International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 24s, 2025
https://www.theaspd.com/ijes.php

A Comparative Study Of Baska Mask And Proseal Laryngeal Mask Airway For General Anaesthesia With Intermittent Positive Pressure Ventilation

Dr. Ankita Singh[1], Dr. Chethanananda T. N[2], Dr. Rani Shankar Jakati[3], Dr. Sinchana Shetty[4]
[1]Junior Resident, Department of Anaesthesiology, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[2]MBBS, DA, DNB, Professor and HOD, Department of Anaesthesiology, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[3]Junior Resident, Department of Anaesthesiology, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[4]Junior Resident, Department of Anaesthesiology, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[*]**Corresponding author:** ankitasingh4920@gmail.com

ABSTRACT

Background: *Supraglottic airway devices (SGADs) are fundamental to non-invasive airway management during general anaesthesia, providing effective ventilation with a low incidence of complications. The Baska Mask (BM) and ProSeal Laryngeal Mask Airway (PLMA) are two widely used second-generation SGADs. This study aimed to compare the efficacy and safety of these devices by evaluating parameters such as airway sealing pressure, haemodynamic stability, ease of insertion, and postoperative complications.*

Methods: *In a randomized comparative study, patients undergoing general anaesthesia with intermittent positive pressure ventilation (IPPV) were assigned to either the Baska Mask or ProSeal LMA group. The primary outcomes evaluated included oropharyngeal leak pressure (OLP), insertion success rate, time to insertion, haemodynamic responses, and post-insertion morbidity.*

Results: *The Baska Mask demonstrated a significantly higher oropharyngeal leak pressure (OLP) compared to the ProSeal LMA. It also exhibited a shorter insertion time and required fewer manipulations to achieve proper placement. Both devices provided effective ventilation, but the Baska Mask was associated with a lower incidence of postoperative sore throat and pharyngeal morbidity. Hemodynamic stability was found to be comparable between the two groups.*

Conclusion: *The Baska Mask offers superior sealing efficiency, ease of insertion, and reduced postoperative complications compared to the ProSeal LMA. While both devices are effective for airway management under general anaesthesia, the choice of device should be based on a comprehensive assessment of patient characteristics, procedural needs, and the anaesthetist's clinical judgment.*

INTRODUCTION:

Supraglottic airway devices (SGADs) are a cornerstone of modern anaesthetic practice, providing an effective and less invasive alternative to endotracheal intubation for airway management during general anaesthesia with intermittent positive pressure ventilation (IPPV). This paradigm shift in airway control technology has enhanced patient safety and reduced the incidence of complications associated with traditional intubation techniques and where intubation is contraindicated. [1,2,3].Two widely utilized second-generation SGADs, the ProSeal Laryngeal Mask Airway (PLMA) and the Baska Mask (BM), have emerged as significant advancements in this field, each with distinct design features to optimize ventilation and minimize risk.

The PLMA, an evolution of the classic LMA, incorporates an innovative gastric drainage channel to reduce the risk of aspiration. Its improved cuff design facilitates a superior pharyngeal seal, which allows for higher airway pressures during IPPV, making it suitable for a wider range of clinical applications. . [4].

In contrast, the Baska Mask represents a newer generation of SGADs, featuring a self-sealing membrane that dynamically conforms to the patient's airway without excessive cuff pressure. This device also includes an integrated suction system for continuous removal of pharyngeal secretions, further enhancing its safety profile by mitigating the risk of aspiration. [4].

Both devices have demonstrated clinical efficacy and safety in various surgical and patient populations. However, studies reveal their respective strengths: the PLMA is particularly beneficial when gastric

drainage is a priority, while the Baska Mask offers superior sealing and continuous suction capabilities. The choice between these two devices is therefore contingent on a comprehensive assessment of patient characteristics, procedural requirements, and the anaesthetist's clinical judgment. [5].

The ongoing development of these devices continues to influence anaesthetic practice, expanding the options available for reliable and safe airway management. [6,7]

MATERIALS AND METHODS

Study Design and Patient Selection

This randomized, comparative study was conducted between December 2022 and May 2024 at AH&RC, a tertiary care hospital attached to Adichunchanagiri Institute of Medical Sciences, B.G.Nagara, Mandya district, Karnataka. Following institutional ethical committee approval and the acquisition of informed written consent from all participants, a total of 70 patients were enrolled. The study included patients aged 18 to 60 years, classified as American Society of Anesthesiologists (ASA) physical status I or II, who were scheduled for elective surgeries under general anesthesia in the supine position with intermittent positive pressure ventilation (IPPV). Patients were excluded if they refused to participate, had an anticipated surgery time exceeding 4 hours, required a prone or lateral position, presented with increased airway resistance or decreased lung compliance (e.g., obstructive or restrictive lung diseases), had an increased risk of aspiration (including patients who were pregnant, obese with a BMI > 30, or had a history of gastroesophageal reflux disease or hiatus hernia), or had a mouth opening of less than 2.5 cm, a thyromental distance of less than 6 cm, a positive upper lip bite test, or a cervical pathology.

Randomization and Sample Size Estimation

A computerized random number generator was used to allocate the 70 eligible patients into two equal groups: the ProSeal Laryngeal Mask Airway (PLMA) group (n=35) and the Baska Mask (BM) group (n=35). The primary outcome variable for this study was the mean airway sealing pressure at 5 minutes, 30 minutes, and at the conclusion of the surgery. Based on a clinically significant mean difference (d) of 1.2 and a standard deviation (σ) of 2.43 from prior research, a sample size calculation was performed using the following formula:

$n=d2(Z\alpha+Z\beta)2\cdot\sigma2$

With a significance level (α) of 0.05 (Zα=1.96) and a statistical power of 80% (β=0.80, Zβ=0.84), the calculated sample size was 33 per group, rounded up to 35 per group to account for potential dropouts, for a total of 70 patients.

Data Collection and Statistical Analysis

Data were collected as per the randomization protocol, with patients undergoing general anesthesia maintained with either the ProSeal LMA or the Baska Mask. The study was conducted over an 18-month period, from December 2022 to May 2024. Statistical analysis was performed using SPSS (V) for Windows, version 28. Parametric data were analyzed using the Student's t-test, while non-parametric data and associations for categorical variables were analyzed using the Chi-Square test. Additional inferential statistics, including Pearson and Spearman tests, were applied to assess correlations. A probability (p) value of less than 0.05 was considered statistically significant.

Procedure

Following randomization, patients in both groups received device sizing according to manufacturer guidelines. The ProSeal Laryngeal Mask Airway (PLMA) was inserted using the standard digital technique with cuff inflation to a volume of 20 ml or 30 ml, while the Baska Mask (BM) was inserted using its unique tab feature. Correct placement for both devices was confirmed by the presence of a square-waveform capnogram and bilateral chest movements. A maximum of two reattempts were permitted before switching to endotracheal intubation.

The primary outcome, oropharyngeal leak pressure (OLP), was measured at three time points: 5 minutes, 30 minutes, and at the end of surgery. The OLP for the PLMA was determined using the manometric stability method, whereas for the Baska Mask, the audible leak method with a stethoscope was employed. Secondary outcomes included insertion time, the number of manipulations required for successful placement, intraoperative complications, and a post-operative laryngopharyngeal morbidity score. Hemodynamic parameters were continuously monitored throughout the procedure.

RESULTS

Baseline Demographics and Characteristics

The demographic and clinical characteristics of the study participants were comparable between the Baska Mask (BM) and ProSeal Laryngeal Mask Airway (PLMA) groups. The mean age of participants was 40.2±10.3years in the BM group and 39.8±9.5 years in the PLMA group (p=0.85). There was no significant difference in gender distribution, with a male-to-female ratio of 20:15 in the BM group and 18:17 in the PLMA group (p=0.62).

Anthropometric data, including weight, height, and body mass index (BMI), were also similar between the groups, with mean values of 70.5±12.0 kg, 165.2±8.1 cm, and 25.8±3.2 kg/m2 for the BM group, and 72.0±10.5 kg, 164.5±7.8 cm, and 26.1±2.9 kg/m2 for the PLMA group. All of these differences were statistically insignificant (p>0.05). The distribution of ASA physical status was also comparable, confirming that the two groups were well-matched at baseline.

Comparison of Baska Mask and ProSeal LMA Parameters

Parameter	**Sub-Parameter**	**Baska Mask (BM) Group (n=35)**	**ProSeal LMA (PLMA) Group (n=35)**	**p-value**
OLP (cm H_2O)	5 Minutes	36.5 ± 2.1	30.2 ± 3.4	<0.001
	30 Minutes	37.0 ± 2.0	31.0 ± 3.5	<0.001
	End of Surgery	36.8 ± 2.2	30.5 ± 3.3	<0.001
Heart Rate (bpm)	5 Minutes	82.5 ± 7.0	88.0 ± 6.5	0.003
	30 Minutes	80.0 ± 6.8	85.0 ± 7.2	0.005
	End of Surgery	79.0 ± 6.0	83.0 ± 6.5	0.020
MAP (mmHg)	5 Minutes	122.0 ± 9.8	126.5 ± 10.5	0.040
	30 Minutes	121.0 ± 9.5	125.0 ± 10.0	0.030
	End of Surgery	120.0 ± 10.0	124.0 ± 9.8	0.050
SpO_2 (%)	5 Minutes	98.2 ± 1.0	98.0 ± 1.1	0.500
	30 Minutes	98.5 ± 0.8	98.3 ± 0.9	0.400
	End of Surgery	98.2 ± 1.0	98.0 ± 1.0	0.450
Insertion Time (min)	Mean ± SD	-	-	-
	First Attempt	90.0 ± 20.0	92.0 ± 18.0	0.60
	Total	95.0 ± 22.0	97.0 ± 20.0	0.65
Manipulations	No Manipulation (n, %)	30 (85.7%)	25 (71.4%)	0.09
	Single Maneuver (n, %)	5 (14.3%)	7 (20.0%)	
	Multiple Maneuvers (n, %)	0 (0%)	3 (8.6%)	

Complications (n, %)	Regurgitation	0 (0%)	1 (2.9%)	0.31
	Laryngospasm	0 (0%)	1 (2.9%)	0.31
	Hypoxia (SpO_2 < 92%)	1 (2.9%)	2 (5.7%)	0.55

Note: OLP = Oropharyngeal Leak Pressure; MAP = Mean Arterial Pressure; SpO_2 = Oxygen Saturation. Values are presented as Mean ± Standard Deviation unless otherwise specified.

The study's primary and secondary outcome measures revealed significant differences between the two groups. The **Oropharyngeal Leak Pressure (OLP)** was significantly higher in the Baska Mask (BM) group compared to the ProSeal Laryngeal Mask Airway (PLMA) group at all measured time points (5 minutes, 30 minutes, and end of surgery; $p<0.001$), indicating a superior airway seal.

Hemodynamic data showed that both groups maintained stable vital signs, though a statistically significant difference was observed. The BM group consistently had lower heart rates and mean arterial pressures compared to the PLMA group throughout the procedure. For instance, at 5 minutes, the BM group's mean heart rate was 82.5±7.0 bpm versus 88.0±6.5 bpm in the PLMA group ($p=0.003$). Oxygen saturation (SpO_2) was comparable between the two groups at all time points, with no significant differences.

Regarding procedural aspects, the time to insertion was not statistically different between the two groups. However, the BM group required fewer manipulations for successful placement, with 85.7% of insertions requiring no manipulation compared to 71.4% in the PLMA group, although this difference was not statistically significant ($p=0.09$). The incidence of complications was not statistically significant..

Summary of Additional Study Parameters

Note: LPM = Laryngopharyngeal Morbidity. Values are presented as Mean ± Standard Deviation unless otherwise specified.

Parameter	**BM Group (Mean ± SD)**	**PLMA Group (Mean ± SD)**	**p-value**
Induction Time (minutes)	3.2 ± 0.5	3.3 ± 0.6	0.40
Recovery Time (minutes)	15.0 ± 3.0	17.0 ± 4.0	0.04
Successful First Attempt (n, %)	32 (91.4%)	28 (80.0%)	0.05
Additional Propofol Required (n, %)	2 (5.7%)	5 (14.3%)	0.21
LMP Score (n, %)			
Score 1	30 (85.7%)	20 (57.1%)	
Score 2	4 (11.4%)	6 (17.1%)	

Score 3	1 (2.9%)	9 (25.7%)	0.01
Postoperative Complications (n, %)			
Nausea	2 (5.7%)	3 (8.6%)	0.64
Vomiting	1 (2.9%)	2 (5.7%)	0.55
Airway Trauma	0 (0%)	1 (2.9%)	0.31

The analysis of procedural and postoperative outcomes revealed several key differences between the groups. Induction time was found to be comparable, with no statistically significant difference between the Baska Mask (BM) and ProSeal Laryngeal Mask Airway (PLMA) groups (p=0.40).
However, the BM group demonstrated a significantly shorter recovery time (15.0±3.0 minutes) compared to the PLMA group (17.0±4.0 minutes), a difference that was statistically significant (p=0.04).
Regarding insertion success, the BM group achieved a higher first-attempt success rate (91.4%) than the PLMA group (80.0%), though this finding was at the threshold of statistical significance (p=0.05). The need for additional propofol was lower in the BM group (5.7% vs. 14.3%), though not statistically significant (p=0.21).
The incidence of postoperative complications, including nausea, vomiting, and airway trauma, was low and comparable between the two groups. Critically, the Laryngopharyngeal Morbidity (LPM) scores showed a significant difference (p=0.01). A substantial majority of patients in the BM group (85.7%) reported a minimal LPM score of 1, whereas this was true for only 57.1% of patients in the PLMA group. A score of 3, indicating severe morbidity, was reported by 25.7% of PLMA patients but only 2.9% of BM patients, suggesting a clear advantage for the Baska Mask in reducing postoperative airway-related discomfort.

DISCUSSION

The BM and PLMA groups were demographically comparable in age, gender, anthropometry, and ASA grade (all $p > 0.05$), ensuring uniformity and minimizing confounding, so outcome differences reflect device performance rather than patient variability correlates with studies done by Zhuo-qiang W (2010)[77] and Ye Z (2010)[9]. Similarity in weight and BMI is particularly relevant, as these factors influence airway patency and resistance. Saraswat N et al. (2011)[10] also highlighted the need for matched characteristics to ensure valid comparisons.
Overall, our study's demographic balance strengthens its internal validity, providing a solid foundation for assessing device performance in terms of sealing pressure, insertion ease, and hemodynamic response. Studies by Zhuo- qiang W (2010)[9], Ye Z (2010)[10], and Saraswat N et al. (2011)[11] also emphasize the need for matching baseline cardiovascular values when evaluating device performance.Our study showed that the BM group consistently achieved higher airway sealing pressures (ASP) than the PLMA group at all time points, highlighting its superior ability to maintain an effective seal during positive pressure ventilation. These results align with previous studies, such as Ali S et al. (2013) [12].Garpagalakshmi S (2019) [13] Zundert T and Gatt S (2012)[14] confirmed that the BM consistently achieved leak pressures above 30 cm H_2O. Our study found that patients using the BM device had lower heart rates throughout the procedure compared to those with the PLMA, suggesting reduced sympathetic stimulation. This aligns with Karthik GS et al. (2021) [15] and Malviya PS et al. (2016) [16],
. The BM's design appears to promote better hemodynamic stability, supporting its use in clinical practice.The BM group had consistently lower SBP than the PLMA group, indicating less cardiovascular stress. Similar findings were observed by Ye Z (2010) [9], Karthik GS et al(2021) [15], and Malviya PS et

al. (2016) [16], who noted that devices with less manipulation caused fewer BP fluctuations. Both the BM and PLMA devices maintained excellent oxygenation during the procedure.Results align with studie one by Hoda MQ et al. (2017) [17] and Das B et al. (2017) [18] .Our results confirm that both devices are effective in oxygenation, with the BM offering superior airway sealing without compromising safety.The BM group showed a low complication rate,These results are consistent with studies by Sinha A et al. (2013) [11] and Ali S et al. (2013) [20].

In our study The BM group required fewer manipulations, as seen in . Studies by Ali S et al. (2013) [12] and Jose J et al. (2023) [19] Induction times were similar between the BM (3.2 ± 0.5 min) and PLMA (3.3 ± 0.6 min) groups, showing both devices enable quick airway establishment. Ye Z (2010) [9] and Saraswat N et al. (2011) [10] found no significant difference in induction times, supporting the user-friendly nature of both devices.

The BM group had a shorter recovery time (15.0 ± 3.0 min) than the PLMA group (17.0 ± 4.0 min, p = 0.04) which aligns with Karthik GS et al. (2021) [15] and Ye Z (2010) [9], who linked reduced airway manipulation to quicker recovery.

The BM group had a higher first-attempt insertion success rate (91.4%) compared to the PLMA group (80.0%, p = 0.05), showing the BM's easier insertion. Studies by Ali S et al. (2013) [12] and Jose J et al. (2023) [19] support these findings,.The BM group had fewer emergence complications compared to the PLMA group, This aligns with Malviya PS et al. (2016) [16] and Ye Z (2010) [9],Only 5.7% of BM patients required additional propofol, compared to 14.3% in the PLMA group, indicating the BM causes less airway stimulation. This supports findings from Ali S et al. (2013) [20] and Abdel Aziz RA and Osman Y (2017) [21], The majority of participants in both groups had a laryngopharyngeal morbidity score of 1, though a higher percentage was observed in the BM group (85.7%) compared to the PLMA group (57.1%).

Moderate morbidity (score 2) was slightly more frequent in the PLMA group (17.1%) than in the BM group (11.4%). Notably, severe morbidity (score 3) was significantly higher in the PLMA group (25.7%) compared to only 2.9% in the BM group.These results suggest that while both airway management techniques are commonly associated with mild morbidity, the use of PLMA appears to increase the likelihood of higher morbidity scores.

This finding highlights the need for careful consideration when selecting airway devices to minimize laryngopharyngeal complications[13].

CONCLUSION

The results of this comparative study favor the Baska Mask for airway management with IPPV. It demonstrates superior airway sealing, a more stable hemodynamic profile, shorter recovery times, and significantly less postoperative pharyngeal morbidity compared to the ProSeal LMA. These findings suggest that the Baska Mask is a highly effective and patient-friendly device for a wide range of surgical procedures.

Limitation

Despite its strengths, the study is constrained by several limitations. The relatively small, single-center sample size limits the generalizability of the findings. The absence of long-term follow-up data on patient comfort and late-onset complications is another significant limitation. Additionally, the lack of blinding for clinicians could have introduced a degree of observer bias. Future research should address these limitations by conducting larger, multicenter trials with more heterogeneous patient populations. It would also be valuable to explore device performance in high-risk patients and to collect long-term outcome data to provide a more comprehensive assessment.

REFERENCES

1. Sambasiva Reddy P, Shivakumara KC, Madhu D, Osheen M. Baska mask, I-Gel supraglottic airway device and LMA-Proseal in spontaneously breathing, anaesthetised children during elective surgeries: Ease of insertion of the three devices. 2022.
2. Kachakayala RK, Bhatia P, Singh S, Dwivedi D. A comparative study of supraglottic airway devices Baska mask and ProSeal-laryngeal mask airway in short gynaecological procedures. *Int J Res Med Sci*. 2019;8:285.
3. Alexiev V, Ochana A, Abdelrahman D, Coyne J, McDonnell J, O'Toole D, Neligan P, Laffey J. Comparison of the Baska® mask with the single-use laryngeal mask airway in low-risk female patients undergoing ambulatory surgery. *Anaesthesia*. 2013;68.
4. Carvalho CC, Kapsokalyvas I, El-Boghdadly K. Second-generation supraglottic airway devices versus endotracheal intubation in adults undergoing ab.
5. Dhanasekaran R, Mehta G, Parameswari A. A prospective randomized comparative study between Baska Mask, Proseal LMA and I-Gel during positive pressure ventilation in laparoscopic cholecystectomy. *J Anesthesiol Reanim Spec Soc*. 2019.

6. Grier G, Bredmose P, Davies G, Lockey D. Introduction and use of the ProSeal laryngeal mask airway as a rescue device in a pre-hospital trauma anaesthesia algorithm. *Resuscitation*. 2009;80:138–41.
7. Zaballos M, Ginel M, Portas M, Barrio M, López AM. Awake insertion of a Laryngeal Mask Airway-Proseal™ as alternative to awake fiberoptic intubation in management of anticipated difficult airway in ambulatory surgery. *Braz J Anesthesiol*. 2016;66:539–42.
8. Zhuo-qiang W. Application of ProSeal laryngeal mask airway in pediatric undergoing ETV. 2010.
9. Ye Z. The research of ProSeal laryngeal mask airway used in gynaecological laparoscopy operation under general anesthesia. *Guide China Med*. 2010.
10. Saraswat N, Kumar A, Mishra A, Gupta A, Saurabh G, Srivastava U. The comparison of ProSeal laryngeal mask airway and endotracheal tube in patients undergoing laparoscopic surgeries under general anaesthesia. *Indian J Anaesth*. 2011;55:129-134.
11. Sinha A, Jayaraman L, Punhani D, Panigrahi B. ProSeal laryngeal mask airway improves oxygenation when used as a conduit prior to laryngoscope guided intubation in bariatric patients. *Indian J Anaesth*. 2013;57:25-30.
12. Ali S, Al-Rawahi S, Aziz H, Malik AM, Khan R, Kaul N. A comparative analysis of the Baska® Mask vs. Proseal® laryngeal mask for general anesthesia with IPPV. 2013.
13. Garpagalakshmi S. A comparative study of Baska Mask and Proseal laryngeal mask for general anaesthesia with intermittent positive pressure ventilation. 2019.
14. Zundert T, Gatt S. The Baska Mask® – A new concept in self-sealing membrane cuff extraglottic airway devices, using a sump and two gastric drains: A critical evaluation. *J Obstet Anaesth Crit Care*. 2012;2:23.
15. Karthik GS, Sudheer R, Priyanka D, Rangalakshmi S, Halima S, Supriya R. Comparison of Baska Mask and conventional endotracheal tube in airway management during laparoscopic cholecystectomy: A randomized clinical study. *Indian J Anaesth Analg*. 2021.
16. Malviya PS, Manish S, Sumit K, Dharmendra Y, Mishra S. A comparison of general anaesthesia techniques using ProSeal laryngeal mask airway or endotracheal tube in patients undergoing laparoscopic surgery. *IOSR J Dent Med Sci*. 2016;15(9):01-07.
17. Hoda MQ, Samad K, Ullah H. ProSeal versus Classic laryngeal mask airway (LMA) for positive pressure ventilation in adults undergoing elective surgery. *Cochrane Database Syst Rev*. 2017;7:CD009026.
18. Das B, Varshney R, Mitra S. A randomised controlled trial comparing ProSeal laryngeal mask airway, i-gel and Laryngeal Tube Suction-D under general anaesthesia for elective surgical patients requiring controlled ventilation. *Indian J Anaesth*. 2017;61:972-977.
19. Jose J, Kagalkar N, Kattimani MM, Suntan A. Comparison of Baska Mask versus ProSeal Laryngeal Mask Airway in elective surgeries under general anaesthesia: A randomized clinical trial. *Cureus*. 2023.
20. Ali S, Al-Rawahi S, Aziz H, Malik AM, Khan R, Kaul N. A comparative analysis of the Baska® Mask vs. Proseal® laryngeal mask for general anesthesia with IPPV. 2013. *(Duplicate of #12)*
21. Abdel Aziz RA, Osman Y. Comparison of I-gel with Baska Mask Airway for controlled ventilation in obese patients undergoing ambulatory surgery: A prospective randomized trial. *Open J Anesthesiol*. 2017;5:29.