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Original Research Article

A Comparison of Endotracheal Intubation with Ambu Aura Gain and Blockbuster LMA in Anaesthetized Adult Patients under Controlled Ventilation: A Randomised Single Blinded Study

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Abstract

Introduction: Supraglottic airway devices (SADs) that facilitate tracheal intubation can provide an alternative approach to airway management during general anaesthesia. This study compared Ambu® AuraGain™ and LMA BlockBuster® with respect to first-attempt tracheal intubation success and other airway-related parameters in adult patients undergoing elective surgery.

Methodology: after ethical committee approval, 60 patients, of age group 18-60 years, of either gender, belonging to ASA Grade I & II, undergoing elective surgical procedures under general anesthesia were randomly allocated into two groups - Ambu Aura Gain group (AA)(n=30)- Ambu Aura Gain device was used. Blockbuster LMA group (BB) (n=30)- Blockbuster LMA device was used.

Results: The success rate of first successful attempt of ET insertion was significantly higher in Blockbuster LMA (p-value =0.023). Ease of LMA insertion was significantly easier (p= 0.045), and time required for LMA insertion was lower in Blockbuster LMA (p=0.022).

Conclusion: Blockbuster LMA was found to be superior than Ambu® AuraGain™ in terms of first attempt successful intubation, time taken for LMA insertion, better oropharyngeal leak pressure; ease of insertion compared to Ambu Aura Gain.

Keywords: Blockbuster LMA, Ambu® AuraGain™.

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Introduction

Managing a difficult airway during anesthesia induction is among the most challenging tasks for anesthesia professionals. In recent years, supraglottic airway devices, particularly those designed with an intubation conduit, have emerged as vital adjuncts in these scenarios, bridging ventilation and tracheal intubation across diverse patient profiles.[1] Laryngeal Mask Airway (LMA) is a bridge between endotracheal intubation and bag and mask ventilation.

The LMA was conceived and designed by Dr. Archie Brain UK in 1983 and introduced into clinical practice in 1988, which brought a revolution in anesthesia. [2]

The Ambu AuraGain is a single-use, phthalate free-Polyvinyl Chloride (PVC) material made, anatomically curved SAD, which is designed for both ventilation and as a conduit for tracheal intubation.[3] It incorporates a 90° preformed curvature designed to approximate airway anatomy and bite block and has navigation marks to guide a fiberscope during intubation.

A newer BlockBuster LMA invented by Prof. MingTian. It has been gaining popularity to provide increased safety and quality of anaesthesia. It is advantageous in providing ventilation and is being increasingly used for cases of difficult intubation. [4] The Block Buster LMA has some unique features like its 95-degree angulated airway that makes ventilation and intubation easier through it. [5]

Despite individual advantages, there is limited head-to-head comparison of these devices specifically in the setting of first successful attempt for endotracheal intubation, where smooth endotracheal intubation without complications along with an effective ventilation are critical.{6}

Hence, we designed this study to compare Ambu Aura Gain with blockbuster LMA in terms of first successful attempt for endotracheal intubation in percentage as our primary objective and to compare ease of LMA insertion, second successful attempt for endotracheal tube insertion in percentage, oropharyngeal seal pressure, haemodynamic responses [HR, SBP/DBP/MAP], and the removal characteristics and percentage of postop complications as our secondary objectives.

Methodology

This hospital based, prospective randomized comparative study was conducted in the Department of Anaesthesiology, Jawahar Lal Nehru Medical College and the associated group of hospitals, Ajmer. It was approved by Institutional Ethics Committee (letter number- 02555/Acad-III/MCA/2024, dated-24/08/2024). The study was conducted over the period of 1 year. (1/11/2024 to 30/10/2025).

Inclusion Criteria: Patients who were ready to give consent, aged between 18–60 years of either gender, belonging to ASA physical status I and II, scheduled to undergo elective surgeries under general anesthesia with surgery duration less than 3 hours.

Exclusion Criteria: Patients refusal, mouth opening <2.5 cm, patients with chronic disease, anticipated difficult intubation, pregnancy, head and neck surgeries, abnormal or distorted anatomy of the airway and patients with the increased risk of aspiration of gastric contents were excluded from the study.

Randomization: randomization was done by computer generated table of random numbers.

Study groups: A minimum of 60 patients undergoing elective surgical procedures under general anesthesia were divided into two groups:

- **Group AA- (n=30) –** Ambu Aura Gain LMA was used.
- **Group BB (n=30)-** Block Buster LMA was used.

Procedure: Patient was identified, PAC, informed written consent and fasting status checked. Premedication with inj. Glycopyrrolate 0.004 mg/kg IV and inj. Fentanyl 2 µg/kg IV was given. Preoxygenation was done with 100% O2 for 3 minutes. Induction was done using inj. Propofol 2 mg/kg IV, Inj Atracurioum 0.5 mg/kg was given.

The appropriate size of LMA was selected according to body weight. Size 3 for (30-50 kg) and size 4 for (50-70 kg) as per the manufacturers' guidelines.

After the successful placement of SGD, patients in group AA were intubated using a PVC ETT, while those in group BB were intubated with a BB LMA tube. During the insertion of the ETT, maneuvers like jaw thrust, adjusting insertion depth, head extension, and neck flexion were done as per the requirement. A maximum of two attempts were allowed. If intubation was unsuccessful after two attempts, the procedure was abandoned, and tracheal intubation was performed by direct laryngoscopy. Anesthesia was maintained with 1.5–2.0% sevoflurane with 50% oxygen and 50% nitrous oxide. After completion of the surgery, the standard reversal protocol of the institution was followed, and ETT was removed.

We assessed the first successful attempt for endotracheal intubation in percentage, ease of LMA insertion in terms of the number of insertions attempts and time needed for LMA placement, oropharyngeal seal pressure (OSP), second attempt successful endotracheal intubation in percentage and haemodynamic parameters.

Statistical Analysis: Descriptive statistics in terms of frequency (%), mean and standard deviation (SD) or median and interquartile range (IQR) were used to characterize the participants. Prevalence of study variables was calculated in terms of percentage with 95% confidence interval (CI). The association between two categorical variables was tested by chi-square or Fisher exact test. For normally distributed variables, we used unpaired t-test. The results between two groups were compared using unpaired t-test. A p-value <0.05 was considered significant for all statistical tests. This randomized controlled trial was designed, conducted, analyzed and reported in accordance with the Consolidated Standards of Reporting Trials (CONSORT) guidelines. The study participants were enrolled, randomized, allocated to the intervention group, followed up and analyzed as illustrated in the CONSORT flow diagram.

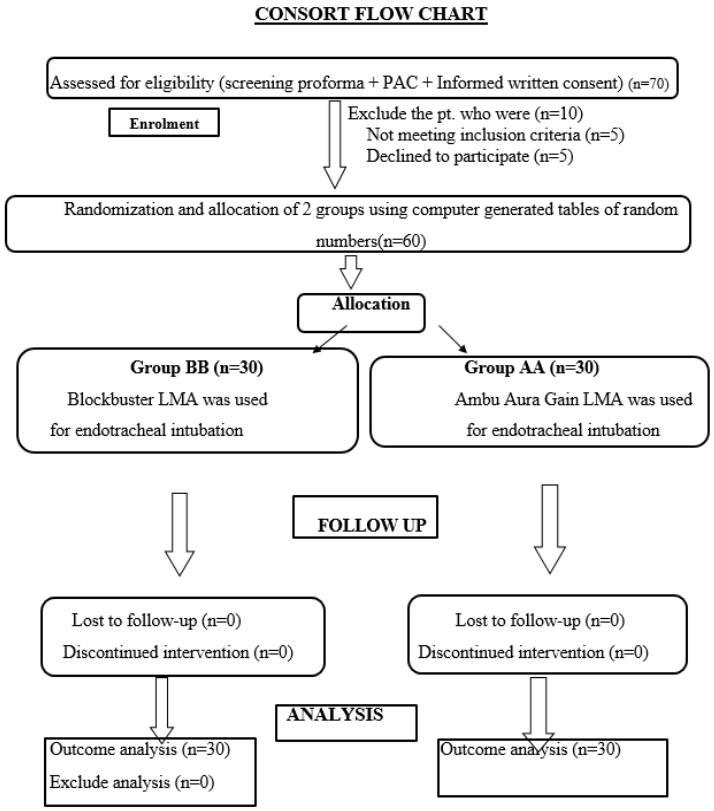

Chart 1: consort flow chart

Observations and Results

Table 1: Distribution of study subjects according to first successful attempt of ET insertion.

First successful attempt of ET insertion	GROUP AA (n=30)		Group BB (n=30)		p value
	N	%	N	%	
Yes	23	76.67	29	96.67	**0.023 (S)**
No	7	23.33	1	3.33	
Total	30	100	30	100	

Table 1 shows that number of patients intubated in first attempt were significantly higher in group BB compared to group AA. On inter-group comparison, results were statistically significant with p-value = 0.023.

Table 2: Comparison of ease of LMA insertion between study groups.

Ease of Insertion	GROUP AA (n=30)		GROUP BB (n=30)		p value
	N	%	N	%	
Grade I (No Resistance)	13	43.33	19	63.33	**0.045 (S)**
Grade II (Mild resistance)	12	40.00	11	36.67	
Grade III (Moderate resistance)	5	16.67	0	0	
Garde IV (inability to place a device)	0	0	0	0	
Total	30	100	30	100	

Table 2 shows that ease of LMA insertion was significantly better in group BB compared to group AA. There was statistically significant difference in the ease of LMA insertion in between both Groups (p = 0.045).

Table 3: Comparison of mean time taken to LMA insertion (sec.) and Oropharyngeal seal pressure (OSP)

Parameters	Group AA (n=30)	Group BB (n=30)	p value
Time taken to LMA insertion (sec.) (MEAN ± SD)	20.05 ± 4.68	17.77 ± 2.56	**0. 022 (S)**
OSP (cm of H_2O) (Mean ± SD)	25.13 ± 2.68	29.30 ± 2.46	**<0.0001 (S)**

Table 3 shows that time taken for LMA insertion was less and OSP was higher in group BB as compared to group AA with statistically significant difference. ($p<0.05$).

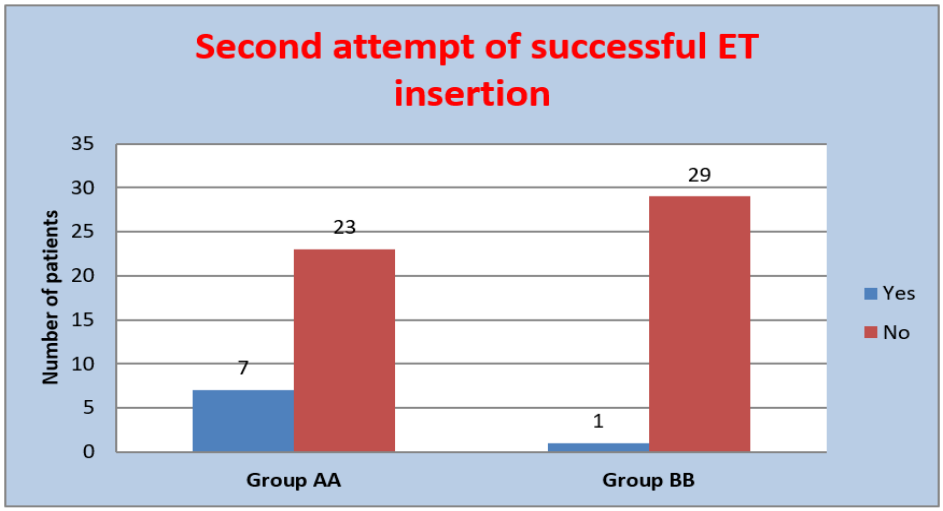

Figure 1: Distribution of study subjects according to second successful attempt of ET insertion.

Figure 1 shows that number of patients intubated in second attempt were significantly lower in group BB compared to group AA. On inter-group comparison, results were statistically significant with p-value = 0.023.

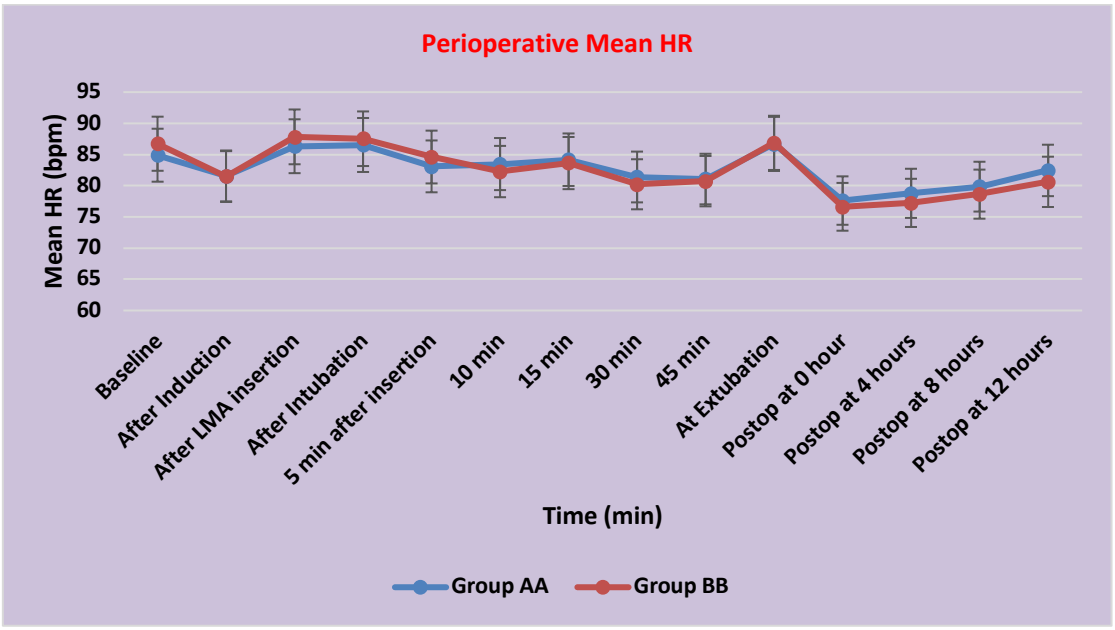

Figure 2: Comparison of mean Heart rate (HR) (bpm) between study groups

Figure 2 shows that after LMA insertion, and after ET insertion, both groups experienced increase in heart rate but the difference was not significant. At extubation, again both groups experienced increase in heart rate but the difference was not significant. Both groups were comparable in terms of mean HR with no significant difference.

Discussion

Safe and effective airway management is the foundation of quality anaesthetic practice. Laryngeal mask airways (LMA) have been introduced with an intention to reduce pressor response. Compared to first generation LMAs, the second-generation LMAs with property of easier insertion, higher oropharyngeal leak pressures and presence of gastric port improves safety profile for its use in controlled ventilation. Hence, present study was conducted to compare success of tracheal intubation using newer second generation divices i.e. Ambu® Aura Gain™ versus Block Buster® LMA in adult patients. Both AA group and BB group patients were comparable regarding age, sex, weight, ASA grade and duration of surgery with no statistically significant difference ($p>0.05$).

First successful attempt for endotracheal intubation was considered when the insertion of endotracheal tube through respective LMA device to obtain capnograph waveform and to effectively secure the airway completed in first attempt. If first attempt was failed then second attempt was taken to insert the ET tube. In our study, in group AA, ET insertion was done in first attempt in 23 patients

(76.67 %), in second attempt 7 patients (23.33%). In group BB, ET insertion was done in first attempt in 29 patients (96.67 %), in second attempt 1 patient (3.33%). The high success rate of intubation through the BB LMA could be attributed to the more than 95° angulated short airway tube, which matches the oropharyngeal curve. The Parker Flex inverted BB tube tip helps to overcome the impingement of the anterior tracheal wall during intubation. The tip places a role for self-guidance that reduces the difficulty of intubation and damage to the glottis and improves the success rate of intubation.

Similar findings were found in the study done by Manohar M et al.[9] in their study, the success rate of first-attempt intubation is higher with the BB LMA group when compared with AA LMA. A failure rate of 13% was observed in group A. In contrast, 86.66% of the patients were intubated in the first attempt, and 13.33% were intubated in the second attempt, for a success rate of 100% in group B.

Similar findings were found by Yashwani G et al.[8], The first attempt success rate of blind endotracheal intubation through the SGA device was 80% in the LMA Block Buster® group compared to 4% in the Ambu® Aura Gain™ group.

Ease of LMA insertion was assessed using a subjective scale of 1 – 4 (1 - resistance, 2 - mild resistance, 3 - moderate resistance, and 4 - inability to place a device).

There was statistically significant easier insertion of Block buster LMA compared to Ambu Aura Gain. LMA Block Buster® was relatively easy to insert because of modification in the design of Block Buster® such as suitable anatomical curvature and soft distal part (gastric port).

In the study done by Raiger LK et al.[6] LMA Block Buster® and LMA Fastrach® were found to be inserted with more ease as compared to Ambu® Aura Gain™ Gain (Block Buster®>Fastrach®>Ambu® Aura Gain™).

The time taken for LMA insertion was less and OSP was higher in group BB as compared to group AA with statistically significant difference. ($p<0.05$). Our study supported by Garg S et al.[10] oropharyngeal seal pressure (OSP) demonstrated significantly better performance with LMA Block Buster (29.9 ± 1.71 cm H_2O) compared to Ambu Aura Gain (22.7 ± 1.32 cm H_2O; p value 0.001) in their study.

Both groups exhibited comparable haemodynamic parameters perioperatively without significant difference.

Conclusion

In this study we compared Ambu Aura Gain versus Block Buster LMA regarding intubation characteristics and we found that both Block Buster LMA and Ambu Aura Gain are suitable devices for blindly securing the airway. Easy to insert and provide effective airway control during positive pressure ventilation.

Blockbuster LMA was found to be superior to Ambu® Aura Gain™ in terms of first successful attempt of endotracheal intubation, better oropharyngeal leak pressure; better ease of insertion compared to Ambu Aura Gain. Hence, Blockbuster LMA was found to be superior to Ambu® Aura Gain™ in terms of first successful attempt of endotracheal intubation.

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