Texila International Journal of Public Health
ISSN: 2520-3134
DOI: 10.21522/TIJPH.2013.12.04.Art027

Prospective Comparison of Intubating Condition with King Vision Video Laryngoscope and Macintosh Laryngoscope in Randomly Selected Elective Adult Surgical Patients

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Abstract

Intubation is a crucial medical procedure that involves the insertion of a tube into the airway to ensure proper breathing and save lives. This technique, which is fundamental in the field of anaesthesia, requires skill and precision. Anaesthesiologists play a key role in mastering, teaching, and performing intubations, making it a cornerstone of their practice for many years. Traditionally, machine learning has been utilized as a reliable method for tracheal cannulation, establishing itself as the gold standard over the past seven decades. In recent times, there has been a notable development in intubation technology with the introduction of alternative devices such as the King Vision Video Laryngoscope (KVVL). Unlike the conventional method that relies on direct visualization, the KVVL utilizes an indirect magnified image for enhanced accuracy during the procedure. A comparative study was conducted between the King Vision Video Laryngoscope and the traditional Macintosh Laryngoscope on two groups of patients, with Group A consisting of 70% male and 30% female, and Group B with 60% male and 40% female participants. The results of the study revealed that while BMI, thyromental distance, and MPC showed no significant differences between the two devices, the King Vision Video Laryngoscope outperformed the Macintosh Laryngoscope in terms of intubation difficulty score and Cormack Lehane grading. Moreover, the former demonstrated superior outcomes in terms of airway trauma, heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and saturation levels, ensuring a smoother and safer intubation process overall. Based on these findings, the study concluded that the King Vision Video Laryngoscope offers distinct advantages over the traditional Macintosh Laryngoscope, highlighting its potential as a superior tool for efficient and effective airway management in clinical settings.

Keywords: *Anesthesia, Airway Trauma, Airway Management, Comparative Study, Clinical Settings, Cormack Lehane Grading, Diastolic Blood Pressure, Heart Rate, Intubation, Intubation Difficulty Score, Indirect Magnified Image, King Vision Video Laryngoscope, Medical Procedure, Mean Arterial Pressure, MPC, Systolic Blood Pressure, Tracheal Cannulation, Thyromental Distance.*

Introduction

Airway care is one of the many essential elements of anaesthesia. Every year in industrialized nations, difficulties associated with airway management cause about 600 deaths in patients [1, 2, 3]. In impoverished countries, the rates are substantially higher. Unfavorable respiratory events that happen during intubation, such as insufficient ventilation (38%), endoesophageal intubation (17%), and difficult intubation (18%), account for 75% of ASA closed claims. The most effective strategy to maintain airway clearance

Received: 22.07.2024 ***Accepted: 11.11.2024*** ***Published on: 27.12.2024***
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during general anesthesia administration and in critical care settings is to use a laryngoscope to assist with tracheal intubation. It affords several benefits, including reduced aspiration risk due to its ability to divide the respiratory and gastrointestinal tracts; easier delivery of oxygen and other anaesthetic gas mixtures without inflating the stomach; easier tracheobronchial tree access for bronchopulmonary lavage and drug administration, such as inhaled bronchodilators; and easier surgical access for head and neck surgeries [4,5]. This research examines the intubating condition using a King Vision Video Laryngoscope versus a Macintosh Laryngoscope in terms of effective intubation time, intubation experience ease or difficulty, laryngeal view obtained, intubation time, airway trauma, and hemodynamic response to laryngoscope.

Methods

The study was conducted in Sree Balaji Medical College & Hospital Chennai at the Department of Anaesthesiology, CC & Pain Medicine from September 2018 to January 2020. It is a single-centre, prospective, randomized, parallel-group, open-label, interventional controlled study. Ethical clearance was obtained from the institution.

Sample Size

In this research study, 60 cases within the inclusion criteria, and who are posted for elective cases requiring GA, were studied after obtaining the informed consent.

Randomization: A computer-based randomization of two groups with random numbers comprising each of the groups of about 30 patients. They were Group A (Conventional ML) and Group B (Standard KVVL).

Inclusion criteria: The cases that are taken up for surgery on an elective basis within the age group of 18 years to 60 years, ASA- I & II patients, and Mallampati classification 1 & 2 patients.

Exclusion Criteria: The patients who were excluded from the study were difficult and compromised airway patients, morbid obesity, MPC 3 & 4, ASA III & IV, patients posted for surgeries like tonsil, thyroid surgery and other surgeries involving airway, pregnant patients, patients with severe cardiac, respiratory illness, hepatic, renal diseases, patient refusal to give consent, patient requiring the need for nasal intubation, and patient's age less than 18 and greater than 60 years.

Study Procedure

The medical history of patients was enquired and recorded, which included airway assessment, BMI and individual airway indices. Patients were also assessed for atlantooccipital joint movement, neck flexion, temporomandibular joint function, upper lip bite test, sternomental distance, neck circumference, dentures examination, and Samsoon and Young modification of Mallampati grading.

Procedure: After assessment patient is shifted to the operating room. Intravenous line started electrocardiography (ECG), saturation (Spo2), non-invasive blood pressure (NIBP), and end-tidal capnography (ETCO2) monitors were connected. Then 0.2mg/kg Glycopyrrolate, and 2mcg/kg fentanyl were given by IV route 10 mins before IV induction. Preoxygenation was given with O2 about 100% for 3mins at tidal volume respiration. Baseline Spo2, HR, Systolic BP, Diastolic BP, and MAP were noted. For induction, 2.5 mg/kg Propofol was given. Then 0.5 mg/ kg dose of Atracurium was given as relaxant for intubation. Intubation was done with KVVL /ML, and Bilateral air entry was checked by auscultation. SpO2, HR, Systolic BP, Diastolic BP, and MAP were recorded at baseline and 3rd, and 5th.10th minutes following intubation.

Outcome Measures: Ease of intubation as a primary outcome measure was assessed by IDS. Hemodynamic response, any airway trauma, and intubation time were assessed as secondary outcome measures.

Statistics

The data were analysed using International Business Machines (IBM) Corp. Released in 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.

Results

A total of 60 patients studied. Group A 30, Group B 30 Comparison of mean age among study groups (N=60).

In this study, 3.33% were <20 years in both groups, 33.33% of group A and 36.67% of group B were in age group 21 – 30 years, 23.33% of group A and 16.67% of group B were in age group 31-40 years, 16.67% of group A and 20% of group B belong to age group 41 – 50 years, 26.67% of group A and 23.33% of group B belong to age group of 51 – 65 years. There was no statistical significance between the age groups among the study groups (P value= 0.971) (Table 1, Figure 1).

Table 1. Comparison of Mean Age among Study Groups (N=60)

Age	Group A (ML)	Group B (KL)	Chi-square	P value
< 20	1 (3.33%)	1 (3.33%)	0. 522	0.971
21-30	10 (33. 33%)	11 (36 .67%)		
31-40	7 (23.33%)	5 (16.67%)		
41-50	5 (16.67%)	6 (20%)		
51-65	8 (26 .67%)	7 (23.33%)		
Total	30 (100%)	30 (100%)		

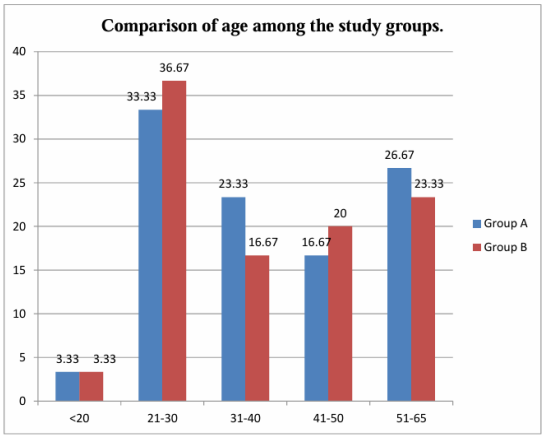

Figure 1. Cluster Bar Graph showing Comparison of Study Group with Mean Age (N=60).

Comparison of gender among the study groups (N=60)

In group A where ML is used 21 (70%) were male and 9 (30%) were females. In group B, KL was used 18 (60%) were males and 12 (40%) were females. The difference between the gender distribution and the study group was statistically not significant (P value 0.416) (Table 2, Figure 2).

Table 2. Comparison of Gender among the Study Groups (N=60)

Gender	Group A (ML)	Group B (KL)	Chi-square	P value
Male	2 1 (70%)	18 (60%)	0.659	0.416

Female	9 (30%)	12 (40%)		
Total	30 (100%)	30 (100%)		

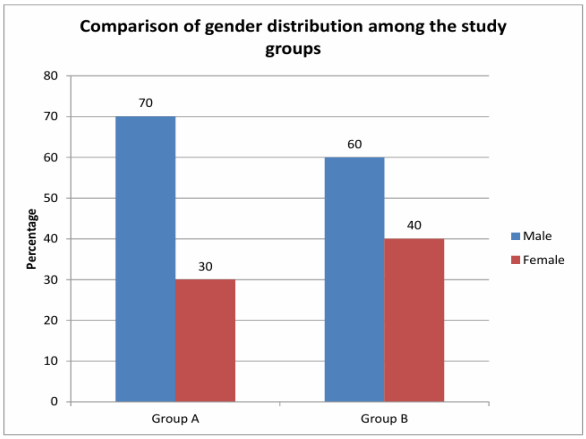

Figure 2. Cluster Bar Graph for Comparison of Study Group with Gender (N=60).

Comparison of BMI among the study groups (N=60)

In Group A where ML was used, 2 (6.67%) had BMI 30. In Group B where KL was used, 3 (10%) had a BMI of 30. The difference between BMI among the study group was statistically not significant (P value 0.362) (Table 3, Figure 3).

Table 3. Comparison of BMI among the Study Groups (N=60).

BMI	Group A (ML)	Group B (KL)	Chi-square	P value
< 18.5	2 (6.67%)	3 (10%)		
18.5- 24.9	12 (40%)	22 (33.33%)		
25 - 29.9	13 (43.33%)	3 (10%)	3.19	0 .362
> 30	3 (10%)	2 (6.67%)		
Total	30 (100%)	30 (100%)		

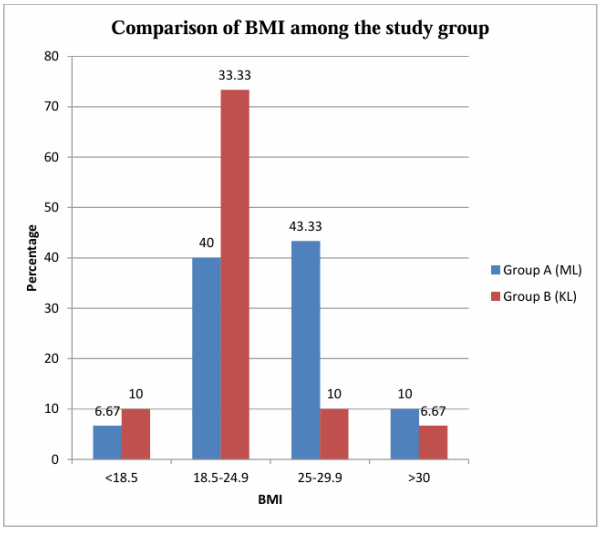

Figure 3. Cluster Graph for Comparison of Study Groups with BMI (N=60).

Comparison of ASA among the study groups (N=60).

Among the participants where ML was done 60% of cases belong to ASA grade 1 and 40% of cases belong to ASA grade 2. Among

the people where KL was used, 86.67% of cases belong to ASA grade 1 and 13.33% of cases belong to ASA grade 2. In both the study groups, there were no cases of ASA grades 3 & 4. It is significant from the above table that the majority of patients belong to ASA 1(P value 0.019) (Table 4, Figure 4).

Table 4. Comparison of ASA among the Study Groups (N=60).

ASA	Group A (ML)	Group B (KL)	Chi-square	P value
1	18 (60%)	26 (86 .67%)	5.45	0.019
2	12 (40%)	4 (13.33%)		
3	0 (00%)	0 (00%)		
4	0 (00%)	0 (00%)		
Total	30 (100%)	30 (100%)		

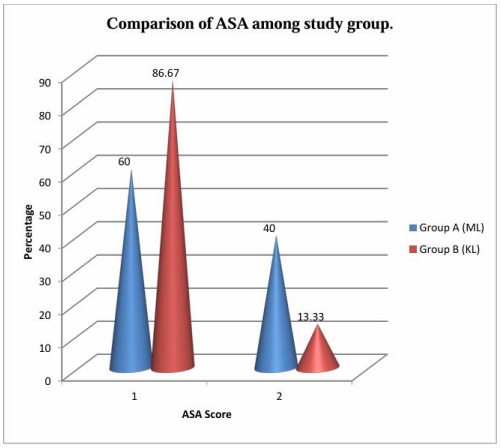

Figure 4. Cluster Bar Graph for Comparison of Study Group with ASA Grading (N=60).

Comparison of thyromental distance among the study groups (N=60).

In group A, 83.33% had thyromental distance >6.5 cm 16.67% had thyromental distance 70% had thyromental distance >6.5 cm and 30% of cases had thyromental distance <6.5 cm. The difference between thyromental distance among the study group was statistically not significant (P value 0.222) (Table 5, Figure 5).

Table 5. Comparison of Thyromental Distance among the Study Groups (N=60).

Parameter	Group A (ML)	Group B (KL)	Chi-square	P value
> 6.5 cm	2 5 (83.33%)	21 (70%)	1.49	0.222
< 6.5 cm	5 (16.67%)	9 (30%)		
Total	30 (100%)	30 (100%)		

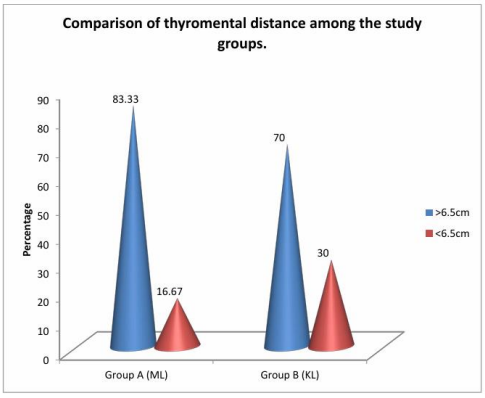

Figure 5. Cluster Bar Graph for Comparison of Study Group with Thyromental Distance (N=60).

Comparison of Mallampati classification among the study groups (N=60).

In Group A,53.33% of cases belong to MPC grade 1, 26.67% of cases belong to MPC grade 2 and 20% of cases belong to MPC grade 3. In Group B, 43.33% of cases belong to MPC grade 1, 33.33% of cases belong to MPC grade 2 and 23.34% of cases belong to MPC grade 3. Among both the groups no cases recorded MPC grade 4. The difference between MPC grading among the study group was statistically not significant (P value 0.737) (Table 6, Figure 6).

Table 6. Comparison of MPC among the Study Groups (N=60).

MPC grade	Group A (ML)	Group B (KL)	Chi-square	P value
1	16 (53.33%)	13 (4 3.33%)		
2	8 (26.67%)	10 (33.33%)		
3	6 (20%)	7 (23.34 %)	0 .609	0 .737
4	0 (00%)	0 (00%)		
Total	30 (100%)	30 (100%)		

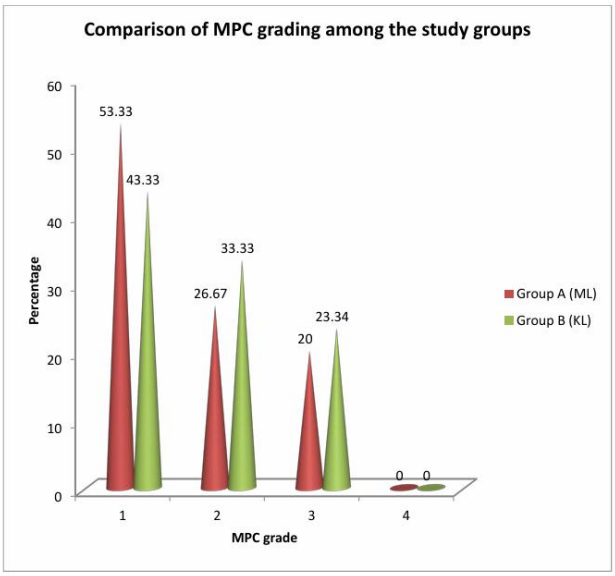

Figure 6. Cluster Bar Graph for Comparison of Study Group with MPC Grading (N=60).

Comparison of Intubation Difficulty Scoring (IDS) among the study groups (N=60).

Among the participants, the following IDS parameters were seen: In group A 4 patients of 30 and in group B 1 patient of 30 cases

intubated in a second attempt (N1). All the participants of both study groups were intubated by single operators and no supplementary operators were needed (N2). In group A, 4 out of 30 cases and in group B none out of 30 cases needed additional techniques such as BURP, or head flexion (N3). 19 patients showed CL grade 1, 7 patients showed CL grade 2a, 4 patients showed CL grade 2b in group A, 28 patients showed CL grade 1,1 patient showed CL grade 2a, and 1 patient showed CL grade 2b in group B (N4). Among the participants, 6 out of 30 cases in Group A and 1 out of 30 cases in Group B required lifting forces (N5). Among the participants, 11 out of 30 patients in Group A and 2 out of 30 patients in Group B needed the application of laryngeal pressure (N6). Among the participants of both the study groups vocal cord mobility was in abduction (N7) (Table 7, Figure 7). In group A, IDS of 0 were 43.33%, IDS of 1 were 40% IDS of 2 were10% and IDS of 3 were 6.67%. In group B, IDS of 0 was 80%, IDS of 1 was 13.34%, IDS of 2 was 3.33% and IDS of 3 were 3.33%. The difference between IDS scoring among the study groups was statistically significant (P value 0.035).

Table 7. Comparison of Intubation Difficulty Scoring (IDS) among the Study Groups (N=60).

Variables	**Group A (ML)**	**%**	**Group B (KL)**	**%**
N l	4/30 (score-1)	13.33%	1/30 (score-1)	3.33%
N Z	0/30 (score-0)	0.00%	0/30 (score-0)	0.00%
N3	4/30 (score-1)	13.33%	0/30 (score-0)	0.00%
N 4				
CL l	19/30 (score-0)	63.33%	28/30 (score-0)	93.33%
CL 2a	7/30 (score-1)	23.33%	1/30 (score-1)	3.33%
CL 2b	4/30 (score-1)	13.33%	1/30 (score-1)	3.33%
NS	6/30 (score-1)	20.00 %	l/30 (score-l)	3.33%
N6	11/30 (score-1)	36.67%	2/30 (score-1)	6.67%
N7	0/30 (score-0)	0.00%	0/30 (score-0)	0.00%
IDS	**Group A (ML)**	**Group B (KL)**	**Chi-square**	**P value**
0	13 (43.33%)	24 (80%)	8.603	0.035
1	12 (40%)	4 (13.34 %)		
2	3 (10%)	1 (3 .33%)		
3	2 (6.67%)	1 (3.33%)		
Total	30 (100%)	30 (100%)		

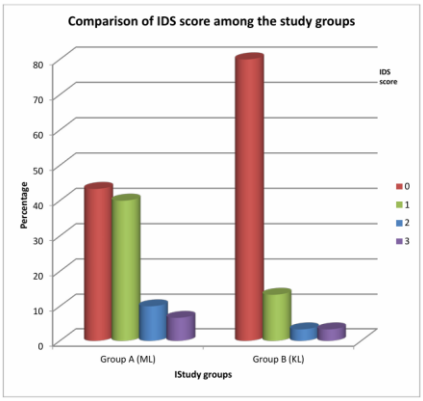

Figure 7. Cluster Bar Graph for Comparison of Study Group with Intubation Difficulty Score (N=60).

Comparison of Cormack and Lehane grading among the study groups (N=60).

CL grading was done to grade the glottis view among both the study groups. In group A 63.33% had CL grade of 1, 23.34% had 2a and 13.33% had 2b CL grading. In group B, 93.34% had grade 1, 3.33% had 2a and 3.33% had 2b CL grading. No participants in both groups had CL 3 and CL 4 grading. The difference between CL grading among the study groups was statistically significant (P value 0.018) (Table 8, Figure 8).

Table 8. Comparison of Cormack and Lehane Grading among the Study Groups (N=60).

CL grade	Group A (ML)	Group B (KL)	Chi-square	P value
1	19 (63.33%)	28 (93.34%)	8.023	0 .018
2a	7 (23.34%)	1 (3.33%)		
2b	4 (13.33%)	1 (3.33%)		
3	0 (0 .00%)	0 (0 .00%)		
4	0 (0 .00%)	0 (0 .00%)		
Total	30 (100%)	30 (100%)		

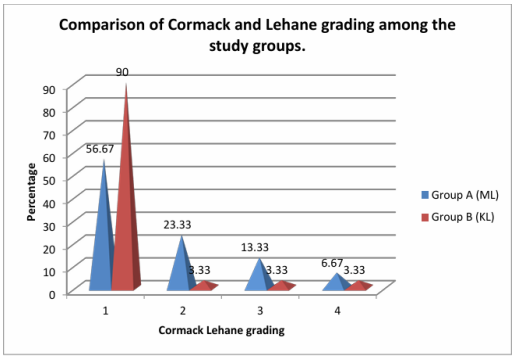

Figure 8. Comparison of Cormack and Lehane Grading among the Study Groups.

Comparison of mean duration of intubation among the study groups (N=60).

Among the study groups, the mean duration of intubation in group A was 27.33secs and in group B was 21.5secs. The difference between the mean duration of intubation among the study groups was statistically significant (0.0007) (Table 9, Figure 9).

Table 9. Comparison of Mean Duration of Intubation among the Study Groups (N=60).

Parameter	Group A (ML)	Group B (KL)	P value
Mean Duration of intubation (sec)	27.33±7 .2 1	2 1.5±5.2 1	0.0007

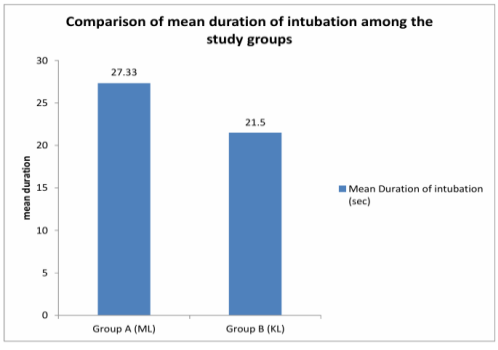

Figure 9. Bar Graph for Comparison of Study Group with Mean Duration of Intubation (N=60).

Comparison of airway trauma among the study groups (N=60).

Among the participants in group A 4 got lip trauma, 2 got gum injury, 2 got teeth injury and 1 had tongue injury. In group B 2 got lip injury, 1 each got gum and teeth injury and none got tongue injuries. No laryngeal trauma was seen in any of the groups (Table 10).

Table 10. Comparison of Airway Trauma among the Study Groups (N=60).

Airway trauma	Group A (ML)	Group B (KL)
Lips	4/30	2/30
Gums	2/30	1/30
Teeth	2/30	1/30
Tongue	1/30	0/30

Hemodynamic changes

Comparison of mean heart rate among the study groups (N=60).

In group A, the mean baseline heart rate was 86.7, after intubation was 83.77, after 3 minutes was 84.8 after 5 minutes was 83.53 and after 10 minutes was 83.07. In group B, the mean baseline heart rate was 81.53, after intubation, it was 75.6, after 3 minutes 76.27, after 5 minutes 77.07 and after 10 minutes was 77.37. The difference between mean heart rate among the study group was statistically significant (p <0.0001) (Table 11, Figure 10).

Table 11. Comparison of Mean Heart Rate among the Study Groups (N=60).

Heart rate	Group A (ML)		Group B (KL)		P value
	Mean	SD	Mean	SD	
Baseline	86.7	1.84	81.53	1.17	<0 .0001
After intubation	83.77	1.57	75.6	4 .37	
After 3 min	84 .8	2 .83	76 .27	3.25	
After 5 min	83.53	1.5	77 .07	1.96	
After 10 min	83.07	3.05	77 .37	2 .74	
Grand mean	84 .37		77 .57		
P value	< 0.0001				

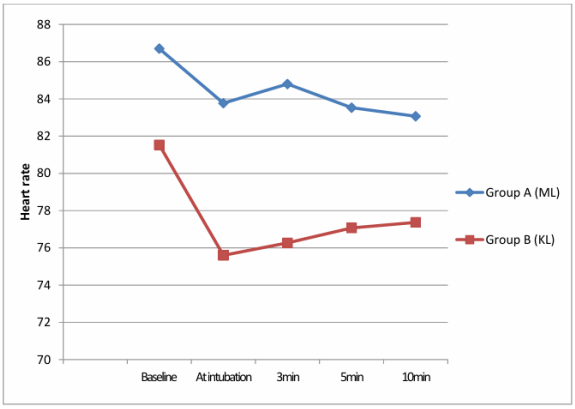

Figure 10. Cluster Line Graph for Comparison of Study Group with Mean Heart Rates (N=60).

Comparison of mean systolic blood pressure among the study groups (N=60).

In group A, the mean baseline systolic blood pressure was 122.27, after intubation was 136.93, after 3 minutes was 125.87, after 5 minutes was 126.6 and after 10 minutes was 126.73. In group B, the mean baseline systolic blood pressure was 126.03, after intubation it was 124.17, after 3 minutes 112.63, after 5 minutes 114.4 and after 10 minutes was

123.87. The difference between mean systolic blood pressure among the study groups showed strong statistical significance (p<0.0001) (Table 12, Figure 11).

Table 12. Comparison of Mean Systolic Blood Pressure among the Study Groups (N=60).

Systolic blood pressure	Group A (ML)		Group B (KL)		P value
	Mean	SD	Mean	SD	
Baseline	122 .27	5.75	126.03	5.71	0.013
After intubation	136 .93	2.03	124. 17	5.37	< 0.0001
After 3 min	125.87	5.82	112.63	6.46	< 0.0001
After 5 min	126.6	5.26	114.4	5.99	< 0.0001
After 10 min	126.73	5.64	123.87	4.29	0.031
Grand mean	127.68		120.22		
P value	< 0.0001				

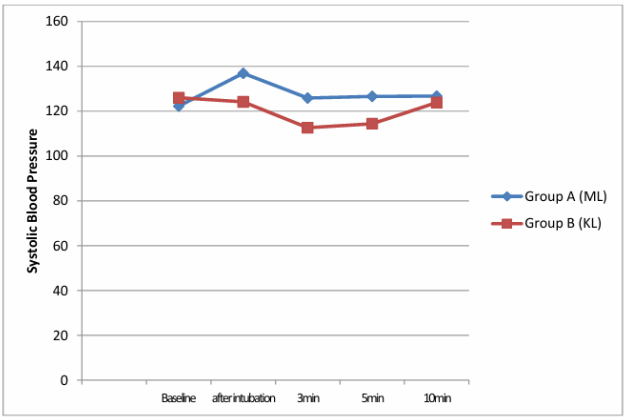

Figure 11. Cluster Line Graph for Comparison of Study Group with Mean Systolic Blood Pressure (N=60).

Comparison of mean diastolic blood pressure among the study groups (N=60). In group A, the mean baseline diastolic blood pressure was 84.93, after intubation was 81.33, after 3 minutes was 78.47, after 5 minutes was 78.47 and after 10 minutes was 82.13. In group B, the mean baseline diastolic blood pressure was 78.6, after intubation it was 80.47, after 3 minutes 74.83, after 5 minutes 78.27 and after 10 minutes was 79.07. The difference between mean diastolic blood pressure among the study groups was statistically significant at baseline and 3 minutes after intubation. However statistical differences were insignificant between the groups after intubation and 10 minutes after intubation. However, the statistical difference in mean diastolic systolic pressure throughout the procedure was statistically significant between the groups (p<0.0001) (Table 13, Figure 12).

Table 13. Comparison of Mean Diastolic Blood Pressure among the Study Groups (N=60).

Diastolic blood pressure	Group A (ML)		Group B (KL)		P value
	Mean	SD	Mean	SD	
Baseline	84.93	3.89	78.6	1.19	< 0 .0001
After intubation	81.33	6.71	80.47	2.33	0.509
After 3 min	78.47	3.43	74 .83	2.55	< 0 .0001
After 5 min	78.47	3.78	78.27	2.08	0.800
After 10 min	82.13	4.52	79.07	3.1	0.0034
Grand mean	81.07		78.25		

P value	< 0 .0001

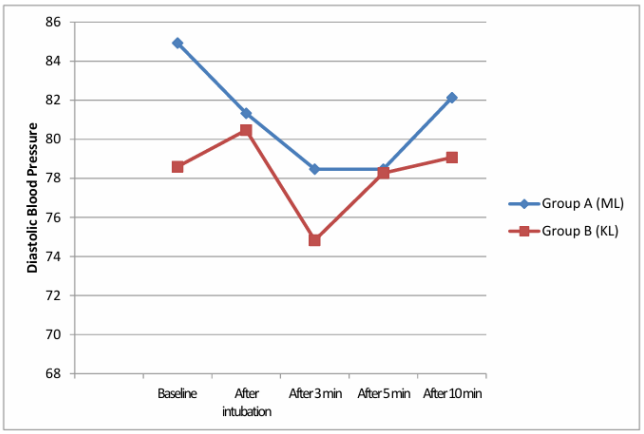

Figure 12. Cluster Line Graph for Comparison of Study Group with Mean Diastolic Blood Pressure (N=60).

Comparison of mean arterial pressure among the study groups (N=60).

In group A, the mean baseline arterial pressure was 82.9, after intubation was 84.33, after 3 minutes was 79.9, after 5 minutes was 81.73 and after 10 minutes was 77.43. In group B, the mean baseline arterial pressure was 80.73, after intubation it was 82.7, after 3 minutes 75.4, after 5 minutes 76.4 and after 10 minutes was 77.57. The difference between mean arterial pressure among the study group was statistically significant at baseline and intubation after 3 & 5 mins. Statistical difference was not significant between groups after 10 mins. However, the difference in mean arterial pressure between groups throughout the procedure was statistically significant (p=0.0006) (Table 14, Figure 13).

Table 14. Comparison of Mean Arterial Pressure among the Study Groups (N=60).

Mean arterial pressure	**Group A (ML)**		**Group B (KL)**		**P value**
	Mean	**SD**	**Mean**	**SD**	
Baseline	82.9	3.58	80.73	1.23	0.002
After intubation	84.33	2.88	82.7	1.78	0.010
After 3 min	79.9	4.66	75.4	2.5	< 0 .0001
After 5 min	81.73	4.86	76.4	3.08	< 0 .0001
After 10 m in	77.43	2.49	77.57	2.54	0.830
Grand mean	81.26		78.56		
P value	0 .0006				

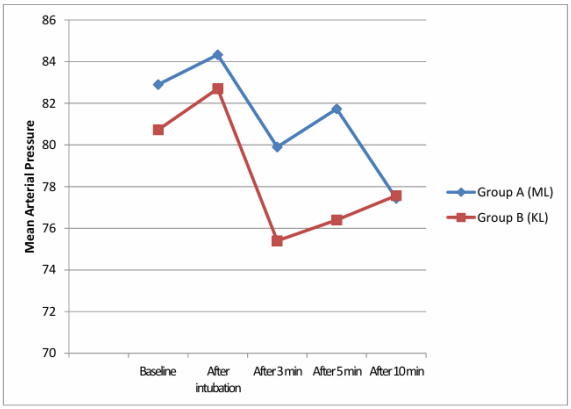

Figure 13. Cluster Line Graph for Comparison of Study Group with Mean Arterial Pressure (N=60).

Comparison of mean SpO2 among the study groups (N=60).

In Group A, the mean baseline SpO2 was 98.73, after intubation was 98.9, after 3min was 98.73 after 5mins was 98.7 and after 10 minutes was 98.67. In group B, the mean baseline SpO2 was 98.13, after intubation it was 99.17, after 3 minutes 98.73, after 5 minutes 98.83 and after 10 minutes was 98.57. The difference between mean SpO2 among the study group was not statistically significant (p=0.4035) (Table 15, Figure 14).

Table 15. Comparison of Mean SpO2 among the Study Groups (N=60).

Mean SpO2	Group A (ML)		Group B (KL)		P value
	Mean	SD	Mean	SD	
Baseline	98.73	0.78	98. 13	0.86	0.006
After intubation	98.9	0.84	99. 17	0.87	0.001
After 3 min	98.73	0.9 1	98.73	0.91	1.000
After 5 min	98.7	0.84	98.83	0.75	0.529
After 10 min	98.67	1.06	98.57	1.1	0.721
Grand mean	98.75		98.69		
P value	0.4035				

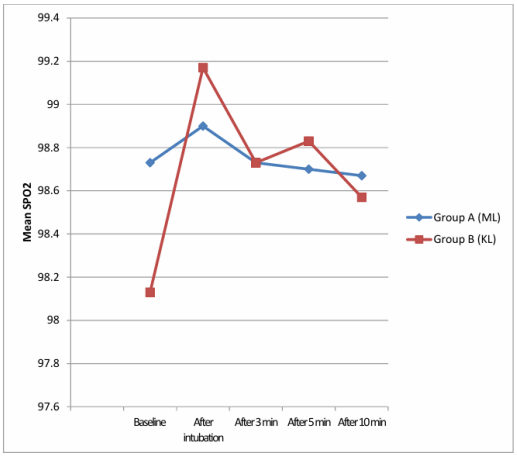

Figure 14. Cluster Line Graph for Comparison of Study Group with Mean SpO2 (N=60).

Discussion

Intubation is a crucial procedure that helps to save lives by maintaining a patent airway [6,7]. It protects the airway from aspiration and prevents complications like cough, airway spasm, and cardiac arrest [8,9]. An ideal intubating apparatus should be simple, provide perfect visualization, achieve tracheal cannulation quickly, minimize apneic period, avoid physical trauma, complete the process in a first attempt, and produce less or no autonomic hemodynamic response. Intubation is a lifesaving skill that requires mastery and should be performed by an anaesthesiologist [10,11].

For over 70 years, ML has been the primary standard for tracheal cannulation. However, alternatives such as KVVL have emerged in the past 20 years [11,12]. While ML requires uniocular vision, KVVL offers simple binocular vision with a wider angle of view. Anaesthesiologists have mastered ML, but KVVL requires a specific insertion procedure. VL has advantages such as not needing axes alignment, being useful in cases of altered anatomy and easier recognition of anatomy and anomalies. Coordination is easier with VL

because the operator and assistant see the same image on the video monitor. ML is best for simple airways, while KVVL excels in more difficult airways due to its perfect panoramic picture [13,14]. This study is introduced to test ML and KVVL based on efficiency and safety by skilled anaesthesiologists in the airway which is normal and at a neutral position. Intubation requires opening of the mouth, the passage of a laryngoscope, viewing of Vocal cords and finally insertion of the tracheal cannula. Mallampati classification and thyromental distance are assessed pre-operatively. This skilled art seems easy but is found to be difficult in case of abnormal morphology of the upper airway, improper positioning, and suboptimal height of the table. In this study all these factors are eliminated by choosing subjects with predicted normal anatomy, placing the patient's head at the edge of the table and levelling it at the navel level of the incubator [15,16].

The study compared two groups of patients with similar demographics and airway predictors. The duration of the laryngoscope was shorter in Group B compared to Group A, despite previous studies showing the opposite result. The intubation time was also shorter with the VL blade compared to the ML blade, but there was a learning curve for the KVVL blade. The study suggests that the neutral position of the head and neck may have caused the longer intubation time for the ML blade.

In a clinical trial, only a small percentage of patients required a second attempt for success in both Group A and Group B. The results were not statistically significant, but poor visualization of the glottis and non-alignment of airway axes could have contributed to this outcome.

The study compared the effectiveness of two devices for intubation: the Macintosh laryngoscope (ML) and the King Vision video laryngoscope (KVVL). Group A used ML and Group B used KVVL. In Group A, 30 patients had to be intubated, of which 19 had a Cormack Lehane grade 1, 7 had grade 2a, and 4 had grade 2b. None of the patients had grade 3 or 4 laryngeal views. In Group B, 28 patients had a vivid, wide, magnified, true colour, and binocular view of vocal folds (Cormack Lehane grade –I) without using greater retraction force. Only 2 participants needed laryngeal pressure or bougie for intubation. The intubators who used KVVL did not bend or peep and were not stressed to perform a laryngoscope with KL. The IDS (intubation difficulty score) was used to evaluate the intubating conditions [17,18,19,20]. In our study, KVVL was found to be superior to ML in terms of ease of intubation.

The study found that Group A had more instances of airway injuries, including lip, gum, teeth, and tongue injuries, compared to Group B. The entrapment of the lip between the blade and lower jaw was the cause in two patients in Group B. The study suggests that minor airway injuries do not cause major mortality and morbidity, but immediate recognition and management are required. Trauma rates were similar in both groups according to a previous study [21,22,23]. Proper technique and experience in using KL can prevent injuries.

The study compared the cardiovascular responses of two groups of patients undergoing intubation with different video laryngoscopes. The KVVL group had a lower heart rate and mean arterial pressure response compared to the ML group during intubation. The researchers found that KVVL provided a better view of the glottis and required less force for the laryngoscope lift. Additionally, KVVL resulted in less intubation time, airway trauma, and hemodynamic response. These results suggest that KVVL is a better option for endotracheal intubation.

Conclusion

The King Vision Video Laryngoscope (VL) is a useful tool for intubation due to its advantages of improved visualization of the

larynx, ease of use, and reduced morbidity and mortality. Compared to the Macintosh Laryngoscope, which requires years of experience to perfect intubation skills, the King Vision VL allows budding anaesthetists to intubate with ease and less airway trauma. This newer tool has a better scope of advancement in clinical conditions like CAD, neurosurgical patients, and less airway trauma.

Acknowledgement

The authors would like to thank Professor Dr M. R. Vasanthan, Ex-HoD and Director of the Department of Anaesthesiology, Sri Balaji Medical College and Hospitals, for his continuous support from the department.

Financial Support and Sponsorship

Nil.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] Mort, T. C. 2004. Emergency tracheal intubation: complications associated with repeated laryngoscopic attempts. Anesthesia & Analgesia, 99(2), 607-613.

[2] Mort, T. C. 2005. Esophageal intubation with indirect clinical tests during emergency tracheal intubation: a report on patient morbidity. Journal of Clinical Anesthesia, 17(4), 255-262.

[3] Tse, J. C., Rimm, E. B., & Hussain, A. 1997. Predicting difficult endotracheal intubation in surgical patients schedules for general anesthesia: a prospective blind study. Journal of Emergency Medicine, 2(15), 266.

[4] Cheney, F. W. 1999. The American Society of Anesthesiologists Closed Claims Project: what have we learned, how has it affected practice, and how will it affect practice in the future?. The Journal of the American Society of Anesthesiologists, 91(2), 552-556.

[5] Peterson, G. N., Domino, K. B., Caplan, R. A., Posner, K. L., Lee, L. A., & Cheney, F. W. 2005. Management of the difficult airway: a closed claims analysis. The Journal of the American Society of Anesthesiologists, 103(1), 33-39.

[6] Cook, T., Woodall, N., Harper, J., Benger, J., & Fourth National Audit Project. 2011. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 2: intensive care and emergency departments. British journal of anaesthesia, 106(5), 632-642.

[7] Woodall, N. M., Benger, J. R., Harper, J. S., & Cook, T. M. 2012. Airway management complications during anaesthesia, in intensive care units and in emergency departments in the UK. Trends in Anaesthesia and Critical Care, 2(2), 58-64.

[8] Metzner, J., Posner, K. L., & Domino, K. B. 2009. The risk and safety of anesthesia at remote locations: the US closed claims analysis. Current Opinion in Anesthesiology, 22(4), 502-508.

[9] Aziz, M. F., Dillman, D., Fu, R., & Brambrink, A. M. 2012. Comparative effectiveness of the C-MAC video laryngoscope versus direct laryngoscopy in the setting of the predicted difficult airway. The Journal of the American Society of Anesthesiologists, 116(3), 629-636.

[10] Gaszynska, E., & Gaszynski, T. 2014. The King Vision™ video laryngoscope for awake intubation: series of cases and literature review. Therapeutics and clinical risk management, 475-478.

[11] Akihisa, Y., Maruyama, K., Koyama, Y., Yamada, R., Ogura, A., & Andoh, T. 2014. Comparison of intubation performance between the King Vision and Macintosh laryngoscopes in novice personnel: a randomized, crossover manikin study. Journal of anesthesia, 28, 51-57.

[12] Murphy, L. D., Kovacs, G. J., Reardon, P. M., & Law, J. A. 2014. Comparison of the king vision video laryngoscope with the macintosh

laryngoscope. The Journal of emergency medicine, 47(2), 239-246.

[13] Yun, B. J., Brown, C. A., Grazioso, C. J., Pozner, C. N., & Raja, A. S. 2014. Comparison of video, optical, and direct laryngoscopy by experienced tactical paramedics. Prehospital Emergency Care, 18(3), 442-445.

[14] Asai, T. 2012. Videolaryngoscopes: do they truly have roles in difficult airways?. The Journal of the American Society of Anesthesiologists, 116(3), 515-517.

[15] Miceli, L., Cecconi, M., Tripi, G., Zauli, M., & Della Rocca, G. 2008. Evaluation of new laryngoscope blade for tracheal intubation, Truview EVO2©: a manikin study. European journal of anaesthesiology, 25(6), 446-449.

[16] Ezri, T., Warters, R. D., Szmuk, P., Saad-Eddin, H., Geva, D., Katz, J., & Hagberg, C. 2001. The incidence of class "zero" airway and the impact of Mallampati score, age, sex, and body mass index on prediction of laryngoscopy grade. Anesthesia & Analgesia, 93(4), 1073-1075.

[17] Jarvis, J. L., McClure, S. F., & Johns, D. 2015. EMS intubation improves with King Vision video laryngoscopy. Prehospital Emergency Care, 19(4), 482-489.

[18] Apfelbaum, J. L., Hagberg, C. A., Caplan, R. A., Blitt, C. D., Connis, R. T., ... & Ovassapian, A. 2013. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology, 118(2), 251-270.

[19] Schoettker, P., & Corniche, J. 2015. The AirView Study: Comparison of Intubation Conditions and Ease between the Airtraq-Air View and the King Vision. BioMed research international, 2015(1), 284142.

[20] Cortellazzi, P., Caldiroli, D., Byrne, A., Sommariva, A., Orena, E. F., & Tramacere, I. 2015. Defining and developing expertise in tracheal intubation using a GlideScope® for anaesthetists with expertise in Macintosh direct laryngoscopy: an in-vivo longitudinal study. Anaesthesia, 70(3), 290-295.

[21] Cierniak, M., Timler, D., Wieczorek, A., Sekalski, P., Borkowska, N., & Gaszynski, T. 2016. The comparison of the technical parameters in endotracheal intubation devices: the Cmac, the Vividtrac, the McGrath Mac and the Kingvision. Journal of clinical monitoring and computing, 30, 379-387.

[22] Alvis, B. D., Hester, D., Watson, D., Higgins, M., & St Jacques, P. 2015. Randomized controlled trial comparing the McGrath MAC video laryngoscope with the King Vision video laryngoscope in adult patients. Minerva anestesiologica, 82(1), 30-35.

[23] Erdivanli, B., Sen, A., Batcik, S., Koyuncu, T., & Kazdal, H. 2018. Comparison of King Vision video laryngoscope and Macintosh laryngoscope: a prospective randomized controlled clinical trial. Revista Brasileira de Anestesiologia, 68(5), 499-506