Original Research Article

EASE OF INSERTION OF ENDOTRACHEAL TUBE USING BLOCKBUSTER LMA – AN OBSERVATION STUDY OF FIRST ATTEMPT SUCCESS RATE

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Abstract

Background: Today various Laryngeal mask airways (LMA) are available which are helpful adjuncts in difficult airway. BLOCKBUSTER® Laryngeal Mask Airway, a newer supraglottic airway device, is claimed to be an efficient conduit for endotracheal intubation. A silicone wire reinforced tube with a Touhy-tip named as the BLOCKBUSTER^{TM} tube, is recommended for intubation via the BLOCKBUSTER^{TM} LMA.

Aim: This observational study was undertaken to evaluate the ease of insertion of endotracheal tube using Blockbuster LMA.

Methods: Patients undergoing elective surgeries under general anaesthesia (GA) were intubated, using the blockbuster LMAs and observed keenly. Intubation was considered successful on the first attempt if tracheal tube was passed without any resistance through the LMA. Following successful

tracheal intubation, the LMA was removed using the standard technique and the stabilizing rod. The first attempt success rate was noted. The time taken for insertion and removal of LMA was observed. All complications were properly observed and noted.

Results: 81.8% (45) patients were successfully intubated in first attempt, 10.9% (6) patients needed two attempts while the rest 7.3% patients required three attempts for intubation. Mean time required for LMA insertion was 19.9±8.95 seconds. Among the complications only sore throat was seen after 1 hour post-surgery in 4 of our patients and after 4 hours in other 4 patients.

Conclusion: Blockbuster LMA provides higher first pass success rate of blind tracheal intubation with less complications like sore throat, nausea and hoarseness of voice.

Key words: Supraglottic airway, Blockbuster LMA, Tracheal intubation.

INTRODUCTION

Airway management in patients undergoing general anesthesia is a set of actions that result in the creation of a safe and secure airway for ventilation[1]. Laryngeal mask airways with intubation conduit are useful and are also recommended by 'All India Difficult Airway Association' guidelines 2016[2]. Since its invention in 1981 by Dr. Archie Brain[3''4] the classical LMA has undergone many modifications. Today various LMAs are available which are helpful adjuncts in difficult airway, intubation via LMA, deep extubation, spontaneous ventilation in short procedures, Ryle's tube insertion etc. An intubating LMA is a supraglottic airway device that allows the passage of an endotracheal tube through it. There have been many modifications of the original classical Fastrach LMA[5]. A silicone wire reinforced tube with a Touhy-tip named as the BLOCKBUSTER^{TM} tube, is recommended for intubation via the BLOCKBUSTER^{TM} LMA. This tube has a soft, flexible, blunt edge that causes less mucosal damage during blind intubation. The LMA can be used as a rescue device for unanticipated difficult intubation and may also be used as an adjunct for LMA guided intubation. It can be used for both blind intubation and also for fiberoptic guided intubation.

CLASSIFICATION

- BASED ON SEALING MECHANISM
- CUFFED PERILAYNGEAL SEALERS

1. Non directional-Classic LMA, intubating LMA
2. Directional sealers-proseal LMA

CUFFED PHARYNGEAL SEALERS

1. Without oesophageal sealing-COPA.
2. With oesophageal sealing-Combitube

CUFFED PHARYNGEAL AND OESOPHAGEAL SEALERS

1. Combitube
2. Laryngeal tube

CUFFLESS PRESHAPED SEALERS

1. SLIPA
2. I gel
3. Baska mask

AIMS AND OBJECTIVES

1. To study

a. The first attempt successful intubation done using blockbuster LMAs.
b. The time of LMA insertion and LMA removal.
c. Any complications occurring using LMAs.

MATERIAL AND METHODS

The study was conducted as a prospective, observational study in the Department of Anaesthesiology, Critical Care and Pain Management, Government Medical College and associated hospitals. The time period of the study was 18 months and was done after obtaining approval from the Institutional Ethical Committee. Patients fulfilling the selection criteria were enrolled for the study.

Inclusion Criteria

1) ASA I and II
2) MPS I and II
3) Age 20-60 years
4) Patients of either sex
5) Elective surgeries under GA

Exclusion Criteria

1) ASA III and IV
2) Patients with MPS III and IV
3) Patients refused to give consent
4) Mouth opening <2cm
5) Oropharyngeal pathology
6) Morbidly obese
7) Risk of regurgitation
8) Pregnancy

METHODOLOGY

Patients undergoing elective surgeries under general anaesthesia (GA) were intubated, using the blockbuster LMAs and observed keenly. Intubation was considered successful on the first attempt if tracheal tube was passed without any resistance through the LMA. If resistance was encountered,

according to the length at which resistance was encountered, different maneuvers were used including twisting of the tracheal tube and this was considered as second attempt. If intubation was still not successful, up and down maneuver of the tracheal tube was tried and was considered as third attempt. Following successful tracheal intubation, the LMA was removed using the standard technique and the stabilizing rod. If intubation was unsuccessful after three attempts, the procedure was abandoned and tracheal intubation was performed under direct laryngoscopy. All maneuvers used were recorded as well as the number of attempts required for successful intubation. Postoperative complications like sore throat, nausea and hoarseness were recorded along with any other complications. The first attempt success rate was noted. The time taken for insertion and removal of LMA was observed. All complications were properly observed and noted. Ease of intubation was observed using the below scoring system.

Ease of intubation through BlockBuster LMA		
Time (sec)	**Score**	**Grade**
<20	**2**	Easy
20-40	**1**	Medium
>40	**0**	Difficult

Maneuvers used for LMA insertion were reinsertion and Jaw thrust.

ANAESTHETIC TECHNIQUE

Standard premedication with Injection Glycopyrolate 0.2mg, Injection Fentanyl 2mcg/kg, Injection Midazolam 0.02mg/kg was given. All patients were preoxygenated with 100% O2 for 3min. Each patient was induced with injection Propofol 2mg/kg until loss of response to verbal commands was lost, paralyzed with injection succinylcholine 2mg/kg iv. Patients head placed in sniffing position. SAD was inserted. LMA was lubricated with water based jelly, inserted and inflated with 20ml of air, in case of further leak, entire recommended air for inflation was used. The expiratory valve was closed and fresh gas flow 3L was kept.

Inserting BlockBuster LMA: Lay the patient on his back, tilt the head backwards with a little pillow meanwhile place the fixed band to the back of his neck. Open the patients' mouth with left hand to lift the jaw and then place the LMA along with the mouth axis with right hand. Gently push patient's forehead with left hand to tilt the head when encountering resistance and push forward the LMA in left right rotating motion with right hand. If the whole mask enters the mouth, keep pushing with up down manuever, if it does not arise to the right position lift the patients lower jaw with both hands and at the same time grip the wing type fixed handle with two thumbs. Push forward the LMA with updown manuever until it arrives to the right position. Hook the band to the fixed handle, than inflate the cuff with the syringe. The cuff pressure is about 30cm water, connect the breathing circuit for positive airway pressure.

Position judgement of blockbuster laryngeal mask airway: Smooth ventilation, appropriate pressure, ups and downs chest and end tidal CO_2 pressure show good ventilation. Test the seal pressure or try the twice tidal volume method in a short time.

Leakage test: Drop gel into the gastric access channel inlet in positive airway pressure way to check its leakage. Check whether the depth is appropriate by observing the distance of the incisor and the wing type fixed handle. Judge the location of the laryngeal mask airway by smoothness of gastric tube intubation.

Visual location: Inspect the location of the laryngeal mask airway and exposure of glottis, grade by inserting fiberoptic bronchoscope or other fiberscope into the airway tube.

ET tube exchange: Exposure of glottis grade is visually observed as I – II level via the laryngeal mask airway. Blind intubation can be realized by blockbuster endotracheal tube and the success rate is higher than 95%. When intubating, blockbuster endotracheal tube needs to be sufficiently lubricated and insert the endotracheal tube into the laryngeal mask airway until the marking line reaches the fixed handle. Then gently push the endotracheal tube forward with the right hand until there is no resistance and desired depth is reached. Inflate the cuff and connect breathing circuit. If ventilation is smooth continuous end tidal CO_2 pressure can be shown on the ventilator screen. In that case draw out the laryngeal mask airway with special tool and fix the endotracheal tube.

OBSERVATIONS AND RESULTS:

A total of 55 patients were included in this study. Mean age of patients in our study was 21 to 60 years (37.9±11.55). 36.4% (20) were males 63.6% (35) were females. 74.5% (41) of study patients had ASA I and 25. 5% (14) study patients had ASA II status.83.6% of study patients had MPS I and 16.4% study patients had MPS II status among the study population [Table 1].

Mean heart rate of the study patients was 79.4 beats per minute with standard deviation of 8.05, mean systolic blood pressure of study patients was 125.1 mmHg with standard deviation of 13.12, mean diastolic blood pressure of study patients was 75.9 mmHg with standard deviation of 8.09, mean of mean arterial pressure was 92.3 mmHg with standard deviation of 8.87 and mean SpO2 of study population was 98.2% with standard deviation of 1.42 [Table 2].

89.1% (49) patients required while single attempt for LMA insertion. 81.8% (45) patients were successfully intubated in first attempt, 10.9% (6) patients needed two attempts while the rest 7.3% (4) patients required three attempts for intubation. Mean time required for LMA insertion was 19.9+8.95 seconds [Table 3].

Majority of patients i.e. 49 (89.1%) does not need any maneuver for LMA insertion, jaw thrust was used in 4 (7.3%) patients and reinsertion was required in 2 (3.6%) patients and 45 (81.8%) does not need any maneuver for intubation, twisting was used in 6 (10.9%) patients and reinsertion was required in 4 (7.3%) patients [Table 4].

Statistically insignificant association was observed when heart rate, mean arterial pressure, mean oxygen saturation was observed at different time intervals with a p value of >0.05. Among the

complications only sore throat was seen after 1 hour post-surgery in 4 of our patients and after 4 hours in other 4 patients [Fig 1].

Table 1: Demographic profile of the study population

Variables	Frequency	%
Male	20	36.4
Female	35	63.6
ASA I	41	74.5
ASA II	14	25.5
MPS I	46	83.6
MPSII	9	16.4
Mean age (years) =37.9±11.55 [21 -60]		

Table 2: Preoperative vitals of study patients

Parameters	Mean ±SD	Range	95% CI
HR (beats/min)	79.4±8.05	60-100	77.2-81.5
SBP (mmHg)	125.1±13.12	110-170	121.5-128.6
DBP (mmHg)	75.9±8.09	65-99	73.8-78.2
MAP (mmHg)	92.3±8.87	81-117	89.9-94.7
SPo2 (%)	98.2±1.42	94-99	96.8-97.6

Table 3: Showing number of attempts for LMA insertion and intubation

Attempts	Frequency	%
1 Attempt LMA insertion	49	89.1
2 Attempt LMA insertion	6	10.9
1 Attempt intubation	45	81.8
2 Attempts intubation	6	10.9
3 Attempts intubation	4	7.3

Table 4: Showing any Maneuver used For LMA insertion and intubation

Maneuver Used	Frequency	%
Jaw thrust	4	7.3
Reinsert	2	3.6
None	49	89.1
Twisting	6	10.9
Up and down Movement	4	7.3
None	45	81.8

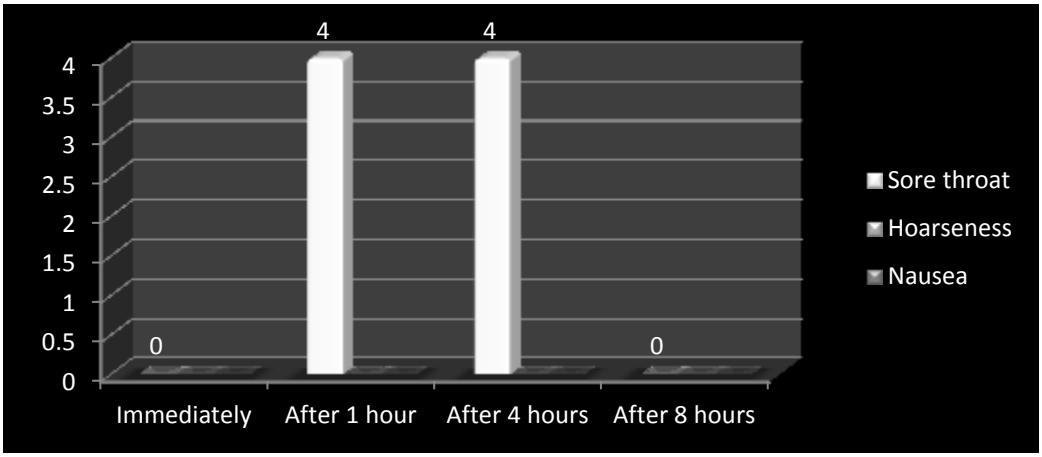

Fig 1. Postoperative complications among study patients

DISCUSSION

In our study, the age of study patients vary from 21 to 60 years with mean age of distribution was 37.9±11.5 (21 to 60 years). Maximum number of study patients lied between the ages of 31 to 40 years. Out of all study patients 36.4% (20) were males 63.6% (35) were females. Endigeri A et al., (2019)[6] conducted a study to evaluate the success rate of blind intubation using blockbuster or Fastrack LMAs. In their study 60 patients were included who were aged between 20-60 years. The mean age of the patients in Group B (BlockBuster LMA) was 36.0±15.0 years compared to 35.0±14.0 years in Group F (Fastrach LMA). The male to female ratio in their study was 16:14 in Group B and 15:15 in Group F.In our study, 74.5% of study patients had ASA I and 25. 5% study patients had ASA II status. Endigeri A et al., (2019)[6] conducted a study on 60 patients to evaluate the success rate of blind intubation using either of these LMAs. The ASA I to ASA II ratio was 12:12 in Group B and 12:12 in Group F. Arora HS et al., (2022)[7] conducted a study on 70 patients in which 19 and 18 patients in Group F had ASA I status compared to 16 and 17 in Group B.

The mean heart rate of the study patients in this study was 79.4 beats per minute with standard deviation of 8.05, mean systolic blood pressure of study patients was 125.1 mmHg with standard deviation of 13.12, mean diastolic blood pressure of study patients was 75.9 mmHg with standard deviation of 8.09, mean of mean arterial pressure was 92.3 mmHg with standard deviation of 8.87 and mean SpO_2 of study population was 98.2% with standard deviation of 1.42. Menon G (2019)[8] conducted a study in which Group I had a higher HR response and a higher SBP and DBP during intubation and one minute after intubation, compared to Group II. But this increased hemodynamic response got attenuated in the subsequent minutes and was comparable between both the groups during the 5th and 10th minutes. This result contrasts with the one obtained by Sharma MU et al., (2013)[9] who described comparable hemodynamic responses for both the groups. The difference could probably be due to the better alignment and better hemodynamic profile of the BLOCKBUSTER tube than the PVC tube, whereby hemodynamic parameters did not alter much from the pre-operative baseline values even during intubation in Group II patients.In our study, statistically insignificant association was observed when heart rate, mean arterial pressure, mean oxygen saturation was observed at different time intervals with a p value of >0.05.In a study done by Raiger L et al., (2022)[10] all the groups were comparable in respect of systolic and diastolic blood pressure, mean arterial blood pressure and heart rate per minute at baseline, pre intubation, 1, 3, 5, 7, 10 minutes postintubation and at the end of surgery.

Number of attempts required for LMA insertion was single in majority of patients i.e. 49 (89.1%) while the rest 6 (10.9%) patients required two attempts. Arora HS et al., (2022)[5] conducted a study on 70 patients in LMA insertion was done in the first attempt only in all patients in both the study groups. Endigeri A et al., (2019)[4] conducted in which successful LMA device placement in both the Group B and Group F was achieved on first attempt in all 60 patients. Sharma MU et al., (2013)[7] did a study in which in group I, 96% patients were successfully intubated (90% in the 1st attempt, 5% in the 2nd attempt, and 1% in the 3rd attempt). In group II, the success rate was 97% (95% in 1st attempt and 2% in 2nd attempt). In their study, Kundra P et al., (2005)[9] 74.6% of patients had successful tracheal intubation on the first attempt. Kapila A et al., (1997)[11] 72% were intubated at the 1st attempt with no manipulation, 21% with 2 or more attempts with manipulation.

Majority of patients i.e. 45 (81.8%) does not need any maneuver for intubation, twisting was used in 6 (10.9%) patients and up and down maneuver was required in 4 (7.3%) patients.In a study by Endigeri A et al., (2019)[6], majority of patients i.e. 49 (89.09%) does not need any maneuver for LMA insertion, jaw thrust was used in 4 (7.27%) patients and reinsertion was required in 2 (3.63%) patients. In a study by Brain AI et al., (1997)[12] tracheal intubation with silicone tube was successful in 149 of 150 (99.3%) patients. 75 (50%) at the first attempt, 28 (19%) required one adjusting manoeuvre, 21 (14%) required two, 18 (12%) required three and seven (5%) required four attempts. They used different maneuvers to achieve high success rate, which include the reinsertion, optimizing the airway, change of size, raising the mask upwards, partial withdrawal, rotating the bevel, adjusting head-neck position, and adding air to the cuff.

In our study, LMA insertion was successfully done in first attempt in 49 (89.1) patients while the rest 6 (10.9%) patients needed second attempt. In a study by Endigeri A et al., (2019)[4], first attempt success rate of blind tracheal intubation was 90% in Group B similar to Yunluo LY et al., (2016)[12]. Majority of patients i.e. 45 (81.8%) were successfully intubated in first attempt, 6 (10.9%) patients needed two attempts while the rest 4 (7.3%) patients required three attempts for intubation. In a study by Endigeri A et al., (2019)[6], 90% patients needed single attempt for successful intubation, 6.6% required two attempts while the rest 3.4% required third attempt. Mean time required for LMA insertion was 19.9$\pm$8.95 seconds. LMA was inserted in <20 seconds in 31 (56.4%) patients, 23 (41.8%) patients needed 20-40 seconds while the rest 2 (1.8%) patients required >40 seconds for LMA insertion. Mean time taken for intubation was 24.8$\pm$11.43 seconds. 35 (63.6%) patients were intubated within 20-40 seconds and 15 (27.3%) in <20 seconds.In a study by Endigeri A et al., (2019)[6], the time for intubation was lesser in Group B (18.2 ± 2.7s) compared to (31.8 ± 3.9s) in Group F. Time for intubation was significantly less in Group B than Group F. The reason for lesser time for intubation in Group B is evident based on the shape and anatomy of the LMA and short airway tube. The results are similar to previous studies.[13,14,15,16,17,18]

In the present study, postoperative complications were observed in 8 patients. Complications encountered were sore throat in 4 patients after 1 hour and 4 patients after 4 hours. Complications such as blood stained LMA and nausea/vomiting were least recorded in group B (BlockBuster®) as compared to other two groups in a study done byRaiger L et al., (2022)[10]. Menon G (2019)[8] also confirmed that sore throat, hoarseness, nausea were the complications encountered by their patients. At 4 hours of surgery 16% patients experienced sore throat and 16% experienced hoarseness of voice while at 8 hours complications like sore throat and hoarseness of voice were present in only 4% of patients. In a study by Endigeri A et al., (2019)[6],complications like incidence of sore throat

was observed in 10% in Group B compared to 53.3% in Group F. Nausea / vomiting was seen in 6.6% patients in Group B compared to 20% in Group F.

CONCLUSION

Blockbuster is a useful tool to secure airway and can serve as a helpful adjunct while securing airway in difficult airway patients e.g. cervical spine pathology. It is suggested that the ideal body weight may be beneficial to the size selection of the laryngeal mask airway (LMA) in overweight patients. BlockBuster LMA provides higher first pass success rate of blind tracheal intubation with less complications like sore throat, nausea and hoarseness of voice. More studies need to be done on MPS III and MPS IV patients to evaluate the efficacy of securing airways in such scenarios.

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