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**Original research article**

# Comparative Assessment of Intubating Conditions in Abdominal Surgeries using Video Laryngoscope and Macintosh Direct Laryngoscope

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## ABSTRACT

**Introduction:** Failure to successfully intubate the trachea and to secure the airway remains a leading cause of morbidity and mortality in the operative and emergency settings. A study evaluating the intubating conditions using video laryngoscope and Macintosh direct laryngoscope for visualization of the vocal cords, success rate for intubation, time for intubation, and the need for additional manoeuvres in adult patients in elective general anaesthesia cases was planned.

**Methods:** It was a prospective study conducted in the department of Anaesthesiology, GSL Medical College. Individuals aged 18 to 60 years, ASA physical status grade 1 and grade 2 were included; ASA grade $\geq$3, mouth opening < 4cm were excluded. A thorough preanesthetic evaluation was conducted. Airway was assessed using modified Mallampatti grading. In the operating room, standard monitoring devices were applied including a pulse oximeter, 3 lead ECG and blood pressure. Baseline measures of Blood pressure, heart rate, oxygen saturation were made. Vital signs were recorded every minute from the time induction of anesthesia was begun until five minutes after the patient had been intubated, and then at five-minute intervals thereafter for fifteen minutes.

**Results:** In this study, 40 members each were recruited in group D and V, respectively. Age wise, majority were 21 – 30 years, respectively in group D (40%) and group V (42.5%).

In group D, majority (45%) were graded to be MMG 1 and in group V, majority were in grade 2 (47.5%). When the overall intubation was considered, it was easy in 37.5% for V group members and major difficult to 5% individuals; statistically there was no significant difference.

**Conclusion:** Video laryngoscope was associated with better visualization of laryngeal structures as compared to Macintosh direct laryngoscope. Videolaryngoscope is suitable for tracheal intubation in routine clinical practice as an alternative to Macintosh laryngoscope.

**Keywords:** Cerebrovascular accidents; electrocardiographic changes; mortality

## INTRODUCTION

Failure to successfully intubate the trachea and to secure the airway remains a leading cause of morbidity and mortality in the operative and emergency settings. Difficulties in securing airway lead to serious soft tissue trauma. These issues have stimulated the development of novel laryngoscopes, to reduce the difficulty in laryngeal visualization. [1]

Non alignment of the oral, pharyngeal, and tracheal axes while using indirect laryngoscopes is the major advantage. The video laryngoscope can provide improved view for anaesthetist. [2] The system was very effective in large study in patients with an expected difficult intubation. Whether it can improve the intubating conditions and hence the success rate in routine intubations is yet to be confirmed with large sample size. [3] So a prospective study evaluating the intubating conditions using video laryngoscope and Macintosh direct laryngoscope for visualization of the vocal cords, success rate for intubation, time for intubation, and the need for additional manoeuvres in adult patients in elective general anaesthesia cases was planned.

**Methods:**

It was a prospective study conducted in the department of Anaesthesiology, GSL Medical College. Study was conducted between September 2021 to 2022. Study protocol was approved by the Institutional Ethical Committee. Informed written consent was collected from the study members.

Individuals aged 18 to 60 years, ASA physical status grade 1 and grade 2 were included in the research. ASA physical grade $\geq$3, mouth opening < 4cm, those with oral pathology or masses, risk of gastric aspiration and allergic drug history were excluded.

A thorough preanesthetic evaluation was conducted. Airway was assessed using modified Mallampatti grading. The modified Mallampati score was assessed with the patient in sitting position, with mouth fully opened and tongue protruded. The patients were asked to phonate and graded. Patients were randomly allotted by computer generated randomisation to one of study groups. Group D to undergo conventional direct laryngoscopy using Macintosh direct laryngoscope and Group V to undergo video laryngoscopy using video laryngoscope.

In the operating room, standard monitoring devices were applied including a pulse oximeter, 3 lead ECG and blood pressure. Baseline measures of Blood pressure, heart rate, oxygen saturation were made. Vital signs were recorded every minute from the time induction of anesthesia was begun until five minutes after the patient had been intubated, and then at five-minute intervals thereafter for fifteen minutes. Before induction of anaesthesia, all patients were given Inj Glycopyrrolate (10micrograms/kg) IV, Inj Fentanyl (1.5 ug/ kg) IV. General anesthesia was induced by using Inj Propofol (2-3 mg/kg) followed by Inj Vecuronium (0.I µg/kg) induced muscle relaxation, isoflurane was used for maintainence of anaesthesia. Once the ability to mask ventilate was confirmed, patient was ventilated via an anaesthesia mask for 5 minutes with 100% oxygen until complete relaxation was achieved. After 5 minutes, laryngoscopy was performed with either Macintosh Direct laryngoscope (Group D) or Videolaryngoscope (Group V).

Cormack & Lehane grading of laryngeal structures, number of attempts required, need of BURP, need of stylet, duration of laryngoscopy and intubation, hemodynamics, overall ease of intubation were recorded. Correct placement of endotracheal tube was confirmed by auscultation and endtidal carbon dioxide. For the study, Macintosh blades size 3 and 4 in Group D and videolaryngoscope blades sizes 3 and 4 in Group V were used. Size of the blades and tracheal tubes (7.0—8.5 mm ID) were used at discretion of the intubating anaesthesiologists. After endotracheal intubation subsequent anesthetic management was continued as per the need of the case.

**Results:**
In this study, 40 members each were recruited in group D and V, respectively. Age wise, majority were 21 – 30 years, respectively in group D (40%) and group V (42.5%). Minimum were in 51 – 60 years, respectively in the groups (Table 1). In group D, 97.5% (39) were graded as ASA 1 and it was 92.5% (37) in group V.

In group D, majority (45%) were graded to be MMG 1 followed by grade 2 (42.5%). Whereas in group V, majority were in grade 2 (47.5%; 19) followed by grade 1 (37.5%; 15) (Table 2). The Mean+SD for the basal oxygen saturation was 98.4±1.6, 98.3±1.7 respectively. When the overall intubation was considered, it was easy in 37.5% for V group members and major difficult to 5% individuals; statistically there was no significant difference (Table 3).

**Table 1:** Age wise distribution of the study participants; n (%)

| Age | Group D | Group V |
|---|---|---|
| <20 | 5 (12.5) | 4 (10) |
| 21 – 30 | 16 (40) | 17 (42.5) |
| 31 – 40 | 8 (20) | 9 (22.5) |
| 41 – 50 | 7 (17.5) | 7 (17.5) |
| 51 – 60 | 4 (10) | 3 (7.5) |
| Total | 40 (100) | 40 (100) |

**Table 2:** Group wise Modified Mallampathi Grading (MMG); n (%)

| MMG | Group D | Group V |
|---|---|---|
| 1 | 18 (45) | 15 (37.5) |
| 2 | 17 (42.5) | 19 (47.5) |
| 3 | 4 (10) | 4 (10) |
| 4 | 1 (2.5) | 2 (5) |
| Total | 40 (100) | 40 (100) |

**Table 3:** Overall ease of the intubation among the groups; n (%)

| Intubation | D group | V group |
|---|---|---|
| Easy | 13 (32.5) | 15 (37.5) |
| Slight difficulty | 27 (67.5) | 23 (57.5) |
| Major difficulty | 0 | 2 (5) |
| Total | 40 (100) | 40 (100) |
| Statistical analysis | P = 0.292; statistically not significant | |

**Discussion:**
Direct laryngoscopy using Macintosh laryngoscöpe has been used for laryngoscopy and intubation since 1943. [5] Videolaryngoscope has been introduced to provide better laryngoscopic view on a video monitor and it can also potentially improve ease of intubation.

The use of videolaryngoscope in intubation is well established and has been extensively supported in the literature for managing the difficult airway. [7, 8] But its use for routine elective cases has not been studied in detail. Thus we prospectively evaluated the intubating conditions in 80 patients; 40 in each group using Macintosh direct laryngoscope and videolaryngoscope. Overall there was no statistical difference in demographics in 2 Groups. There were no significant differences in airway assessment using Cormack and Lehane grading and was comparable between 2 groups. This can be explained by the fact that the blades of videolaryngoscope and Macintosh are identical in design and the skills acquired using one device should be transferable to the other device and the two patient groups were of similar demographic. [9, 10]

Need of BURP manoeuvre using conventional Macintosh laryngoscope or videolaryngoscope was almost similar although more patients had Cormack and Lehane grade 1 in Group V. Intubation could be facilitated by use of stylet in almost 30% of cases in Group V, whereas only one needed stylet in Group D. [11] Also, more patients in Group V needed use of both BURP and Stylet together for laryngoscopy and intubation. We appreciate the difference in the way the videolaryngoscope view is obtained using a camera but to achieve successful intubation without using a stylet or bougie, some alignment of oropharyngo- laryngeal axes is required. This can be explained by the fact that there is difference in hand-eye co-ordination while viewing the glottis on monitor and intubating the patient and also familiarity with the device videolaryngoscope in routine practice. Other reasons for the higher need of additional manoeuvers may need to be identified and studied.

Our results showed statistically significant difference in the mean duration of intubation between videolaryngoscope and Macintosh laryngoscopes 29.57±19.12s and 12.22±9.25s (P=0.0000). Our Study results are comparable with results of V Hodgetts et al. [13] showed mean intubation times of 29.2±18.6s and 23,,5+9 4s for videolaryngoscope and Macintosh laryngoscope respectively. In anticipated difficult airway, videolaryngoscope has been shown to perform better in terms of shorter intubation time, higher success rate and less number of optimizing manoeuvres.

However the additional cognitive processing required for indirect laryngoscopy may affect the total intubation time and success rate when used in routine clinical practice, particularly when used by novices. The first stage of learning is the verbal cognitive phase, where the operator needs to understand what is to be achieved; while the second stage is task execution. Stage one of cognitive learning would have been a learned skill, requiring minimal cognitive processing. Therefore, we may hypothesize that delay in time to achieve laryngoscopy and intubation, using the video laryngoscope, must reflect the second stage of learning, which is in task execution. Although video laryngoscopes provide a good view of the larynx, they may not guarantee an easy tracheal intubation 32 and may prolong the time required for successful intubation as seen in our study.

Intubating difficulty scale score was introduced by Frederic Adnet et al. [4] in year 1997,1t is a quantitative scale of intubation difficulty for useful for objectively comparing the complexity of endotracheal intubation. In our study there was no significant alteration in Group V as compared to Group D. Hemodynamics were well maintained and were comparable in both Groups. Inspite of prolonged duration of intubation in Group V, hemodynamic changes were comparable to those in Group D.

Inspite of difference in need for additional manoeuvre for laryngoscopy and intubation there was no significant difficulty in intubation in Group V. However out of 2 patients with moderate to major difficulty, one had grade 4 Mallampati airway in preanesthetic evaluation and other patient had Mallampati grade 4 and previous history of difficult intubation and both were successfully intubated. These are of some of study results compared with our study.

**Conclusion:**

Video laryngoscope was associated with better visualization of laryngeal structures as compared to Macintosh direct laryngoscope. But this was associated with longer duration of intubation, higher use of stylet and combined use of BURP and stylet; These results, the intubating conditions and the success rate in routine intubations is yet to be confirmed with large sample size. Regular usage of videolaryngoscope may improve the overall ease of intubation. Videolaryngoscope is suitable for tracheal intubation in routine clinical practice as an alternative to Macintosh laryngoscope.

**References:**

1. M.A.Malik, R. Subramaniam, C Ho Maharaj, B. H. Harte and J. G. Laffey,A Comparison of Three Videolaryngoscopes: The Macintosh Laryngoscope Blade Reduces, but Does Not Replace, Routine Stylet Use for Intubation in Morbidly Obese Patients. 2009; 109: 1560 – 65.
2. Kaplan MB, Ward DS, Berci G. A new video laryngoscope—an aid to intubation and teaching. J Clin Anesth 2003; 14: 620 – 6.
3. A.Jungbauer, M. Schumann, V. Brunkhorst, A. Borgers and H. Groeben Expected difficult tracheal intubation: a prospective comparison of direct laryngoscopy and video laryngoscopy in 200 patients. BJA. 2012; 102: 546 – 50.
4. Frederic Adnet Stephen W Borron, Stephane X Racine, Jean Luc Clemessy, Jean Luc Fourmer, Patrick plaisance et al. The Intubation Difficulty scale (IDS) score, Proposal and evaluation of a new score characterizing the complexity of endotracheal intubation. Anesthesiology 1997; 87: 1290 – 96.
5. Manuel Garcia. Observations on the Human Voice. Proceedings of the Royal Society of London. 2010. 7: 399 – 410.
6. Hirsch NP, Smith GB, Hirsch PO. Alfred Kirstein. Pioneer of direct laryngoscopy. J Anaesth. 2012; 41: 42 – 5.
7. Steven M. Zeitels. Chevalier Jackson's contributions to direct laryngoscopy. J Voice. 1997; 12: 1 – 6.
8. Robert Reynolds. Macintosh A new laryngoscope. The Lancet. 2018; 2: 9552 – 8.
9. Rebecca S. Hackell, Lisa D. Held, Paul A. Stricker, and John E. Fiadjoe Management of the Difficult Infant Airway with the storz Video Laryngoscope: A Case Series. 2009; 109: 763 – 6.
10. Kaplan MB, Hagberg CA, Ward DS, Brambrink A, Chhibber AK, Heidegger T, et al. Comparison of direct and video-assisted views of the larynx during routine intubation, J. Clin. Anesthesia. 2006; 18(5):357 – 62.
11. Brown CA, Bair AE, Pallin DJ, Laurin EG and Walls RM Improved glottis exposure with the Video Macintosh Laryngoscope in adult emergency department tracheal intubations. Ann Emerg Med. 2010; 56(2): 83 – 8.
12. Bannister PB, MacBeth RG. Direct Laryngoscopy and tracheal intubation Lancet. 1944; 1: 651 – 4
13. V Hodgetts, RF Danha, C Mendonca C, Hillerman. A randomized Comparison of C-MAC Videolaryngscope Versus Macintosh Laryngoscope for Tracheal Intubation. J Anesthe Clinic Res. 2011. 2:163.