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Comparison of two in tubatingsupraglottic airway devices blockbuster versus fastrach

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Abstract

Supraglottic airway devices have become a standard fixture in airway management, filling a niche between face mask and tracheal tube. LMA Fastrach first described by Brain and co-workers in British Journal of Anaesthesia in 1997 is currently the gold standard for trachealintubationthroughsupraglotticairwaydeviceorbyfiberscopeguidance.In this study we have compared the efficiency of blindoro-tracheal intubation for two supraglottic airway devices that are equipped with a channel for intubation namely the Blockbuster LMA and fastrach LMA.

Methods: Patients were randomly divided into 2 groups by sealed envelope technique:

Group F- Fastrachintu bating LMA.

Group B- Blockbuster intubating LMA.

General examination and airway assessment including mouth opening, neck movements, teeth, Mallampatti Grade and systemic examination were carried out. Among 60 patients compared with mallampati grade, 51 of them are grade I and 9ofthem are grade II.

Results: Success rate of first attempt, in Group B was 90% (27/30) and in Group F was 60%(18/30), P =0.007. In second attempt, in Group B it was 6.7% (2/30), while in Group F it was 20% (6/30), P = 0.12 Overall success rate of intubation in both the groups is P = 0.04 whose difference is statistically significant. In Group Bone

patient and in Group F three patients required laryngo scope intubation.

Conclusion: Blockbuster LMA is better conduit for Oro-tracheal intubation than Fastrach LMA in terms of higher first attempt and overall success rate, lesser time taken for device insertion and ease of insertion of Endotracheal tube and lesser post – operative sore throat. Blockbuster LMA provides higher success rate of blind tracheal intubation with fewer complications like sore throat and blood staining.

Keywords: Ease of intubation, Fastrach LMA, Blockbuster LMA, Blind intubation.

Introduction: Airway management is the backbone of anesthesia and resuscitation. Conventional airway management involves the use of a face mask, a rigid directlaryngo scope and an Endotracheal tube. Failuretomaintainpatencyofairwayresultsincatastrophicoutcomessuchasbraindamageandevendeath.Asairwayrelated mortality is the major cause of anesthesia related mortality, to reduce the incidence ofthisairwayrelatedhypoxia,muchofinnovationhasbeendoneintheformofsupraglotticairwaydevicesandvideolaryngo scopes. Supraglottic airway devices have become a standard fixture in airway management, filling a niche between face mask and tracheal tube. Thefirstsuccessfulsupraglotticdevice,thelaryngealmaskairwayclassicbecame available was first described by Archie Brain. The LMA Classic was launched in the UK and the British anesthesia community were quick to realize the potential benefits of the laryngeal mask LMA. As the time went on, additional devices were added to LMA family to satisfy specific needs. One such modification of CLMA is Fastrach LMA introduced in 1995. The LMA-Fastrach in addition to ventilation of lungal so known to provide a superior conduit for blind or fiber optically guided tracheal intubation in difficult airway cases. Recently a new intubating LMA known as blockbuster LMA has been introduced by Tuoren medicals claiming it to have high success rate.

Aims and objective

To compare clinical performance of Fastrach LMA and Blockbuster LMA airway in terms of efficacy and safety in anesthetized patients on controlled ventilation undergoing surgerie sunder general anesthesia. The parameters used for comparison were:

Primary aim: First attempt and overall success rate of blind tracheal intubation.

Secondary aim: Time taken for effective airway establishment. Airway trauma during insertion, intra-operative complications and post-operative airway morbidities.

Materials and methods: With institutional ethics committee approval and written informed consent, 60ASA grade I-II patients between the ages of 18-80 years who were to undergo elective surgery were included in the study. This study was carried out through a period of one year from June-2020 to June-2021 and was performed as per guidelines and principles of Declaration of Helsinki.

Patients were randomly divided into 2 groups by sealed envelope technique:

Group F- Fastrach intubating LMA

Group B- Block buster intubating LMA.

Study Design

Prospective single blinded randomized control study. The randomization and group assignment were only performed after recruitment of patients. Sample size was calculated by website named www.biomath.info.Yunluo LYU, Yuan Z et al., conducted a study on application of Blockbuster LMA in urology surgery. Their main aim was to compare the success rate of intubation. The success rate of intubation through Blockbuster

LMAwas90.5%.Theanticipated difference in intubation success rate which was used for calculating sample size was 37.0%.Based on this study we choose intubation success rate as the primary criteria for sample size calculation. For 80% power of the study and 0.05significancelevel,Minimumsamplesizeis 27 in each group. The Sample size was further inflated by 10% to take care of non response, incomplete response, refusals and withdrawals. Therefore, minimum sample size was 27 + 2.7 = 29.7 = 30. We recruited 30 patients for each device within each group to increase power of the study and allowing for possible dropouts.

All patients underwent thorough preoperative assessment prior to surgery. Patient's demographic data like age, sex, weight, history was noted. General examination and airway assessment including mouth opening, neck movements, teeth, Mallampatti Grading and systemic examination especially cardiovascular and respiratory systems were carried out.

Baseline investigations like haemoglobin, blood sugar, renal function tests were obtained. ECG, chest X-ray and other special investigations were done when required. All patients were kept nil per orally overnight. On arrival in the operation theatre, vital parameters i.e. pulse, blood pressures were noted and routine monitoring ECG, NIBP and SpO2 done after securing the IV access.

Pre-use check of the device: The device and the ETT were inspected for any damage, leak or obstruction of lumen. The cuff of the device was checked by inflating the cuff with 20cc syringe and inspecting for leak of air.

The cuff of the ETT was checked by inflating the cuff with 10cc syringe and inspecting for air leak. We lubricated the Endotracheal tube with adequate amount of lignocaine jelly (2%) and pass the ET tube, with cuff completely deflated, through the LMA to check for any obstruction in the lumen of the LMA. Under all aseptic precaution, device was held along integral bite block and lubricated on the back and sides of the cuff with lignocaine jelly.

Premedication

Patients were kept nil by mouth (NBM) for 6 hours prior to surgery. After arrival in the operating room, an 18G/20G peripheral intravenous catheter was inserted into patient forearm. Standard multichannel monitoring was used throughout the procedure, including non-invasive blood pressure (NIBP), electrocardiograph (ECG), pulse oximetry (SPO2) and end tidal carbon dioxide ($ETCO_2$). All patients were pre medicated with ranitidine 50mg, on dansetron 4mg, glycopyrrolate 0.004mg/kg, fentanyl 2μg/kg intravenously 10min. prior to induction.

General anesthesia: A standard anesthesia protocol was followed with patient in supine position and patient's head on a standard pillow, 7cm in height. Patients were pre-oxygenated with 100% O2 for 3 minutes and mask ventilation was done. After confirming adequate mask ventilation, succinylcholine (0.5 to 1mg/kg) was administered for neuromuscular blockade. Mask ventilation was done till suitable conditions for SAD insertion i.e., loss of consciousness, loss of corneal reflex, apnoea and no response to jaw thrust were achieved. Either of the devices was inserted by a senior anaesthetist who had experience with both the devices. Blind tracheal intubation was done with either of the intubating LMA, using a midline insertion technique in neutral neck position for both the groups. The appropriate size of LMA was selected according to body weight. Size 3 for (30-50kg) and size 4 for (50-70kg) as per the manufacturers' guidelines. Observation and data collection was done then by an independent observer. Anaesthesia was maintained with O2, air, is oflurane /

sevoflurane. Neuromuscular block maintenance was achieved with atracurium (0.5 mg /kg).

Correct position of the SAD was confirmed by

- Inspection of the front of the neck (symmetrical bulging on insertion) and device (adequate depth of insertion absence of axial rotation)
- Adequate bilateral chest inflation
- An expired tidal volume of 7 ml/ kg
- Stable oxygenation as measured by pulse oximetry
- A square wave capnograph

Time required for insertion of LMA was defined from removal of facemask to the time where adequate ventilation as established through LMA with normal square wave capnogram. Adequate ventilation was defined by easy bag ventilation, bilateral equal air entry and absence of audible air leak around the cuff. Soon after the insertion, LMA cuff was inflated with air using Smiths cuff pressure manometer (Smiths Medical International Ltd. Boundary Road, Hythe, KentCT216JL, UK) as per recommendations, to a pressure of 30 cm H_2O. The LMA was connected to the breathing circuit. The number of attempts and ease for LMA insertion was noted.

Score	Ease of insertion of LMA
0	No manoeuvre used
1	One manoeuvre used

Both the devices were fixed by taping the tube over the chin. Patients were ventilated at an inspired tidal volume of 8-10 ml/kg, a respiratory rate of 12-14 breaths /min, and an inspiratory: expiratory ratio of 1:2.

After confirmation of placement of SAD against the glottis the appropriate size endotracheal tube was lubricated and passed via the LMA

The time for successful tracheal intubation started when the endotracheal tube was inserted into the green channel of LMA until the confirmation through capnography waveform. Intubation was performed blindly through the LMAs, using LMA specific tubes like Blockbuster tubes (Parker flex tip) and Fastrach tubes (armoured silicone tip). The number of intubation attempts were also noted. Time for first intubation attempt was measured, whereas time taken for second attempt was not assessed as it was not in our objectives as per the studies we referred.

For failed first attempt of blind intubation in Group B, second attempt was done by the same anesthesiologist with a change in the technique applied like head extension, jaw thrust or if required up-down movement.

Before conducting this we had used both the devices for intubation and noted that in Fastrach there were more oesophageal intubation which could be decreased by doing Chandy's manoeuvre.

So, for Group F blind intubation in first attempt was done with Chandy manoeuvre which is a two-step approach. In step 1, the metal handle was used to rotate the device in sagittal and/or coronal plane to establish optimal ventilation with minimum resistance to bag ventilation and audible leaks during manual ventilation. Then the handle was held in this position to optimise the passage of tracheal tube.

The second step was to use the handle to lift the LMA away from the posterior pharyngeal wall. If the intubation still failed, second attempt was done using the manufactures guidelines for resistance encountered as mentioned below:

- If resistance was felt after advancing the tube beyond the distal opening of the Fastrach airway tube, then the device was too small and a larger LMA was needed.
- If no resistance was felt within 1 cm while advancing the tube, the device was too large and a smaller Fastrach LMA was needed.

- If resistance was felt at 2-2.5cm beyond the distal opening of the LMA, then there must be a down folding of epiglottis and was not within the reach of epiglottic elevating bar, in such case LMA was withdrawn and reinserted.

To avoid airway trauma, force was not used to advance the endotracheal tube. The numbers of intubation attempts were limited to two.

After the confirmation of intubation, the closed circuit was detached from the tube and the LMA was removed, while stabilising the tube with a stabilising rod.

Following the removal of the LMA, closed circuit was re-attached and ventilatory parameters were adjusted according to the patient.

Table 1: socio demographic characters of patients

Characteristics	Group F(n-30)	Group B (n-30)	Total(n-60)	p value
Age(years)	30.33 ±3.81	35.4±8.24	32.87 ±6.86	0.64
Female: Male	9:1	5:1	6.5:1	0.71
Weight(kg)	53.67 ±4.9	55.7±8.53	54.68 ±6.97	0.26
BMI (kg/m^2)	21.78 ±1.52	20.74 ±3.18	21.26 ±2.53	0.11

Table 2: Comparison of MO/MPG,CL grade and ASA grade between two groups

Variable	Group F (n-30)	Group B (n-30)	Total(n-60)	P value
MPG				
O Grade I	25(83.3%)	26(86.7%)	51(85.0%)	0.7
O Grade II	5(16.6%)	4(13.3%)	9(15.0%)	1
Mouth opening				
O 3 fingers	30(100%)	30(100%)	60(100%)	NA
ASA grade				
o1	22(73.3%)	21(70%)	43(71.7%)	0.7
o2	8(26.7%)	9(30%)	17(28.3%)	7
Mask ventilation (easy)	30(100%)	30(100%)	60(100%)	NA

Success rate of first attempt, in Group B was 90% (27/30) and in Group F was 60%(18/30), P = 0.007. In second attempt, in Group B it was 6.7% (2/30), while in Group F it was 20% (6/30) [Table 2], P = 0.12 Overall success rate of intubation in both the groups is P = 0.04 whose difference is statistically significant. In Group Bone patient (3.3%) and in Group F three patients (9.9%) required laryngoscopicintubation [Table3]

Table3: Comparison of insertion time and success rate between two groups

Variable	Group F(n-30)	Group B (n-30)	Total(n-60)	P value
Successful intubation at				
First pass	18(60%)	27(90%)	45(75%)	0.007
Second pass	6 (20%)	2 (6.7%)	8(13.3%)	0.12
Overall success	24(80%)	29(96.7%)	53(88.3%)	0.04
Insertion time device(sec)	18.37 ±4.94	14.57 ±6.28	16.47 ±5.92	0.01
Insertion time tube (sec)	13.08 ±4.42	12.21 ±4.66	12.6±4.53	0.48
Total duration (sec)	28.83 ±8.19	26.36 ±9.31	27.6±8.78	0.28

The insertion time of Blockbuster was14.57 ± 6.28 and Fastrach was18.37 ± 4.94 with aPvalueof0.01 being significant. The insertion time of tube in Blockbuster was 12.21 ± 4.66 where as the insertion time of tube in Fastrach was 13.08 ± 4.42 with P value of 0.48 not being statistically significant.

Complications like incidence of sore throat is 14 (56.0%) cases in patients with GroupFand 3 (10.7%) cases in Group B.The incidence of sore throat was significantly higher in Group F than in Group B in the immediate postoperative period with p value 0.001 which is significant. The cases of post-operative sore throat were treated with warm salt water gargle.The incidence of trauma (blood on device) was seen in 1 (3.6%) in Group B and 4 (16.0%) in Group F. The results for intra-operative trauma were insignificant with p value > 0.05%.

Discussion

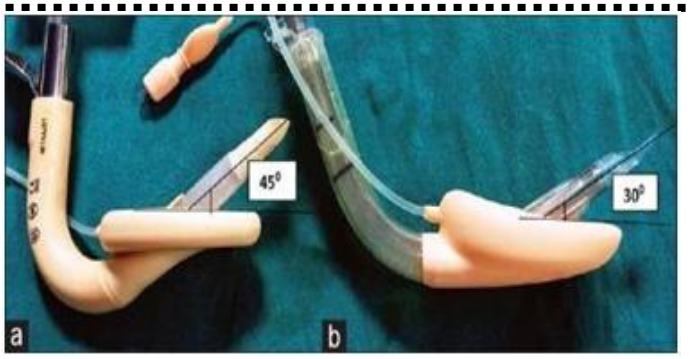
Initially, a study by Aberts Anj et al [1] used the Classic LMA to guide an ETTblindly into the trachea but there were various limitations in the structure of thedevice that posed a difficulty in intubation through the device; ToovercometheselimitationsoftheClassicLMA,A.I.J.Brai nandC.Varghese et al in 1997 developed the first intubating LMA that was popularly called the Fastrach LMA. This device could serve as a ventilatory device and

as an aid to blind / fibre optic intubation. ILMA has anatomically curved rigid airway tube with an integral guiding handle, an epiglottic elevating bar and a ramp built into the floor of the mask that helps in directing the ET tube towards the larynx. Then Blockbuster came into the market in 2012 and it was hypothesised to be better than previous intubating LMA's. Therefore, we decided to compare blockbuster with Fastrach which is considered to be gold standard for blind intubation.

variable	Group f	Group b
Overall success rate Our IKDRC institute	80%	96.7%
Archana et al	89.9%	96.6%
Lakesh an and et al	92%	-
First attempt success rate Our IKDRC institute	60%	90%
Tian ming et al	-	96.3%
Lakesh anand et al	62%	
Yunluo et al	-	90.5
Lieu et al	-	62%

The reasons for such high success rate of intubation through Blockbuster LMA is because of suitable anatomy and alignment of the LMA, the inverted tip ofblockbustertubeandtheanglethattheETTmakeswhilecom ingoutofthebowl of LMA. The airway tube is >95° angulated and short which aligns with the or opharyngeal curve and it aids insertion of tube at an acute angle of 30degrees from the bowl of LMA whereas the Fastrach LMA tube forms an arc of128 degrees and introduces the tube in the laryngeal inlet at an angle of 45degrees so that there are major chances of tube impinging against the anterior tracheal wall in Fastrach as per SuKetal.[8]

Figure 3: Angle of emergence of Endotracheal tube from the cuff of LMA. (a)Fastrach LMA,(b) Block Buster LMA



The posterior-facing bevel of the Blockbuster tube may also reduce the chance of contact with the anterior tracheal wall. Even if the tip of the Blockbuster tubecontactstheanteriortrachealwall,itsflexibilityalsohelps toovercomemechanical impediment to tube passage.

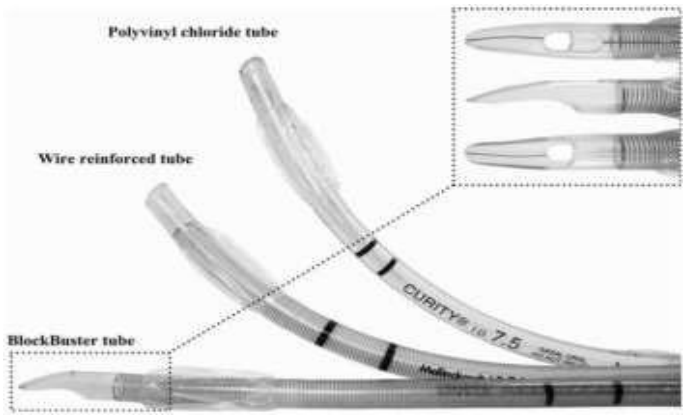


Figure 4: ETT with varied tips

The available literature provides the evidence to support our presumption. It has been shown that the Parker Flex-Tip tracheal tube, which is similar to the Blockbuster tube, can prevent subglotticimpingement of the tube on the anterior tracheal wall during as tracheal intubation with direct laryngoscopy and improve the ease and success rate of or tracheal intubation as studied by **Sugiyama and Manabe**[17]. Insertion time for device placement was significantly less in Group B (18.37 ± 4.94) with P value 0.01. The reason for longer time for device placement in fastrach group could be the Chandy's manoeuvre that we used for optimal fastrach placement. When we did a few cases before beginning with our study we observed that there were more cases of esophageal intubation through fastrach which could be

avoided if we use the Chandy's manoeuvre during device placement and then in tubate through the device.

The results of number of attempts for insertion of Blockbuster and Fastrach LMA were comparable with the study done by Archana Endigeri and Anil Kumar Ganeshnavar et. Al [(2)] in which successful device placement was achieved in all the patients in first attempt. The results of attempts for insertion of Fastrach LMA were similar with the study done by Lakesha Anand and Manpreet Singhet. Al [(3)]with successful insertion of device achieved in first attempt in 47/50 cases (94%) and in second attempt in3/50(6%) cases. In our study, first attempt success rate of blind tracheal intubation was 90% in Group B and 60% in group F and the difference between the two being significant with P value 0.007. The second attempt success rate was 20% in group F and 6.7% in group B. The overall success rate of intubation was 96.7%in group B and 80% success rate in group F with the statistical difference being significant with P value 0.04. Our study is similar to Yunluo et al [(4)] where first attempt success rate of blockbuster intubating LMA was 90.5%. Success of first attempt in Group F was 60% similar to Liu et al [(5)] in which the first attempt success was 67.9% for Fastrach LMA. Our results of first pass success do not correspond with Wang et al.[(6)] because they compared intubation through Blockbuster LMA with respect to sevoflurane concentration in obese patients with BMI30-50 kg/m2 which was not so in our study.[(13)] The results of or tracheal intubation for Blockbuster LMA were comparable with the study done by Zhang Shuai Zhou and Wei Zhang et. al.[(7)]withthefirstattemptsuccessrate95%andoverallsuccessrateofintubation100%[(14).]Results of intubation via Blockbuster LMA were also in consonance with the studies done by Lian Jie and Tian Ming et. al with the first attempt success rate 96.7%. and the study done by Archana Endigeri and Anil Kumar Ganeshna varet. al. (2019) with the first attempt success rate 90% and overall success rate of intubation96.6%. The supraglottic injury score or complication rates like sore throat were less in Group B 3/30(10.7%) when compared to Group F 14/30(56%) with P value (0.01) being significant because of low resistance exerted by Blockbuster tube during passage causing reduced subglottic mucosal injury. The results were similar to Su K et al study in which they got a subglottic injury of 1/53 in blockbuster and 2/54 in fastrach with P value of 0.01 being significant.

Also, the higher incidence of sore throat in Fastrach LMA can be attributed to the rigid metallic structure of the device that can cause more metallic trauma as compared to the silicone body of Blockbuster LMA.

An added advantage with respect to blockbuster intubating LMA is that it is an economy friendly budget device which is available at a price of Rs. 9,500 INR when compared to Fastrach ILMA which is available at a price of Rs. 42,000INR

Limitations

1. The limitations of this study are that our sample size is less; a higher sample size may be needed to confirm the outcomes.
2. As only the patients with normal airway are included in the study further study in patients with difficult airway are needed to evaluate the performance of the device.
3. The proportion of female patients were higher in our study.
4. Fibreoptic visualisation of larynx through these supraglottic airway devices and evaluation of Cormack lehane was not performed in the study due to infra structural issues. Therefore, we could not diagnose the exact cause of failed intubation attempts.

5. We used a standard scale for assessing the ease of LMA insertion, but it is a subjective scale.
6. It was impossible to blind the investigators to the device that they were using.

Conclusion

Blockbuster LMA is better conduit for Oro-tracheal intubation than Fastrach LMA in terms of higher first attempt and overall success rate, lesser time taken for device insertion and ease of insertion of endotracheal tube and lesser post-operative sore throat. Blockbuster LMA provides higher success rate of blind tracheal intubation with fewer complications likes or ethroat and blood staining.

References

1. Alberts Anj et al. the LMA Classic as a conduit for tracheal intubation in adult patient: are view and practical guide. South African Journal of Analgesia 2014; 20(1):77-88
2. Archana Endigeri A, Ganeshnavar A, Varaprasad BV, Shivan and YH, Ayyangouda B. Comparison of success rate of Block Buster ® versus Fastrach® LMA as conduit for blind endotracheal intubation: A pro spectiver an do mised trial. Indian JA naesthesiology2019;63:988-94.
3. Comparative evaluation of Ambu Aura-i and Fastrach intubating laryngealmask airway for tracheal intubation: A randomized controlled trial by LakeshAnand,ManpreetSingh,DheerajKapoor,Anjali Singh Journalof Anaesthesiology Clinical Pharmacology, Volume 35, Issue 1, January-March2019
4. LyuYunluo,ZhangYongetal.ApplicationofBlockBusterintubatinglaryngealmaskairwayinurologicdaysurgery. Journal of Clinical Anaesthesiology2016;32(10)
5. LiuEH, GoyRW, Lim Y, ChenFG. Successof tracheal intubationwithintubating laryngeal mask airways: A randomised trial of the LMA Fastrachand LMACTrach.Anaesthesiology2008; 108:621-6.
6. Wang H, Gao X, Wei W, Miao H, Meng H, Tian M. The optimum sevofluraneconcentration for supraglottic airway Blockbuster insertion with spontaneousbreathinginobesepatients.BMC Anaesthesia2017; 17:156-64
7. Zhang Shuai, Zhou Jing, Zhang Ye, Hao Xiaofang, Tian Ming International journal of anaesthesiology and resuscitation 2016, issue 10. Application of blind or tracheal intubation via Blockbuster LMA in patient sunder going general anaesthesia
8. Su K, Gao X, Xue FS, Ding GN, Zhang Y, Tian M. Difficult tracheal tube pass ageandsubglottic airway injury during intubation with the Glide Scope video laryngo scope: Arandomized , controlled comparison of three tracheal tubes. Anaesthesia 2017;72:504-11.
9. Emsley JG, Hung OR. A ‘‘VL tube’’ for endotracheal intubation using video laryngoscopy. Canadian JournalofAnaesthesia2016; 63:782–3
10. SugiyamaK,ManabeY,KohjitaniA.TheParkerFlex-Tiptubepreventssubglottic impingement on the tracheal wall during nasotracheal intubation.AnaesthesiaandAnalgesia2012;115:212–3.