ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 08 | August - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A PROSPECTIVE RANDOMISED STUDY COMPARING CLINICAL PERFORMANCE OF AMBU AURAGAIN AND LMA BLOCKBUSTER IN ADULT PATIENTS UNDERGOING GENERAL ANAESTHESIA FOR ELECTIVE SURGERIES.

Anesthesiology

Dr. Smriti Garg	Junior Resident Lala Lajpat Rai Memorial Medical College Meerut Uttar Pradesh
Dr. Sweta	Associate Professor Lala Lajpat Rai Memorial Medical College Meerut Uttar Pradesh
Dr. Yogesh Kumar Manik	Professor Lala Lajpat Rai Memorial Medical College Meerut Uttar Pradesh
Dr. Navneet Gupta	Assistant Professor Lala Lajpat Rai Memorial Medical College Meerut Uttar Pradesh

ABSTRACT

Background And Aims: Supraglottic airway devices are pivotal in modern airway management. While endotracheal intubation remain the gold standard, it carries risks of complications including trauma and haemodynamic instability. Supraglottic airway devices like Ambu AuraGain (single-use) and LMA BlockBuster (reusable) offer less invasive alternatives with advanced features, though comparative data remain limited. This study compared Ambu AuraGain and LMA BlockBuster in terms of oropharyngeal seal pressure (OSP), insertion efficacy, and complications. **Methods:** This randomized study compared 90 ASA I-II patients (18-65 years) receiving either device during elective surgery. Standardized anesthesia included propofol, fentanyl, and vecuronium. Primary outcomes assessed insertion success, time to placement, and oropharyngeal seal pressure (OSP). Secondary outcomes evaluated haemodynamics and complications. Data were analysed using Student's t-test and Chi-square test, with p value 0.05 deemed statistically significant. **Results:** LMA BlockBuster demonstrated superior performance with 100% first-attempt success versus 88.9% for AuraGain (p=0.066). It achieved higher OSP (29.9 vs 22.7 cm H_2O, p value 0.001) and faster placement (12.3±2.2 vs 17.6±2.0 sec, p value 0.001). Ease of insertion favored BlockBuster (84.4% vs 77.8% effortless). Haemodynamic stability was comparable between groups. AuraGain showed higher rates of sore throat (13.3% vs 4.4%), displacement (6.7% vs 0%), and blood staining (4.4% vs 0%), though not statistically significant. **Conclusion:** LMA BlockBuster demonstrated advantages in insertion success, airway sealing, and speed of placement while maintaining haemodynamic stability. Both devices were clinically effective, with BlockBuster potentially offering superior performance characteristics for routine and challenging airway management.

KEYWORDS

Supraglottic airway devices, Airway management, General anesthesia, Ambu AuraGain, LMA BlockBuster

INTRODUCTION

Airway management remains a critical component of general anaesthesia, balancing the need for secure oxygenation with minimizing patient morbidity. While endotracheal intubation has traditionally been the gold standard, its association with haemodynamic instability, airway trauma, and postoperative complications has driven the adoption of supraglottic airway devices (SADs)[1]. Second-generation SADs like the Ambu AuraGain and LMA BlockBuster represent significant advancements, offering improved sealing pressures and integrated gastric access while maintaining ease of use.

The single-use Ambu AuraGain features a 90° preformed curvature matching airway anatomy, achieving seal pressures up to 40 cm H_2O. Its integrated gastric port allows nasogastric tube placement, reducing aspiration risk.[2] In contrast, the reusable LMA BlockBuster's >95° angulation and 30° tracheal tube guidance system facilitate easier insertion and blind intubation.[3] Both devices offer distinct advantages, yet robust comparative data remain limited.

This knowledge gap is clinically significant as SAD selection impacts airway security, ventilation efficiency, and patient outcomes. Existing studies show conflicting results regarding these devices' relative performance in seal quality, insertion success rates, and complication profiles.[4] With increasing reliance on SADs for both routine and difficult airway management, evidence-based device selection becomes paramount.

Our prospective randomized study compared these devices in adult elective surgery patients, evaluating oropharyngeal seal pressure (primary outcome), insertion characteristics, haemodynamic stability, and complications. The findings provide actionable insights for clinicians choosing between these advanced SADs, particularly in resource-constrained settings where reusable versus disposable device decisions carry economic implications.

This research contributes to optimizing airway management strategies by clarifying the performance differences between two leading second-generation SADs. By addressing current evidence gaps, we aim to guide clinical decision-making and improve patient outcomes in diverse anaesthetic scenarios, from brief outpatient procedures to more complex surgical cases requiring secure ventilation.

METHODS

This prospective, randomized, comparative study was conducted in the Department of Anaesthesiology at a tertiary care center from 2023 to 2025 after obtaining approval from the Institutional Ethical Committee. Written informed consent was obtained from all participants in their native language, either Hindi or English, following a detailed explanation of the study protocol.

The sample size was determined using the formula for comparing two population means, with a target of 90 patients (45 per group) to achieve adequate statistical power. The calculation incorporated a 95% confidence level (Z=1.96), the standard deviation from pilot data, and a predefined margin of error representing a clinically meaningful difference between groups.

Randomization was achieved through computer-generated random tables, with participants equally divided into two groups of 45 patients each. Allocation concealment was maintained using sealed opaque envelopes that were opened immediately before device insertion. Group A received the Ambu AuraGain (AAG) supraglottic airway device, while Group B received the LMA BlockBuster (LBB).

The study enrolled 90 adult patients aged 18-65 years with ASA physical status I or II who were scheduled for elective surgeries under general anesthesia lasting less than 2 hours. Exclusion criteria included patients with anticipated difficult airways (Mallampati grade III/IV), high aspiration risk such as pregnancy or gastroesophageal reflux disease, cervical spine pathology, or known allergies to device materials. All participants underwent a thorough pre-anesthetic evaluation including airway assessment and recording of baseline vital signs (heart rate, systolic and diastolic blood pressure, and oxygen saturation).

A standardized anesthesia protocol was followed for all patients. Premedication consisted of intravenous glycopyrrolate (0.2 mg), midazolam (1 mg), and ranitidine (50 mg). Induction was performed with propofol (2 mg/kg) and fentanyl (2 µg/kg), followed by vecuronium (0.1 mg/kg) for neuromuscular blockade. After confirming adequate mask ventilation, the assigned supraglottic airway device was inserted by an anesthesiologist with more than three years of experience. Device size was selected based on patient weight, with size 3 for 30-50 kg and size 4 for 50-70 kg patients. Correct placement was verified through capnography, bilateral chest auscultation, and confirmation of adequate tidal volume (>7 mL/kg).

The primary outcomes measured were oropharyngeal seal pressure, assessed by closing the expiratory valve at a fresh gas flow of 3 L/min, and first-attempt insertion success rate. Secondary outcomes included the time required to secure the airway (from device pickup to circuit connection), hemodynamic parameters (heart rate, systolic and diastolic blood pressure, and mean arterial pressure) recorded at baseline, during device insertion, and at a fixed time interval thereafter, as well as postoperative complications such as sore throat, device displacement, blood staining on the device, and hoarseness.

Statistical analysis was performed using SPSS version 23.0. Continuous variables were expressed as mean ± standard deviation and compared using Student's t-test, while categorical variables were presented as percentages and analyzed with either Chi-square or Fisher's exact test as appropriate. A p-value of less than 0.05 was considered statistically significant for all comparisons.

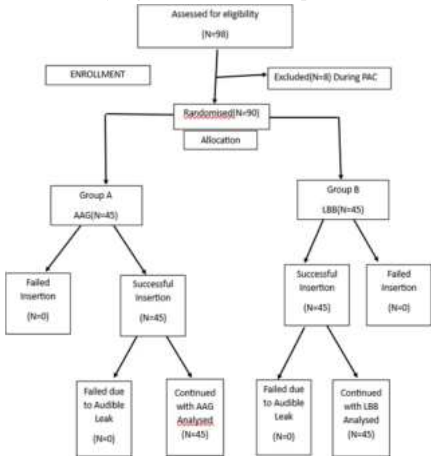

Figure 1: Consolidated standards of reporting trials (CONSORT) flow diagram.

RESULTS

Of the 98 patients recruited for this study, eight were excluded before allocation after pre-anaesthetic checkup. The final analysis, as per the protocol, had 90 patients undergoing elective surgeries under general anaesthesia, with 45 patients each randomized to the Ambu AuraGain and LMA BlockBuster groups **(See Figure 2).** Baseline demographic characteristics were well-matched between groups **(See Table 1).** The mean age was comparable between Ambu AuraGain (42.2 ± 12.1 years) and LMA BlockBuster (43.5 ± 11.8 years) groups (p=0.728). Gender distribution showed no significant difference (Ambu AuraGain: 19 males, 26 females; LMA BlockBuster: 23 males, 22 females; p=0.398). Body mass index (BMI) was similar between groups (Ambu Auragain: 22.06 ± 4.35 kg/m²; LMA BlockBuster: 21.86 ± 4.05 kg/m²; p=0.45). ASA physical status distribution showed slightly more ASA I patients in the LMA BlockBuster group (46.7% vs 33.3%), though this difference was not statistically significant (p=0.282).

Table 1: Socio-Demographic and Baseline Characteristics of the participants.

Parameter	AAG Group (n=45)	LBB Group (n=45)	p-value
Age (years)	42.2 ± 12.1	43.5 ± 11.8	0.728
Gender (M:F)	19:26	23:22	0.398
BMI (kg/m²)	22.06 ± 4.35	21.86 ± 4.05	0.45
ASA I:II	15:30	21:24	0.282
Mallampati I:II	27:18	19:26	0.140

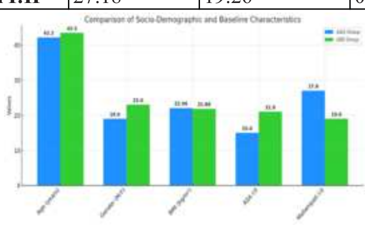

Figure 2: Comparison of Oropharyngeal seal pressure (OSP) among both the groups.

The primary outcome of oropharyngeal seal pressure (OSP) demonstrated significantly better performance with LMA BlockBuster (29.9 ± 1.71 cm H_2O) compared to Ambu AuraGain (22.7 ± 1.32 cm H_2O; p value 0.001) **(See Figure 3)**. This difference of 7.2 cm H_2O represents a clinically important advantage for the LMA BlockBuster in maintaining airway seal during positive pressure ventilation. Regarding insertion characteristics, LMA BlockBuster showed superior performance with a 100% first-attempt success rate compared to 88.9% for Ambu AuraGain (p=0.021). In the Ambu AuraGain group, 5 patients (11.1%) required a second insertion attempt. The mean time for successful device placement was significantly shorter for LMA BlockBuster (12.3 ± 2.2 seconds) compared to Ambu AuraGain (17.6 ± 2.0 seconds; p value 0.001), representing a 30% reduction in insertion time **(See Table 2).**

Table 2: Comparison of Insertion Characteristics viz. First attempt success, Insertion time(sec), Ease of insertion (VAS) of both devices.

Parameter	AAG Group	LBB Group	p-value
First-attempt success	40 (88.9%)	45 (100%)	0.021
Insertion time (sec)	17.6 ± 2.0	12.3 ± 2.2	0.001
Ease of insertion (VAS)	6.2 ± 1.8	8.5 ± 1.2	0.001

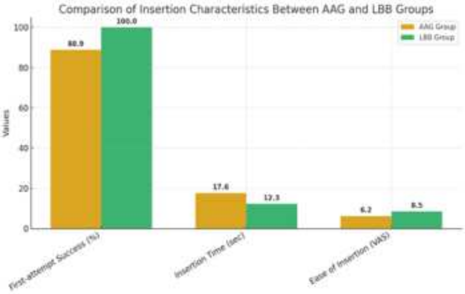

Figure 3: Insertion Characteristics Between AAG and LBB Group

Haemodynamic stability was well-maintained with both devices throughout the procedure **(See Table 3)**.

Table 3: Change in various Haemodynamic Parameters viz, Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Mean Arterial Pressure, Oxygen Saturation at various time points.

A. Heart Rate (HR, bpm)			
Time Interval	**Ambu AuraGain**	**LMA BlockBuster**	**p-value**
Pre-Op	89.9 ± 14.4	91.2 ± 15.2	0.678
During Insertion	93.7 ± 11.8	94.4 ± 12.5	0.785
1 min	92.6 ± 11.9	92.4 ± 13.1	0.94
5 min	92 ± 12.3	90 ± 13	0.455
10 min	90.6 ± 10.7	88.9 ± 13.1	0.502
15 min	91.5 ± 11.4	88.9 ± 11.7	0.289
30 min	90.5 ± 12.7	88.1 ± 12	0.359
45 min	92 ± 13.2	89.4 ± 13.1	0.351
1 hour	92.4 ± 13.3	89.4 ± 13.9	0.298
1.5 hours	94.7 ± 12.5	93.2 ± 14	0.593
Post-Op	98.4 ± 11.6	97.2 ± 10.8	0.613
B. Systolic Blood Pressure (SBP, mmHg)			
Pre-Op	125 ± 11.36	127 ± 14.2	0.463
During Insertion	125 ± 12.7	126 ± 12.5	0.707
1 min	121 ± 14.31	122 ± 13.03	0.73
5 min	123 ± 14.31	121 ± 15	0.519
10 min	123 ± 14.46	122 ± 15.61	0.753
15 min	122 ± 10.85	123 ± 13.83	0.704
30 min	125 ± 11.26	126 ± 14.1	0.711
45 min	125 ± 12.2	126 ± 12.16	0.698
1 hour	127 ± 11.63	129 ± 11.63	0.417
1.5 hours	130 ± 10.74	131 ± 9.16	0.636
Post-Op	132 ± 9.76	134 ± 10.64	0.355
C. Diastolic Blood Pressure (DBP, mmHg)			
Pre-Op	78.7 ± 9.85	78.4 ± 10.1	0.887
During Insertion	77.3 ± 10.35	76.3 ± 9.64	0.636

 PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

1 min	76.8 ± 10.36	75.6 ± 13.89	0.643
5 min	78 ± 10.38	76.9 ± 12.53	0.651
10 min	77.6 ± 9.17	78 ± 11.12	0.853
15 min	79.6 ± 8.77	80.9 ± 10.79	0.532
30 min	79.8 ± 7.65	81.9 ± 11.3	0.305
45 min	80.1 ± 7.89	84.3 ± 10.57	**0.035**
1 hour	82.6 ± 7.04	86.6 ± 10.35	**0.035**
1.5 hours	84.6 ± 8.13	87 ± 8.4	0.172
Post-Op	78.7 ± 9.85	78.4 ± 10.1	0.887
D. Mean Arterial Pressure (MAP, mmHg)			
Pre-Op	91.3 ± 10.16	91.8 ± 13.39	0.842
During Insertion	91.3 ± 10.25	90.5 ± 12.44	0.74
1 min	89.3 ± 12.5	87.3 ± 13.01	0.459
5 min	89.2 ± 12.24	88.6 ± 15.36	0.838
10 min	91.2 ± 12.33	89.3 ± 16.14	0.532
15 min	90.4 ± 9.36	91.5 ± 13.04	0.647
30 min	92.2 ± 9.75	93.2 ± 12.52	0.674
45 min	92.3 ± 8.95	94.1 ± 13.18	0.451
1 hour	92.8 ± 9.48	95.3 ± 11.61	0.266
1.5 hours	95.9 ± 6.71	94.4 ± 9.41	0.386
Post-Op	97.6 ± 8.11	100.3 ± 10.16	0.167
E. Oxygen Saturation (SpO_2, %)			
Pre-Op	98.7 ± 0.809	98.5 ± 0.815	0.246
During Insertion	99.9 ± 0.252	99.9 ± 0.288	1
1 min	99.9 ± 0.252	99.9 ± 0.358	1
5 min	99.9 ± 0.288	99.9 ± 0.358	1
10 min	100 ± 0.208	99.9 ± 0.383	0.127
15 min	99.8 ± 0.367	99.9 ± 0.252	0.135
30 min	99.9 ± 0.252	100 ± 0.149	0.124
45 min	100 ± 0.208	100 ± 0	**1**
1 hour	99.9 ± 0.318	100 ± 0	**0.038**
1.5 hours	100 ± 0.149	100 ± 0	**1**
Post-Op	99.8 ± 0.42	99.9 ± 0.344	**0.22**

Mean heart rates remained comparable between groups at all time points (pre-insertion: Ambu AuraGain 89.9 ± 14.4 vs LMA BlockBuster 91.2 ± 15.2 bpm, p=0.678; post-insertion: Ambu AuraGain 98.4 ± 11.6 vs LMA BlockBuster 97.2 ± 10.8 bpm, p=0.613). Similarly, systolic blood pressure showed no significant differences (pre-insertion: Ambu AuraGain 125 ± 11.4 vs LMA BlockBuster 127 ± 14.2 mmHg, p=0.463; post-insertion: Ambu AuraGain 132 ± 9.8 vs LMA BlockBuster 134 ± 10.6 mmHg, p=0.355). These findings suggest both devices were equally well-tolerated from a cardiovascular perspective.

Postoperative complications showed some notable differences between devices (See Figure 4,5,6,7&8).

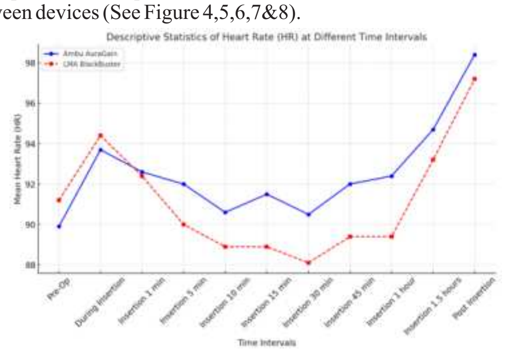

Figure 4: Heart Rate (HR) at Different Time Intervals

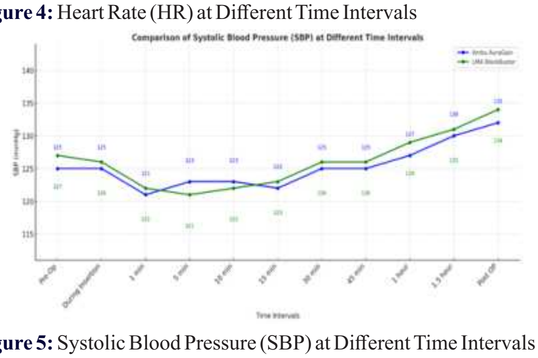

Figure 5: Systolic Blood Pressure (SBP) at Different Time Intervals

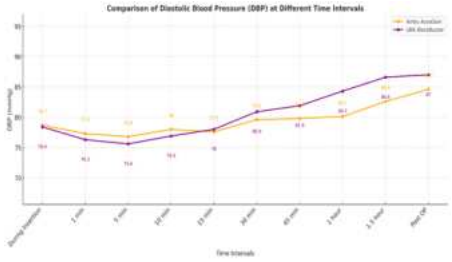

Figure 6: Diastolic Blood Pressure (DBP) at Different Time Intervals

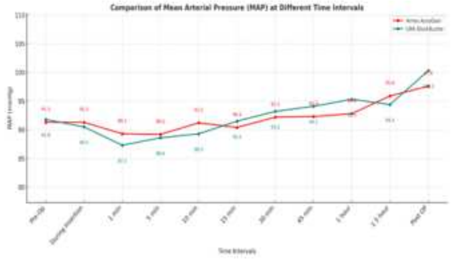

Figure 7: Mean Arterial Pressure (MAP) at Different Time Intervals

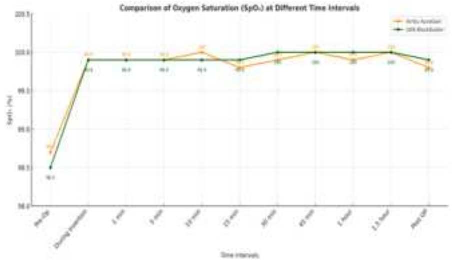

Figure 8: Oxygen Saturation (SpO_2) at Different Time Intervals

Sore throat was reported by 13.3% of Ambu AuraGain patients compared to 4.4% of LMA BlockBuster patients, though this difference did not reach statistical significance (p=0.138). Device displacement occurred in 6.7% of Ambu Auragain cases but was not observed with LMA BlockBuster (p=0.078). Blood staining of the device was noted in 4.4% of Ambu AuraGain insertions but absent with LMA BlockBuster (p=0.153). Hoarseness was reported in one Ambu AuraGain patient (2.2%) versus none in the LMA BlockBuster group (p=0.315).

The ease of nasogastric tube placement through the device's gastric channel was comparable between groups, with successful placement in 84.4% of Ambu AuraGain and 88.9% of LMA BlockBuster cases (p=0.756). Minor resistance during NG tube placement was encountered in 15.6% of Ambu AuraGain and 11.1% of LMA BlockBuster cases. Mallampati classification analysis showed that LMA BlockBuster performed well across airway grades, with successful placement in all patients regardless of Mallampati grade (I or II) **(See Figure 9)**.

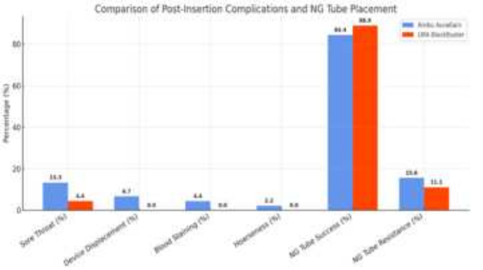

Figure 9: Post-Insertion Complications and NG Tube Placement

These comprehensive results demonstrate that while both devices were effective for airway management, the LMA BlockBuster showed several clinically relevant advantages over the Ambu AuraGain, including superior sealing pressure, more reliable first-attempt insertion, faster placement time, and a trend toward fewer postoperative complications. The haemodynamic stability maintained by both devices supports their safety in routine anesthetic practice.

DISCUSSION

Our study demonstrated that the LMA BlockBuster outperformed the Ambu AuraGain in critical aspects of airway management. LMA BlockBuster's significantly higher OSP (29.9 vs. 22.7 cm H_2O; p value 0.001) aligns with its design features, including a larger cuff surface area and ergonomic curvature. This advantage is clinically relevant for procedures requiring positive-pressure ventilation, as it reduces the risk of gastric insufflation and aspiration. **Gaur et al. (2023)**[1]**, Raiger et al. (2022)**[5]**, Sharma et al. (2022)**[4]**, Kumar et al. (2022)**[6]**,** also showed similar results in their respective studies.

LMA BlockBuster's 100% first-attempt success rate and shorter insertion time (12.3 vs. 17.6 seconds; p value 0.001) can be attributed to its >95° preformed angulation, which facilitates alignment with oropharyngeal anatomy. This finding corroborates **Raiger et al. (2022)**[5], who reported similar ease of insertion with LMA BlockBuster in difficult airway scenarios. **Harjeet Singh Arora et al. (2022)**[2] also observed that LMA BlockBuster had better insertion characteristics compared to Ambu AuraGain, further supporting the findings of our study. **Pathak et al. (2022)**[7] reported that while both devices were generally easy to insert, LMA BlockBuster had a slight edge in terms of user experience and patient comfort, reinforcing the notion that insertion ease may differ marginally between devices.

Both devices maintained haemodynamic stability, with no significant differences in HR, SBP, or DBP (0.05). However, Ambu AuraGain had numerically higher rates of sore throat (13.3% vs. 4.4%) and displacement (6.7% vs. 0%), though these differences were not statistically significant. In the study conducted by **Gaur et al. (2023)**[1] HR comparisons between different airway devices also showed no significant baseline differences. In **Selvin et al. (2023)**[8], HR differences during the insertion phase were observed to be more pronounced, with the LMA BlockBuster group showing higher HR values, particularly 1 minute post-insertion, which contrasts with the minimal fluctuations found in our study.

LMA BlockBuster is preferable for rapid, high-seal scenarios: Its design advantages make it ideal for short elective surgeries or cases requiring secure ventilation. While Ambu AuraGain remains a viable alternative though it required more insertion attempts, its integrated gastric port offers utility in procedures with aspiration risk.

However, the study has limitations. The sample size was limited, which may affect the generalizability of the findings. Additionally, factors such as patient demographics, operator experience, and anatomical variations were not accounted for, which could influence OSP measurements. Further research with larger, diverse populations and controlled variables is needed to confirm these findings and assess their clinical impact.

CONCLUSION

The LMA BlockBuster demonstrated superior first-attempt insertion success, higher seal pressure, and faster placement compared to the Ambu AuraGain, with comparable haemodynamic stability. While both devices were clinically effective, the LMA BlockBuster may offer slight advantages in ease of use and airway security.

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