. Patients, who do not provide any informed consent.
2. Increased intracranial pressure.
3. BMI> 30 Kg/m$^2$
4. Patients with edentulous and loose teeth.
5. Classification of Mallampati III, IV
6. Patients with uncontrollable hypertension.
7. Patients with disease of the cervical spine.
8. Patients are positive for SARS-COV-2.
9. Difficulty in the airway.
10. Conditions that require rapid sequential intubation.
11. HRCT chest- CORADS 3,4,5,6.
12. ASA III and IV.

### Statistical analysis

The data on continuous variables were given as mean±standard deviation across the research groups, and the data on categorical data will be presented as n (% of cases). If more than 20% of the cells have an anticipated count of less than 5, the chi-square test or Fisher's exact probability test for a 2x2 contingency table was used to determine the significance of the difference in categorical variable distribution between the two study groups. The statistical significance of the difference in the average of continuous variables between the two research groups was evaluated using an independent sample *t*-test. Before applying the *t*-test to the research variables, the underlying normality assumption was examined. Statistical significance was determined by P values under 0.05. Two-tailed alternates will be used to create all of the hypotheses against each null hypothesis. The full set of data was statistically evaluated using the IBM Corporation's SPSS version 22.0 software for Microsoft Windows.

### Ethical approval

The patients were given a thorough explanation of the study by the authors. The patients' permissions have been obtained. The concerned hospital's Ethical Committee has approved the study's methodology.

### Results

The age range in the study is 21 to 69 years and 23 to 68 years in CL and ML groups respectively. The mean age is 44.37 and 44.83 years in CL and ML groups respectively. The range of BMI is 15.59 to 27.92 in the CL group and 17.75 to 27.01 in the ML group (Table 1).

**Table 1: Showing overall mean, median, and standard deviation of CL & ML groups**

| Group | Parameters | Minimum | Maximum | Mean | Std. Deviation | Median |
|---|---|---|---|---|---|---|
| **CL** | Age (years) | 21.00 | 69.00 | 44.37 | 13.71 | 45.00 |
| | Weight(kg) | 31.00 | 80.00 | 66.25 | 9.34 | 67.50 |
| | Height(cm) | 141.00 | 176.00 | 165.79 | 7.16 | 169.00 |
| | BMI | 15.59 | 27.92 | 24.01 | 2.55 | 24.09 |
| **ML** | Age(years) | 23.00 | 68 | 44.83 | 13.66 | 45.50 |
| | Weight(kg) | 41.00 | 81.00 | 67.37 | 8.45 | 68.00 |
| | Height(cm) | 152.00 | 183.00 | 168.27 | 7.01 | 167.00 |
| | BMI | 17.75 | 27.01 | 23.73 | 2.05 | 24.38 |

The mean age ± SD of patients is 44.83 ± 13.66 and 44.37 ± 13.71 in ML and CL groups respectively (Table 2).

**Table 2: Comparison of the mean age and standard deviation of the participants in the two groups.**

| Age (Years) | Groups | Mean | Std Deviation | T Value (df) | P Value |
|---|---|---|---|---|---|
| | ML | 44.83 | 13.66 | 0.172 | 0.864 |
| | CL | 44.37 | 13.71 | | |

The laryngoscopic views of grade I, IIa, IIb, III in both ML and CL were 57.7%, 26.9%, 11.5%, 3,.8%, and 48.1%, 32.7%, 15.4%, 3.8% respectively. It has a p-value of 0.384 showing a difference between both the groups to facilitate is statistically not significant (Table 3).

**Table 3: Comparison of laryngoscopic view in the participants in the two groups**

| LARYNGOSCOPIC VIEW | GROUP | | Total | Chi-Square | P Value |
|---|---|---|---|---|---|
| | CL | ML | | | |
| GRADE I | 25 (48.1%) | 30 (57.7%) | 55 | 5.27 | 0.384 |
| GRADE IIa | 17 (32.7%) | 13 (26.9%) | 24 | | |
| GRADE IIb | 8 (15.4%) | 6 (11.5%) | 14 | | |
| GRADE III | 2 (3.8%) | 2 (3.8%) | 4 | | |
| Total | 52 | 52 | 104 | | |

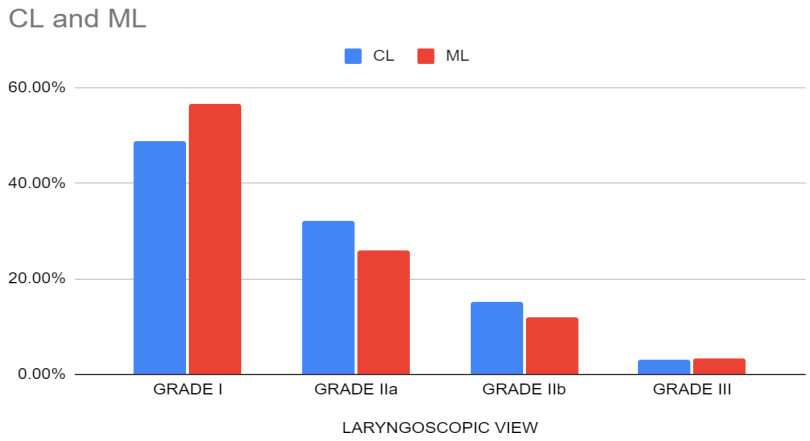


**Figure 1: Distribution of grading of laryngoscopic view**

In grade, I patients the time taken for intubation in CL was 22.04 ± 3.63 and in ML was 33.6 ± 14.79 secs (Table 4).

**Table 4: Time taken for endotracheal intubation in grade I Cormack's lahane in 2 groups**

| Time is taken for intubation in Grade I patients (secs) | Groups | Mean | Std Deviation | T Value | P Value |
|---|---|---|---|---|---|
| | ML | 33.67 | 14.79 | 3.8 | <0.001 |
| | CL | 22.04 | 3.63 | | |

The requirement of aids in CL was 10 out of 52 (19.2%). Out of this 1.9& require bougie, 9.6% require ELM, and 7.7% require bougie plus ELM whereas in ML patients 30.7 % require air intubations out of which 7.7% require bougie, 11.5% require ELM, and 11.5% require both. According to the chi-square test, P value of

0.431 shows a difference between the two groups (Table 5).

**Table 5: Showing aids used by the participants in 2 groups**

| AIDS USED (BOUGIE OR ELM) | Group | | Total | P Value | Chi Square |
|---|---|---|---|---|---|
| | CL | ML | | | |
| **Not Used** | 42(80.8%) | 36(69.2%) | 78 | 2.752 | 0.431 |
| **Bougie** | 1 (1.9%) | 4 (7.7%) | 5 | | |
| **Bougie+ ELM** | 4 (7.7%) | 6 (11.5%) | 10 | | |
| **ELM** | 5 (9.6%) | 6 (11.5%) | 11 | | |
| **Total** | 52 | 52 | 104 | | |

The mean endotracheal intubation time in Cl was 35.8 secs and in ML was 42.11 secs. P value of 0.149 that shows the difference between the two groups is not statistically significant (Table 6).

**Table 6: Comparison of mean time taken for endotrachela intubation for two groups**

| Time is taken for endotracheal intubation (secs) | Groups | Mean | Std. Deviation | T Value | P Value |
|---|---|---|---|---|---|
| | ML | 42.11 | 24.01 | 1.45 | 0.149 |
| | CL | 35.8 | 22.52 | | |

## Discussion

A study was conducted recently to determine which type of laryngoscope performs best at each bed height and whether bed height impacts intubation performance during cardiopulmonary resuscitation. At the minimal height, the Glidescope video laryngoscope's TTI was comparable to that of the Macintosh laryngoscope. The effectiveness of intubation was unaffected by the height of the bed, whether it was set to the maximum or minimum setting. Furthermore, the intubation time with the video laryngoscopes, particularly AWS, was much shorter than with the direct laryngoscope under chest compression, regardless of the bed height [20].

Excellent laryngoscopic views are provided by the McGrath MAC video laryngoscope, which in some circumstances raises the success rate of orotracheal intubation. The purpose of a recent study was to compare the McGrath MAC with the Airway scope and Macintosh laryngoscope to ascertain the use of the McGrath MAC for routine nasotracheal intubation. By reducing the time required for tracheal intubation and raising the Cormack Lehane grade, the study found that the McGrath MAC greatly aids routine nasotracheal intubation when compared to Airway scope and Macintosh laryngoscope [21].

Three innovative laryngoscopes-the Pentax Airway scope, the Truview EVO2-enable vision, and the Glidescope of the vocal cords without pharyngeal, oral, or tracheal axis alignment. In a mock easy and difficult laryngoscopy, they compared these tools to the Macintosh laryngoscope. There was no difference in the success of tracheal intubation between both the study devices and the Macintosh in the simulated simple laryngoscopy scenarios. The Pentax AWS and Glidescope, and to a smaller extent the Truview EVO2 laryngoscope, showed advantages over the Macintosh laryngoscope in more challenging tracheal intubation settings, including one with a better view of the glottis, increased success with tracheal intubation, and simplicity of device usage. The study concluded that when utilized by skilled anaesthetists in challenging tracheal intubation situations, the Pentax AWS laryngoscope showed more improvements over the Macintosh laryngoscope compared to either the

Glidescope laryngoscope or Truview EVO2 [22].

Infants' anatomical and metabolic characteristics make intubation difficult. For intubating newborns, the C-MAC video laryngoscope performs better than the traditional DL. Infants can now utilize the newly released McGrath MAC size-1 with a disposable Macintosh-type blade; this product has not yet undergone rigorous evaluation in this demographic. The main goal of the study is to compare the times using the two devices while evaluating the intubation properties of the C-MAC Miller and McGrath MAC in neonates and babies. While the McGrath MAC offered better glottic views, the C-MAC Miller blade had comparable intubation timings, chances of success, and intubation difficulty scores in infants and neonates. Both video laryngoscopes can be used safely for routine intubation in neonates and infants [23].

In research, the McGrath® Series 5 video laryngoscope and the Macintosh laryngoscope were evaluated for the installation of double-lumen tracheal tubes in patients who were expected to have satisfactory glottic vision upon airway assessment. In patients with a low airway risk index score the Macintosh laryngoscope is used as the first device who needed intubation with a double-lumen tracheal tube and the McGrath video laryngoscope is used only when this offers a poor glottic view, as well as providing more Cormack and Lehane grade-1 views, a longer mean (SD) intubation time and a higher incidence of double-lumen tube malposition [24-26].

## Conclusion

The study concludes that the McGrath MAC VL provides a better view of the laryngoscope compared to C-MAC. For the endotracheal tube intubation, the time is comparable in both groups. The aids like external laryngeal manipulation or bougie or both are used more extensively in McGrath MAC than in C-MAC. Medical students use C-MAC as a very good tool and McGrath MAC is used by experienced operators or used in intubation in peripheries.

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