# The Success of Videolaryngoscopy & Macintosh Laryngoscopy in Intubation Attempts & Visualisation Vocal Cords in Adult Patients- A Comparative Study

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## ABSTRACT

**Introduction**

The laryngoscope was created to facilitate tracheal intubation & enhance glottis visualisation. It is uncertain whether this method works well for patients whose intubation is anticipated to be challenging. The aim of present study is to comparatively study the success of videolaryngoscopy& Macintosh laryngoscopy in intubation attempts &visualisation vocal cords in adult Patients.

**Material & Methods**

The present prospective comparative study was conducted at department of anaestheisa of a tertiary care centre among patients undergoing surgery with tracheal intubation under general anesthesia during the study duration period of one year. Two groups of fifty patients each were randomly assigned to receive either a videolaryngoscope (VL Group) or a Macintosh laryngoscope blade (ML Group). The analyses were conducted using the SPSS 25.0 package software for Windows, using a significance level of P <0.05.

**Results**

In the VL Group, there were 68% of patients with CL- I, but in the ML Group, there were 30%. In both groups, there were no CL-IV patients (P =.001). Within the VL Group, 85% of patients required just one attempt at intubation, 15% needed two, & none needed three. Of the patients in the ML Group, 86%

only needed one attempt at intubation, 13% needed two, & 1% needed three. Compared to videolaryngoscope patients (9%), those using Machintosh laryngoscopes (20%) experienced higher problems.

**Conclusion**

In patients undergoing endotracheal intubation for general anaesthesia, videolaryngoscopy was found to be superior to Macintosh laryngoscopy due to its increased glottic view, shortened intubation time, streamlined intubation process, and decreased risk of complications.

**Keywords:** Anesthesia, Intubation, Macintosh Laryngoscopy, Patients, Surgery, VideoLaryngoscopy

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## INTRODUCTION

In every anaesthetic surgery, the first step is to ensure & manage airway safety. Furthermore, unless a functional airway is established, administering any anaesthetic is unsafe. Anaesthesia operations often involve endotracheal intubation, particularly general anaesthesia. With the use of this technique, anesthesiologists can maintain an open airway, regulate breathing, modify the effort required to breathe, lessen dead space, avoid aspiration, make sure they & their equipment stay out of the surgical field, &administer the airway during resuscitation. These factors make endotracheal intubation the most effective technique for controlling & guaranteeing airway safety. The trachea is punctured with a tube during endotracheal intubation.[1] For many years, this technique has been performed using a Macintosh laryngoscope blade. The use of videolaryngoscopes has increased recently.[2] It is believed that using a videolaryngoscope reduces the risk of airway damage. The "American Society of Anesthesiologists" (ASA) advises videolaryngoscopy as the primary option for all subjects to be intubated, in compliance with the challenging airway algorithm.[3]

Furthermore, the use of video-assisted approaches presents a chance to enhance airway management instruction.[4] Generally speaking, the benefit of these methods is that the larynx entry can be seen without having to line up the mouth & pharynx's optical axes.[5]

Into clinical practice, the Storz video laryngoscope was first used in 2003 by Kaplan &Berci.[6] The Storz video laryngoscope has an integrated video camera & is constructed similarly to a typical Macintosh laryngoscope. The picture is projected onto a portable screen by the camera.

In addition to providing the anesthesiologist with a better vision, the technology enables support personnel to provide the best possible care (external laryngeal manipulation). A comprehensive investigation involving patients who were expected to have typical immune responses has demonstrated the system's high efficacy.[7] These researches are mostly those with goal to evaluate the use of videolaryngoscopes with the classic Macintosh laryngoscope.

Increases in intraocular, intravascular,or intracranial pressure & heart rate as well as bronchoconstriction & arrhythmia, are common side effects of laryngoscopy & endotracheal intubation.[8]Hence the aim of present study is to comparatively study the success of videolaryngoscopy& Macintosh laryngoscopy in intubation attempts &visualisation vocal cords in adult Patients.

## MATERIAL & METHODS

The present prospective comparative study was conducted at department of anaestheisa of a tertiary care centre among patients undergoing surgery with tracheal intubation under general anesthesia during the study duration period of one year. The ethical clearance was taken from institutional ethical committee before commencement of study. Patients were asked to sign an informed consent after explaining them the complete procedure.

The study involved100 patients through consecutive sampling, aged 18 to 65, who were scheduled for surgery involving tracheal intubation & would therefore receive general

anaesthesia. Two groups of fifty patients each were randomly assigned to receive either a videolaryngoscope (VL Group) or a Macintosh laryngoscope blade (ML Group).

The study excluded patients who were pregnant, underwent emergency surgery, were in the ASA IV-V category, had decompensated heart failure, or had increased intracranial pressure.

The patients' El-Ganzouri Risk Index (EGRI) score, comorbidity, weight,height, body mass index (BMI), ASA score, sex, smoking & alcohol habits, & neck circumference were all noted. The EGRI is a scoring index with a range of 0 to 12 that is based on seven parameters.

The following characteristics were calculated & recorded for this index: mouth opening, Mallampati score, thyromental distance, predisposition for prognathism, neck movement, body weight, & history of difficult intubation.

The time taken to achieve intubation was noted. Following intubation, the quantity of attempts made as well as the frequency of trauma, difficulties, & problems were assessed.

The glottic vision was assessed using Cormack-Lehane (CL) grading. In the preoperative preparation room, 0.02 mg kg−1 of midazolam was given to each patient. In order to induce anaesthesia, the patients received 2 mg kg−1 of propofol IV, 0.6 mg kg−1 of rocuronium IV and 1.5 µg kg−1 of fentanyl IV. After three minutes of mask ventilation, they were intubated. For the purpose of maintaining anaesthesia, the patients received 0.1 µg kg−1 min−1 of fentaniland 2% of sevoflurane.

M3 & M3D were the blade types utilised on the VL Group. Patients having a history of challenging intubations were treated with M3D more frequently. Blades three & four were employed in the ML Group. Patients with a history of challenging intubation were given preference for the videolaryngoscope group. The intubation process involved the insertion of a stylet into the endotracheal tube (ETT) for both groups.

Using the Shapiro-Wilk test, the conformance of numerical variables with a normal distribution was examined. When comparing abnormally distributed variables between two groups, a Mann-Whitney U test was employed; when comparing variables across more than three groups, Kruskal-Wallis & Dunn's tests were utilised. The Spearman's rank correlation coefficient test was used to determine the correlation between numerical variables, & the chi-squared test was used to determine the correlation between categorical variables. The analyses were conducted using the SPSS 25.0 package software for Windows, using a significance level of $P < 0.05$.

**RESULTS**

Demographic data of patients of both groups were analysed& compared There was no statistically significant difference observed between the two groups when the demographic data were analyzed only comparison of intubation time showed significant results (p=0.001) as shown in table 1.

| Variable | VLGroup(n=50) | ML Group(n=50) | PValue |
|---|---|---|---|
| Mean age (years) | 43.45±12.56 | 43.21±10.45 | 0.943 |
| Mean BMI (kgcm$^2$) | 28.14±5.67 | 28.97±4.89 | 0.881 |
| Mean neck circumference (cm) | 37.64±4.56 | 37.94±4.78 | 0.856 |
| Mean EGRI score | 2.88±2.10 | 2.65±1.90 | 0.489 |
| Mean intubation time (seconds) | 25.09±16.78 | 35.45±21.90 | 0.001 |
| Gender (f/m%) | 60/40 | 75/25 | 0.656 |
| Smoker (no/yes%) | 67/33 | 54/46 | 0.876 |
| Alcohol consumer (no/yes%) | 88/12 | 80/20 | 0.879 |
| Comorbidity (no/yes%) | 50/50 | 54/46 | 0.655 |
| ASA (I/II/III%) | 41/37/22 | 32/48/20 | 0.478 |

***Table 1: Demographic Data of Patients***

Data on Cormack-Lehane scoring for both groups were collected. Sixty-eight percent of the VL Group's patients had Cormack–Lehane Score I (CL–I), twenty-six percent had CL–II, five percent had CL–III, & one percent had CL–IV. In the ML Group, 30% of the patients had CL-I, 52% had CL-II, & 18% had CL-III. Table 2 shows the absence of CL-IV patients in the ML group (P =.001).

| Cormack–LehaneScore | VLGroup(%) | ML Group (%) | PValue |
|---|---|---|---|
| CL-I | 68 | 30 | 0.001 |
| CL-II | 26 | 52 | |
| CL-III | 5 | 18 | |
| CL-IV | 1 | 0 | |

***Table 2: Cormack–LehaneScoring Information for Both Groups***

After calculating the total amount of intubation attempts in the ML Group & VL Group, it was discovered that 85% of the patients in the VL Group only needed one attempt, 15% needed two, & none of the patients required three. Of the patients in the ML Group, 86% only needed one attempt at intubation, 13% needed two, & 1% needed three. Table 3 indicates that the number of intubation attempts needed was not statistically significant.



| Number of Attempts | VLGroup(%) | ML Group (%) | P Value |
|---|---|---|---|
| 1 attempt | 85 | 86 | 0.321 |
| 2 attempts | 15 | 13 | |
| 3 attempts | 0 | 1 | |

***Table 3: Comparison of Both Groups on the Basis of Number of Intubation Attempts***

Information on the patients' EGRI Indexes for both groups was recorded. Due to the VL Group's prioritisation of videolaryngoscopy for patients with suspected & confirmed difficult intubations, there was a statistically significant difference in the patients experiencing hard intubation. Table 4 indicates that no statistically significant difference was seen between the EGRI scores.

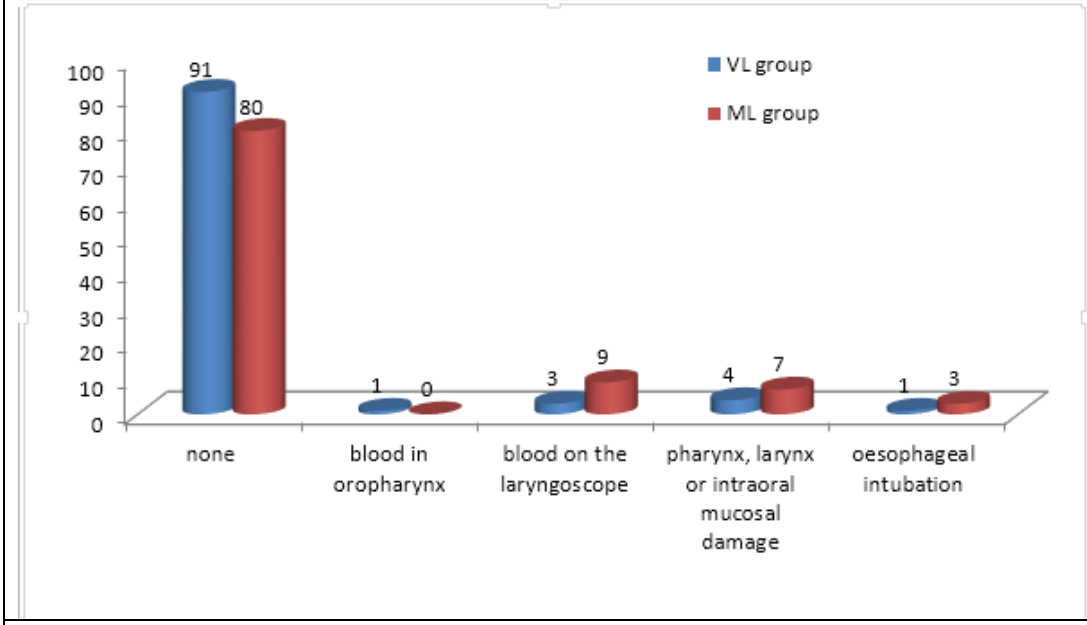
| Variable | | VLGroup(%) | ML Group (%) | PValue |
|---|---|---|---|---|
| Mouth Opening (cm) | ≥4 | 80 | 85 | 0.715 |
| | <4 | 20 | 15 | |
| ThyromentalDistance(cm) | >6.5 | 86 | 80 | 0.678 |
| | 6-6.5 | 13 | 15 | |
| | <6.5 | 1 | 5 | |
| MallampatiScore | M1 | 15 | 20 | 0.420 |
| | M2 | 40 | 35 | |
| | M3 | 45 | 45 | |
| Body Weight (kg) | <90 | 85 | 80 | 0.567 |
| | 90-110 | 10 | 12 | |
| | 110< | 5 | 8 | |
| Maximal Neck Movement (Degree) | >90 | 50 | 45 | 0.690 |
| | 80-90 | 45 | 53 | |

| | | | | |
|---|---|---|---|---|
| | <80 | 5 | 2 | |
| Propensity for Prognathism | Definite | 60 | 70 | 0.078 |
| | None | 40 | 30 | |
| History of Difficult Intubation | None | 85 | 90 | 0.042 |
| | Questionable | 10 | 10 | |
| | Definite | 5 | 0 | |
| EGRI | None≤7 | 99 | 100 | 0.098 |
| | Yes >7 | 1 | 0 | |

***Table 4: "El-Ganzouri Risk Index Scores" for Both Groups***

In the VL Group, there were 91% of patients without complications from intubation, 1% of patients with blood in the oropharynx, 3% of patients with blood on the laryngoscope, 4% of patients with damage to the pharynx, larynx, & intraoral mucosa, & 1% of patients requiring oesophageal intubation. As seen in graph 1, the ML Group included 80% of patients without complications from intubation, 0% of patients with blood in the oropharynx, 9% of patients with blood on the laryngoscope, 7% of patients with pharynxlarynx& intraoral mucosal damage, & 3% of patients requiring oesophageal intubation.






***Graph 1: Complications in the VL and ML Groups Associated with Intubation***

**DISCUSSION**

When it is difficult to see the glottis, videolaryngoscopy enhances the glottic view & increases the success rate of intubation.[9] To increase the field of view during direct laryngoscopy, techniques including the "sniffing" position & external larynx movement with cricoid pressure are employed.[10]Patients who have a high risk of aerosolized virus transmission, such as those infected with coronavirus-2019, should undergo more swift & dependable endotracheal intubation. A videolaryngoscope should be used during intubation if at all possible. This is due to the fact that more tries & a longer time to achieve intubation also result in a higher exposure to the aerosolized virus.[11]

In a number of randomised controlled trials, patients who are expected to have a difficult airway have had videolaryngoscopy compared with direct laryngoscopy. When compared to traditional laryngoscopy, videolaryngoscopy has been demonstrated in several meta-analyses derived from these studies to offer a clearer image of the larynx, increase the frequency of successful intubation on the first attempt&increase the frequency of successful intubation,.[12-14]

In the present study the two groups having 50 patients in each were compared on the basis of methods of laryngoscope used. The patients' El-Ganzouri Risk Index (EGRI) score, comorbidity, height, BMI, weight,sex, ASA score, smoking & alcohol habits, & neck circumference were all noted.

Abdallah et al[15] discovered in their prospective study that compared to Macintosh laryngoscopy, the Airtraqvideolaryngoscope enabled easier intubation. The Macintosh laryngoscope group took an average of 14.18 seconds to achieve intubation, whereas the videolaryngoscope group took an average of 11.5 seconds. It was discovered that using a videolaryngoscope makes intubation easier & results in difficulties less commonly. Reena et al[16] compared patients undergoing endotracheal intubation with an armouredETT using a Macintosh laryngoscope & a KingVision non-channelledvideolaryngoscope. It was concluded that the videolaryngoscope was better in terms of first try success & intubation time. The results were similar to our study where time taken by VL group was 25.09±16.78 seconds & by ML group was 35.45±21.90 seconds.

In patients requiring nasotracheal intubation due to difficult intubation, Zhu et al[17] compared a MAC videolaryngoscope, a Macintosh laryngoscope, & a KingVisionnon channeled videolaryngoscope. They showed that groups using videolaryngoscopes had superior glottic views, a reduced risk of problems, & a higher percentage of successful initial intubations. In the present study after calculating the amount of intubation attempts for the patients in the ML Group & VL Group, it was discovered that 85% of the patients in the VL Group only needed one attempt, 15% needed two, & none of the patients needed three. Of the patients in the ML Group, 86% only needed one attempt at intubation, 13% needed two, & 1% needed three similar to previous literature.

Kaur et al[18] examined the efficacy of endotracheal intubation in patients undergoing general anaesthesia using a “McGrath MAC videolaryngoscope”, a “Truviewvideolaryngoscope”, & a “Macintosh laryngoscope”. Intubation times were shortened for both videolaryngoscope groups. Only CL I & II views were visible in the videolaryngoscope group; however, CL III & IV views were also visible in the Machintosh laryngoscope group. The group using a videolaryngoscope experienced two difficulties, while the group using a Macintosh laryngoscope experienced five. Patients in the videolaryngoscope groups seen improvements in glottic view & less problems. In our study also the patients with Machintosh laryngoscope (20%) had more complications than videolaryngoscope (9%).

With the advancement of technology, videolaryngoscopes become more user-friendly & offer a sharper, easier-to-access glottic image. This facilitation reduces intubation-related difficulties & shortens the time needed to achieve intubation. For challenging airway management, the videolaryngoscope is advised as it offers a clinically meaningful improvement in intubation settings. Videolaryngoscopy is typically utilised in situations where hard intubation is anticipated, but it can also be employed in any situation where tracheal intubation is necessary.

As a study limitation, we must note that even with our best efforts to prevent bias through patient selection, standardisation of the anaesthesia& intubation techniques, & other measures, we are unable to completely rule out the possibility of an unintentional bias because of the unavoidable unblinded study design.

## CONCLUSION

The visualization of vocal cords in patientswas bybetter in videolaryngoscope group in our investigation. This group experienced less trauma during intubation since it took less time to complete & was assisted. Videolaryngoscopy is consequently advised to decrease problems in situations where tracheal intubation is necessary, particularly in unpredictable, difficult airways.

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