Section: Anaesthesiology

Original Research Article

TO COMPARE SUCCESS AND HEMODYNAMICS DURING INSERTION THROUGH BLOCKBUSTER LMA OF POLYVINYL CHLORIDE ENDOTRACHEAL TUBE, MICROCUFF ENDOTRACHEAL TUBE AND BLOCKBUSTER ENDOTRACHEAL TUBE

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Abstract

Background: With invention of supraglottic devices in 1981 marked a paradigm shift, changing the focus of airway management, from intubation to oxygenation and ventilation. The study was conducted to compare success and hemodynamics during insertion through BLOCKBUSTER LMA of Polyvinyl Chloride Endotracheal Tube, Microcuff Endotracheal Tube and BLOCKBUSTER Endotracheal Tube. **Material & Methods:** In this study 90 female patients were randomly allocated to the following three groups of 30 patients each. Group-A: Patients received general anesthesia and airway protection with PVC endotracheal tube through Block Buster LMA, Group-B: Patients received general anesthesia and airway protection with Micro-Cuff endotracheal tube through Block Buster LMA and Group-C: Patients received general anesthesia and airway protection with Block Buster endotracheal tube. The results were tabulated and statistically analysed using SPSS (Statistical Package for Social Sciences) Software version 15.0. P <0.05 was considered as significant. **Results:** On analysing the data statistically, the p value was calculated as 0.7607 hence the difference was statistically insignificant, so all the three groups were comparable with regard to time taken for LMA insertion. On analysing the data statistically, the p value was calculated as <0.0001, hence the difference was statistically significant with regard to time taken from the successful insertion of LMA to successful intubation. No significant differences were found in hemodynamic parameters 5th, 10thand 15th minutes after intubation among the three groups. Significant differences were found in hemodynamic parameters during intubation, one minute after intubation among the three groups. Changes in hemodynamic parameters compared to preoperative status was significantly less with the BLOCKBUSTER tube followed by the Micro-cuff endotracheal tube and last by the PVC tube. **Conclusion:** The study concluded that all three ET tubes can be safely used for blind intubation through Block buster LMA during GA and in positive pressure ventilation.

INTRODUCTION

In 1981, Dr. Archie Ian Jeremy Brain invented the first supraglottic airway device.[1,2] All LMA prototypes were invented by Dr. Brain himself. It further led on to the inventions of LMA-Flexible, which had a wire reinforced shaft, in 1992.[1] The inventions of LMA-Fastrach in 1997, also popularly known as ILMA, allowed the passage of an ETT through it, thereby facilitating intubation via an LMA.[3] In 2012, LMA-BLOCKBUSTER was invented in China by Professor Ming Tian, a relatively new modification of the conventional ILMA, claimed to have better success rate for intubation using their BLOCKBUSTER™ tube.[4] They claim that the LMA has better hypolarynx ventilation and provides a better green channel for intubation via the LMA. Because of the make of the LMA, it is claimed to produce lesser post intubation tachyphonia and reduced aspiration risk due to the gastric port.[4] Eisenmenger (1893) was the first to describe the use of a cuffed Endotracheal tube (ETT), as well as the concept of a pilot balloon to monitor intracuff pressure. Anaesthesiologist Franz

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Kuhn made significant contributions in the early 1900s.[5,6] Large volume, low pressure endotracheal tube cuffs are claimed to have less deleterious effect on tracheal mucosa than high pressure, low volume cuffs.[5,6] Manufacturers introduced a high volume low pressure(HVLP) PVC-cuffed ETT in the 1970s, which has become the standard ETT in use today. Desirable characteristics of PVC include that it is transparent, nontoxic, and inexpensive and conforms to the patient's anatomy at body temperature.[7,8] Microcuff Adult Endotracheal Tube provides a superior tracheal seal and proven to reduce leakage.[9] The study was conducted to compare success and hemodynamics during insertion through BLOCKBUSTER LMA of Polyvinyl Chloride Endotracheal Tube, Microcuff Endotracheal Tube and BLOCKBUSTER Endotracheal Tube.

MATERIALS AND METHODS

This study was conducted as a prospective randomized case-controlled study done on 90 adult female patients. The study was conducted for 1-year duration i.e. from July 2020 to June 2021. Study group was included all eligible patients & they were allotted into all three groups randomly. Study was conducted in these patients after explaining the procedure details to family members of the patients. This was conducted in the department of anaesthesiology and critical care, government medical college & attached hospitals, Kota (Raj). Patients with ASA grade I & II, female sex, MPG score I & II, weight between 30kg – 70kg, duration of surgery <3 hours were included in the study. Patients with ASA grade III & IV, patients with loose dentures, MPG score III &IV, patients weighing <30kg or >70kg, history of obstructive sleep apnea, renal, cardiac, pulmonary diseases and known gastrointestinal reflux diseases, history of allergy to one or more drugs and latex, Duration of surgery >3hrs were excluded from the study. In this study patients were randomly allocated to the following three groups of 30 patients each.

- Group-A: Patients received general anesthesia and airway protection with PVC endotracheal tube through Block Buster LMA.
- Group-B: Patients received general anesthesia and airway protection with Micro-Cuff endotracheal tube through Block Buster LMA.
- Group-C: Patients received general anesthesia and airway protection with Block Buster endotracheal tube through Block Buster LMA.

Study Procedure

Approval of the Ethical Committee of Government Medical College & attached Hospitals, Kota was obtained for surgery, anaesthesiology and this study. This study was conducted on 90 adult patients of female sex. All patients was scheduled for surgery of duration <3 hours. Written consent was obtained from all participating patients and their attendants for inclusion in the study. The patient was weighed and the size of LMA to be used was determined.

Preoperative Assessment

Complete medical history and physical examination including vital signs and airway assessment for all patients was done. Patients were kept nil per orally for 8 hrs.

Preanaesthetic Medication and Preoxygenation

In operative room Inj. glycopyrrolate 0.2 mg, inj. midazolam 1 mg and fentanyl 2mcg/kg intravenously was given 5 minutes before induction as premedication. All patients were preoxygenated with 100% oxygen for 3 minutes.

Clinical Monitoring

Monitoring equipments was attached to the patient including 3 leads ECG, non-invasive blood pressure, pulse-oximetry, ETCO2, heart rate, systolic, diastolic and mean arterial pressure was recorded at the baseline, and every 5 min thereafter.

Anaesthesia Induction

- Induction of anaesthesia was done slowly with propofol 2-2.5mg/kg and neuromuscular blockade will be achieved with succinyl choline 1.5 mg/kg.

Intubation

- The type of tube to be used was selected using sealed envelope method.
- Group A was to be intubated with PVC tube and was named the PVC group (n=30) while Group B was to be intubated with the Micro cuff tube and was named the MC group (n=30) and Group C was to be intubated with the BLOCKBUSTER™ tube and was named the BB group (n=30).
- An LMA BLOCK-BUSTER of appropriate size (3 OR 4) was introduced into the patient and cuff was inflated with appropriate amount of air (max 30mL). Correct placement of laryngeal mask was confirmed with chest inflation, the presence of equal bilateral air entry, a square wave capnography and no oropharyngeal leak with peak airway pressures ≥20 cm H2O.
- If any one of the above criteria were not met, the LMA was repositioned, removed and reinserted or changed to a different size. If ventilation continued to be a problem, patient was excluded from the study. After successful placement of the LMA, anaesthesia was maintained with 1-2% sevoflurane.
- A lubricated endotracheal tube, a polyvinyl chloride endotracheal tube or a BLOCKBUSTER tube, or a Microcuff tube was inserted via the laryngeal mask airway, and the patient was intubated. Correct placement of endotracheal tube in the trachea was confirmed with equal bilateral air entry and capnograph tracing.
- When intubation was successful, the laryngeal mask airway was removed and the connector was placed at the machine end of the tube and the tube was connected to the anesthesia machine.

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- The ease of tracheal intubation was judged by the time taken to intubate the trachea (time from disconnection of the breathing circuit from the LMA-BLOCKBUSTER to confirmation of tracheal tube placement by auscultation and display of a square-wave capnography trace) and the number of attempts to achieve successful intubation.
- In each patient, intubation through LMA-BLOCKBUSTER was limited to three attempts.
- Intubation was considered successful on the first attempt if tracheal tube could be passed without any resistance through the LMA-BLOCKBUSTER.
- If resistance was encountered, according to the length at which resistance was encountered, different maneuvers was used including twisting of the tracheal tube or/and Chandy's maneuver to align the bevel and this was considered second attempt.
- If still intubation was not successful, up and-down movement of the tracheal tube was tried and this was considered as third attempt.
- Following successful tracheal intubation, the LMA was removed using the standard technique and the stabilizing rod.

Maintenance of anaesthesia: Low flow O2 with any inhalational agent and NDMR (non-depolarizing muscle relaxant) + IPPV (intermittent positive pressure ventilation).

End of surgery: At the end of the operation, anaesthetic agents were discontinued, and proper oral suctioning was done allowing smooth recovery of consciousness.

Reversal: Inj. Neostigmine 0.04-0.08 mg/kg iv +Inj. Glycopyrrolate 0.004-0.008 mg / kg iv.

Extubation: Vitals noted (5 min before and 5 min after).

Post anaesthesia care unit: The patient was shifted to post-operative ward after full recovery and was followed up for 24 hours.

Statistical Analysis

The results was tabulated and statistically analysed using SPSS (Statistical Package for Social Sciences) Software version 15.0, Chi-square test was used for qualitative data (ASA grade, weight, MPG, Mouth opening), and quantitative data (heart rate, SBP, DBP, Mean blood pressure, was compared using paired t test within the group against baseline values, and between two groups unpaired-t test was used.

One-way ANOVA test was used for three group comparisons of continuous variables; P >0.05 will be considered insignificant, P<0.05 as significant and highly significant if P<0.001.

RESULTS

The table 1 exhibit that the meantime which was time taken from the after induction to successful insertion of LMA was 40.86±5.78 sec seconds in group A and 41.4±4.78 sec in group B and 44.43±4.5 sec in group C. On analysing the data statistically, the p value was calculated as 0.7607 hence the difference was statistically insignificant soall three groups were comparable with regard to time taken for LMA insertion.

The table 2 exhibit that the meantime which was time taken from the successful insertion of LMA to successful intubation was 32.26±16.40 sec in group A and 20.1±7.54sec in group B and 14±6.29 sec in group C. Patients in the Blockbuster ET tube group took less time for successful intubation. On analysing the data statistically, the p value was calculated as <0.0001, hence the difference was statistically significant.

Preoperative mean heart rate in group A was 81.96±7.95per minute and in group B it was 83.5±7.64 per minute and in group C was 81.93±12.42 per minute. On analysing the data statistically, the p value was calculated as 0.7693, hence the difference was statistically insignificant, and the groups were comparable.

Preoperative heart rate was considered as baseline heart rate. Baseline heart rate was found to be comparable in all three groups.

During LMA insertion in group A the mean heart rate was 87.77±5.85 per minute and in group B, it was 86.53±4.28 per minute and in group C was 85.33±8.61 per minute. On analysing the data statistically, the p value was calculated as 0.3517, hence the difference was statistically insignificant, and the groups were comparable. And also, after LMA insertion heart rate was found to be comparable in all three groups.

During intubation in group A the mean heart rate was 100.1±5.57 per minute and in group B, it was 91.53±7.66 per minute and in group C it was 85.26±6.22per minute. On analysing the data statistically, the p value was calculated as <0.0001hence the difference was statistically significant.

One minute after intubation in group A mean heart rate was95.86±5.10per minute and in group B, it was 89.96±7.36 per minute and in group C it was 82.5±7.53 per minute. On analysing the data statistically, the p value was calculated as <0.05hence the difference was statistically significant.

5-minute 10 minute and 15 minutes after intubation in group A, in group B and in group C mean heart rate was found to be comparable in all three groups.

Comparison between group A (PVC tube) and group B (MC tube)-Mean heart rate per minute was comparable preoperative, during LMA insertion, after LMA insertion, 5-minute 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

Comparison between group A (PVC tube) and group C (BB tube)-Mean heart rate per minute was comparable preoperative, during LMA insertion,

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After LMA insertion, 5-minute 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

Comparison between Group B (MC tube) and Group C (BB tube) Mean heart rate per minute was comparable preoperative, during LMA insertion, After LMA insertion, 5-minute 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

Pre-operative mean SBP in group A was 132.4±11.90mmHg and in group B, it was 130.9±10.75 mmHg and in group C it was 131.93±12.34 mmHg per. On analysing the data statistically, the p value was calculated as 0.8788, hence the difference was statistically insignificant, and the groups were comparable.

The SBP before premedication was considered as baseline SBP. Baseline SBP was found to be comparable in all three groups.

During LMA insertion in group A mean SBP was 126.46±9.63 mmHg and in group B, it was 124.8±10.74 mmHg and in group C it was 126.4±4.76 mmHg. On analysing the data statistically, the p value was calculated as 0.7086, hence the difference was statistically insignificant, and the groups were comparable. And also, after LMA insertion SBP was found to be comparable in all three groups.

During intubation in group A mean SBP was 133.13±5.55 mmHg and in group B, it was 128.33±4.07 mmHg and in group C it was 124.26±4.51 mmHg. On analysing the data statistically, the p value was calculated as <0.05 hence the difference was statistically significant.

One minute after intubation in group A mean SBP was 131.46±5.94 mmHg and in group B, it was 127.03±6.09 mmHg and in group C it was 122.6±5.56 mmHg. On analysing the data statistically, the p value was calculated as <0.05 hence the difference was statistically significant.

1 minute 5 minute and 10 minutes after intubation in group A, in group B and in group C mean SBP was found to be comparable in all three groups.

Comparison between group A (PVC tube) and group B (MC tube)-Mean systolic blood pressure (mmHg) was comparable preoperative, during LMA insertion, After LMA insertion, 5-minute 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

Comparison between group A (PVC tube) and group C (BB tube)-Mean systolic blood pressure (mmHg) was comparable preoperative, during LMA insertion, After LMA insertion, 5-minute,10 minute and 15 minutes after intubation.

During intubation, one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

Comparison between Group B (MC tube) and Group C (BB tube) Mean systolic blood pressure (mmHg) was comparable preoperative, during LMA insertion, after LMA insertion, 5-minute 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

Preoperative mean DBP in group Awas 76.83±8.74 mmHg and in group B, it was 77.46±7.77 mmHg and in group C it was 78.13±10.62 mmHg. On analysing the data statistically, the p value was calculated as 0.8589, hence the difference was statistically insignificant, and the groups were comparable.

The DBP before premedication was considered as baseline DBP. Baseline DBP was found to be comparable in all three groups. As shown in table 17.

During LMA insertion in group A mean DBP was 71.66±7.78 mmHg and in group B, it was 70.46±7.43 mmHg and in group C it was 72.33±6. 12mmHg. On analysing the data statistically, the p value was calculated as 0.592, hence the difference was statistically insignificant, and the groups were comparable. And also, after LMA insertion DBP was found to be comparable in all three groups.

During intubation in group A mean DBP was 83.5±6.92mmHg and in group B, it was 78.26±6.85 mmHg and in group C it was 73.96±5.36 mmHg. On analysing the data statistically, the p value was calculated as <0.05 hence the difference was statistically significant.

One minute after intubation in group A mean DBP was 79.8±5.29 mmHg and in group B, it was 76.9±6.21 mmHg and in group C was 72±5.27 mmHg. On analysing the data statistically, the p value was calculated as <0.05 hence the difference was statistically significant.

1 minute 5 minute and 10 minutes after intubation in group A, in group B and in group C mean SBP was found to be comparable in all three groups.

Comparison between group A (PVC tube) and group B (MC tube)-Mean diastolic blood pressure (mmHg) was comparable preoperative, during LMA insertion, After LMA insertion, 5-minute, 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05 hence the difference was statistically significant.

Comparison between group A (PVC tube) and group C (BB tube)-Mean diastolic blood pressure (mmHg) was comparable preoperative, during LMA insertion, After LMA insertion, 5-minute, 10 minute and 15 minutes after intubation.

During intubation, and one minute after intubation the p value was calculated as <0.05 hence the difference was statistically significant.

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Comparison between Group B (MC tube) V/S Group C (BB tube) Mean diastolic blood pressure (mmHg) was comparable preoperative, during LMA insertion, After LMA insertion, 5-minute, 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05, hence the difference was statistically significant.

Pre-operative mean MAP in group A was 99.4±7.97 mmHg and in group B, it was 94.32±5.72 mmHg and in group C it was 95.10±9.25 mmHg per. On analysing the data statistically, the p value was calculated as 0.913, hence the difference was statistically insignificant and the groups were comparable.

The MAP before premedication was considered as baseline MAP. Baseline MAP was found to be comparable in all three groups. As shown in table 19.

During LMA insertion in group A mean MAP was 89.03±6.85mmHg and in group B, it was 87.43±7.65 mmHg and in group C it was 89.45±4.64 mmHg. On analysing the data statistically, the p value was calculated as 0.5517, hence the difference was statistically insignificant, and the groups were comparable. And also, after LMA insertion MAP was found to be comparable in all three groups.

During insignificant, in group A mean MAP was 99.04±5.15mmHg and in group B, it was 94±4.92 mmHg and in group C it was 89.82±4.16 mmHg.On analysing the data statistically, the p value was calculated as <0.05 hence the difference was statistically significant.

One minute after intubation in group A mean MAP was 96.05±4.23mmHg and in group B, it was 92.67±5.19mmHg and in group C it was 87.97±4.26 mmHg. On analysing the data statistically, the p value was calculated as <0.05 hence the difference was statistically significant.

1 minute 5 minute and 10 minutes after intubation in group A, in group B and in group C mean SBP was found to be comparable in all three groups.

Comparison between group A (PVC tube) and group B (MC tube)-Mean MAP (mmHg) was comparable preoperative, during LMA insertion, After LMA insertion, 5-minute, 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

Comparison between group A (PVC tube) and group C (BB tube)-Mean MAP (mmHg) was comparable preoperative, during LMA insertion, after LMA insertion, 5-minute, 10 minute and 15 minutes after intubation.

During intubation, and one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

Comparison between Group B (MC tube) and Group C (BB tube) Mean MAP (mmHg) was comparable preoperative, during LMA insertion, after LMA insertion, 5-minute, 10 minute and 15 minutes after intubation.

During intubation and one minute after intubation the p value was calculated as <0.05hence the difference was statistically significant.

The changes in SpO2 were statistically insignificant in all three groups at all-time intervals.

Table 1: Time Taken LMA insertion (Mean±SD)

LMA Insertion (Sec)	Group A (PVC Tube)		Group B (Micro Cuff Tube)		Group C (Block Buster Tube)	
	No. of Patients	%	No. of Patients	%	No. of Patients	%
30-40	17	57	16	53	18	60
41-50	11	36	13	43	12	40
> 50	2	7	1	4	0	0
Total	30	100	30	100	30	100
Mean± SD	40.86±5.78 sec		41.4±4.78 sec		44.43±4.5 sec	
P value	0.7607					

Table 2: Time taken for intubation (Mean±SD)

Intubation Time (sec)	Group A (PVC Tube)		Group B (Micro Cuff Tube)		Group C (Block Buster Tube)	
	No. of Patients	%	No. of Patients	%	No. of Patients	%
10-25 sec	16	53	25	83	27	90
26-50 sec	10	33	5	17	3	10
> 50 sec	4	14	0	0	0	0
Total	30	100	30	100	30	100
Mean± SD	32.26±16.40 sec		20.1±7.54 sec		14±6.29 sec	
P value	0.0001					

Table 3: Heart Rate (per minute) (Mean±SD)

Time Intervals	Group A (PVC Tube)	Change in Heart Rate HR form Pre-Operati	Group B (Micro Cuff Tube)	Change in Heart Rate HR form Pre-Operati	Group C (Block Buster Tube)	Change in Heart Rate HR form Pre-Operati	p value

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		ve Value		ve Value		ve Value	
Preoperative	81.96±7.95	0	83.5±7.64	0	81.93±12.42	0	0.7693
During LMA Insertion	87.77±5.85	7	86.53±4.28	3	85.33±8.61	4	0.3517
After LMA Insertion	89.23±5.46	9	88.5±6.23	5	87.76±5.86	6	0.6252
During Intubation	100.1±5.57	19	91.53±7.66	8	85.26±6.22	5	0.0001
After Intubation 1 min	95.86±5.10	14	89.96±7.36	6	81.5±7.53	0	0.0001
5 min	82.46±7.92	1	82.63±7.52	-1	82.5±6.36	1	0.9412
10 min	86.4±4.02	5	85.26±7.45	2	85±8.36	4	0.7039
15 min	85.3±3.34	4	84±6.69	1	84.66±10.46	3	0.795

Table 4: Group wise statistical analysis of Heart rate per minute

Time Intervals	P- VALUE		
	Group A vs B	Group A vs C	Group B vs C
Preoperative	0.4474	0.9911	0.5577
During LMA Insertion	0.3527	0.2043	0.497
After LMA Insertion	0.6312	0.319	0.6104
During Intubation	0.0001	0.0001	0.001
After Intubation 1 min	0.0001	0.0001	0.0003
5 min	0.9295	0.7953	0.7273
10 min	0.4637	0.4118	0.8992
15 min	0.3449	0.7507	0.8984

Table 5: Systolic Blood Pressure (SBP)(Mean±SD)

Time Intervals	Group A (PVC Tube)	Change in SBP form Pre-Operative Value	Group B (Micro Cuff Tube)	Change in SBP form Pre-Operative Value	Group C (Block Buster Tube)	Change in SBP form Pre-Operative Value	p value
Preoperative	132.4±11.90	0	130.9±10.75	0	131.93±12.34	0	0.8788
During LMA Insertion	126.46±9.63	-6	124.8±10.74	-6	126.4±4.76	-5	0.7086
After LMA Insertion	122.6±7.10	-10	121.26±6.18	-9	122.73±4.21	-9	0.5729
During Intubation	133.13±5.55	+1	128.33±4.07	-2	124.26±4.51	-7	0.0001
After Intubation 1 min	131.46±5.94	-1	127.03±6.09	-3	122.6±5.56	-9	0.0001
5 min	125±4.35	-7	124.66±5.02	-6	122.2±5.56	-9	0.0663
10 min	121.2±5.41	-11	123.23±6.56	-7	122.8±8.44	-9	0.4908
15 min	120.33±5.12	-12	122.63±5.64	-8	120.06±6.52	-10	0.1738

Table 6: Group wise statistical analysis of SBP (mmHg)

Time Intervals	P- VALUE		
	Group A vs B	Group A vs C	Group B vs C
Preoperative	0.6104	0.8812	0.7316
During LMA Insertion	0.531	0.9757	0.459
After LMA Insertion	0.4387	0.9316	0.2861
During Intubation	0.0003	0.0001	0.0005
After Intubation 1 min	0.006	0.0001	0.0047
5 min	0.7802	0.0610	0.0773
10 min	0.9196	0.3856	0.8264
15 min	0.1036	0.2139	0.1079

Table 7: Diastolic Blood Pressure (DBP) (Mean±SD)

Time Intervals	Group A (PVC Tube)	Change in DBP form Pre-	Group B (Micro Cuff Tube)	Change in DBP form Pre-	Group C (Block Buster Tube)	Change in DBP form Pre-	p value

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		Operative Value		Operative Value		Operative Value	
Preoperative	76.83±8.74	0	77.46±7.77	0	78.13±10.62	0	0.8589
During LMA Insertion	71.66±7.78	-5	70.46±7.43	-7	72.33±6.12	-6	0.592
After LMA Insertion	70.46±7.28	-6	70.33±7.43	-7	71.8±6.85	-7	0.6834
During Intubation	83.5±6.92	+7	78.26±6.85	-8	73.96±5.36	-5	0.0001
After Intubation 1 min	79.8±5.29	+3	76.9±6.21	-6	72±5.27	-6	0.0001
5 min	71.63±5.88	-5	72.66±5.95	-5	71.36±6.10	-6	0.6748
10 min	70.9±5.24	-6	72.63±5.93	-5	71.86±8.73	-6	0.6161
15 min	70.33±4.83	-6	71.96±6.05	-6	71.26±8.96	-6	0.6524

Table 8: Group wise statistical analysis of DBP (mmHg)

Time Intervals	P- VALUE		
	Group A vs B	Group A vs C	Group B vs C
Preoperative	0.769	0.6066	0.7813
During LMA Insertion	0.5436	0.7122	0.2917
After LMA Insertion	0.9457	0.4658	0.4289
During Intubation	0.0046	0.0001	0.0089
After Intubation 1 min	0.0474	0.0001	0.0017
5 min	0.5027	0.862	0.4068
10 min	0.236	0.6075	0.6909
15 min	0.2535	0.6187	0.7241

Table 9: Mean Arterial Pressure (MAP)(Mean±SD)

Time Intervals	Group A (PVC Tube)	Change in MAP form Pre-Operative Value	Group B (Micro Cuff Tube)	Change in MAP form Pre-Operative Value	Group C (Block Buster Tube)	Change in MAP form Pre-Operative Value	p value
Preoperative	99.4±7.97	0	94.32±5.72	0	95.10±9.25	0	0.913
During LMA Insertion	89.03±6.85	-10	87.69±7.65	-7	89.45±4.64	-6	0.5517
After LMA Insertion	86.96±6.5	-13	86.43±6.17	-8	87.89±4.82	-8	0.6236
During Intubation	99.04±5.15	0	94±4.92	0	89.82±4.16	-6	0.0001
After Intubation 1 min	96.05±4.23	-3	92.67±5.19	-2	87.97±4.26	-8	0.0001
5 min	88.52±4.8	-11	89.1±4.76	-5	87.42±4.82	-8	0.3904
10 min	86.79±4.83	-13	88.60±4.96	-6	87.95±6.13	-8	0.4164
15 min	86.13±4.48	-13	87.96±5.13	-7	86.65±6.52	-9	0.4102

Table 10: Group wise statistical analysis of MAP (mmHg)

Time Intervals	P- VALUE		
	Group A vs B	Group A vs C	Group B vs C
Preoperative	0.9645	0.7546	0.6959
During LMA Insertion	0.477	0.782	0.2858
After LMA Insertion	0.7472	0.5315	0.3079
During Intubation	0.0003	0.0001	0.0008
After Intubation 1 min	0.0076	0.0001	0.0003
5 min	0.6402	0.3794	0.1796
10 min	0.157	0.4189	0.6533
15 min	0.1465	0.7201	0.3907

Table 11: SPO2 (Mean±SD)

Time Intervals	Group A(PVC Tube)	Group B(Micro Cuff Tube)	Group C(Block Buster Tube)	p value
Preoperative	97.83±0.91	98.2±1.09	97.96±0.96	0.3443
During LMA Insertion	99.56±0.50	99.3±0.70	99.03±1.35	0.0908

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After LMA Insertion	99.3±0.70	99.2±0.71	99.36±0.71	0.6766
During Intubation	99.2±0.84	99.3±0.65	99.46±0.62	0.3636
After Intubation 1 min	99.66±0.47	99.6±0.49	99.63±0.49	0.891
5 min	99.63±0.49	99.5±0.5	99.7±0.65	0.6184
10 min	99.66±0.47	99.7±0.46	99.76±0.43	0.6946
15 min	99.76±0.43	99.66±0.47	99.7±0.466	0.6946

DISCUSSION

Securing airways is a vital responsibility of anaesthesiologists. Recently supraglottic airway devices with a conduit for blind tracheal intubation are gaining popularity as a bridge connecting ventilation and intubation in all genres of patients. Laryngeal mask airways with intubation conduit are useful and are also recommended by 'All India Difficult Airway Association' guidelines 2016.[10]

In this study, an attempt has been made to intubate the trachea through the BLOCKBUSTER™ LMA, using all three the BLOCKBUSTER™ tube, Micro-cuff endotracheal tube and the conventional PVC tube and to compare the ease of insertion, the hemodynamic changes during intubation using all three of these tubes.

The ease of insertion was compared by the time taken for intubation for each tube. On an average, the PVC tube took 32.26±16.40 seconds compared to 20.10±7.54 seconds taken by the Micro-cuff endotracheal tube and 14.60±6.29 seconds taken by the BLOCKBUSTER tube. The time taken for PVC tube insertion is longer, which is consistent with the results shown in studies by Sharma MU, Gombar S et al 2013,[11] and Shah VR, Bhosle GP, Mehta T et al 2014,[12] i.e. for intubation of FTST through ILMA.

Studies by Sharma MU, Gombar S et al,[11] 2013 showed time taken for tracheal intubation were significantly greater in group I (PVC tube) than group II (Fasttrach TM silicone wire reinforced tube) (14.71±6.21 seconds and 10.04±4.49 seconds, respectively (P<0.001).

Studies by Shah VR, Bhosle GP, Mehta T et al,[12] 2014ie.The time taken for intubation was 18.6 ± 6.8 secs. in FTST (Fasttrach TM silicone wire reinforced tube) group and 22.42 ± 8.5 secs. in PVCT group.

But the time taken in studies by Shah VR, Bhosle GP, Mehta T et al,[12] 2014 i.e. were much lesser (22.42 ± 8.5 sec) than obtained in this study.

In this study Group A (PVC tube) had a higher Heart Rate response and a higher Systolic Blood Pressure and Diastolic Blood Pressure during intubation and one minute after intubation, compared to Group B (MC tube) and Group C (BB tube). But this increased hemodynamic response attenuated in the subsequent minutes and was comparable between all three groups during the 5th, 10th and 15th minutes after intubation.

This result contrasts with the one obtained by Sharma MU, Gombar S et al,[11] 2013 i.e. who described comparable hemodynamic responses for Group A (PVC tube) and Group C (BB tube).

The difference could probably be due to the better alignment and better hemodynamic profile of the BLOCKBUSTER tube than the PVC tube, and whereby hemodynamic parameters did not alter much from the pre-operative baseline values even during intubation in Group C (BB tube) patients.

SpO2 was comparable between the two groups at all stages of the procedure and did not fall below 97% during any part of the procedure.

This study had certain limitations. First, the results of the study are only applicable to patients with normal airways. Second, the mask-glottis seating was only ascertained clinically and had no fiberoptic confirmation. Third, as the product is relatively newly launched in the market, there is a dearth of studies with this LMA and hence further studies in more number of patients are required for corroborative evidence.

CONCLUSION

The study concluded that all three ET tubes can be safely used for blind intubation through Block buster LMA during GA and in positive pressure ventilation.

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