OLOMIL - 11, 1350L - 05, SEPTEMBER - 2022 - PHINT ISSN NO. 2277 - 8100 - DOI: 10.38100/gjra						
Sunt FOR RESERPC	Original Research Paper	Anaesthesiology				
Tritemational	ANALYSIS OF THE BASKA MASK VERSUS PROSEAL LARYNGEAL MASK AIRWAY SEALING PRESSURE IN PATIENTS POSTED FOR LAPAROSCOPIC SURGERIES UNDER GENERAL ANAESTHESIA					
Dr Manu G R	Assistant professor, Department of anaesthesia Bangalore	ology, SSIMS & RC, T.begur,				
Dr Chaitanya A Kamat	Professor, Department of anaesthesiology, JNM	C, Belagavi				
Dr Manjunath C Patil	Professor, Department of anaesthesiology, JNM	C, Belgavi				
ABSTRACT Backgrou	and: Airway management by anaesthesiologist has come	a long way from the invention of				

endotracheal intubation. Invention of supraglottic airway devices (SAD) provided alternative airway, without hazards of direct laryngoscopy and intubation. First generation SAD was considered airway tubes, and hence modifications were made to them. PLMA (Proseal laryngeal mask airway) is a second generation SAD which has a gastric port along with the airway tube. BASKA mask is a novel 3rd generation SAD. We designed this study to compare the clinical efficacy of BASKA mask and PLMA for time for insertion, ease of insertion, airway sealing pressure and complications in anaesthetised patients undergoing positive pressure ventilation under general anaesthesia. Methodology: The present randomized control trial was conducted in 60 ASA-1 and ASA-2, aged between 18-60 years posted for elective laparoscopic surgeries under general anaesthesia. Patients were allocated into two equal groups, Group B-BASKA mask (n=30) and Group P-PLMA (n=30). All the data Collected were analysed. The demographic data, duration of insertion and airway sealing pressure were analysed using unpaired't test. Results: In our study we observed that, BASKA mask took lesser time to insert in comparison to PLMA, the mean duration of insertion was 16.77 ± 2.14 sec in BASKA Mask and 25.40 ± 3.04 sec in PLMA Group. This difference was statistically of H2O in PLMA Group, after 5 min of insertion and 31.33±2.06 cm of H20 in BASKA Mask and 26.90±1.79 cm of H2O in PLMA Group after 5 min of pneumoperitoneum. The airway sealing pressure was more in BASKA group which was statistically significant both after 5 min insertion and 5 min of pneumoperitoneum. There were no significant mean airway sealing pressures between 5 min after insertion and 5 min after pneumoperitoneum in both the groups. The ease of insertion was more in BASKA mask but it was statistically insignificant. The Laryngopharyngeal morbidity score between these groups were statistically insignificant. Conclusion: To conclude, we observed that BASKA mask took lesser time to insert than PLMA in anaesthetized paralysed adult patients. Mean airway sealing pressure was higher in BASKA mask than PLMA. The ease of insertion was more in BASKA mask but it was statistically insignificant. The LPM score between these groups were statistically insignificant.

KEYWORDS : BASKA mask, PLMA, Mean airway sealing pressure

INTRODUCTION

The most important part in providing functional respiration is to secure a patent airway. The primary goal of Anaesthesiologist is to maintain a patent airway. In addition to this, providing adequate oxygenation and ventilation is an important consideration in both emergency and elective situations.

However, laryngoscopy and tracheal intubation triggers adverse response such as increase in the level of plasma catecholamines, hypertension, tachycardia, arrhythmia, myocardial ischemia and an increase in intraocular and intracranial pressures.^[1,2] Apart from the above-mentioned adverse effects, laryngoscopy and endotracheal intubation requires skill, continuous training and practice.

Supraglottic Airway Devices were considered to be an alternative airway device as a potential lifesaving tool which has now been integrated into American Society of Anaesthesiologists (ASA) guidelines for most of the difficult airway management algorithms.^[3] Considering the invasiveness degree and the anatomical position, the SAD fills the gap between the face mask and the endotracheal tube(ETT).^[4]

First Supraglottic Airway Device or Laryngeal Mask Airway (LMA) was described in 1981 by Dr.Archie Brain. Since the time of its discovery, though initially criticized, later was accepted worldwide by 1988.^[5]

which included gastric aspiration, imperfect sealing of airway, airway obstruction at glottic and subglottic levels. Imperfect sealing of airway can be identified by either fibre optic scope or by measuring Mean airway sealing pressure (MASP) which helps us to know the pressure level beyond which patent airway cannot be maintained.^[6,7]

All the newer SADs provided superior efficacy regarding ease of insertion and prevention of aspiration. In addition to these, SADs have certain other advantages when compared to endotracheal intubation namely avoiding the use of rigid laryngoscopes, avoiding the stressor response associated with intubation.^[7]

Proseal Laryngeal Mask Airway (PLMA), a second generation SAD offering gastric access, which is re-usable, was introduced in 2000. The PLMA facilitates PPV as it offers higher glottic seal pressures than the Classic LMA. It has a built in drain tube that allows passage of orogastric tube for draining the gastric contents and preventing aspiration. The drain tube also allows instant clinical diagnosis of device misplacement if we were not able to not pass an orogastric tube. The PLMA decreases the chances of throat irritation and stimulation, which in turn reduces postoperative nausea and vomiting by as much as 40% compared to an ETT.^[8,3]

The BASKA mask is a new SAD device. It has new modifications more importantly its non-inflatable cuff that is designed appropriately considering the anatomy of the airway providing us with lower risk of nerve damage that are commonly associated with inflation of the cuff. During IPPV as

During their usage, certain drawbacks were encountered

48 ★ GJRA - GLOBAL JOURNAL FOR RESEARCH ANALYSIS

the pressure increases with PPV the cuff gets inflated itself. This improves the seal and aids during ventilation. It has a large sump with two drains to which suction can be attached to aspirate the gastric contents.^[10]

The gold standard 2nd gen. SAD that is used for surgical procedures is PLMA, till date. There are very few studies evaluating the benefits of the BASKA mask over Proseal LMA. So, a further study regarding usage of these devices had to be done. Hence, we compared BASKA Mask and Proseal LMA regarding MASP, time of insertion, ease of insertion, postoperative complications and Laryngopharyngeal morbidity(LPM) score in adult patients undergoing laparoscopic surgeries under general anaesthesia.

MATERIAL AND METHODS

After obtaining approval from ethic committee in our institution and taking written informed consent from the patients, Patients were randomly allocated by opening a computer generated 'sealed envelope' method into two groups, sample size obtained was 30 in one group. Hence a total of 60 patients equally distributed into two groups namely, Group B-BASKA mask

Group P-Proseal LMA

Selection Criteria:

- Adults undergoing Laparoscopic surgeries under general anaesthesia aged 18-60 years.
- Surgeries lasting up to 120 min or less.
- ASA physical status I and II.
- Mallampati grade I and II.

Exclusion Criteria:

- Significant lung diseases.
- · Neck and upper respiratory tract pathology.
- Potential difficult intubation.
- High risk of aspiration (gastro-oesophageal reflux or full stomach).
- Pregnant women.
- BMI > 30.

Procedure:

A thorough Pre anaesthetic evaluation (PAE) was done previous day of the surgery. Patient was enrolled into the study after considering inclusion and exclusion criteria, consent for anaesthesia and participation in the study was taken. On the day of surgery after confirming nil by mouth for 6 hours, intravenous line was secured.

In the operating room, a standard anaesthesia protocol was followed. Routine monitoring devices were applied – Electrocardiography (ECG), non- invasive blood pressure (NIBP), pulse oximetry (SpO₂). The patients were placed in sniffing position with occiput rested on a pillow (7 cm of height).

The airway device to be used was prepared for insertion with the cuff completely deflated (in case of PLMA) and its dorsal surface lubricated with the clear water-based gel.

All the patients were initially pre-medicated with intravenous inj. Glycopyrrolate, inj. midazolam and inj. fentanyl citrate of doses 0.005mg/kg, 0.05mg/kg and 2mcg/kg respectively. Preoxygenation with 100% oxygen for 3 minutes was done.

Anaesthesia was induced with intravenous inj. Propofol of dose 2mg/kg and neuromuscular blockade was attained with inj. Atracurium of dose 0.5mg/kg. The airway devices of appropriate size were inserted in strict accordance with the Manufacturers recommendation.

Insertion Technique: BASKA mask: The proximal part of cuff is compressed between thumb and other two fingers, and then it is passed along the curve of hard palate. The oral tab was pulled to increase the device curvature to negotiate the palato-pharyngeal curve. It was passed till the resistance is felt.

Proseal LMA:

The cuff of PLMA was completely deflated and the dorsum of the cuff was lubricated with water based jelly. The device was then mounted onto a metal introducer with the tip of the introducer resting in the introducer strap. PLMA is inserted in the oral cavity with the dominant hand of the anaesthesiologist. It is then advanced around the palato – pharyngeal curve using a single hand technique until a resistance is felt. Then the metal introducer is removed keeping LMA in place. Successful placement of the device was assessed by square wave capnography, adequate chest expansion, absence of audible leak and lack of gastric insufflation.

Once the procedure is done, the neuromuscular blockade was reversed with intravenous inj. Glycopyrrolate of dose 0.001mg/kg and inj. Neostigmine of dose 0.05mg/kg. After the return of protective airway reflexes, regain of consciousness, the airway device was removed and ventilated with facemask for 5 min.

Study variables:

The ease of insertion was defined as:

- 1 Very easy: absolutely no resistance to LMA
- 2 Easy: no resistance to insertion in the single manoeuvre.
- 3 Difficult: resistances to insertion.
- 4 Very difficult: more than one manoeuvre was required for the correct placement of the device.

If an effective airway could not be achieved, the device was removed and failure of insertion was recorded and endotracheal intubation was done.

The duration of insertion was defined as the time taken from the prepared BASKA mask or PLMA touching the incisors of the teeth to the successful placement of the device confirmed by square wave capnography, bilateral equal air entry and bilateral chest rise.

MASP was determined by placing patient in manual mode with APL valve closed with fresh gas flow of 6L/min (Datex/Drager anaesthesia delivery system). The pressure at which audible leak occurred at the throat by keeping stethoscope taken as MASP.

The presence/absence of oropharyngeal air leaks (detected by audible leak over the mouth), gastric air leaks (detected by auscultating over the epigastrium) were noted.

Any episodes of laryngospasm and bronchospasm, intraoperatively were documented. Postoperatively, incidence of LPM Score was recorded at the $4^{\rm th}$ hour.

Table 3: LPM Score

SCORE	0	1	2	3
Sorethroat	none	Minimal	Moderate	Severe:neveranSAD
				again
Dysphagia	none	Minimal	Moderate	severe:cannoteat
Hoarseness	none	Minimal	Moderate	Severe:cannotspeak

RESULTS

Mean insertion time (sec)

GROUP	MEAN	S.D	MIN	MAX	P-VALUE
BASKA	16.77	2.14	14	21	< 0.0001
PLMA	25.40	3.04	20	31	

VOLUME - 11, ISSUE - 09, SEPTEMBER - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Mean insertion time (sec)



In our study, the mean duration of insertion was 16.77 ± 2.14 sec in BASKA Mask and 25.40 ± 3.04 sec in PLMA Group. This difference was statistically significant (p<0.0001)

MASP (cm of H_2O)

	BASKA MASK			PLMA					
ASP	MEAN	S.D	MIN	MAX	MEAN	S.D	MIN	MAX	P-VALUE
After	31.33	2.31	28	35	27.00	1.84	24	30	< 0.0001
5 Min									
Of									
Inserti									
on									
After	31.33	2.06	26	35	26.90	1.79	24	30	< 0.0001
5 Min									
Of									
Pneu									
mope									
ritone									
m									
32	32.00								



Mean ASP (cm of H₂O)

The MASP was 33 ± 2.31 cm of H_2O in BASKA mask group and 27.00 ± 1.84 cm of H_2O in PLMA Group after 5 min of insertion and 31.33 ± 2.06 cm of H_2O in BASKA mask and 26.90 ± 1.79 cm of H_2O in PLMA Group after 5 min of pneumoperitoneum.

The MASP was more in BASKA mask group which was statistically significant both after 5 min insertion and 5 min of pneumoperitoneum. There were no significant MASP between 5 min after insertion and 5 min after pneumoperitoneum in both the groups.

Ease of insertion

	BASK	AMASK	PROSEAL	P-VALUE	
EASE OF	NUM	PERCEN	NUMBER	PERCENT	0.6404
INSERTION	BER	TAGE		AGE	
l(very easy)	28	93.33	27	90.00	
2(easy)	2	6.67	3	10.00	
TOTAL	30	100.00	30	100.00	



Ease of insertion

In our study insertion was very easy in 28 patients of BASKA mask Group and 27 patients of PLMA Group. Easy in 2 patients of BASKA Group and 3 patients of PLMA Group. This difference was statistically insignificant.

LMP Scores

	BASKA M	ASK	PROSE	p-value	
LMP	NUMBER	PERCENT	NUMBE	PERCENT	
SCORES		AGE	R	AGE	
0	17	56.67	17	56.67	0.1576
1	8	26.67	7	23.33	
2	5	16.67	6	20.00	
TOTAL	30	100.00	30	100.00	



LMP Scores

In the recovery area patients were assessed for LPM score,

- 17 patients had score of 0 in both BASKA Group and PLMA Group.
- 8 patients of BASKA Group and 7 patients of PLMA Group had score of 1
- 5 patients of BASKA Group and 6 patients of PLMA Group had a score of 2.
- The difference between the two groups was statistically insignificant.

DISCUSSION

From the 19th century, endotracheal intubation was considered as the only way of establishing a definitive airway. But invention of supraglottic airway devices has proven to effectively replace endotracheal tube in securing a definitive airway. SAD has various advantages like easy insertion, minimal hemodynamic changes, hands free maintenance, and lesser airway morbidity with relatively secure airway. It is also better tolerated in lighter planes of anaesthesia. Because of the above mentioned advantages, SADs have been used ideally as an alternative to tracheal intubation as it has more advantages than endotracheal tube. Current guidelines on cardiopulmonary resuscitation recommend SADs as an alternative to tracheal intubation

PLMA is a reusable SAD that allows easy insertion, higher glottis seal pressures, and separation of respiratory tract from gastrointestinal tract via the gastric port which permits gastric drainage. In this study we compare BASKA Mask and PLMA for ease of insertion, time taken for insertion, MASP at insertion, 5 min after pneumoperitoneum and PLM scoring in anaesthetised, paralysed patients on positive pressure ventilation undergoing laparoscopic surgeries.

We enrolled a total of 60 ASA 1 and 2 patients aged 18-60 years, posted for elective laparoscopic surgeries under general anaesthesia. They were randomly divided into two groups of 30 each by computer generated sealed envelope method.

When comparing the ease of insertion, it was observed that insertion was very easy in 28 patients of BASKA mask group and 27 patients of PLMA group; easy in 2 patients of BASKA mask group and 3 patients of PLMA group. The difference was statistically insignificant.

Time taken for insertion of SAD in our study was observed to be 16.9 ± 2.14 sec in BASKA mask group and 25.40 ± 3.04 sec in PLMA group. This difference is statistically significant (p<0.0001).

The observations of our study were similar to a study by Balwinderjit Singh et al,"" comparing BASKA mask versus PLMA for general anaesthesia, where time taken for insertion was lower in BASKA group compared to PLMA group($14.25 \pm 3.82 \sec and 22.01 \pm 2.64 \sec$) respectively.

In a study done by Ebenezer et al, ^[12] the mean insertion time for BASKA mask is 13.3 sec while for PLMA it was 19.7sec. In a study conducted by Sharifa Ali Sabeeh Al-Rawahi et al,¹¹ comparing BASKA mask versus PLMA group for general anaesthesia The mean insertion time was significantly shorter in the BASKA mask group as compared to the PLMA group $(16.43 \pm 4.54 \text{ vs. } 21.45 \pm 6.13)$ (p = 0.001).

In a study conducted by Ranjith Kumar Kachakayalal et al,^[14] the time (in seconds) required for insertion of BASKA mask group was significantly less in duration compared to PLMA (20.9 vs. 16) (p<0.0001).

The lesser time taken for insertion for BASKA mask was attributed to any difficulty in negotiating oropharyngeal curve which was overcome by pulling the tab of BASKA mask and being a non-inflatable cuff there was no need to inflate the cuff which reduces the time consumption.

The MASP after 5 min of insertion was 31.33 ± 2.31 cm of H₂O in BASKA Group and 27 ± 1.84 cm of H₂O in PLMA Group. The MASP measured after 5 min of pneumoperitoneum was 31.33 ± 2.06 cm of H₂O in BASKA Group and 26.90 ± 1.79 cm of H₂O in PLMA Group. The mean airway pressure is significantly higher in BASKA mask Group compared to PLMA group after 5 min of insertion and 5 min of pneumoperitoneum. In a study conducted by Sharifa Ali Sabeeh Al-Rawahi et al, [13] comparing BASKA mask versus PLMA for general anaesthesia, the MASP was 29 \pm 8.51cm of H₂O for BASKA group and 24.50 ± 6.19 cm of H₂O. These results were similar to that found in our study.

In an another study conducted by Balwinderjit singh et al,^[13] the MASP was 30.25 ± 3.34 cm of H_2O in BASKA Group and 22.01 \pm 2.64 cm of H₂O in PLMA Group in patients posted for general anaesthesia.

In the study conducted by Alexiev V, Salim A et al,^[14] on 30 female patients, states that the MASP of BASKA mask was 35.7cm H₂O indicating a better seal. In the study done by Tom van Zundert *et al.*^[12] on 50 patients, MASP was above 30 cm H_2O in all patients. The maximum ASP was 40 cm H_2O .

The MASP is better in BASKA mask compared to PLMA. This

may be attributed to thermolability of the membranous mask which makes it more adaptable to the shape of laryngeal outlet over time, hence a better seal.

In our study, insertion was very easy in 93.33% patients of BASKA mask and 90.00% patients of PLMA Group. Easy insertion was found in 6.67% patients in BASKA group and 10.00% patients in PLMA Group.

In the study conducted by Alexiev V, Salim A et al, $^{\scriptscriptstyle [14]}$ it was found that BASKA mask insertion was relatively easy with a mean VAS insertion difficulty score of 0.9 (1.6) out of 10.

In the study conducted by Rehab Abdel Raof Abdel Aziz,^[15] "ease of insertion was comparable in patients of both groups. An easy insertion (score 1) and effective airway was achieved on the first attempt without performing adjustment manoeuvres in 76.67% of BASKA mask group versus 73.3% of I-gel".

In the study conducted by Alexiev V et al, [16] compared BASKA mask with single use classic LMA in 150 females. They concluded that BASKA mask was difficult to insert without any additional manoeuvres in 99% of patient whereas classic LMA insertion success rate in 96% of patients.

In the study conducted by Tom van Zundert et al,^[8] concluded that "compared to other SADs, BASKA mask cuff can easily be decreased in size by compressing the proximal, firmer part of the mask between thumb and fingers making insertion easier".

In our study 8 patients of BASKA mask Group and 7 patients of PLMA Group had LPM score of 1, 5 patients of BASKA mask Group and 6 patients of PLMA Group had a LPM score of 2. The difference between the two groups is statistically insignificant.

Study conducted by Sharifa Ali Sabeeh Al-Rawahi et al,[13] also concluded that there is no significant difference between BASKA mask group and PLMA Group of LPM scores.

CONCLUSION

In our comparative study of BASKA mask and PLMA, we compared BASKA Mask (size 3 and 4) and PLMA (size3 and 4) and it was concluded that:

- BASKA mask insertion time was significantly lower than that of PLMA.
- The MASP was significantly higher in BASKA mask compared to PLMA both after 5 min of insertion and 5 min of pneumoperitoneum.
- The ease of insertion comparison between the BASKA mask and PLMA was found to have no statistical significance.
- The LPM score between BASKA mask and PLMA didn't show significant difference.

REFERENCES

- Brimacombe JR, Brain AIP, Berry AM. The laryngeal mask airway: A review 1. and practical guide. Great Britain: W.B Saunders Company Ltd; 1997.
- 2. Miller RD, Eriksson LI, Fleisher LA, Wiener- Kronish JP, Young WL. Miller's 3.
- Anesthesia. 7thed., Philadelphia: Churchill Livingstone Elsevier; 2010. Barash PG, Cullen BF, Stoelting RK, Cahalan MK, Stock MC. Clinical Anaesthesia. 6thed., Philadelphia: Lippincott Williams & Wilkins; 2009.
- Helmy AM, Atef HM, El-Taher EM, Henidak AM. Comparative study between igel, a new supraglottic airway device, and classical laryngeal mask airway in anaesthetized spontaneously ventilated patients. Saudi Journal of Ānaesthesia 2010;4(3):131-6.
- Miller RD, Eriksson LI, Fleisher LA, Wiener- Kronish JP, Young WL. Miller's 5. Anesthesia. 7th ed., Philadelphia: Churchill Livingstone Elsevier; 2010.
- Belena JM, Ochoa EJ, Nunez M, Gilsanz C, Vidal A. Role of laryngeal mask airway in laparoscopic cholecystectomy. World Journal of Gastrointestinal 6. Surgery 2015;7(11):319-25.
- 7. Ramachandran SK, Anjana MK. Supraglottic Airway Devices. Respiratory Care 2014;59(6):920-932
- Cook TM, Lee G, Nolan JP. The Proseal [™] laryngeal mask airway: a review of the literature. Canadian Journal of Anaesthesia 2005; 52(7):739-60. 8.

VOLUME - 11, ISSUE - 09, SEPTEMBER - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

- 9. Hohlrieder M, Brimacombe J, Von Goedecke A, Keller C. Postoperative nausea, vomiting, airway morbidity, and analgesic requirements are less for the Proseal laryngeal mask airway then the tracheal tube in females undergoing breast and gynaecological surgery. Br J Anaesth 2007;99(4): 576-80.
- Zundert Tv, Gatt S. The Baska Mask® -A new concept in Self-sealing 10. membrane cuff extraglottic airway devices, using a sump and two gastric drains: A critical evaluation. J Obstet Anaesth Crit Care 2012;2:23-30.
- 11. Singh B, Singh AP, Attri JP. Randomized controlled trial to compare Baska® mask versus ProSeal laryngeal mask airway for general anesthesia with intermittent positive pressure ventilation. Anesth Essays Res 2020; 14:25-8. Ebenezer Joel Kumar E, G Vijay Anand, Aldona Shaji R. A comparative study
- 12. of Baska mask vs proseal LMA in elective sterilization surgeries. IAIM, 2019; 6(2):108-113.
- 13. Sharifa Ali Sabeeh Al-Rawahi, Haris Aziz, Azharuddin M Malik, Rashid M Khan, Naresh Kaul. A comparative analysis of the Baska Mask vs. Proseal laryngeal mask for general anesthesia with IPPV. Anaesthesia, pain and Intensive care, 2013; 17(3).
- Alexiev V., Salim A., Kevin L.G. and Laffey J.G. 2012. An observational study of 14.
- the Baska® mask: a novel supraglottic airway. Anaesthesia 67: 640-645. Aziz, Rehab. (2017). Comparison of I-gel with Baska Mask Airway for Controlled Ventilation in Obese Patients Undergoing Ambulatory Surgery: A 15. Prospective Randomized Trial. Journal of Anesthesiology. 5. 29. 10.11648/j.ja.20170504.12.
- Alexiev V, Ochana A, Abdelrahman D, Coyne J, McDonnell JG,O'Toole DP, et al. Comparison of the Baska® mask with the single use laryngeal mask airway in low-risk female patients undergoing ambulatory surgery. 16 Anaesthesia 2013; 68: 1026-32