Original Research Article

Comparative assessment of laryngoscopy and intubating conditions using Macintosh Direct Laryngoscope and video laryngoscope at a tertiary level hospital

MD Danish[1], Vaishnavi V Kulkarni[2*], Rahul D Kore[3], Pushpa I Agrawal[4]

[1]Senior Resident, [3]Associate Professor, [4]Professor and HOD, Department of Anaesthesiology, Dr. V.M. Government Medical College, Solapur, Maharashtra, INDIA.
[2]Professor and HOD, Department of Anaesthesiology, Dr. Shankarao Chavan Government Medical College and Hospital, Nanded, Maharashtra, 431606, INDIA.
Email: vaishnavikulkarni786@gmail.com

Abstract

Background: Laryngoscope and intubation are an integral part of general anesthesia. Direct laryngoscope has been the most common device for intubation. Present study was aimed at 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 maneuvers in adult patients in elective general anesthesia cases, at our tertiary hospital. **Material and Methods:** Present study was single-center, prospective, comparative, parallel-group, observational study, conducted in patients of 18- 65 years age, either gender, ASA physical status grade 1/2, Mallampati Grade I/II, posted for elective surgeries under general anesthesia. 80 patients were randomly allocated by computer based random number generator in two groups as Group I to undergo conventional direct laryngoscopy using Macintosh direct laryngoscope and Group II to undergo video laryngoscopy. **Results:** Among the 80 patients allotted to Group I and Group II (40 Each), Age distribution, ASA physical status and Modified Mallampati grade were comparable in both groups and difference was not significant statistically ($p>0.05$). As per Cormack and Lehane grading, 60% of patients in Group II had grade 1, whereas only 40% in Group I had grade 1. However a greater number of patients had grade 2 score in Group I as compared to Group II respectively (p value=0.125). In present study, 45 % patients in Group II needed BURP maneuvers for laryngoscopic view, where 55 % patients in Group I needed BURP, difference not statistically significant. Considering use of another aid for intubation, the need for stylet was significantly more in Group II(30%) whereas it was necessary in only one patient(2.5%) in Group I which was statistically significant ($p<0.05$). **Conclusion:** Video laryngoscope is suitable for tracheal intubation in routine clinical practice as an alternative to Macintosh laryngoscope and can be used in difficult intubation and covid 19 patients.

Keywords: Video laryngoscopy, intubation, stylet, BURP, Macintosh laryngoscope.

[*]**Address for Correspondence:**
Dr Vaishnavi Vishwas Kulkarni, Professor and HOD, Department of Anaesthesia, Dr. Shankarao Chavan government medical college and Hospital Vishnupuri, Nanded, Maharashtra, INDIA.
Email: vaishnavikulkarni786@gmail.com

Received Date: 23/08/2021 Revised Date: 12/09/2021 Accepted Date: 07/10/2021

Access this article online

Quick Response Code:

Website: www.medpulse.in

DOI: https://doi.org/10.26611/10152034

INTRODUCTION

Laryngoscope and intubation are an integral part of general anesthesia. Direct laryngoscope has been the most common device for intubation. The Macintosh or Miller blade has reported success rate as around 95% in expert practitioners under controlled conditions. Direct laryngoscopy and passage of endotracheal tube through the larynx is a noxious stimulus, which can provoke untoward response in cardiovascular, respiratory and other

How to site this article: MD Danish, Vaishnavi V Kulkarni, Rahul D Kore, Pushpa I Agrawal. Comparative assessment of laryngoscopy and intubating conditions using Macintosh Direct Laryngoscope and video laryngoscope at a tertiary level hospital. *MedPulse International Journal of Anesthesiology.* December 2021; 20(3):91-95. http://medpulse.in/Anesthsiology/index.php

physiological systems.[1,2] Hypertension, tachycardia and arrhythmia caused by endotracheal intubation can be deleterious in patients. Recent evidence has suggested an increasing role of video laryngoscopy. Since the introduction of video laryngoscopy there is improved glottic visualization. In 96-98% of cases airway can be managed with conventional rigid laryngoscope blades, it is only 2-4% of cases that requires video laryngoscopy.[3,4,5] The key novel features of this indirect laryngoscopes compared with the MacIntosh laryngoscope is that they facilitate visualization of vocal cords without the need to align the oral, pharyngeal and tracheal axes.[1] Present study was aimed at 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 maneuvers in adult patients in elective general anesthesia cases, at our tertiary hospital.

MATERIAL AND METHODS

Present study was single-center, prospective, comparative, parallel-group, observational study, conducted in Department of Anaesthesiology, Dr. V.M. Government Medical College, Solapur, India. Study duration was of 2 years (December 2018 To October 2020).

Inclusion criteria: Patients of 18- 65 years age, either gender, ASA physical status grade 1/2, Mallampati Grade I/II, posted for elective surgeries under general anesthesia

Exclusion criteria: Patient with predicted difficult laryngoscopy and intubation. Patients with cervical spine injury. Obese.

A thorough preanesthetic evaluation was conducted and investigations (CBC, LFT, RFT, SERUM ELECTROLYTES) noted. Airway was assessed using modified Mallampati grading, with the patient in sitting position, the mouth fully open and the tongue protruded. The patients were asked to phonate and graded.

After approval by the Institutional Ethical Committee and patient consent, 80 patients posted for elective surgeries under general anesthesia were randomly allocated by computer based random number generator in two groups during the period from.

Group I to undergo conventional direct laryngoscopy using Macintosh direct laryngoscope and Group II to undergo video laryngoscopy.

In the operating room, standard monitoring devices were applied including a SPO2 Probe, 3 lead ECG, ETCO2 and NIBP. Baseline measures of BP, heart rate, oxygen saturation was 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 an anesthesia, all patients were given Inj Midazolam (0.03mg/kg) IV. Inj Ondansetron (0.10mg/kg) IV, Inj Glycopyrrolate (10µg/kg) IV, Inj Pentazocine (0.3 mg/ kg) IV. 1mg/kg Inj Lignocaine IV 90 seconds before intubation to attenuate the pressor response. Once the ability to mask ventilate was confirmed, general anesthesia was induced by using Inj Propofol (2 mg/kg) followed by In Vecuronium(0.12mg/kg) for muscle relaxation; patient was ventilated via an anesthesia mask for 5 minutes with 100% oxygen until complete relaxation was achieved. After 5 minutes, laryngoscopy was performed with either Macintosh Direct laryngoscope (Group I) or Video laryngoscope (Group II). Anesthesia was maintained using a mixture of oxygen and nitrous oxide in the ratio of 50:50 along with isoflurane (0.6-1.1) as inhalation anesthetic. Vital Parameters of patients were recorded at baseline, at time of intubation, at 1,2,5 minute after intubation. Correct placement of endotracheal tube was confirmed by auscultation and end tidal carbon dioxide. For the study, Macintosh blades size 3 and 4 in Group I and Video laryngoscope blade size 3 and 4 blades in Group II were used. Size of the blades and tracheal tubes (7.0–8.5 mm ID) were used at discretion of the intubating anesthesiologist. Intra-operatively, Spo2, pulse rate, blood pressure, ETCO2, urine output of the patient was monitored every 10 minutes. Patient was extubated in deep plane with the help of Reversal agents, Inj glycopyrrolate (0.008 mg/kg) and Inj Neostigmine (0.05 mg/kg). Patient was shifted to Recovery Room, monitored for 2 hours and shifted to ward. Parameters recorded during laryngoscopy were Visualization of Glottic view using Cormack and Lehane laryngoscopy grading, Number of attempts required for intubation, Need of optimization maneuvers (BURP and stylet), Time taken for laryngoscopy, Hemodynamics during laryngoscopy and intubation, Ease of intubation and any complications Modified intubating difficulty scale (IDS)[4] score: Intubation difficulty was assessed by intubation difficulty scale (IDS) developed by Adnet *et al.*[8] on the basis of seven variables associated with difficult intubation.

Table 1: Intubation difficulty scale

	Parameter	Score
N1	No. of attempts>1, Every additional attempt adds 1 point	1
N2	No. of operators>1 Every additional operator adds 1 point	1
N3	No. of alternative techniques, Each alternative technique adds 1 point (Repositioning of patient, change of materials e.g., blade, endotracheal tube, addition of stylets or use of another technique-fibreoptic/laryngeal mask airway)	1
N4	glottic exposure as defined by Cormack and Lehane[9]	
	Grade I	0
	Grade II	1
	Grade III	2
	Grade IV	3
N5	Lifting force required	
	Normal	0
	Increased	1
N6	Laryngeal pressure	
	Not applied	0
	Applied	1
N7	Vocal cord mobility/ position of the vocal cords at intubation	
	Abduction	0
	Adduction	1

Total score was calculated. Score of ≤ 5 indicates no or slight difficulty and > 5 indicates moderate to major difficulty. All information recorded on the anesthetic records were kept strictly confidential and stored in a data logbook. Data were analyzed using software STATA version 12. Results were presented as mean ± standard deviation. $P < 0.05$ was considered as statistically significant.

RESULTS

Among the 80 patients allotted to Group I and Group II (40 Each), Age distribution, ASA physical status and Modified Mallampati grade were comparable in both groups and difference was not significant statistically (p>0.05).

Table 1: General characteristics

	Group I (DL)	Group II (VL)
Age (years)		
<20	5(12.5%)	4(10%)
21 - 30	16(40%)	17(42.50%)
31 - 40	8(20%)	9(22.5%)
41 - 50	7(17.5%)	7(17.5%)
51 - 60	4(10%)	3(7.5%)
ASA grade		
1	39(97.5%)	37(92.5%)
2	1(2.5%)	3(7.5%)
Modified Mallampati grade		
1	18(45%)	20(50%)
2	22(55%)	20(50%)

As per Cormack and Lehane grading, 60% of patients in Group II had grade 1, whereas only 40% in Group I had grade 1. However a greater number of patients had grade 2 score in Group I as compared to Group II (22/40 versus 12/40) respectively (p value=0.125).

Table 2: Cormack and Lehane grades.

Cormack and Lehane grade	Group I (DL)	Group II (VL)
1	16(40%)	24(60%)
2	22(55%)	12(30%)
3	2(5%)	3(7.5%)
4	0	1(2.5%)

In present study, only 18 out of 40 patients in Group II needed BURP maneuvers for laryngoscopic view, where 21 out of 40 patients in Group I needed BURP, difference not statistically significant. Considering use of another aid for intubation, the need for stylet was significantly more in Group II(30%) whereas it was necessary in only one patient(2.5%) in Group

I which was statistically significant (p<0.05). Use of both the BURP maneuver for laryngoscopy and stylet for intubation was needed in 8 patients out of 40 in Group II as compared to only one patient in Group I, which was statistically significant. Overall duration of laryngoscopy and intubation was significantly more in Group II than Group I. Mean IDS score obtained in both groups were similar and statistically insignificant (Group I 2.02±1.6 and Group II 2.3±2.1.

Table 3: Need of BURP maneuver.

	Group I (DL) (Mean ± SD)	Group II (VL) (Mean ± SD)	P value
Need of BURP maneuver	21(52.5%)	18(45%)	0.502
Stylet use	1(2.5%)	12(30%)	0.001
Combined use of BURP and Stylet	1(2.5%)	8(20%)	0.013256
Duration of laryngoscopy and intubation (seconds)	12.22 ± 9.25 s	29.5 ± 19.12s	0.001
Mean IDS Score	2.025 ± 1.67	2.3 ± 2.138	0.0635

Hemodynamics and Oxygen saturation were well maintained and comparable in both Groups. Overall, successful laryngoscopy and intubation could be performed with minimal to no difficulty in all patients in Group I; only 2 patients in Group II had moderate to major difficulty (P value=0.292).

Table 4: Overall ease of intubation.

Overall ease of Intubation	Group I (DL)	Group II (VL)
Easy	13(32.5%)	15(37.5%)
Slight difficulty	27(67.5)	23(57.5%)
Moderate to Major difficulty	0	2(5%)

DISCUSSION

Direct laryngoscopy using Macintosh laryngoscope has been used for laryngoscopy and intubation since 1943.[6] Video laryngoscope has been introduced to provide better laryngoscopic view on a video monitor and it can also potentially improve ease of intubation. The use of video laryngoscope in intubation is well established and has been extensively supported in the literature for managing the difficult airway. 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. Need of BURP maneuver using conventional Macintosh laryngoscope or Video laryngoscope was almost similar although more patients had Cormack and Lehane grade 1 in Group II. Intubation was facilitated by use of stylet in almost 30% of cases in Group II, whereas only one needed stylet in Group I. Also, more patients in Group II needed use of both BURP and Stylet together for laryngoscopy and intubation. We appreciate the difference in the way the view is obtained using a camera but to achieve successful intubation without using a stylet or bougie, some alignment of oropharyngeal-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 Video laryngoscope in routine practice. Hodgetts V *et al.*,[7] noted use of BURP + Bougie in 5 patients in GROUP II and BURP + Bougie in 3 patients. Our results showed statistically significant difference in the mean duration of intubation between and Macintosh laryngoscopes 29.57 ± 19.12s and 12.22 ± 9.25s (p value=0.0001). Our Study results are comparable with results of Hodgetts V *et al.*,[7] noted mean intubation times of 29.2 ± 18.6s and 23.5 ± 9.4s for and Macintosh Video laryngoscope respectively. In anticipated difficult airway, video laryngoscope performed better in terms of shorter intubation time, higher success rate and a smaller number of optimizing maneuvers.[3,8] 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; whilst the second stage is task execution.[9] 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.[9] Although video laryngoscopes provide a good view of the larynx, they may not guarantee an easy tracheal intubation and may prolong the time required for successful intubation as seen in our study and also in study.[10] In our study there was no significant alteration in Group II as compared to Group I. In spite of difference in need for additional maneuver for laryngoscopy and intubation, there was no significant difficulty in intubation in Group II. Similar findings were noted in other studies. Use of Video Laryngoscope was associated with better visualization of laryngeal structures, but it was associated with longer duration of laryngoscopy and Intubation, higher incidence of use of stylet, and combined use of BURP and stylet, as compared to direct

Macintosh laryngoscope. Overall ease of intubation was comparable in both Groups. These results, the intubating conditions and the success rate in routine intubations is yet to be confirmed with large sample size. Regular usage of Video laryngoscope may improve the overall ease of intubation.

CONCLUSION

Video laryngoscopy was associated with longer duration of intubation, higher use of stylet (alone) and combined use of BURP and stylet and hemodynamic changes but associated with better visualization of laryngeal structures so with routine practice video laryngoscopy can be a useful aid in COVID 19 patients and in difficult intubation. In conclusion, video laryngoscope is suitable for tracheal intubation in routine clinical practice as an alternative to Macintosh laryngoscope and can be used in difficult intubation and covid 19 patients.

REFERENCES

1. M.A Malik, R. Subramaniam, C. H. Maharaj, B. H. Harte and J. G. Laffey,A Comparison of Three Video laryngoscopes: The Macintosh Laryngoscope Blade Reduces, but Does Not Replace, Routine Stylet Use for Intubation in Morbidly Obese Patients A and A November 2009 vol. 109 no. 5 1560-1565
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, Volume102, Issue4, P 546-550.
4. Frederic Adnet Stephen W Borron, Stephane X Racine,Jean Luc Clemessy,Jean Luc Fournier, Patrick plaisanc e at al The Intubation Difficulty scale (IDS) score, Proposal and Evaluation of a New score characterising the complexity of Endotracheal intubation. Anesthesiology 1997;87:1290-7.
5. Adnet F, Borron SW, Racine SX, Clemessy JL, Fournier JL, Plaisance P, et al. The intubation difficulty scale (IDS): Proposal and evaluation of a new score characterizing the complexity of endotracheal intubation. Anesthesiology 1997;87:1290-7.
6. B Bailey B. "Laryngoscopy and laryngoscopes--who's first?: the forefathers/four fathers of laryngology". The Laryngoscope 106 (8): 939–43.
7. Hodgetts V, Danha RF, Mendonca C, Hillerman C (2011) A randomized Comparison of C-MAC Videolaryngscope Versus Macintosh Laryngoscope for Tracheal Intubation. J Anesthe Clinic Res 2:163
8. Erol Cavus, Joerg Kieckhaefer, Volker Doerges, Thora Moeller, Carsten Thee, Klaus Wagner, The C-MAC video laryngoscope: first experiences with a new device for video laryngoscopy-guided intubation. A and A,2010 Feb 1;110(2):473-7.
9. Newell KM, Ginnis PM.Kinematic information feedback for skilled performance. Human Learning, 2012, 4: 35-56.
10. Frerk CM, Lee G, Laryngoscopy: time to change our view. Anaesthesia 2009, 64: 351-354.

Source of Support: None Declared
Conflict of Interest: None Declared