ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 05 | May - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARATIVE EVALUATION OF MACINTOSH LARYNGOSCOPE AND VIDEOLARYNGOSCOPE FOR ENDOTRACHEAL INTUBATION IN PATIENTS UNDERGOING SURGERY UNDER GENERAL ANAESTHESIA

Anaesthesiology

Dr. Amruta Mane Junior Resident, Department of Anaesthesiology, Government Medical College and Hospital, Aurangabad, Maharashtra, India.

Dr. Rajshree Virshid Professor, Department of Anaesthesiology, Government Medical College and Hospital, Aurangabad, Maharashtra, India.

Dr. Chetan G. Agrawal Assistant Professor, Department of Anaesthesiology, Government Medical College and Hospital, Aurangabad, Maharashtra, India.

Dr. Ganesh Nikam Associate Professor, Department of Anaesthesiology, Government Medical College and Hospital, Aurangabad, Maharashtra, India.

ABSTRACT

Introduction: Macintosh laryngoscope is the standard laryngoscope used since its introduction in 1943. It indirectly elevates the epiglottis with a short-curved laryngoscope to visualize the larynx. It is easy to use and master and remains ubiquitous and is regarded as the gold standard of direct laryngoscopy. Video laryngoscope was introduced in year 2001. Their indirect view of the upper airway improves glottis visualization including in suspected or encountered difficult intubation. The American society of Anaesthesiologist (ASA) has already incorporated VL as an adjunct to 'Alternate difficult airway approaches' in their practice guidelines for management of difficult airway. **Aim:** This study compared the time taken for Endo-tracheal intubation by Macintosh Laryngoscope and Video laryngoscope. **Method:** After Institutional Ethical Committee approval, patient consent obtained. 60 patients were enrolled and divided into 2 groups, Group A: MacIntosh laryngoscope and Group B: Video laryngoscope. The results were expressed as mean ± standard deviation for continuous variables. Continuous variables were analyzed by using unpaired Student's 't' test. Discrete data was analyzed using Chi-square test. $P<0.05$ considered as statistically significant. **Result:** Time taken for endotracheal intubation was comparable in both groups ($p>0.05$). Less time was taken while intubating with a MacIntosh laryngoscope than with a Video laryngoscope ($p<0.05$). **Conclusion:** Time taken for intubation was less with MacIntosh laryngoscope than with Video laryngoscope.

KEYWORDS

Macintosh laryngoscope, Video laryngoscope, Endo-tracheal intubation

INTRODUCTION

Endotracheal intubation using direct laryngoscopy is the gold standard for establishing an air-way and it is a fundamental skill for acute care practitioners. The American Society of Anaesthesiologists Closed Claims analysis concluded that the main reason for anesthesia-related morbidities was due to inability to secure the airway. However, tracheal intubation using direct laryngoscope (DL) requires technical skills and is often difficult to acquire, often requires alignment of the three axes (oral, pharyngeal, and laryngeal axis) in a straight line. This skill is difficult to master and has a long learning curve.[1]

Direct laryngoscopy has been the standard technique for tracheal intubation since its introduction in the early 19th century.[1] Laryngoscopy and tracheal intubation, however, are associated with hemodynamic changes; caused due to intense sympathetic discharge on stimulation of epipharynx and laryngopharynx.[2]

Macintosh laryngoscope is the standard laryngoscope used since its introduction in 1943. It indirectly elevates the epiglottis with a short-curved laryngoscope to visualize the larynx. It is easy to use and master and remains ubiquitous and is regarded as the gold standard of direct laryngoscopy.[3,4]

Video laryngoscope was introduced in year 2001. Their indirect view of the upper airway improves glottis visualization including in suspected or encountered difficult intubation. The American society of Anaesthesiologist (ASA) has already incorporated VL as an adjunct to 'Alternate difficult airway approaches' in their practice guidelines for management of difficult airway.[4]

Metanalysis from database has shown improved laryngeal view, decrease in difficulty in intubation & decreased incidence of failed intubation[5], greater first pass intubation[6,7], decrease oesophageal intubation[4], improved success[8], decrease is number of attempts[9], good POGO score, less intubation trauma[10] & decrease in complication with VL with drawback of time consuming and higher malposition with double Endotracheal tube[8]. Few studies quote less time required for intubation, less difficulty score, more Cormack Lehane grade, easier intubation[11] even with aerosol box for intubation[12], but one metanalysis shows intubation time reduction and increase in success with Macintosh Laryngoscope[13] while other metanalysis showed time to intubate and failure at first attempt to be equal with Macintosh Laryngoscope and video laryngoscope[10] but increased incidence of dental click with Macintosh Laryngoscope.[11] One study suggested video laryngoscopy use as routine emergency device.[14]

With the above background, the following study was planned to find out the efficacy and safety of video laryngoscope compared with Macintosh Laryngoscope for endotracheal intubation.

MATERIALS AND METHODS

After approval from ethical committee a prospective, randomized, double blind comparative study was carried out at tertiary care center with 60 patients.

Inclusion And Exclusion Criteria

Patient undergoing elective surgery under General Anaesthesia, American Society of Anaesthesiologists grade 1 and 2, age 18-60 years, BMI 18.5 – 28kg/m2, both sexes and patient giving valid informed consent were included in the study. Patient's refusal to participate in the study, ASA grade 3 or more, MPC grade 3 and 4, patients posted for laryngeal or thyroid surgeries, Hypertensive and IHD Patients were excluded from study.

Method Of Collection Of Data

Informed written consent was taken for participation in the study in a language that patient easily understands. 60 patients satisfying eligibility criteria were randomly allocated into 2 groups: Group A and Group B.

In Group A: Intubated with Macintosh laryngoscope.

In Group B: Intubated with Video laryngoscope.

Patients will be preoxygenated with 100% oxygen for 3-5 mins, Premedication given with inj. Midazolam 0.02mg/kg and inj. Fentanyl 2ug/kg and inj. Ondansetron 0.08mg/kg. Induced with inj. Propofol 2-2.5 mg/kg, after confirming mask ventilation, inj. Vecuronium 0.1 mg/kg will be given.

Intubated with endotracheal tube by an anaesthesiologist who has done minimum 50 laryngoscopies with MacIntosh laryngoscope and Videolaryngoscope each. Confirmed by capnography and chest auscultation. Anaesthesia will be maintained with intermittent positive pressure ventilation, with 50% oxygen and nitrous oxide and inj. Vecuronium 0.02 mg/kg and isoflurane. After the end of the surgery,

reversed with IV Neostigmine 0.05 mg/Kg & Glycopyrrolate 0.008 mg/Kg. Endotracheal tube will be removed when the patient is awake and then the patient will be transferred to the recovery room for monitoring of vital signs till transfer to the ward.

Intraoperatively and post operatively Heart Rate, Systolic BP, Diastolic BP, MAP, SpO2, ECG will be observed before intubating the patient and after intubation every 5 minutes for 20 minutes, then every 10 minutes till 30 minutes , then hourly till the patient is extubated and also postoperatively every four hourly for 24 hours, the patient will be observed for side effects like hypotension, bradycardia, fall in oxygen saturation, hoarseness of voice, sore throat.

Efficacy Evaluation Procedure And Formats:

1. Time required for intubation from picking up the laryngoscope till ETCO2 graph
2. Number of attempts required for intubation
3. Rescue techniques like BURP, OELM, Bougie
4. POGO Score
5. Cormac Lehane score
6. Haemodynamic changes like PR, SBP, DBP,MAP, SP02
7. Side effects like sore throat, hoarseness, dental injury, mucosal injury

Statistical Analysis Details

Data was entered in Microsoft Excel and analyzed using SPSS version 24.0. Mean and SD was calculated for quantitative variables and proportions were calculated for categorical variables. Also data was represented in form of visual impression like bar-diagram etc. Chi-square test was applied to check significance association between different two attributes. Unpaired t-test was applied to check significance difference between two groups. P- Value of <0.05 will be considered statistically significant

RESULTS

The demographic data with age, gender, BMI, MPC scale and ASA grade of participants was compared and was found statistically nonsignificant (p value >0.05).

Table 1: Demographic Data- Comparison Between Group A And Group B

Group		N	Mean	Std. Deviation	t	P	Inference
Age	Group A	30	31.53	11.29	-1.448	0.17 (>0.05)	Not Significant
	Group B	30	39.43	13.6			
Weight (kg)	Group A	30	59.5	11.21	-0.681	0.498 (>0.05)	Not significant
	Group B	30	61.23	8.28			
Height	Group A	30	1.52	0.09	-1.002	0.32 (>0.05)	Not significant
	Group B	30	6.88	29.3			
BMI	Group A	30	24.56	2.16	-0.182	0.856 (>0.05)	Not significant
	Group B	30	24.69	3.22			
Duration of Surgery	Group A	30	1.91	0.5	-0.833	0.408 (>0.05)	Not significant
	Group B	30	2.04	0.7			

We compared the mean pulse rate between two groups at different time interval post intubation. We observed statistically significant difference between two groups at 1 minutes, 5 minutes and 10 minutes (p<0.05). After that no significant difference.

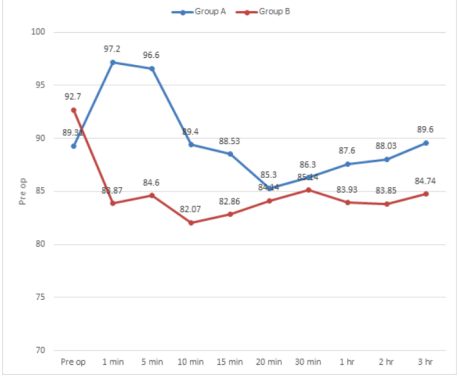

Figure 1: Line Diagram Showing Comparison Of Pr Between Group A And Group B

We compared the mean SBP between two groups at different time interval post intubation and we observed statistically no significant difference between two groups (p>0.05). It means both the groups are comparable with respect to SBP.

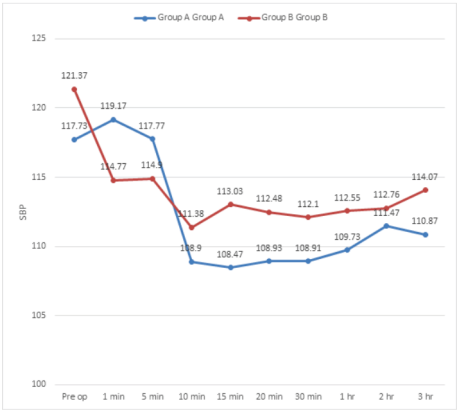

Figure 2: Line Diagram Showing Comparison Of Sbp Between Group A And Group B

Table 2: Comparison Of Time For Intubation Between Group A And Group B

Group		N	Mean	Std. Deviation	t	P	Inference
Time taken for Intubation (Second)	Group A	29	19.07	6.28	-12.98	0.0001	Highly significant
	Group B	30	38.60	5.25		(<0.01)	

Mean time taken for intubation in Group A and B are 19.07±6.28 and 38.60±5.25 seconds respectively. We observed statistically significant difference between two groups (p<0.05). It means time taken for intubation was significantly more in Group B as compared to Group A.

DISCUSSION

Sociodemographic Information

In our study we observed mean age, gender, BMI, ASA grade, MPC scale, mean duration of surgery from Group A and B was statistically non-significant (p>0.05). It means both the groups are comparable.

Time Taken For Intubation

Mean time taken for intubation from Group A and B are 19.07±6.28 and 38.60±5.25 seconds respectively. We observed statistically significant difference between two groups(p<0.05). It means time taken for intubation was significantly more in Group B as compared to Group A. Panwar N et al[15] Tutuncu AC et al[20] Torun et al[18] Singh et al[19] also observed same results.

Number Of Attempts Required For Intubation

Group A and Group B patients intubated in single attempt so difference was statistically insignificant (p<0.05). Dalal et al[21],Torun et al[18], Barak et al[16] and Timanayakar et al[17] found similar results.

POGO Score

Mean POGO score from Group A and B are 0.78±0.09 and 0.98±0.06 respectively. We observed statistically significant difference between two groups(p<0.05). It means POGO score was more in Group B as compared to Group A. Elhadi SM et al[22] reported same results.

Haemodynamic Parameters

Mean pulse rate from Group A and B are 90.27±9.05 and 85.33±9.43, Mean SBP from Group A and B are 117.73±10.11 and 121.37±15.68, Mean DBP from Group A and B are 75.73±8.4 and 78.13±8.22, Mean MAP from Group A and B are 89.31±8.57 and 92.7±9.59, Mean SPO2 from Group A and B are 98.23±0.58 and 98.13±0.82 respectively. We observed statistically non-significant difference between two groups(p>0.05). Sonavane SR et al2[4],Upasana Gupta et al[23],Mogahed et al[25] reported same results.

Side Effects

We observed a greater number of patients with side effects in Group A i.e. mucosal injury in 16.7%, dental injury in 3.3%, hoarseness and sore throat in 20% as compared to group B.

Side effects could be more with Group A due to excessive manipulation of oropharyngeal airway while doing laryngoscopy, material of the scope-blade(metallic).

CONCLUSION

It was concluded that Mean time taken for intubation was significantly more in Group B as compared to Group A. In both groups patient intubated in single attempt. Rescue techniques like BURP, OELM were used more in Group A than Group B. POGO score was more in Group B as compared to Group A. Hemodynamic parameters like SBP, DBP, MAP, PR and SPO2 were comparable in both the groups. We observed a greater number of patients with side effects like mucosal injury, dental injury, hoarseness and sore throat in group A than group B.

REFERENCES

1. Levitan RM, Heitz JW, Sweeney M, et al. The complexities of tracheal intubation with direct laryngoscopy and alternative intubation devices. Ann Emerg Med 2011;57(3):240–247.
2. Lee LC. Two curves theory does not clearly explain laryngoscopy and intubation. Br J Anaesth 2011;106(6):909–910.
3. Jeanetle Scott and Paul A. Baker, how did the Macintosh laryngoscope become so popular, Review Article, Paediatric Anesthesia 2009; 19(1) 24-29.
4. R.V. Chemsian, S Bhananker and R. Ramaiah, Videolaryngoscopy, International Journal of Critical illness & injury science 2014; 4(1): 35
5. S.R. Lewis, A.R. Butler, J. Parker et.al. Videolaryngoscopy versus direct laryngoscopy for adult patients requiring tracheal intubation: A Cochrane systematic Review, British Journal of Anaesthia 2017; 119 (3) : 369-83
6. Souvik Maitra, Anirban Som, Sulagna Bhattacharyaji, comparison videolaryngoscope and direct laryngoscope for intubation in critically ill patients, A Bayesian Metaanalysis, Med R xiv 2020; 1(2):1-8
7. Arulkumaran N, Lowe J, Ions R, Mendoza M, Bennett V, Dunser MW. Videolaryngoscopy versus direct laryngoscopy for emergency orotracheal intubation outside the operating room: a systematic review and meta-analysis. British journal of anaesthesia. 2018 Apr 1;120(4):712-24.
8. Kim YS, Song J, Lim BG, Lee IO, Won YJ. Different classes of videoscopes and direct laryngoscopes for double-lumen tube intubation in thoracic surgery: A systematic review and network meta-analysis. PLoS One. 2020 Aug 28;15(8):e0238060.
9. Motoki Namekawa, Yasushi Tsujimoto, Masahiro Banno et.al., videolaryngoscopy for trans esophageal echocardiography probe insertion: A systematic review & meta-analysis of randomized control trials, Journal of Anaesthesia, 1-11-2020.
10. Xiaoxue Hu, Yi Jin, Jiansong Li et.al. Efficacy & safety of videolaryngoscopy versus direct laryngoscopy in pediatric intubation: A meta-analysis of 27 randomized control trials, Journals of Clinical Anaesthesia 66, 109968, 2020.
11. In Kyong Yi, Hyun Jeong Kwak, kyuing cheon Lee et.al. Comparison of MC Grath, Pentax & Macintosh laryngoscope is normal & cervical immobilized manikin by nevices: a randomized crossover trial European Journal of medical research 25 (1), 01-07-2020.
12. Deepak Dwivedi, Parmeet Bhatia, Manish Agrawal et.al. A comparison of direct laryngoscopy versus videolaryngoscopy using aerosol box for intubation in emergency surgeries during Covid-19 pandamic : A pilot study, Med know publication 2020.
13. Kobi Ludwin, Szymon Bialka, Lukasz. czyzwski et.al. Videolaryngoscopy for endotracheal intubation of adult patients with suspected / confirmed Covid - 19. A systematic review & meta-analysis of randomized controlled trials, Disaster and emergency medicine Journal, 2020.
14. Davies M, Hodzovic I. Videolaryngoscopy post COVID-19. Trends in Anaesthesia & Critical Care. 2021; 36:49.
15. Panwar N, Vanjare H, Kumari M, Bhatia VS, Arora KK. Comparison of video laryngoscopy and direct laryngoscopy during endotracheal intubation- A prospective comparative randomized study. Indian J Clin Anaesth 2020;7(3):438-443.
16. Barak M, Philipchuck P, Abecassis P, Katz Y. A comparison of the TruView blade with the Macintosh blade in adult patients. Anaesthesia 2007; 62:827-31. 18.
17. Timanayakar RT, Anand LK, PaltaS. A randomized controlled study to evaluate and compare TruView blade with Macintosh blade for laryngoscopy and intubation under general anesthesia AnaesthesiolClinPharmacol2011; 27:199-204. 19.
18. Torun AÇ, Tür A, Özkan F, Kelsaka E, Karakaya D, Sarıhasan B, et al... Assessment of Macintosh laryngoscope and TruView EVO2 video-laryngoscope with respect to hemodynamic and intubation quality in patients with presumptive difficult intubation. J Exp Clin Med 2011; 28:4-7. 16.
19. Singh I, Khaund A, Gupta A. Evaluation of TruView EVO2 laryngoscope in anticipated difficult intubation - A comparison to Macintosh laryngoscope. Indian J Anaesth 2009; 53:164-8.
20. Tutuncu AC, Kaya G, Tunali Y, Altintas F, Dilmen OK. A comparison of the TruView EVO2 and macintosh laryngoscope blades. Clinics (Sao Paulo) 2011; 66:709- 11
21. Dalal S, Manohar M. Anticipated Difficult Tracheal Intubation: Comparison between conventional laryngoscope (Macintosh) and video laryngoscope TrueView EVO2. J Health Res Rev 2015; 2:66-72.
22. Elhadi SM, Rady WK, Elfadly AM. A comparative study between the macintosh laryngoscope and the king vision video laryngoscope in endotracheal intubation. Research and Opinion in Anesthesia and Intensive Care. 2016 Oct 1;3(4):168.
23. Upasana Gupta, Vasudha Jadhav. A comparative study between Video-laryngoscopy (TrueView evo2) vs Conventional laryngoscopy (Macintosh) in adult patients with predicted difficult airway. MedPulse International Journal of Anesthesiology. March 2020; 13(3): 196-201.
24. Sonavane SR, Gvalanil SK, Bhokare PP. Comparison between Conventional Macintosh Laryngoscope and King Vision Video Laryngoscope in Endotracheal Intubation for Elective Surgeries: A Prospective Randomized Study. 2020; 5(2):28-32
25. Mogahed MM, Elghamri MR, Anwar AG. Comparative study of intubation performance between macintosh, the channeled king vision and the C-MAC D-blade videolaryngoscope in controlled hypertensive patients. J Anesth Clin Res 2017;8(11):780.