Original Research Article

Comparison of endotracheal intubation between c-mac video laryngoscope and airtraq device

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Abstract

Background: Failed tracheal intubation is the leading cause of anesthetic morbidity and mortality both within and outside the operation theatre. To determine intubation difficulty, a significant factor like adequacy of the laryngeal view is obtained by using laryngoscopy. Aim: The aim of the present study was to "Comparison of endotracheal intubation between C-MAC video laryngoscope and airtraq device*"* Methodology: The study was performed to compare two different laryngoscopes. 60 ASA physical status I and II non-obese patients of either sex (20-60 yrs age) undergoing general anesthesia for elective surgery were included. Patients with predicted difficult intubation were not included. After obtaining approval from the Institutional Ethical Committee, patients were randomly divided into two groups. Patients of group CM (n=30) were intubated using a C-MAC video laryngoscope, and group AT (n=30) were intubated using Airtraq laryngoscope size 3. Blinding of the attending laryngoscopists was not possible as the two laryngoscopes were conspicuously different. The two optical intubation devices, the Airtraq and C-MAC, were compared with each other with respect to the intubation time, peri laryngoscopy, and intubation changes in heart rate and blood pressure, Modified Cormack and Lehane grading, ease of insertion and incidence of oral trauma during laryngoscopy. The incidence of successful intubation was 100% with both C-MAC video laryngoscope and Airtraq laryngoscope. Results: In Group CM, ease of insertion of CMAC video laryngoscope was very easy in 28 patients and easy in 2 patients. In Group AT, ease of insertion of Airtraq laryngoscope was very easy in all the patients. There was no significant difference during the ease of insertion between both groups. The duration of intubation was significantly less with C-MAC video laryngoscope as compared to Airtraq laryngoscope (15.43±3.08 secs vs. 17.30±2.78secs). Airtraq laryngoscope required a slightly higher time to intubate. In both groups, there was a significant increase in heart rate from pre-intubation value to 1-minute post-intubation value, and the increase was higher with the Airtraq group compared to the C-MAC group. Heart rate in both the group reached its baseline value within 5 minutes after intubation. In both groups, there was a significant increase in the SBP, DBP MAP at 1 minute after intubation. However, the values reached near or even below the baseline at 3 and 5 min intervals. Conclusion: C-MAC video laryngoscope had a slight edge over Airtraq laryngoscope in the aspect of time required for the laryngoscopy and intubation and in offering a better view of glottis and the upper airway.

Keywords: C-MAC, Laryngoscopy, Intubation, Endotracheal, Airtaq, Heart rate, Blood Pressure

Introduction

Laryngoscopy and endotracheal Intubation form an essential step in the administration of general anesthesia. Direct laryngoscopy or tracheal intubation, uncomplicated by coughing, anoxia, or hypercapnia, can produce marked circulatory effects characterized by a rise in the blood pressure and an increase in the heart rate[1-4].

Laryngoscopy cannot provide good laryngeal exposure in some patients. Various optical devices were designed to get an excellent glottic view and facilitate endotracheal intubation without distorting normal airway anatomy and minimizing hemodynamic instability.

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The goal of all advances in airway management is to achieve better maintenance of the airway and adequate ventilation in both elective and emergencies.

The latest generation of Karl Storz video laryngoscopes, the C-MAC video laryngoscope, features several distinct video laryngoscopy improvements. The optical system and the high-intensity light-emitting diodes (LEDs) as a light source produces a good view of the glottic aperture and permits the operator to turn the tip of the blade into the vallecula under laryngoscopic vision. Various types of blades are available for the C-MAC videolaryngoscope. Currently, the system has Macintosh blade sizes 2, 3and 4, and additional models such as Miller sizes 0 and 1.A special D-blade is also available for the C-MAC system[5-7].

The Airtraq is a single-use, indirect laryngoscope introduced into clinical practice in 2005. It has an exaggerated blade curvature with the internal arrangement of optical lenses and a mechanism to prevent fogging of the distal lens. A good view of the glottis is provided without aligning the oral, pharyngeal, and tracheal axis[8-11]

Aims and objectives

Aim

The aim of this study was to evaluate and assess the effectiveness of laryngoscopy, endotracheal intubation and hemodynamic changes with C-MAC video laryngoscope and Airtraq laryngoscope under general anesthesia.

Objectives

The following parameters were compared using the C-MAC video laryngoscopeand Airtraq device:

1. Duration of intubation
2. Glottic view by Modified Cormack Lehane Grade
3. Ease of insertion of the laryngoscope
4. Number of attempts
5. Heart Rate
6. Systolic Blood Pressure
7. Diastolic Blood Pressure
8. Mean Arterial Pressure
9. Airway trauma

Materials and methods

The present study was a prospective randomized single-blinded study and was undertaken to compare the performance of C-MAC videolaryngoscope and airtraq optical laryngoscope for endotracheal intubation and assess the hemodynamic responses.

After the institutional ethical committee's approval, the study was conducted in 60 patients belonging to ASA I and II of either sex between 20 and 60 years of age undergoing elective surgeries under General anaesthesia. The study was done from March 2019 to March 2021 in the Department of Anaesthesia in Gitam Institute of Medical Sciences & Research, Vishakapatnam.

Inclusion criteria

1. Age group:20 to 60 years.
2. Patients of ASA grade I and II.
3. Patients with body mass index ≤30kg/m2..
4. Mallampati grades 1and 2
5. Patients undergoing elective surgical procedures under General anaesthesia.

Exclusion criteria

1. Patient refusal for the procedure.
2. Patients of ASA III and above.
3. Patients with Mallampati grade 3 and 4.
4. Patients with a cervical spine injury.
5. Patients with anticipated difficult intubation.

Method of collection of data

The patients were allocated randomly into two groups, with 30 patients in eachgroup using the computer-generated random numbers.

GROUP CM: Thirty patients were intubated with CMAC Video laryngoscope.GROUP AT: Thirty patients were intubated with Airtraq laryngoscope.

Pre anaesthetic check up and preparation

The pre-anaesthetic evaluation was done a day prior to surgery. It included thefollowing,

The general condition of the patient

Airway assessment using Mallampati Classification.

Mallampati classification

It is a frequently performed test that examines the size of the tongue in relationto the oral cavity.

Class I: The palatal arch, including the bilateral faucial pillars and bases of the pillars.Class II: The upper part of the pillars and the uvula are visible.

Class III: Only the soft and hard palates are visible.Class IV: Only the hard palate is visible.

Endotracheal intubation was done using either CMAC videolaryngoscope or Airtraq laryngoscope with appropriate endotracheal tube and after auscultation of thechest for bilateral equal air entry, the tube was fixed, and the heart rate, systolic bloodpressure, diastolic blood pressure, mean arterial pressure was noted at 1,3 and 5 minutes after intubation.

Anaesthesia was maintained with 60%Nitrous oxide,40%Oxygen and sevoflurane were kept at a MAC of 2.

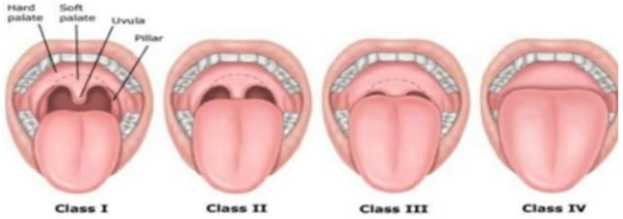

Fig 1:Mallampati grading

At the end of the surgery, the study patients were recovered with Inj.Neostigmine 0.05mg/kg and Inj.Glycopyrrolate 0.01mg/kg IV.The patients were extubated when awake and breathing adequately and shifted to the recovery unit. Airway trauma during intubation was noted.

An ideal laryngoscopy and intubation should provide an excellent glottic view, facilitate easy intubation, minimize hemodynamic parameters and airway complications.

The present study is undertaken to compare the laryngoscopy, endotracheal intubation and the associated hemodynamic alterations between C-Mac videolaryngoscope and Airtraq optical laryngoscope.

Statistical analysis of the data

The Statistical Package for the Social Sciences [SPSS] version 25.0 was used to analyze the data. The data was entered into Microsoft-Excel and Word and was used to generate graphs and tables.

Observations and results

A total of 60 patients included in this study, and these patients were divided into two groups, group CM and group AT. Each group included 30 patients.

Group CM : Intubation with Cmac video laryngoscope.

Group AT : Intubation with Airtraq laryngoscope.

The following were the observations and results from the study done in two groups.

Age

The mean age of the study subjects in group CM was 40.30 ± 12.62 years, and the group AT was 37.80±12.01 years. Therefore we conclude that the difference between the two groups was statistically insignificant (p value:0.435)

Table 1:Age wise distribution of the patients studied

Group	N	Meanage	Standarddeviation	p-value
CM	30	40.30	12.62	
AT	30	37.80	12.01	0.435

2.**Gender distribution:O**ut of 30 patients in group CM, 17 (56.7%) were females, and 13(43.3%) weremales. Similarly, in group AT, 19 (63.3%) were females, and 11 (36.7%) were males. The participants were allocated into two groups, such that there wasn't gender wise difference between the groups. (X^2=0.278; p value 0.598)

Table 2: Gender wise distribution of the patients studied

			GROUP		Total
			CM	AT	
SEX	Female	Count	17	19	36
		% within SEX	47.2%	52.8%	100.0%
		% within GROUP	56.7%	63.3%	60.0%
	Male	Count	13	11	24
		% within SEX	54.2%	45.8%	100.0%
		% within GROUP	43.3%	36.7%	40.0%
Total		Count	30	30	60
		% within SEX	50.0%	50.0%	100.0%
		% within GROUP	100.0%	100.0%	100.0%

Weight: The mean weight of the study subjects in group CM was 59.57±4.74 kilograms; group AT was 58.60± 5.57 kilograms. The participants were allocated into groups, such that there won't be any difference between the groups with respect to mean weight. (p value: 0.472).

Table 3: Distribution of the study participants by mean weight :

Group	N	Mean weight	Standard deviation	p-value
CM	30	59.57	4.74	0.472
AT	30	58.60	5.57	

Height: The mean height of the study subjects in group CM was 158.03 ± 6.32 centimeters; group AT was 156.37±4.50 centimeters. The participants were allocatedinto groups, such that there won't be any difference between the groups with respect to mean height. (p value: 0.244)

Table 4: Distribution of the study participants by mean height:

Group	N	Mean height	Standard deviation	p-value
CM	30	158.03	6.32	0.244
AT	30	156.37	4.50	

BMI: The mean BMI of the patients in Group CM was 23.77±2.05 kg/m2 and in Group AT was 24.03 ± 2.08 kg/m2, and the differences were found to be statistically insignificant (p value: 0.618).

Table 5: Distribution of the study participants by mean BMI (in kilograms/m^2)

Group	N	Mean BMI	Standard deviation	p-value
CM	30	23.77	2.05	
AT	30	24.03	2.08	0.618

MPG: In Group CM, 14(46.7%) patients had MPG I and 16 (53.3%) patients had MPGII, while in Group AT, 20(66.7%) patients had MPG I and 10 (33.3%) patients had MPG II. The difference in the MPG between the two groups was statistically insignificant(X^2=2.443; pvalue: 0.118).

Table 6:Distribution of the groups based on MPG

			GROUP		Total
			CM	AT	
MPG	I	Count	14	20	34
		% within MPG	41.2%	58.8%	100.0%
		% within GROUP	46.7%	66.7%	56.7%
	II	Count	16	10	26
		% within MPG	61.5%	38.5%	100.0%
		% within GROUP	53.3%	33.3%	43.3%
Total		Count	30	30	60
		% within MPG	50.0%	50.0%	100.0%
		% within GROUP	100.0%	100.0%	100.0%

Modified cormack lehane grading: In Group CM, 28 (93.3%) patients had MCLG I, and the remaining 2 (6.7%) patients had MCLG II, while in Group AT, 25 (83.3%) patients had MCLG I, and 5 (16.75%) patients had MCLG II.

The differences in the Modified Cormack and Lehane grading between the twogroups were statistically insignificant (X^2=1.970; p value : 0.373).

Table 7:Distribution of the groups based on MCLG

			GROUP		Total
			CM	AT	
MCLG	1	Count	28	25	53
		% within MCLG	52.8%	47.2%	100.0%
		% within GROUP	93.3%	83.3%	88.3%
	2a	Count	1	4	5
		% within MCLG	20.0%	80.0%	100.0%
		% within GROUP	3.3%	13.4%	8.3%
	2b	Count	1	1	2
		% within MCLG	50.0%	50.0%	100.0%
		% within GROUP	3.4%	3.3%	3.3%

Total	Count	30	30	60
	% within MCLG	50.0%	50.0%	100.0%
	% within GROUP	100.0%	100.0%	100.0%

Duration of intubation

The mean time taken to intubate was 15.43± 3.08 sec in Group CM and 17.30±2.78sec in Group AT. The differences were found to be statistically highly significant (t value : -2.463; p value : 0.017).

Table 8: Distribution of the groups based on the duration of intubation

Group	N	Mean DOI	Standard deviation	p-value
CM	30	15.43	3.08	0.017
AT	30	17.30	2.78	

Ease of insertion

In Group CM, ease of insertion of cmac video laryngoscope was very easy in28 (93.3%) patients and easy in 2 (6.7%) patients.

In Group AT, insertion was very easy for all the patients.

The differences in the ease of insertion of laryngoscopes between the two groupswere statistically highly insignificant (X^2=2.069; p=0.150).

Table 9: Distribution of the groups based on the ease of insertion

			GROUP		Total
			CM	AT	
EOI	I	Count	28	30	58
		% within EOI	48.3%	51.7%	100.0%
		% within GROUP	93.3%	100.0%	96.7%
	II	Count	2	0	2
		% within EOI	100.0%	0.0%	100.0%
		% within GROUP	6.7%	0.0%	3.3%
Total		Count	30	30	60
		% within EOI	50.0%	50.0%	100.0%
		% within GROUP	100.0%	100.0%	100.0%

Number of Attempts: In group CM, 28 (93.3%) patients were intubated in the first attempt, and 2 (6.7%) patients required a second attempt. In group AT, 26 (86.7%) patients were intubated in the first attempt, and 4 (13.3%) required a second attempt. The difference in the number of attempts between the two groups was statistically insignificant. (*X^2=0.741; pvalue:0.389)*

Table 10: Distribution of the groups based on the number of attempts

			GROUP		Total
			CM	AT	
No. of Attempts	1	Count	28	26	54
		% within No_of_Attempts	51.9%	48.1%	100.0%
		% within GROUP	93.3%	86.7%	90.0%
	2	Count	2	4	6
		% within No_of_Attempts	33.3%	66.7%	100.0%
		% within GROUP	6.7%	13.3%	10.0%
Total		Count	30	30	60
		% within No_of_Attempts	50.0%	50.0%	100.0%
		% within GROUP	100.0%	100.0%	100.0%

Heart rate

In Group CM, the baseline mean heart rate was 81.13(± 10.65) bpm, 93.73 (± 8.30) bpm at 1 minute after intubation, 90.63(± 6.201) bpm at 3 min after intubation, and 79.90(± 8.23) bpm at 5 min after intubation.

In Group AT, the baseline mean heart rate was 77.13 (± 4.61) bpm, 103.50 (± 10.92) bpm at 1 min after intubation, 93.53 (± 5.50) bpm 3 min after intubation, and 77.10(± 3.45) bpm at 5 min after intubation.The differences in the baseline mean heart rate of the two groups were found to be statistically insignificant with p value:0.064. The differences in the mean heart rate at 1 min after intubation between the two groups were found to be statistically significant with a p-value of 0.0001. The differences in the mean heart rate 3 min and 5min after the intubation were statistically insignificant with p=0.060 and 0.091. The increase in heart rate at 1minute after intubation was more with airtraq laryngoscope compared to the cmac video laryngoscope.

Table 11: Distribution of the groups based on the mean heart rate:

Variable	Group CM			Group AT			
	n	Mean	SD	n	Mean	SD	P-Value
HR_Baseline	30	81.13	10.65	30	77.13	4.61	0.064
HR_1	30	93.73	8.30	30	103.50	10.92	0.0001
HR_3	30	90.63	6.201	30	93.53	5.50	0.060
HR_5	30	79.90	8.23	30	77.10	3.45	0.091

Systolic blood pressure

In Group CM, the baseline mean systolic blood pressure was 117.33(± 9.34) mmHg prior to intubation, 134.90(± 8.58) at 1min after intubation,118.57 (±13.52)mmHg at 3 minute after intubation, and 116.63(±14.87)mmHg at 5min after intubation.

In Group AT, baseline mean systolic blood pressure was 117.90(± 7.82) mmHg prior to intubation, 144.10(± 7.55) mmHg at 1min after intubation,119.43 (±7.21) at 3 min after intubation, and 117.10 (± 8.89) mmHg at 5 minute after intubation.

The increase in the systolic blood pressure at 1 min after intubation were statistically significant (p<0.0001) between the two groups and was found to be morewith the Airtraq laryngoscope than with the C-Mac video laryngoscope.

The increase in systolic blood pressure at 3min and 5min after intubation werefound to be statistically insignificant.

Table 12: Distribution of the groups based on the systolic blood pressure:

Variable	Group CM			Group AT			
	n	Mean	SD	n	Mean	SD	P-Value
SBP_Baseline	30	117.33	9.34	30	117.90	7.82	0.800
SBP_1	30	134.90	8.58	30	144.10	7.55	0.0001
SBP_3	30	118.57	13.52	30	119.43	7.21	0.503
SBP_5	30	116.63	14.87	30	117.10	8.89	0.883

Diastolic blood pressure:In Group CM, the baseline mean diastolic blood pressure was 78.17(± 9.09) mmHg prior to intubation, 85.43 (± 6.71) mmHg at 1min after intubation,82.87 (±12.35)mmHg at 3 minute after intubation, and 77.20(± 6.69) at 5min after intubation.

In Group AT, it was 76.67 (± 5.93) mmHg prior to intubation, 95.23 (± 6.55) mmHg at 1 min after intubation, 81.77 (± 5.88) mmHg at 3 minute after intubation and 78.90 (± 7.60) at 5 min after intubation.

Table 13: Distribution of the groups based on the diastolic blood pressure:

Variable	Group CM			Group AT			
	n	Mean	SD	n	Mean	SD	P-Value
DBP_Baseline	30	78.17	9.09	30	76.67	5.93	0.452
DBP_1	30	85.43	6.71	30	95.23	6.55	0.0001
DBP_3	30	82.87	12.35	30	81.77	5.88	0.662
DBP_5	30	77.20	6.69	30	78.90	7.06	0.342

Mean arterial pressure:In Group CM, the baseline mean arterial pressure was 91.23 (± 7.49) mmHg prior to intubation, 101.93 (± 5.00) mmHg at 1min after intubation,94.77 (±11.50) mmHg at 3 minute after intubation and 90.34(± 6.77)mmHg at 5min after intubation.

In Group AT, the baseline mean arterial pressure was 90.53 (± 4.04) mmHg prior to intubation, 111.43(± 5.08) mmHg at 1min after intubation,94.32 (± 4.80)at 3minafter intubation, and 91.60(± 4.90) mmHg at 5 minute after intubation.

Table 14: Distribution of the groups based on the mean arterial pressure

Variable	Group CM			Group AT			
	N	Mean	SD	n	Mean	SD	P-Value
MAP_Baseline	30	91.23	7.49	30	90.53	4.04	0.659
MAP_1	30	101.93	5.00	30	111.43	5.08	0.0001
MAP_3	30	94.77	11.50	30	94.32	4.80	0.846
MAP_5	30	90.34	6.77	30	91.60	4.90	0.414

Airway Trauma

Two patients in the AT group had airway trauma as evidenced by the presenceof blood stain on the laryngoscope blade, and none of the patients in group CM had airway trauma.The differences in the airway trauma between the two groups was statistically insignificant(X^2=2.069;p-value=0.150)

Table 15:Incidence of airway trauma in both the groups.

			GROUP		Total
			CM	AT	
Airwaytrauma	YES	Count	0	2	2
		% within Trauma	0.0%	100.0%	100.0%
		% within GROUP	0.0%	6.7%	3.3%
	NIL	Count	30	28	58
		% within Trauma	51.7%	48.3%	100.0%
		% within GROUP	100.0%	93.3%	96.7%
Total		Count	30	30	60
		% within Injuries	50.0%	50.0%	100.0%
		% within GROUP	100.0%	100.0%	100.0%

Discussion

Several new optical airway devices have proved useful in adult airway management during the last few decades.

A video laryngoscope was introduced to provide a better laryngoscopic view on a video monitor and potentially improves the 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. But its use for routine elective cases has not been studied in detail.

The present study compares two such airway devices, C-Mac video laryngoscope and Airtraq laryngoscope."COMPARISON OF ENDOTRACHEAL INTUBATION BETWEEN CMAC VIDEO LARYNGOSCOPE AND AIRTRAQ DEVICE*"* was a study conducted on 60 ASA I and II patients of either sex between 20 – 60

years and a BMI of less than 30 after obtaining informed consent.

Demographic data

In the present study, both the groups were similar concerning demographic datalike age, gender, weight, height, and BMI. The mean age of the study subjects in the group CM was 40.30 ± 12.62 years,and the group AT was 37.80±12.01 years.Out of 30 patients in group CM, 17 (56.7%) were females, and 13(43.3%) weremales. Similarly, in the group AT, 19 (63.3%) were females, and 11 (36.7%) were males.

The mean weight of the study subjects in the group CM was 59.57±4.74 kilograms, and the group AT was 58.60 ± 5.57 kilograms.

The mean height of the study subjects in the group CM was 158.03 ± 6.32 centimeters and in the group AT was 156.37±4.50 centimeters.

The mean BMI of the patients in the group CM was 23.77±2.05 kg/m2, and in the group AT was 24.03 ± 2.08 kg/m2.

The differences in the demographic data like age, gender, weight, height, and BMI were statistically insignificant between both groups.

Mallampati grading

The Mallampati score was used to identify patients at risk for difficult tracheal intubation. It has a score of 1-4 based on the anatomic features of the airway seen when the patient widely opens the mouth and protrudes the tongue.

It examines the size of the tongue in relation to the oral cavity. In the present study, patients with only Mallampati grade 1 and 2 were included.

In Group CM, 14 (46.7%) patients had MPG I, and 16 (53.3%) patients had MPG II, while in Group AT, 20 (66.7%) patients had MPG I and 10 (33.3%) patients had MPG II. The differences in the MPG between the two groups were statistically insignificant.

Ease of insertion

The ease of insertion of the laryngoscope in to the oral cavity during intubationwas observed and graded using a Likerts scale as very easy, easy, neutral, difficult and very difficult.

In Group CM, ease of insertion of CMAC video laryngoscope was very easy in 28 patients and easy in 2 patients. In Group AT, ease of insertion of Airtraqlaryngoscope was very easy in all the patients.

The differences in the ease of insertion of laryngoscopes between the two groups were statistically insignificant (p=0.150).

Our results had a good correlation with the previous study conducted by Ahmed et al[12] They conducted a study on the Comparison of endotracheal intubation time in a neutral position between C-Mac and Airtraq laryngoscopes and found that ease of insertion between these two devices was similar.

Glottic view

The visualization of the glottis was graded according to Modified Cormack and Lehane grading (MCLG). It is an established fact that MPG class I correlates with MCL grade 1, whereas all the MPGrades can fall in any MCL grading (1, 2, 3, & 4).

Out of the 30 patients in the Airtraq group,20 patients were MPG-I as per theirairway assessment. A total of 20 patients with MPG-I were in the MCLG-1, and none belonging to MCLG-2.

As far as the CM group was concerned, out of the 14 patients in the MPG-I group,13 patients were in the MCLG-I group, and only 1 patient belonged to MCLG-II.None of the patients in the Airtraq group out of the 30 belonged to MCLG-3&4.

Out of the 30 patients in the Airtraq group, 10 patients were MPG-II as per theirairway assessment. Of these 10 MPG-II patients, 5 patients were MCLG-1, and 5 wereMCLG-2.In the CM group, 16 patients(out of the 30 total) were MPG-II. Out of the 16 patients with MPG-II,15 patients were MCLG-1, and only one patient was MCLG-2. There were no patients in the CM group with MCLG-3 or 4.

Hence, the total number of patients with MCLG-1 and MCLG-2 in the CMac group were 28 and 2, respectively, and the total number of patients with MCLG-1 and MCLG-2 in the Airtraq 25 and 5, respectively. Therefore, there is no significant change in Modified Cormack and Lehane grading in both CMac and Airtraq groups.

Mc Elwain et al[13] in 2011 conducted a study on the Comparison of the C-MAC, Macintosh, and Airtraq laryngoscopes in patients undergoing tracheal intubation withcervical spine immobilization and concluded that a significantly better Modified Cormack and Lehane glottic view was obtained at laryngoscopy with the Airtraq compared with the Macintosh and C-MAC.

Duration of intubation

The intubation duration was lesser with the CM group (15.43± 3.08 sec) using the C-MAC video laryngoscope than that of the AT Group (17.30±2.78sec)using Airtraq laryngoscope. This difference was found to be statistically significant ($p < 0.017$).

The result correlated with the previous study done by Ahmed et al.[12] on the comparison endotracheal intubation time between CMAC video laryngoscope and Airtraq laryngoscope in the neutral position. They showed that CMAC video laryngoscope was better than Airtraq laryngoscope with respect to duration of intubation.

Number of attempts

In the present study, 86.7 % (26 out of 30) of patients in the AT group were intubated in the first attempt, whereas 13.3 % (4 out of 30) of patients required a second attempt. With the C-MAC video laryngoscope, 93.3 % (28 out of 30) of patientswere intubated in the first attempt, and 6.7% (2 out of 30) of patients required a second attempt with a stylet. The difference in the number of attempts between the two groupswas statistically insignificant.

Hemodynamic parameters

Laryngoscopy and endotracheal intubation result in sympathetic stimulation that leads to an increase in heart rate and blood pressure. In the present study, the hemodynamic responses to laryngoscopy and endotracheal intubation were compared between CMac video laryngoscope and Airtraq laryngoscope.

Heart rate

Heart rate increased slightly in both the groups after tracheal intubation but hadreturned to baseline within 5 min. The fluctuations in heart rate were more pronouncedin the AT group as compared to the CM group.

In both the groups, at 1 min post-intubation, a significant increase in heart rate was observed from its baseline value. The rise in heart rate was higher with group AT.(Group CM 93.73 ± 8.30 bpm, Group AT 103.50 ± 10.92 bpm). The rise in heart rate was not significant in both the groups at 3 min post-intubation. At 5 min post-intubation, both the groups had a heart rate lower than its baseline level; however, the differencewas statistically insignificant.

Systolic blood pressure

Systolic blood pressure increased in both groups after tracheal intubation and returned to baseline within 5 minutes.

At one minute after intubation, the increase in the systolic blood pressure was statistically significant between the two groups (Group CM 134.90 ± 8.58 mmhg, Group AT 144.10 ± 7.55 mmhg). It was found to be more with the Airtraq group than with the CMAC group. The increase in systolic blood pressure at 3 and 5 minutes after intubation was found to be statistically insignificant.

Diastolic blood pressure

Diastolic blood pressure was increased in both groups after tracheal intubationand returned to baseline within 5 minutes.

The increase in the diastolic blood pressure at 1 minute after intubation was statistically significant between the two groups, and the increase was found to be morewith Airtraq than with the CMAC video laryngoscope (Group CM 85.43 ± 6.71 and Group At 95.23 ± 6.55).

The increase in the diastolic blood pressure at 3 and 5 minutes after intubationwas found to be statistically insignificant.

Mean arterial pressure

The increase in mean arterial pressure at 1 minute after intubation between the C-MAC laryngoscope and Airtraq laryngoscope was found significant (Group CM 101.93 ± 5.0 mmhg, Group AT 111.43 ± 5.08 mmhg). Hence rise in mean arterial pressure was

higher with Group AT. At 3 minutes after intubation, the rise in the mean arterial pressure was insignificant. Patients in both groups were closer to the baselineafter 5 minutes.

Our findings were in accordance with the study done by Ahmed et al[64] on the Comparison of endotracheal intubation time in a neutral position between C-Mac and Airtraq laryngoscopes. They found that in both the groups, a significant increase in HR was observed from its baseline value after 1 min post-intubation but had returned to baseline within 5 min. The fluctuations in HR were more pronounced in the AirTraq group as compared to the C-MAC group.

A study done by Ahmed et al[12] on the comparison of endotracheal intubation time in a neutral position between C-Mac and Airtraq laryngoscopes found no significant complications with the use of either of the devices except two cases of minor bleeding with the use of Airtraq laryngoscope.

With video laryngoscope, during intubation, airway structures are in the operator's view, and hence cricoid pressure and external laryngopharyngeal manipulation are less needed and reduce the incidence of throat injury[14]

Limitations

There were some limitations to the study:

1. Patients with anticipated difficult intubations were not included. Therefore, the advantage of these devices in difficult scenarios could not be assessed.
2. The study needs to be conducted in a larger sample size.
3. The potential for bias exists, as it was impossible to blind the anaesthetist to the device used.
4. Hypertensive and coronary artery disease patients were not included, and hence the advantages of these devices in minimizing the sympathetic responses to laryngoscopy in that patients could not be assessed.

Conclusion

From this study we conclude that, both C-MAC video laryngoscope and Airtraq laryngoscope were equally good at visualizing the larynx. The C-MAC video laryngoscope was better with respect to duration of intubation, the number of attempts required to intubate, and the incidence of airway trauma. C-MAC video laryngoscope had a slight edge over Airtraq laryngoscope in the aspect of time required for the laryngoscopy and intubation and in offering a better view of glottis and the upper airway. The hemodynamic responses to laryngoscopy and intubation were statistically significant in both C-MAC and Airtraq laryngoscope. However, the hemodynamic changes were slightly lesser and better in the C-MAC laryngoscopes. However, further larger clinical and comparative studies between Airtraq and C-Mac Video laryngoscope in patients with normal and difficult airways are necessaryto confirm these findings.

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