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Original Research Article

Comparison of Duration of Laryngoscopy and Hemodynamic Responses to Endotracheal Intubations Performed with Video Laryngoscope versus Mccoy Laryngoscope in Adult Patients Scheduled for Elective Surgery under General Anaesthesia: A Prospective Randomized Non-Blind Study

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Abstract:

Background & Objectives: Laryngoscopy and endotracheal intubation can cause exaggerated hemodynamic responses during intubation. Different laryngoscope blades and video laryngoscopes have been explored to reduce these responses. Aim is to evaluate the king vision video laryngoscope in comparison to McCoy laryngoscope with respect to hemodynamic response, duration of intubation, ease of intubation in ASA grade 1 and 2 patient undergoing with elective surgery under General anaesthesia.

Methods: This study included 60 ASA I and ASA II patients aged 18-65 undergoing elective surgery. The patients were randomly assigned to two groups: Group V 30 patients (laryngoscopy with video laryngoscope), Group M 30 patient (laryngoscopy with McCoy blade). Hemodynamic parameters (HR, saturation, SBP, DBP, MAP) were monitored at baseline, before intubation, and at various time intervals after intubation. The duration of laryngoscopy and the hemodynamic changes following intubation were recorded.

Results: The study found no significant differences in age, gender distribution, ASA grade, MPG grade, or number of attempts between the king vision video laryngoscope and McCoy laryngoscope groups. However, the McCoy laryngoscope took longer for laryngoscopy (33.46±3.41) p-value 0.001*. Heart rate and blood pressure were higher in the McCoy group at various time points during and post intubation. The mean Heart rate at Intubation (T0) p value 0.002 *, post-intubation (1 minute) p value 0.011 *, post-intubation (3 minutes) p value 0.008 *and post-intubation (5 minutes) p value 0.020 * was significantly more among McCoy Laryngoscope. The mean MAP at Intubation (T0) p value 0.008*, post-intubation (1 minute) p

value 0.010, post-intubation (3 minutes) p value 0.046* and post-intubation (5 minutes) 0.033 *was significantly more among McCoy Laryngoscope.

Conclusion: It was concluded that the King Vision Video Laryngoscope was better in term of blunting hemodynamic response arising out of laryngoscopy and intubation along with shorter duration of laryngoscopy when compared to McCoy laryngoscope.

Introduction

Laryngoscopy and endotracheal intubation are important procedures in general anaesthesia [1]. Both laryngoscopy as well as endotracheal intubation contribute to the hemodynamic response following endotracheal intubation such as tachycardia, systemic hypertension, arrhythmias, and increased intracranial pressure exposing the patient to unwanted risk [2,3]. Pharmacological and non-pharmacological methods have been explored to reduce these responses. Different laryngoscope blades, such as the Macintosh and McCoy blades, can influence the hemodynamic response. The McCoy blade, with its unique design, has shown to provide better glottic visualization and reduce hemodynamic response compared to the Macintosh blade. Video laryngoscopes, such as the King Vision, offer an enlarged video image of the airway structures and can overcome limitations of direct laryngoscopes.

Aim and Objectives:

Aim of the study is to evaluate the video laryngoscope in comparison to McCoy laryngoscope with respect to hemodynamic response, duration of intubation and no. of attempts and complications in ASA grade 1 and 2 patient scheduled for elective surgeries under general anaesthesia.

Materials and Methods:

After taking Institutional ethics committee approval and informed consent from patient this prospectively randomized non blind study was carried out. We included the 60 ASA I and ASA II patients of 18-65years of age posted for elective surgery under general anaesthesia. Pregnant women, patients undergoing emergency surgery and those with airway abnormalities, and anticipated difficult airway (Mallampati Class III and IV, thyromental distance <6 cm, inter-incisor distance <3 cm, and cervical instability) were excluded from this study.

The study population was randomly allocated into two groups, 30 patients each, by computer generated random number

Group M -laryngoscopy with McCoy laryngoscope.

Group V - laryngoscopy with video laryngoscope.

All the patients were kept nil orally for at least 6 h before surgery. Intravenous cannula was secured and iv fluid was started in pre - operative period. On arrival in the operating room all the standard monitors were attached. Baseline vitals were taken. Patient was induced for general anaesthesia.

At the end of 3 min (just before intubation) of bag mask ventilation hemodynamic response was recorded (according to group allocation) than laryngoscopy performed using the respective laryngoscope as per the allocated group and the endotracheal tube was passed through vocal cords under vision. No external laryngeal pressure was applied.

The duration of laryngoscopy was defined as the time from the insertion of laryngoscope into the oropharynx until the insertion of endotracheal tube. It was noted by using a stopwatch by technician.

Failure to intubate was defined as a failure after three attempts.

The parameters monitored included heart rate (HR), Oxygen saturation, systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP). Those hemodynamic parameters were noted at baseline, before and just after intubation, at 1 ,3,5,10 minutes of post intubation. Duration of laryngoscopy and numbers of attempts of intubation were also recorded. Any complications such as local injuries, bleeding, laryngospasm, and arrhythmias were noted. Statistical analysis was performed using SPSS 20, and significance was set at $p < 0.05$.

Results:

Both groups were similar in demographic characteristics.

There was no statistically significant difference in the distribution of ASA grade, MPG grade and No. of attempts between McCoy and King Vision Video groups. The mean Time taken for laryngoscopy was significantly more ($p < .001$) among McCoy Laryngoscope (33.46±3.41) compared to King Vision Video laryngoscope (27.74±5.11). Baseline hemodynamic parameters were similar in both groups. The mean Heart rate at Intubation (T0), Post-intubation at one, three and five minutes were significantly more among McCoy Laryngoscope. The mean Systolic blood pressure, Diastolic blood pressure and MAP at Intubation (T0), Post-intubation at one, three and five minutes were significantly more among McCoy Laryngoscope.

Table 1: Describing demographic and various other parameters.

Parameter		McCoy Laryngoscope	King Vision Video Laryngoscope	P value
Age (Mean ± SD)		38.43 ±9.25	38.14 ±8.00	0.891
Sex	**Male**	20 (57.1%)	22 (62.9%)	0.626
	Female	15 (42.9%)	13 (37.1%)	
ASA	**I**	14 (40%)	12 (34.3%)	
	II	21 (60%)	23 (65.7%)	
MPG	**I**	13 (37.1%)	11 (31.4%)	0.615
	II	22 (62.9%)	24 (65.7%)	
No of attempts	**One**	28 (80%)	31 (88.6%)	
	Two	7 (20%)	4 (11.4 %)	.145
Time taken (seconds) Mean ± SD		**33.46±3.41**	**27.74±5.11**	**.001**

Table 2: Describing the study groups as per Heart rate at different time intervals

	McCoy		p-value intra-group	King Vision Video		p-value intra-group	p-value for McCoy vs King Vision Video
Heart rate	**Mean**	**Std. Deviation**		**Mean**	**Std. Deviation**		
Baseline	84.40	8.36		85.43	7.15		0.582
Just before intubation	86.71	8.45	0.309	87.37	7.17	0.267	0.727
Intubation T0	97.17	10.71	**0.008***	89.80	7.91	**0.042***	**0.002***
Post-intubation (1 minute)	91.54	10.36	**0.029***	86.11	6.75	0.156	**0.011***
Post-intubation (3 minutes)	88.66	7.35	0.098	84.20	6.26	0.096	**0.008***
Post-intubation (5 minutes)	87.20	7.28	0.682	83.51	5.57	0.640	**0.020***
Post-intubation (10 minutes)	86.49	7.54	0.589	83.89	6.35	0.547	0.123

For McCoy Laryngoscope, the intra-group comparison showed that the mean Heart rate increased significantly from baseline (84.40) to Intubation (T0) (97.17), post-

intubation (1 minute) (91.54) and then showed no significant difference at post-intubation (3 minutes) (88.66), post-intubation (5 minutes) (87.20) and post-intubation (10 minutes) (86.49).

For King Vision Video Laryngoscope, the intra-group comparison showed that the mean Heart rate increased significantly from baseline (85.43) to Intubation (T0) (89.80) and then showed no significant difference at post-intubation (1 minute) (86.11), post-intubation (3 minutes) (84.20), post-intubation (5 minutes) (83.51) and post-intubation (10 minutes) (83.89).

There was no significant difference in complications (Laryngospasm, Arrhythmia, Regurgitation, Local injury, and Bleeding) between McCoy and King Vision Video Laryngoscope. One patient had laryngospasm in McCoy group while one patient had minor local injury.

Table 3: Describing the study groups as per MAP at different time intervals

	McCoy			King Vision Video			p-value for McCoy vs King Vision Video
MAP	**Mean**	**Std. Deviation**	**p-value intra-group**	**Mean**	**Std. Deviation**	**p-value intra-group**	
Baseline	93.62	3.32		94.03	3.20		0.601
Just before intubation	95.33	3.39	0.314	95.75	3.52	0.272	0.872
Intubation (T0)	109.05	3.95	**0.011***	103.03	3.32	**0.029***	**0.008***
Post-intubation (1 minute)	103.93	4.05	**0.033***	97.58	3.36	0.103	**0.010***
Post-intubation (3 minutes)	101.59	3.39	0.140	97.33	3.13	0.138	**0.046***
Post-intubation (5 minutes)	99.35	3.40	0.617	96.84	3.05	0.575	**0.033***
Post-intubation (10 minutes)	97.02	3.60	0.530	95.33	3.28	0.488	0.704

For McCoy Laryngoscope, the intra-group comparison showed that the mean MAP increased significantly from baseline (109.05) to Intubation (T0) (103.93), post-intubation (1 minute) (91.54) and then showed no significant difference at post-intubation (3 minutes) (101.59), post-intubation (5 minutes) (99.35) and post-intubation (10 minutes) (97.02). For King Vision Video Laryngoscope, the intra-group comparison showed that the mean MAP increased significantly from baseline (94.03) to Intubation (T0) (103.03) and then showed no significant difference at post-intubation (1 minute) (97.58), post-intubation (3 minutes) (97.33), post-intubation (5 minutes) (96.84) and post-intubation (10 minutes) (95.33).

Discussion:

This study compared the effectiveness of the King Vision Video Laryngoscope (KVVL) versus the McCoy Laryngoscope (ML) in elective surgeries undergoing general anaesthesia. The focus of the study was on hemodynamic changes during intubation and post intubation for 10 minutes.

In our study, the intergroup comparison of mean heart rate between two groups showed that at the time of Intubation (T0) [p value 0.002], post-intubation (1 minute) [p value 0.011], post-intubation (3 minutes) [p value 0.008] and post-intubation (5 minutes) [p value 0.020] was significantly more among McCoy Laryngoscope than KVVL.

The intergroup comparison of MAP between two groups showed that MAP at the time of Intubation (T0), Post-intubation (1 minute), post-intubation (3 minutes) and post-intubation (5 minutes) was

significantly more among McCoy Laryngoscope.

The findings of this study are supported by other researches. Ali et al. [4] and Elhadi et al. [5] reported similar results, showing that the KVVL resulted in lower heart rate and blood pressure changes compared to the McCoy. Reena [6], on the other hand, did not find any significant difference in hemodynamic parameters between the two laryngoscopes. This discrepancy could be due to variations in patient characteristics or study design.

Devi et al. [7] compared the KVVL to the Macintosh laryngoscope and found that the KVVL was more effective in reducing hemodynamic responses to laryngoscopy. Hiteshi et al. [8] compared the ML, C-MAC video laryngoscope, and Macintosh laryngoscope and found that the ML provided better attenuation of hemodynamic responses. Hemodynamic response after intubation was least in Group B (McCoy) as compared to Group A (Macintosh) and Group C (C-Mac) (P = 0.001). These studies highlight the advantages of video laryngoscopes, in minimizing hemodynamic changes during intubation.

Regarding the duration of intubation, our study showed that the ML group had a significantly longer time to intubation compared to the KVVL group. In our study, the mean Time taken was significantly more among McCoy Laryngoscope (33.46±3.41) compared to King Vision Video laryngoscope (27.74±5.11). No statistically difference between two groups in terms of no. attempts.

Ali et al. [1] also found a longer time to intubation with the McCoy laryngoscope (30.25 ± 8.65) as compared to the king vision video laryngoscope (26.29 ± 11.2) and no significant difference in no attempts between two groups. Erdivanli B et al. [9] however found a longer time to intubation with the KVVL (23.5 sec) compared to the ML (7.9 sec) p value < 0.0001. Aggarwal et al. [10] also reported longer intubation times with video laryngoscopes compared to direct laryngoscopy. Aggarwal *et al*. [10] found that the Time for intubation taken in Group A, Group B, and Group C was 15.53 ± 1.53 min, 18.65 ± 0.44 min, and 22.82 ± 1.323 min, respectively (P = 0.000). This contrary finding may be due to less experience of operator with video laryngoscope as stated by them.

In terms of complications, no significant differences were observed between the ML and KVVL groups in the present study. This finding aligns with the results of Kihara et al. [11]. Ali et al. [1] also noted less airway trauma with the KVVL compared to the ML.

Our study and supporting research indicate that the KVVL is associated with reduced hemodynamic responses, and potentially shorter intubation times compared to the ML. However, individual patient characteristics, operator experience, and other factors should be taken into account when choosing the appropriate laryngoscope for intubation. Further studies may be needed to explore other aspects of laryngoscope performance and patient outcomes.

Conclusion:

It was concluded that the King Vision Video Laryngoscopy was better in term of blunting hemodynamic response, duration of laryngoscopy, ease of insertion than the McCoy laryngoscopy in ASA 1 and ASA 2 group Patients undergoing elective surgeries under general anaesthesia.

Limitations:

Lack of blinding and potential observer bias, limited comparison with other intubation methods, and lack of generalizability to different patient groups and settings.

Author's Contribution:

All authors have read and approved the final manuscript for publication

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