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Comparison of Baska Mask and LMA Supreme for Airway Management Under General Anaesthesia-A Prospective Randomized Study

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Abstract

Background: The supraglottic airway devices are novel devices that have revolutionized airway management and have replaced endotracheal tube in anaesthesia. With the advent of newer supraglottic devices for better airway control, we are comparing efficacy of the Baska mask and LMA supreme. **Setting And Design:** Fifty participants posted for elective surgery under GA were selected for prospective double blinded randomized controlled study. **Materials And Methods:** Total of fifty participants who were undergoing elective surgery under GA of less than 60 min duration, belonging to ASA physical status 1 and II, aged 18 to 60 years were randomised into two groups. Group A: Baska mask and group B: LMA supreme. After induction with propofol 2mg/kg,fentanyl 2µ/kg and Atracurium 0.5 mg/ kg, patients were inserted with either Buska mask or LMA supreme. The efficacy is compared in terms of first-time insertion success rate, the number of attempts for correct placements, device insertion time, leak pressure, ease of insertion of gastric tube and incidence of intraoperative and postoperative complications between the two devices. **Results:** There was no significant difference among demographic variables between the groups. The ease of insertion was significant with 96% in group B compared to 72% in group A. Time taken for insertion also found to be significantly shorter in group B(11.88±2.56) vs group A (14.24±4.96).Oropharyngeal leak pressure was significantly higher($p<0.001$) in group A than group B. There was no significant difference between the groups with regards to gastric tube insertion, intraoperative and postoperative complications. **Conclusion:** We conclude that, LMA supreme was found to have a better ease of insertion compared to Buska mask. The Buska mask provides higher oropharyngeal leak pressure and thus provides better airway protection compared to LMA supreme.

Keywords: Buska mask, LMA supreme, oropharyngeal leak pressure.

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Introduction

The supraglottic airway devices are novel devices that have revolutionized airway management by acting as a bridge between endotracheal intubation and face mask. The

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advantage over endotracheal tube being ease of insertion, decreased airway manipulation,better hemodynamic stability,and lesser postop complications[1].Because of this, the use of SADs has been increased over past decade. They have gained the popularity in emergency and critical care situation also, providing rapid access to the airway. They also provide airway assess in difficult intubation and became a part of difficult airway algorithm.

LMA Supreme is an innovative, sterile,single use second generation LMA.It has a soft,elongated cuff which has the advantage of improved pharyngeal seal making controlled ventilation possible at higher airway pressure. It also has a second seal with the upper esophagealsphinter providing increased esophageal seal.This maintains the patency of drain tube reducing the risk of insufflation during ventilation and thereby reduces the risk of regurgitated gastric content leaking aroung the tip of the mask. The cuff has been designed such that it provides higher sealing pressure[2]

The Baska mask (3rd generation) is a non-inflatable supraglottic airway device which provides efficient ventilation by automatically inflating the cuff during positive pressure ventilation[3-5]Tissue damage is less because of non inflatable cuff.The cuff gets inflated automatically during positive pressure ventilation and hence have a better oropharygeal leak pressure compared to other devices.There are only limited literature to access the effectiveness of Buska mask. Hence we conducted this study to compare the LMA Supreme and the Baska mask for airway management during general anesthesia. Our objective was to compare the first-time insertion success rate, the number of attempts for correct placements, device insertion time,oropharyngeal leak pressure, ease of insertion of gastric tube and incidence of intraoperative and postoperative complications between the Baska mask and LMA Supreme.

Materials And Methods

This study was prospective double blinded randomized controlled study.The study was conducted after the approval of the institutional ethics committee and was registered in Clinical Trials Registry India with registration number CTRI/2020/10/028435 in our institution from November 2019 to March 2021

After obtaining informed written consent, fifty participants who were undergoing elective surgery under GA of less than 60 min duration, patients of either sex belonging to ASA physical status 1 and II, aged 18 to 60 years were included in the study. Patients with obesity(BMI >30),anticipated difficult airway, patients with Cervical spine pathology and pregnant patients were excluded from the study.

Patients were randomized based on computer generated codes that was maintained in serial numbered sealed envelopes into two groups of 25 patients each. Group A: Baska mask(sizes 3 and 4 for patients 30-60kg and >60kg) and group B: LMA supreme(size 3 and 4 for patients weight 30-50 kg and 50-70 kg)

Preoperative assessment was done the day before surgery. Patients were advised to stay nil per oral for 6 hours to solids and 2 hours to clear fluids. They were premedicated with tablet alprazolam 0.25mg and tablet ranitidine 150mg the night before surgery.

On the day of surgery after securing intravenous access, the patients were attached to standard ASA monitors like, non-invasive blood pressure, electrocardiogram (ECG), pulse oximeter (SpO2), capnography and baseline parameters were recorded.

After pre-oxygenating with 100% oxygen for 3 minutes, the patients were pre-medicated with injections of glycopyrrolate 0.005 mg per kg, midazolam 0.05 mg per kg and fentanyl 2 microgram per kg. Induction was done with injection propofol 2 mg per kg and atracurium 0.5 mg per kg. After adequate paralysis,group A received Buska mask.After opening the patients mouth, anesthesiologist inserted the device and directed towards hard palate and

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glided downwards until resistance was felt. The anesthesiologist used extended hand tab to control the flexion to negotiate the palatopharygeal curve. Group B received LMA supreme and was grasped along the bite block and introduced into mouth till resistance was felt.
Successful device placement was confirmed by the adequate chest movement on manual ventilation,appearance of a square wave capnograph trace and absence of palpable leak on ventilation. Anesthesia was maintained with oxygen, air, sevoflurane and atracurium. The device was reinserted or size changed if capnograph trace was abnormal or absence of chest movements. Dexamethasone 4mg intravenously was given to prevent post operative nausea and vomiting.The number of attempts required for successful placement of the device was noted.
The device insertion time was measured in seconds from the time the device is picked up by the operator until the square wave of capnograph trace was obtained. The ease of insertion of device was graded subjectively assessed on a 3-point scale (1=easy, 2= difficult.3=failed)
The leak pressure was measured by closing the adjustable pressure limiting valve of the breathing system, keeping a fixed gas flow of 3 L min−1 and allowing the pressure to rise. The manometer reading was noted at the point at which minimum leak was palpated in the neck. In those patients whose airway pressure reached 40 cm of water, the test was stopped and a value of 40 cm of water was noted. After the device was successfully placed, a lubricated size 16 French gastric tube was inserted. The ease of insertion of gastric tube was graded on a 3 point scale. 1= easy; 2= difficult; 3= impossible.
The patients' heart rate (HR), mean arterial blood pressure (MAP) and peripheral oxygen saturation (SpO2) was recorded for 25 minutes and SpO2<95 is considered as oxygen desaturation. At the end of surgery when the patient is fully awake and with adequate respiration, the gadget is removed. The device's integrity was checked, as well as the existence of blood stains. The patient's lips, tongue, and teeth were examined for any signs of injury. Incidence of Cough, desaturation, gastric distention and aspiration were all recorded. All patients were monitored for dysphagia, sore throat, dysphonia for 24 hours. A resident who was not engaged in the study performed post-operative follow-up.

Statistical Analysis

The significance of research parameters on a continuous scale between the two groups on metric parameters was determined using a student t test (two–tailed and independent). To determine the significance of study parameters on a categorical scale between two or more groups, the Chi square test was performed. When cell samples are very tiny, the Fisher exact test is performed. For data analysis, statistical applications such as SPSS (Statistical package for Social sciences) 22.0 was used, as well as Microsoft Word and Excel to create graphs, tables, and other graphic.

Results

TABLE 1:Demograhic Variables

Variables	Group A	Group B	P Value
Age	37.08±11	35.84±12.14	0.707
BMI	22.96±1.66	23.76±1.45	0.076
ASA I/ASA II	60%/40%	56%/44%	0.077

Table 1 shows the Demographic variables of the patients in all two groups like age,BMI,ASA status were comparable and there was no statistical significant among the groups.

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TABLE 2 Ease of insertion

Variables	Group A	Group B	P Value
EASE OF INSERTION			
1(Easy)	18(72%)	24(96%)	0.0488
2(Difficult)	7(38%)	1(4%)	
3(Failed)	0	0	

Table 2 shows ease of insertion,which was found to be 96% in group B and 72% in group A. LMA supreme found to have a higher first time success rate compared to Buska mask group and this found to be statistically significant. Non of the groups had failed insertion.

TABLE 3

Variables		Group A	Group B	P Value
TIME TAKEN FOR INSERTION(SECONDS)		14.24±4.96	11.88±2.56	0.03
NO OF ATTEMPTS	1	18(72%)	25(100%)	0.009
	2	7(28%)	0(0%)	
OROPHARYNGEAL LEAK PRESSURE		34.64±5.78	30.8±2.18	<0.001**
GASTRICTUBE INSERTION	1	25(100.0%)	25(100%)	1.000
	2	0(0.0%)	0(0.0%)	

In table 3, time taken for insertion was significantly earlier in group B compared to group A. Oropharyngeal leak pressure was found to be higher in Group A 34.64±5.78 compared to group B.

TABLE 4 Complications

COMPLICATIONS	Group A	Group B	P Value
NO	24	23	1.000
SORE THROAT	0	2	
BLOOD STAIN	1	0	

Table 4 shows no significant complications noted in both the groups.

Discussion

The baska mask is a newer LMA device which has been introduced for its unique feature in patients safety and ease of insertion. Apart from this, the device has an advantage of higher sealing pressure compared with other LMA s.

The primary goal of our study was to compare and measure the first-time insertion success rate and the number of attempts required to insert the Baska mask and LMA supreme. The LMA supreme group had a higher rate of first-time successful insertion without the need for any manipulation than the Baska mask group. The difficulty in negotiating the palatopharyngeal curve is the most likely source of the difficulty faced while putting the Baska mask.This can be overcome by pulling the prepared insertion tab that is required to manually curve the mask during insertion.

Jayalekshmi S *et al.*6 and Verma N *et al.*7, conducted a study on the Baska mask and LMA supreme in positive pressure ventilation and found that the Baska mask is more difficult to insert than the LMA supreme, which is also similar to our study.In a study done by Alexiev*et al.*4, first time success rate for Baska mask was 73% and single use LMA was98%. This was

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similar to our study, and we found that the first time success rate was 72% for baska mask and 96% for LMA supreme.

In our study,we found that insertion time for buska mask was 14.24±4.96 sec and LMA supreme was 11.88±2.56 sec. Similarly, Sachidananda R *et al.* compared the Baska mask and I gel and found that insertion time of the Baska mask was slightly more (14.9±6.2 s), when compared with the I-gel (14.7±4.4 s (p=0.877)) which wasn't significant8. In a similar study done by Al Rawahi SAS *et al.*9, the Baska mask was compared with LMA Proseal in adults, insertion time was short in Baska mask group (16.43 ± 4.54 versus 21.45 ± 6.13 s, p=0.001)

The secondary outcome of our study was to compare the oropharyngeal leak pressure. In the LMA supreme group it was 30.8±2.18 cmH20 while in the Baska Mask group it was found to be 34.64±5.78 cmH20. This showed that the Baska mask had a significantly higher leak pressure. In a study done by Al-Rawahi*et al.*9.they compared the Baska mask and proseal LMA and found that the oropharyngeal leak pressure was 30± 9 vs 24±6 cm of H20. The higher oropharyngeal leak pressure with Baska mask was also similar to other studies10,11.Hence higher oropharyngeal leak pressure of Baska mask provides a better airway protection and so preferable in laproscopic surgeries.

The ease of insertion of gastric tube was similar in both study group without any difficulties. TeohWHL *et al.* and Gupta V *et al.* found that the gastric tube insertion was easier and achieved more quickly with the LMA supreme when compared to I-gel13

The changes in heart rate,mean arterial pressure,oxygen saturation were similar between the two groups.In our study, sore thoart was absorbed more in LMA supreme group than Buskamask group,with no significant difference.The reason may be due to inflatablecuff of LMA Supreme. In a study done by Brimacombe *et al.*12 comparing facemask and LMA there was higher incidence of complication like sore throat as LMA cuff volume was increased. One patient in Buska mask group had blood staining.In our study there was no incidence of desaturation, dysphagia, dyshphonia,injury to lip/tongue/dental and laryngospasm in any of the groups

Limitations

In our study,we did not verify the position of the Baska mask or LMA supreme with fibreoptic bronchoscope. We did not check whether the leak pressure remained the same throughout the surgical procedure or in different head and neck positions. We did not include laparoscopic surgeries in the study to verify the performance of Baska mask at higher airway pressures.

Conclusion

We conclude that, ease of insertion was found to be superior in LMA supreme when compared to Baska mask.The time taken for insertion was longer in Baska mask group. Oropharyngeal leak pressure was significantly higher in Baska mask and provides better airway seal compared to LMA supreme.The incidence of post operative complications and gastric tube insertion were similar in both groups.

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