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Original Research Article

Comparision of Intubation Quality and Hemodynamic Changes with Video Laryngoscope and Macintosh Laryngoscope for Orotracheal Intubation in Adult Patients Scheduled for Elective Surgeries Under General Anesthesia: A Prospective Randomized Study

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Conflict of interest: Nil

Abstract

Background: Securing the airway is imperative for safe anaesthesia practise and also lifesaving in critical scenarios. Traditionally conventional laryngoscopes are in widespread use for endotracheal intubation. Video laryngoscopes have gained popularity in the recent years and have shown definite advantages over Macintosh laryngoscope. This study is to evaluate efficiency and safety of Video laryngoscope over Macintosh laryngoscope for orotracheal intubation in adult patients scheduled for elective surgeries under general anaesthesia.

Aim: This study is designed to compare various parameters of intubation quality and hemodynamic changes during orotracheal intubation between Macintosh laryngoscope and Video laryngoscope in adult patients scheduled for elective surgeries under general anaesthesia.

Materials and Methods: It was a Prospective randomized single blind study. The study was conducted at Kurnool Medical College for elective surgeries. The study included 100 patients, they were randomly divided into two groups of 50 patients each. In one group Macintosh laryngoscope was used for orotracheal intubation, and Video laryngoscope was used in other group for orotracheal intubation. Parameters such as intubation time, intubation attempts, modified Cormack Lehane grading, POGO score, hemodynamics were noted.

Results: The current study, 68% of patients showed CL grade 1 in group B, while 42% of patients in group A showed the same grade, which was statistically significant (P value 0.01). The mean POGO score in patients of group A was 71.53 ± 26.97, whereas in patients of group B it was 87.13 ± 15.71, which was statistically significant (P value 0.008). Thus, our study concludes that the modified Cormack-Lehane grading and POGO scores were significantly better with the video laryngoscope compared to the Macintosh laryngoscope. In the present study, there is significant increase in heart rate in group A compared to group B during intubation, 1min, 3min, 5 min after intubation. The present study also revealed a significant increase in mean arterial pressure with group A compared to group B during intubation, 1 min, 3 min, 5 min after intubation.

Conclusion: From the present study, it was concluded that, there was statistically significant increase in hemodynamic parameters during laryngoscopy and intubation of patients of all the study groups but less increase in hemodynamic responses were observed in patients intubated with Video laryngoscope when compared with patients intubated with Macintosh. On the other hand, Video laryngoscope can be used for intubation among patients with anticipated intubation difficulty due to the better visualization of glottis in spite of increased time taken for intubation.

Keywords: Laryngoscopy, Orotracheal Intubation, Hemodynamic Parameters, Cormack Lehane Grading, POGO Score.

Introduction

Management of airway is the essential characteristic of anesthetic preparation and emergency medicine. Endotracheal intubation is a quick and harmless procedure that attains all the objectives of airway management, preserves patency of airway, shields the lungs from aspiration and protection of airways in emergency conditions and henceforth will be the gold standard practice for airway management. [1] Laryngoscopy and endotracheal intubation forms a significant phase in management of general anesthesia. Technique of laryngoscope ranges from direct to indirect, from simple rigid scope with light bulb to complex flexible fiberoptic bronchoscopes to ease the process of laryngoscopy and intubation. [2] Both laryngoscopy as well as endotracheal intubation contribute to the hemodynamic pressor response, it has been seen that the laryngoscopy blades influence the degree of hemodynamic response. [3] The pressure employed by the laryngoscope blade on the base of the tongue while lifting the epiglottis acts as a major stimulus for cardiovascular responses. [4]

Direct laryngoscopic view is best seen in sniffing in the morning air position which improves glottis view. [5] Glottic visualisation is classified by Cormack Lehane grading. [6 The Macintosh laryngoscope is the most commonly used device for directly visualizing the structures of the larynx and facilitating tracheal intubation. While using the Macintosh blade, the tip of the blade is placed in the vallecula – the space between the base of the tongue and the epiglottis. [7] The Video laryngoscope was introduced into clinical practice by Kaplan and Berci in 2002. Now Video laryngoscope is widely used in patients undergoing surgeries under general anaesthesia and also in emergency conditions where difficult intubation is encountered. In our study we have used BESDATA BD-DF Video laryngoscope which has camera at the tip of the curved blade and a portable monitor for seeing the larynx for orotracheal intubation. A perfect laryngoscopic procedure must establish a better glottic view, enable stress-free intubation with negligible hemodynamic modifications and airway difficulties. In past few years, few studies have compared these two laryngoscopes together. In this study, we compared hemodynamic response and glottis view to laryngoscopy and endotracheal intubation, with Macintosh laryngoscope and Video laryngoscope in patients posted for elective surgeries under general anesthesia.

Need for study: Securing the airway is imperative for safe anaesthesia practise and also lifesaving in critical scenarios. Traditionally conventional laryngoscopes are in widespread use for endotracheal intubation. Video laryngoscopes have gained popularity in the recent years and have shown definite advantages over Macintosh laryngoscope. This study is to evaluate efficiency and safety of Video laryngoscope over Macintosh laryngoscope for orotracheal intubation in adult patients scheduled for elective surgeries under general anaesthesia.

Aim and Objectives: This study is designed to compare various parameters of intubation quality and hemodynamic changes during orotracheal intubation between Macintosh laryngoscope and Video laryngoscope in adult patients scheduled for elective surgeries under general anaesthesia.

Primary Objective: To compare intubation time between two groups.

Secondary Objectives:

- To compare intubation attempts between two groups.
- To compare modified Cormack Lehane grading and POGO score (percentage of glottic opening) between two groups.
- To compare hemodynamics (heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure) during intubation between two groups.

Materials and Methods

This was a Prospective randomized single blind study done for an year in 50 cases admitted in Kurnool Medical College for elective surgeries.

Inclusion Criteria: Patients of 18 to 50 years belonging to ASA grade 1 – 2 of both sexes scheduled to undergo elective surgeries under general anaesthesia requiring orotracheal intubation. Exclusion Criteria: Patients with hemodynamic and respiratory compromise. Patients with anticipated difficult airway. Pregnant women. Patients with Body mass index greater or equal to 35kg/m2.

After institutional ethical committee approval, all patients were preoperatively evaluated and written informed consent was obtained. All patients were randomly allocated by computer generated randomization list into Group A and Group B. In the operation theatre after premedication and preoxygenation, induction was done with intravenous Propofol 2mg/kg and injection vecuronium 0.1mg/kg was administered to facilitate endotracheal intubation.

Group A: Macintosh laryngoscope was used for orotracheal intubation. Group B: Video laryngoscope was used for orotracheal intubation. After laryngoscopy the following were noted in both the groups: Intubation time (in Seconds), Intubation attempts, Modified Cormack lehane grading and POGO score (Percentage of glottic opening), To

compare hemodynamics (heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure) during intubation.

Investigations Required: Complete blood picture, renal function test, Liver function test, Serum electrolytes, ECG, Chest X- ray, Random blood sugar.

Results

Table 1: Age distribution (n=100)

Age (years)	Group A		Group B	
	N	%	N	%
< 20	11	22.0	6	12.0
21 – 30	12	24.0	16	32.0
31 – 40	19	38.0	13	26.0
41 – 50	8	16.0	15	30.0
Total	50	100.0	50	100.0
P value	0.267			

Table 2: Gender distribution (n=100)

Gender	Group A		Group B	
	N	%	N	%
Male	22	44.0	23	46.0
Female	28	56.0	27	54.0
Total	50	100.0	50	100.0
P value	0.922			

Table 3: Weight distribution (n=100)

Weight (kgs)	Group A	Group B
Mean	59.04	56.48
SD	6.48	5.82
P value	0.139	

Table 4: Height distribution (n=100)

Height (cms)	Group A	Group B
Mean	162.22	160.62
SD	5.86	5.17
P value	0.306	

Table 5: Body mass index distribution (n=100)

BMI(kg/m^2)	Group A	Group B
Mean	22.31	21.81
SD	1.34	1.40
P value	0.138	

Table 6: ASA physical status distribution (n=100)

ASA	Group A		Group B	
	N	%	N	%
1	32	64.0	21	42.0
2	18	36.0	29	58.0
Total	50	100.0	50	100.0
P value	>0.05			

Table 7: Distribution of Modified Mallampati grading (n=100)

MPG	Group A		Group B	
	N	%	N	%
I	20	40.0	36	72.0
II	30	60.0	14	28.0
Total	50	100.0	50	100.0
P value	0.747			

Table 8: Time taken for intubation

Parameter	Group A		Group B	
	Mean	SD	Mean	SD
Duration of intubation (sec)	14.43	2.13	24.93	4.26
P value	<0.0001			

Table 9: Intubation attempts

No. of attempts	Group A		Group B	
	N	%	N	%
One	48	96.0	50	100.0
Two	2	4.0	0	0.0
Total	50	100.0	30	100.0
P value	0.153			

Table 10: Modified Cormack-Lehane grading (n=100)

CL Grade	Group A		Group B	
	N	%	N	%
1	21	42.0	34	68.0
2	29	58.0	16	32.0
Total	50	100.0	50	100.0
P value	<0.05			

Table 11: Percentage of glottic opening

Parameter	Group A		Group B	
	Mean	SD	Mean	SD
POGO score	71.53	26.97	87.13	15.71
P value	0.0082			

Table 12: Distribution of heart rate (n=100)

Heart rate (per min)	Group A		Group B		P value
	Mean	SD	Mean	SD	
Baseline	83.04	9.21	81.36	11.02	0.410
Before induction	82.92	7.87	80.28	6.75	0.475
After induction	80.8	8.43	78.32	6.87	0.070
During intubation	92.32	8.04	89.32	5.65	0.033
1min	88.64	7.91	86.88	5.77	0.027
3min	81.64	7.77	78.44	6.58	0.029
5min	78.96	7.82	73.72	7.15	0.007

Table 13: Distribution of systolic blood pressure (n=100)

SBP (mm of Hg)	Group A		Group B		P value
	Mean	SD	Mean	SD	
Baseline	126.72	9.72	122.36	10.80	0.732
Before induction	123.36	11.05	120.4	10.44	0.304
After induction	121.76	6.41	118.96	11.17	0.12
During intubation	136.76	7.25	133.88	10.34	0.011
1min	131.96	6.82	129.08	10.93	0.012
3min	125.92	7.31	121.2	12.85	0.026
5min	122.96	8.18	118.04	14.44	0.039

Table 14: Distribution of diastolic blood pressure (n=100)

DBP (mm of Hg)	Group A		Group B		P value
	Mean	SD	Mean	SD	
Baseline	81.64	10.63	81.92	9.48	0.732
Before induction	82.32	3.82	81.64	9.08	0.304
After induction	81.16	10.51	78.6	6.93	0.15
During intubation	95.76	10.57	93.12	6.69	0.013
1min	90.8	10.19	88.6	6.78	0.020
3min	83.56	10.61	81.2	8.08	0.021
5min	80.84	11.08	78.76	8.71	0.029

Table 15: Distribution of mean arterial pressure (n=100)

MAP (mm of Hg)	Group A		Group B		P value
	Mean	SD	Mean	SD	
Baseline	96.68	8.20	95.4	7.65	0.353
Before induction	95.94	4.79	94.48	7.58	0.25
After induction	94.64	7.49	92.00	6.38	0.16
During intubation	109.4	7.66	106.6	5.91	0.043
1min	104.46	7.23	102.02	6.37	0.047
3min	97.74	7.76	94.46	8.26	0.043
5min	94.96	8.49	91.78	9.35	0.028

Discussion

Airway management is the fundamental aspect of anesthetic practice and emergency & critical and care medicine. Laryngoscope and endotracheal intubation forms an important step in administration of general anesthesia. Method of laryngoscopy ranges from direct to indirect, from simple rigid scope to complex fiber optic bronchoscopes to ease the process of laryngoscopy and intubation.[2] The process of laryngoscopy is known to be associated with profound cardiovascular effects. Two laryngoscopes were used in patients undergoing elective surgeries under general anesthesia for intubation. Hemodynamic responses were compared among the two laryngoscopes.

A prospective randomized control study was done among 100 patients posted for elective surgeries under general anesthesia who required endotracheal intubation in department of anaesthesiology, during study period of 1 year (September 2022 to September 2023) after obtaining informed consent. All the patients satisfying the inclusion and exclusion criteria were divided into two groups: Group A – 50 patients intubated with Macintosh Laryngoscope. Group B – 50 patients intubated with Video laryngoscope.

Demographic factors: Age: In present study, majority of patients in group A belong to age group of 31 – 40 years (38%) followed by 24% of belong to age 21 to 30years ;22% of patients belong to age group of less than 20 years , and 16% belong to age group of 41 -50years. In group B, majority of patients belong to age group of 21 – 30 years (32%), 41 – 50 years (30%) followed by 26% of cases belong to age 31 – 40 years, and 12% belong to less than 20 years. In a study done by Buhari et al,[8] in 2016 showed that the mean age of patients in group ML was 28.6 ± 6.8years, and in group VL was 32.0 ± 5.8 years with no statistical significance (P value 0.15).

Gender: In current study, 44% of cases were males and 56% of cases were females in group A. In group B, 46% of cases were males and 54% were females. There was no statistical significance in comparison of gender among the study groups (P value 0.922). In a study done by Aggarwal et al,[9] in 2019 showed that 56% were males and 44% were females in group ML, and 54% were males and 46% were females in group VL which showed females dominance in their study which was similar to present study findings.

Body mass index: In current study, the mean weight of patients in group A was 59.04 ± 6.48kgs, and in group B was 56.48 ± 5.82kgs. There was no statistical significance in comparison of mean weight among the study groups (P value 0.139). The mean height of patients in group A was 162.22 ± 5.86cms, and group B was 160.62 ± 5.17cms. There was no statistical significance in comparison of mean height of patients among the study groups (P value 0.306).

Similarly in a study done by Buhari et al,[8] in 2019 showed that the mean weight of the patients in group ML was 62.0 ± 11.6kgs, and in group VL was 67.8 ± 13.9kgs with no statistical significance (P value 0.113).The mean height ofpatients in group ML was 157.8 ± 5.1cm, and in group VL was 164.1 ± 8.4cm which was no statistical significance (P value 0.06).

In current study, the mean BMI of patients in group A was 22.31 ± 1.34 kg/m2, and in group B was 21.81 ± 1.40 kg/m2. There was no statistical significance in comparison of mean BMI of patients among the study groups (P value 0.138). Similar findings were observed in a study done by Aggarwal et al9 in 2019 with mean BMI of patients in group ML was 22.71 ± 2.73 kg/m2, and in group VL was 23.31 ± 2.57 kg/m2 with no statistical significance (P value >0.05).

ASA Grading: In current study, 64% of patients belong to ASA grade I and 36% belong to ASA II in group A. In group B, 42% of cases belong to ASA grade I and 58% belong to ASA grade II. There was no statistical significance in comparison of ASA grading among the study groups (P value >0.05). In study done by Aggarwal et al,[9] in 2019 it was showed that 52% of cases had ASA I grade and 48% had ASA grade II in study groups.

Mallampati classification: In current study, 40% of cases belong to MPG I and 60% belong to MPG II in group A. In group B, 72% of cases belong to MPG I and 28% of cases belong to MPG II. There

was no statistical significance in comparison of Mallampati classification among the study groups (P value 0.747). Similarly in a study done by Bakshi et al10 in 2019 showed that 62% of cases belong to MPG I and 38% belong to MPG II in Macintosh laryngoscope group whereas 78% of cases belong to MPG I and 22% of cases belong to MPG II in Video laryngoscope group which was statistically insignificant (P value 0.2).

Duration of intubation: In current study, the mean duration of intubation in group A patients was 14.43 ±2.13sec whereas in group B patients was 24.93 ± 4.26sec where there was longer duration in patients of group B when compared with patients of group A (P value <0.0001). Nandakumar KP et al,[11] in 2018 conducted a study to compare intubating conditions between Macintosh and glide scope and found that Video laryngoscope took more time to intubate compared than Macintosh and McCoy laryngoscope which was statistically significant (P = 0.0001).

Number of attempts: In current study, among group A patients, 96% of patients had single attempt and 4% had two attempts of intubation whereas among patients of group B all the patients were intubated in single attempt where there was no statistical significance (P value 0.153). Reena et al,[12] in 2019 showed that first attempt success rate was 92% in group King Vision laryngoscope and 74% in group Direct laryngoscope which was different from our study that was statistically significant (P= 0.017).

CL grading: In current study, 42% of cases had CL grade 1 and 58% of cases in Grade 2 in group A. In group B, 68% of cases had CL grade 1 and 32% of cases had grade 2. There was statistical significance in comparison of CL grading among the study groups (P value 0.01). SimilarlyBharti N et al,[13] in 2014 study showed that CL Grade 1 was obtained more in VL group (53.3%) compared to DL groups. CL Grade 3 was obtained in 20% each in McCoy and Macintosh groups, but no patient in VL group had CL Grade 3.

POGO score: In current study, the mean POGO score in patients of group A was 71.53 ± 26.97 whereas in patients of group B was 87.13 ± 15.71 where there was statistical significance (P value 0.008). Our results were comparable with Jagannathan et al,[14] in 2017 showed that , the percentage of the glottic opening score was better when using the Video laryngoscope compared to direct laryngoscope.

Hemodynamic parameters: Heart rate: In current study, heart rate was recorded during baseline, before induction, after induction, during intubation, 1min, 3min and 5min after intubation. The mean heart rate at baseline in group A was 83.04 ± 9.21 per min, and in group B was 81.36 ± 11.02 per min. The mean heart rate in group A was 82.92 ± 7.87 per min, and in group B was 80.28 ± 6.75 per min before induction. The mean heart rate in group A was 80.8 ± 8.43 per min and in group B was 78.32 ± 6.87 per min after induction. The mean heart rate in group A was 92.32 ± 8.04 per min, and in group B was 89.32 ± 5.65 per min during intubation. The mean heart rate in group A was 88.64 ± 7.91 per min, and in group B was 86.88 ± 5.77 per min during 1min after intubation. The mean heart rate in group A was 81.64 ± 7.77 per min and in group B was 78.44 ±6.58 per min during 3min after intubation. The mean heart rate in group A was 78.96 ± 7.82 per min, and in group B was 73.72 ± 7.15 per min during 5min after intubation. There was statistical significance in comparison of heart rate among the study groups during intubation, 1min, 3min and 5min after intubation (P value <0.05) whereas there was no statistical significance of heartrate among the study groups at baseline ,before and after induction (P value>0.05).

There was increase in heart rate during intubation in all the patients of the study groups but that was statistically significant among the study groups and was observed that more increase in Macintosh group when compared with patients of Video laryngoscope group. Sarkılar G et al,[15] in 2015 compared hemodynamic responses to endotracheal intubation performed with Video and direct laryngoscopy in patients scheduled for major cardiac surgery. They compared Macintosh and Video laryngoscopes and demonstrated that Video laryngoscope offered a better laryngeal view and a longer intubation time, but the number of intubation attempts, and hemodynamic response to orotracheal intubation were comparable between two groups.

Systolic blood pressure: In current study, systolic blood pressure was recorded during baseline, before induction, after induction, during intubation, 1min, 3min and 5min after intubation. The mean systolic blood pressure at baseline in group A was 126.72 ±9.72 mm of Hg, and in group B was 122.36 ± 10.80 mm of Hg. The mean systolic blood pressure in group A was 123.36 ± 11.05 mm of Hg, and in group B was 120.4 ± 10.44 mm of Hg before induction. The mean systolic blood pressure in group A was 121.76 ± 6.41 mm of Hg, and in group B was 118.96 ± 11.17 mm of Hg after induction. The mean systolic blood pressure in group A was 136.76 ±7.25 mm of Hg, and in group B was 133.88 ± 10.34 mm of Hg during intubation. The mean systolic blood pressure in group A was 131.96 ± 6.82 mm of Hg, and in group B was 129.08 ± 10.93 mm of Hg during 1min after intubation. The meansystolic blood pressure in group A was 125.92 ± 7.31 mm of Hg, and in group B was 121.2 ±12.85 mm of Hg during 3min after intubation. The mean systolic blood pressure

in group A was 122.96 ± 8.18 mm of Hg, and in group B was 118.04 ± 14.44 mm of Hg during 5min after intubation. There was statistical significance in comparison of mean systolic blood pressure among the study groups during intubation, 1min, 3min and 5min after intubation (P value <0.05) whereas no statistical significance during baseline, before and after induction (P value >0.05).

There was an increase in systolic blood pressure during intubation in all the patients of the study groups, which was statistically significant among the study groups. It was observed that the increase was more pronounced in the Macintosh group compared to the Video laryngoscope group. In a study done by Aggarwal et al,[9] in 2019 showed that there was significant increase in mean systolic blood pressure among the study groups with less increase in VL group when compared with ML group which was identical to present study findings.

Diastolic blood pressure: In current study, diastolic blood pressure was recorded during baseline, before induction, after induction, during intubation, 1min, 3min and 5min after intubation. The mean diastolic blood pressure at baseline in group A was 81.64 ± 10.63 mm of Hg, and in group B was 81.92 ± 9.48 mm of Hg. The mean diastolic blood pressure in group A was 82.32 ± 3.82 mm of Hg, and in group B was 81.64 ± 9.08 mm of Hg before induction. The mean diastolic blood pressure in group A was 81.16 ± 10.51 mm of Hg, and in group B was 78.6 ± 6.93 mm of Hg after induction. The mean diastolic blood pressure in group A was 95.76 ± 10.57 mm of Hg, and in group B was 93.12 ± 6.69 mm of Hg during intubation. The meandiastolic blood pressure in group A was 90.8 ± 10.19 mm of Hg, and in group B was 88.6 ± 6.78 mm of Hg during 1min after intubation. The mean diastolic blood pressure in group A was 83.56 ± 10.61 mm of Hg, and in group B was 81.2 ±8.08 mm of Hg during 3min after intubation. The mean diastolic blood pressure in group A was 80.84 ± 11.08 mm of Hg, and in group B was 78.76 ± 8.71 mm of Hg during 5min after intubation. There was statistical significance in comparison of mean diastolic blood pressure among the study groups during intubation, 1min, 3min and 5min after intubation (P value <0.05) whereas no statistical significance during baseline , before and after induction (P value >0.05).

There was increase in diastolic blood pressure during intubation in all the patients of the study groups but there was statistically significant among the study groups and was observed that more increase in Macintosh group when compared with patients of Video laryngoscope group. In a study done by M rajasekhar et al,[16] in 2020 showed that there was no statistical significance in diastolic blood pressure among the study groups.

Mean arterial pressure: In current study, mean arterial pressure was recorded during baseline, before induction, after induction, during intubation, 1min, 3min and 5min after intubation. The mean of meanarterial pressure at baseline in group A was 96.68± 8.20 mm of Hg, and in group B was 95.4± 7.65 mm of Hg. The mean of mean arterial pressure in group A was 95.94 ± 4.79 mm of Hg, and in group B was 94.48± 7.58 mm of Hg before induction. The mean of mean arterial pressure in group A was 94.64 ± 7.49 mm of Hg, and in group B was 92.00 ± 6.38 mm of Hg after induction. The mean of mean arterial pressure in group A was 109.4 ± 7.66 mm of Hg, and in group B was 106.6 ± 5.91 mm of Hg during intubation. The mean of mean arterial pressure in group A was 104.46 ± 7.23 mm of Hg, and in group B was 102.02 ± 6.37 mm of Hg during 1min after intubation. The mean of mean arterial pressure in group A was 97.74 ± 7.76 mm of Hg, and in group B was 94.46±8.26 mm of Hg during 3min after intubation. The mean of mean arterial pressure in group A was 94.96 ± 8.49 mm of Hg, and in group B was 91.78 ± 9.35 mm of Hg during 5min after intubation. There was statistical significance in comparison of mean of mean arterial pressure among the study groups during intubation, 1min, 3min and 5min after intubation (P value <0.05) whereas no statistical significance during baseline , before and after induction (P value >0.05).

There was increase in mean arterial pressure during intubation in all the patients of the study groups but there was statistically significant among the study groups and was observed that more increase in Macintosh group a when compared with patients of Video laryngoscope group. Whereas in a study done by Buhari et al,[15] in 2016 it was observed that there was no statistical significance in mean arterial blood pressure among the study groups. In a study done by M rajasekhar et al,[16] in 2020 showed that there was no statistical significance in mean arterial pressure among the study groups.

Airway complications: In our study, airway complications such as airway trauma, sore throat, desaturation, and esophageal intubation etc. were not observed in any of the patients in both groups. S.R. Lewis et al,[17] in 2017 conducted a meta-analysis and found that airway complications like sore throat, laryngeal, or airway trauma were significantly less in Video laryngoscopy compared to direct laryngoscopy.

Conclusion

From the present study, it was concluded that, there was statistical significant increase in hemodynamic parameters during laryngoscopy and intubation of patients of all the study groups but less increase in hemodynamic responses were observed in patients intubated with Video laryngoscope when compared with patients intubated with Macintosh. On the

other hand, Video laryngoscope can be used for intubation among patients with anticipated intubation difficulty due to the better visualization of glottis in spite of increased time taken for intubation

Limitations: Since it was not possible to blind the observer to the device being utilised, the primary drawback of our study is the possibility of observer bias. Subjective factors include the lift force required and the glottic view grade. Another drawback of our research is that we did not assess the relative effectiveness of these instruments against other intubation techniques, such as the glidescope, Airtraq, Bullard laryngoscope, and intubating laryngeal mask airway, which are advised in challenging airway situations. To ascertain the relative efficacies of various devices, more comparative research is required.

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