



A prospective comparative study of the Baska mask and ProSeal laryngeal mask airway for airway sealing and safety during general anaesthesia: a prospective cross-sectional study.

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Abstract

Background:

Supraglottic airway devices play an important role in airway management during general anaesthesia. This study compared the oropharyngeal sealing performance and safety of the Baska Mask and ProSeal laryngeal mask airway (PLMA).

Methods:

This prospective comparative study included 98 adult patients undergoing elective surgery under general anaesthesia with controlled ventilation. Patients were divided equally into Baska Mask and PLMA groups. Oropharyngeal leak pressure (OLP), insertion time, placement success, ventilation parameters, and perioperative complications were assessed.

Results:

The Baska Mask and PLMA groups had comparable baseline characteristics. The mean age was 35.8 ± 10.2 years and 36.4 ± 9.8 years, respectively. Male-to-female distributions were 25:24 and 26:23, respectively. Body mass index, body weight, American Society of Anesthesiologists physical status, and duration of surgery were also comparable ($p > .05$). OLP was significantly higher with the Baska Mask at 5 minutes (36.8 ± 3.4 vs. 30.5 ± 4.0 cm H₂O) and 30 minutes (37.5 ± 3.2 vs. 30.8 ± 3.8 cm H₂O; $p < .001$ for both). Insertion time was shorter with the Baska Mask (14.8 ± 4.1 vs. 20.2 ± 5.0 seconds; $p < .001$). Oxygen saturation, peak airway pressure, and postoperative complications were comparable between groups.

Conclusion:

The Baska Mask provided higher oropharyngeal leak pressure and shorter insertion time, while other measured safety outcomes were comparable to those of the PLMA.

Recommendation:

The Baska Mask may be considered an alternative to the PLMA in suitable adult patients undergoing elective surgery. Larger multicentre studies are recommended to confirm these findings.

Keywords: Baska Mask; ProSeal laryngeal mask airway; Oropharyngeal leak pressure; Supraglottic airway device; General anaesthesia.

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Introduction

Supraglottic airway devices (SGADs) have become important alternatives to endotracheal intubation for airway management during general anaesthesia. They facilitate ventilation without requiring passage of an endotracheal tube through the vocal cords and are particularly useful in

selected elective surgical procedures [1, 2]. Advances in device design have focused on improving airway sealing, facilitating insertion, and incorporating gastric drainage pathways. Systematic reviews and comparative analyses have demonstrated that SGADs differ in their clinical performance, making device selection dependent on the



surgical procedure, patient characteristics and ventilation requirements [3-6].

The ProSeal laryngeal mask airway (PLMA) is a second-generation SGAD that incorporates an inflatable cuff, an integrated bite block, and a gastric drainage channel. Its design permits effective positive-pressure ventilation while providing a pathway for gastric drainage. However, adequate cuff inflation and correct positioning are essential to achieve an effective seal. Excessive cuff pressure or displacement may contribute to mucosal pressure and postoperative pharyngolaryngeal symptoms. Despite these considerations, the PLMA remains an established device against which newer supraglottic airway systems can be evaluated [7-10].

The Baska Mask was developed with a non-inflatable, self-sealing membranous cuff designed to adapt dynamically to airway pressure during positive-pressure ventilation. It also incorporates gastric drainage and a suction system intended to facilitate the removal of secretions. The absence of a separately inflated cuff may simplify placement and avoid complications associated with excessive cuff inflation. Randomised comparative studies have reported higher oropharyngeal sealing pressure and shorter insertion time with the Baska Mask than with the PLMA, although the magnitude of these differences and their effects on postoperative morbidity vary between studies [10-13].

Oropharyngeal leak pressure (OLP) is an important indicator of the sealing capacity of an SGAD and helps assess its suitability for positive-pressure ventilation. However, OLP alone does not establish overall device safety, which also depends on successful placement, adequate oxygenation, ventilation, gastric drainage, and the incidence of airway-related complications. Previous comparative studies involving adults undergoing elective and laparoscopic surgery have reported favourable sealing performance with the Baska Mask, while postoperative morbidity has not consistently differed between devices [12-15]. Therefore, the present study aims to compare the safety of the Baska Mask and PLMA, with particular emphasis on oropharyngeal sealing performance, among 98 patients undergoing elective surgery at a tertiary care centre.

Methods

Study Design and Setting

A prospective comparative cross-sectional study was conducted in the Department of Anaesthesiology at a tertiary care centre from May 2025 to April 2026. The study compared the Baska Mask and ProSeal laryngeal mask

airway (PLMA) in adult patients undergoing elective surgery under general anaesthesia with controlled ventilation.

PGIMS Rohtak is a tertiary-care teaching institution providing multispecialty medical and surgical services, including anaesthesia care for patients undergoing elective and emergency procedures. The study was conducted in the operating theatres among adult patients undergoing elective surgery under general anaesthesia with controlled ventilation. The clinical performance of the Baska Mask was compared with that of the ProSeal laryngeal mask airway (PLMA).

Sample Size

A total of 98 patients were included in the study, with 49 patients in each group.

The sample size was estimated based on the difference in mean oropharyngeal leak pressure (OLP) between the Baska Mask and ProSeal laryngeal mask airway groups reported in a previous comparative study. The expected mean difference and pooled standard deviation were used for the calculation, with a 5% level of significance and 80% statistical power.

Study Population

Adult patients undergoing elective surgery under general anaesthesia in the supine position were included. Eligibility was assessed based on pre-anaesthetic evaluation, American Society of Anesthesiologists (ASA) physical status, and airway assessment. Patients with anticipated difficult airways, increased aspiration risk, significant upper-airway abnormalities or contraindications to supraglottic airway placement were excluded.

Study Procedure

Following pre-anaesthetic assessment, standard monitoring, including electrocardiography, non-invasive blood pressure and pulse oximetry, was established. General anaesthesia was induced according to the institutional protocol, and an appropriately sized airway device was inserted by an experienced anaesthesiologist. Correct placement was confirmed by bilateral chest expansion, capnography, and effective ventilation. The PLMA cuff was inflated according to the manufacturer's recommendations, whereas the Baska Mask was inserted using the recommended technique.



Outcome Measures

The primary outcome was oropharyngeal leak pressure (OLP), measured in cm H₂O at 5 and 30 minutes after device insertion. Secondary outcomes included insertion time, first-attempt success, the need for additional insertion manoeuvres, leak fraction, lowest intraoperative oxygen saturation (SpO₂), and peak airway pressure. Postoperative complications assessed included sore throat, dysphagia, hoarseness, regurgitation or aspiration, and airway trauma.

Bias

Potential bias was minimised by applying the same study protocol and assessment criteria to both groups. Oropharyngeal leak pressure, insertion time, ventilation parameters, and perioperative complications were assessed using predefined criteria.

Statistical Analysis

Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequency and percentage. Between-group comparisons were performed using the independent-samples *t*-test for continuous variables and the chi-square test or Fisher's exact test for categorical variables, as appropriate. A two-sided *p*-

value of less than 0.05 was considered statistically significant.

Results

A total of 110 patients scheduled for elective surgery under general anaesthesia were assessed for eligibility. Of these, 12 were excluded: 7 did not meet the inclusion criteria, and 5 declined to participate. The remaining 98 patients were enrolled and equally allocated to the Baska Mask group (*n* = 49) and the ProSeal LMA group (*n* = 49). All 98 participants completed the study, and no dropouts were reported.

A total of 98 patients were included in the analysis, with 49 patients in each group. The baseline demographic and clinical characteristics of the patients in the Baska Mask and ProSeal laryngeal mask airway (PLMA) groups were compared to assess the comparability of the groups (Table 1). The mean age was 35.8 ± 10.2 years in the Baska Mask group and 36.4 ± 9.8 years in the PLMA group (*p* = 0.765). Sex distribution, body weight, BMI, ASA physical status, and duration of surgery were also comparable between the groups, with no statistically significant differences (*p* > 0.05) (Table 1).

Table 1: Baseline Demographic and Clinical Characteristics of the Study Participants

Variable	Baska Mask (n = 49)	PLMA (n = 49)	p
Age (years), M $\pm$ SD	35.8 $\pm$ 10.2	36.4 $\pm$ 9.8	.765
Sex, male/female, n	25/24	26/23	.841
Weight (kg), M $\pm$ SD	62.4 $\pm$ 8.6	63.1 $\pm$ 9.1	.696
BMI (kg/m ²), M $\pm$ SD	23.6 $\pm$ 2.8	23.9 $\pm$ 2.7	.588
ASA physical status, I/II, n	31/18	30/19	.838
Duration of surgery (min), M $\pm$ SD	68.4 $\pm$ 21.5	70.2 $\pm$ 22.1	.682

Note. Values are presented as mean $\pm$ standard deviation (SD) or counts, as appropriate. PLMA = ProSeal laryngeal mask airway; BMI = body mass index; ASA = American Society of Anesthesiologists.

The mean OLP was significantly higher in the Baska Mask group than in the PLMA group at both 5 minutes (36.8 ± 3.4 vs. 30.5 ± 4.0 cm H₂O) and 30 minutes (37.5 ± 3.2 vs. 30.8 ± 3.8 cm H₂O), with *p* < 0.001 for both comparisons. The mean insertion time was significantly shorter with the Baska Mask (14.8 ± 4.1 vs. 20.2 ± 5.0 seconds; *p* < 0.001). First-

attempt success was higher, and additional insertion manoeuvres were less frequent in the Baska Mask group, although these differences were not statistically significant. Leak fraction was comparable between the groups (*p* = 0.405) (Table 2 and Figure 1).

Table 2: Comparison of Oropharyngeal Sealing and Airway Establishment

Parameter	Baska Mask (n = 49)	PLMA (n = 49)	p
OLP at 5 min (cm H ₂ O), M ± SD	36.8 ± 3.4	30.5 ± 4.0	< .001
OLP at 30 min (cm H ₂ O), M ± SD	37.5 ± 3.2	30.8 ± 3.8	< .001
Insertion time (s), M ± SD	14.8 ± 4.1	20.2 ± 5.0	< .001
First-attempt success, n (%)	46 (93.9)	43 (87.8)	.292
Additional manoeuvres, n (%)	6 (12.2)	11 (22.4)	.181
Leak fraction (%), M ± SD	4.1 ± 2.8	4.6 ± 3.1	.405

Note. Values are presented as mean ± standard deviation (SD) or number (percentage). OLP = oropharyngeal leak pressure; PLMA = ProSeal laryngeal mask airway.

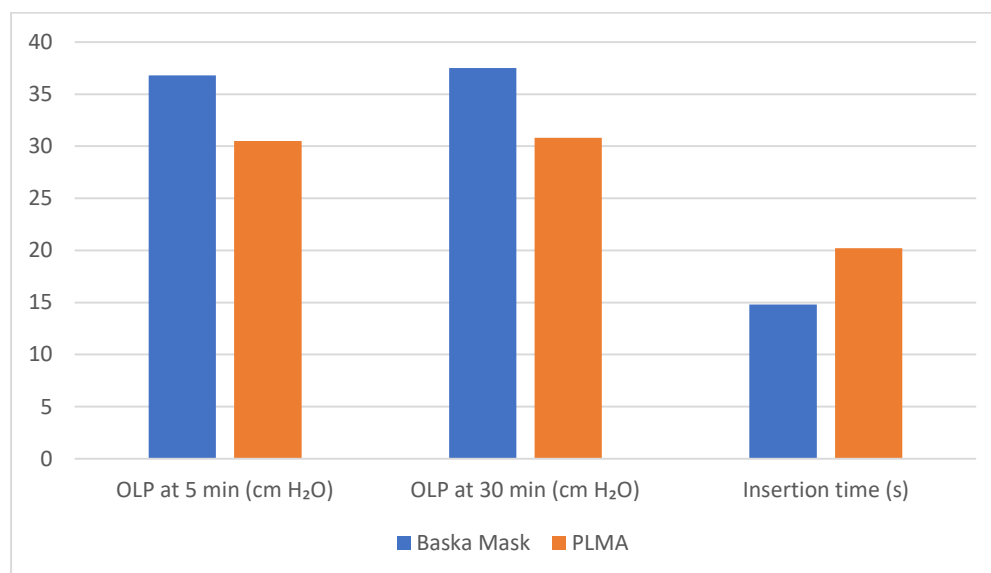


Figure 1: Comparison of Oropharyngeal Leak Pressure and Insertion Time Between the Baska Mask and PLMA

The lowest intraoperative SpO₂ and mean peak airway pressure were comparable between the Baska Mask and PLMA groups, with no statistically significant differences ($p = 0.638$ and $p = 0.602$, respectively). Postoperative sore throat, dysphagia, and hoarseness occurred less frequently in the Baska Mask group, but the differences were not

statistically significant ($p > 0.05$). Regurgitation or aspiration was recorded in one patient in the PLMA group and none in the Baska Mask group. Airway trauma was also less frequent with the Baska Mask; however, the between-group difference was not statistically significant (Table 3 and Figure 2).

Table 3: Comparison of Ventilation Parameters and Perioperative Complications

Parameter	Baska Mask (n = 49)	PLMA (n = 49)	p
Lowest intraoperative SpO ₂ (%), M ± SD	98.1 ± 1.0	98.0 ± 1.1	.638
Peak airway pressure (cm H ₂ O), M ± SD	19.2 ± 2.8	19.5 ± 2.9	.602
Sore throat, n (%)	5 (10.2)	8 (16.3)	.369
Dysphagia, n (%)	2 (4.1)	4 (8.2)	.400
Hoarseness, n (%)	1 (2.0)	2 (4.1)	.558
Regurgitation or aspiration, n (%)	0 (0.0)	1 (2.0)	.315
Airway trauma, n (%)	1 (2.0)	2 (4.1)	.558

Note. Values are presented as mean ± standard deviation (SD) or number (percentage). SpO₂ = peripheral oxygen saturation; PLMA = ProSeal laryngeal mask airway.

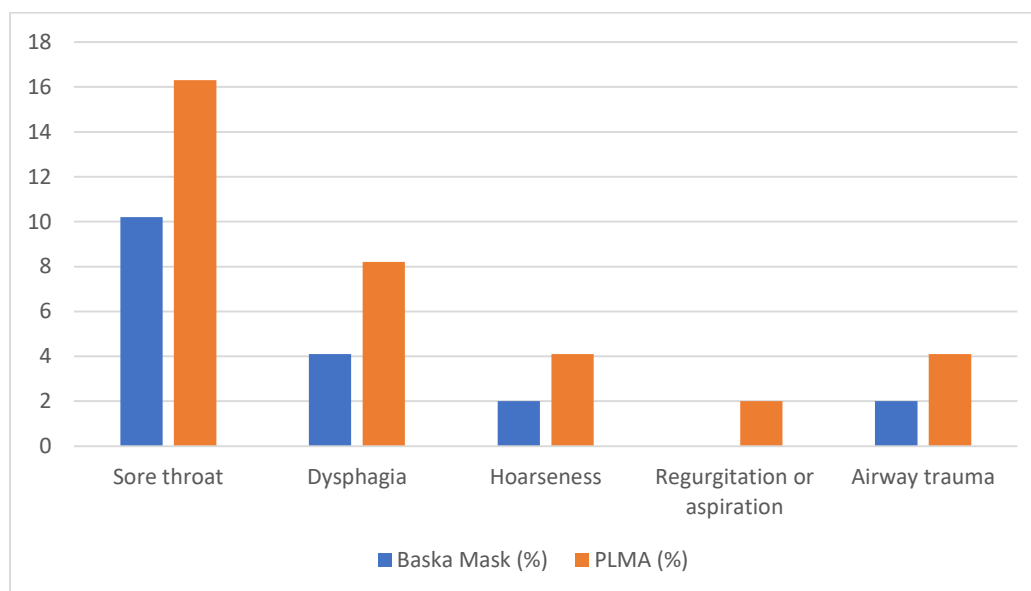


Figure 2: Comparison of Postoperative Complications Between the Baska Mask and PLMA

Discussion

The present study compared the safety and oropharyngeal sealing performance of the Baska Mask and ProSeal laryngeal mask airway (PLMA) in 98 patients undergoing elective surgery under general anaesthesia with controlled ventilation. The baseline demographic and clinical characteristics, including age, sex, body weight, BMI, ASA physical status, and duration of surgery, were comparable between the two groups. Supraglottic airway devices have become important alternatives to tracheal intubation in selected patients because of their ease of use and effectiveness in airway management [1-4]. Their designs have evolved to improve airway sealing and facilitate

controlled ventilation [2, 3, 7]. The PLMA incorporates a drainage tube to help separate the respiratory and gastrointestinal tracts [5], while the Baska Mask incorporates design features intended to improve the airway seal during positive-pressure ventilation [11-13, 16].

The principal finding was the significantly higher oropharyngeal leak pressure (OLP) with the Baska Mask at both 5 minutes (36.8 ± 3.4 cm H₂O) and 30 minutes (37.5 ± 3.2 cm H₂O), compared with 30.5 ± 4.0 and 30.8 ± 3.8 cm H₂O, respectively, with the PLMA ($p < 0.001$ for both comparisons). The Baska Mask also demonstrated a significantly shorter insertion time than the PLMA (14.8 ± 4.1 vs. 20.2 ± 5.0 seconds; $p < 0.001$). These findings are



consistent with previous comparative studies reporting higher sealing pressures and shorter insertion times with the Baska Mask [11–13,18]. Jose et al. reported higher oropharyngeal sealing pressure and shorter insertion time with the Baska Mask [11], while Abdalla et al. also found improved airway sealing with this device [12]. Singh et al. similarly reported favourable sealing pressures and insertion characteristics with the Baska Mask [13]. Evidence syntheses have also examined the sealing performance and safety of the Baska Mask compared with other supraglottic airway devices [16, 17]. A higher OLP may provide a greater margin for effective positive-pressure ventilation before an airway leak occurs, although performance also depends on patient anatomy, device sizing and insertion technique [2, 4, 7].

Despite the differences in OLP and insertion time, first-attempt success, the need for additional insertion manoeuvres and leak fraction did not differ significantly between the groups. First-attempt success was 93.9% with the Baska Mask and 87.8% with the PLMA ($p = 0.292$), while additional manoeuvres were required in 12.2% and 22.4% of patients, respectively ($p = 0.181$). Leak fraction was also comparable ($p = 0.405$). The lowest intraoperative SpO₂ and peak airway pressure were similar between groups, indicating comparable measured ventilation parameters under the conditions of this study. Previous reviews and comparative analyses have highlighted that supraglottic airway devices differ in their sealing mechanisms, ease of insertion, and suitability for controlled ventilation [6, 7, 10, 16, 17]. These findings suggest that the higher OLP observed with the Baska Mask did not translate into statistically significant differences in the other measured airway-establishment or ventilation outcomes.

The incidence of postoperative complications was low in both groups. Sore throat occurred in 10.2% of patients in the Baska Mask group and 16.3% in the PLMA group, while dysphagia and hoarseness were also less frequent with the Baska Mask. However, none of these differences reached statistical significance. One case of regurgitation or aspiration was recorded in the PLMA group, compared with none in the Baska Mask group, and airway trauma occurred in 2.0% and 4.1% of patients, respectively. These findings suggest comparable observed safety outcomes, although the small number of complications limits the ability to establish differences in uncommon adverse events. Previous comparative studies have reported favourable airway-sealing characteristics with the Baska Mask, while differences in postoperative morbidity have varied between studies [11-13, 18]. Evidence reviews also emphasise the

importance of considering sealing performance, ventilation requirements and postoperative complications together when selecting a supraglottic airway device [6, 10, 16, 17]. Overall, the Baska Mask demonstrated higher OLP and shorter insertion time, while the measured ventilation parameters and postoperative complications were comparable between the two groups.

Generalizability

The findings may apply to adult patients undergoing elective surgery under general anaesthesia with controlled ventilation. Generalizability to high-risk patients and emergency surgeries is limited.

Conclusion

The study concluded that the Baska Mask provided significantly higher oropharyngeal leak pressure at 5 and 30 minutes and a shorter insertion time than the ProSeal laryngeal mask airway (PLMA). However, first-attempt insertion success, additional insertion manoeuvres, leak fraction, intraoperative oxygen saturation, peak airway pressure and postoperative complications were comparable between the groups, with no statistically significant differences. Thus, both devices demonstrated comparable observed safety profiles, while the Baska Mask offered advantages in airway sealing and insertion time in adult patients undergoing elective surgery under general anaesthesia with controlled ventilation.

Limitations

The small sample size, single-centre setting, and low incidence of complications limit the strength and generalizability of the findings.

Recommendation

The Baska Mask may be considered an alternative to PLMA in suitable patients. Larger multicentre studies are needed to confirm its safety and effectiveness.

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List of Abbreviations

ASA – American Society of Anesthesiologists

BMI – Body Mass Index

OLP – Oropharyngeal Leak Pressure

PLMA – ProSeal Laryngeal Mask Airway

SGAD – Supraglottic Airway Device; SpO₂ – Peripheral Oxygen Saturation.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Author Contribution

All authors contributed to the conception and design of the study, data collection, analysis and interpretation of results, and preparation and critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript.

Data Availability

Study data are available from the corresponding author upon reasonable request, subject to institutional and ethical requirements, if applicable.

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