*Original Article*

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# Comparison of Baska Mask and Conventional Endotracheal Tube in Airway Management during Laparoscopic Cholecystectomy: A Randomized Clinical Study

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**Abstract**

***Background:*** Baska mask has been chosen to secure airway for surgeries under general anesthesia in view of its adaptability during positive pressure ventilation as it moulds accordingly.

***Aims:*** Our aim was to compare BASKA mask with Endotracheal tube primarily for hemodynamic changes, and also ease of insertion in terms of number of attempts and time taken for insertion, airway trauma, intraoperative and postoperative laryngopharyngeal morbidity (LPM) occurring in patients undergoing laparoscopic cholecystectomies under general Anesthesia.

***Methods:*** A hospital based prospective, randomised comparative clinical study involving60 ASA I and II patients undergoing laparoscopic surgeries under general Anesthesia were randomly divided into 2 groups of 30 each (n=30), either using BASKA mask or ETT. Hemodynamic changes in both the groups were compared, along with number of attempts and time for insertion and laryngopharyngeal morbidities.

***Results:*** Hemodynamic fluctuations are less in patients who received Baska mask for their airway management than with endotracheal tube insertion. The number of attempts of insertion and time duration of insertion of Baska Mask (Mean ±SD=13.50±5.49) for airway management were less and with negligible postoperative laryngopharyngeal comorbidities when compared with endotracheal intubation in adult patients undergoing elective laparoscopic cholecystectomy under general anaesthesia with positive pressure ventilation.

***Conclusion:*** Baska Mask with its unique anatomy and features is a good alternative to endotracheal tube for airway management in elective laparoscopic cholecystectomies under general anaesthesia with positive pressure ventilation in terms of negligible hemodynamic changes, less number of attempts and reduced mean time duration of insertion, and less laryngopharyngeal morbidities.

**Key words:** BASKA Mask; Endotracheal Tube; Hemodynamic Response; Laparoscopic Cholecystectomy.

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## Introduction

Till date, airway management for laparoscopic cholecystectomies under General Anesthesia, the gold standard technique was endotracheal intubation. But it involves rigid laryngoscopy which may damage tissues, increased risk of heamodynamic response like tachycardia, hypertension, arrhythmias which may lead to myocardial damage, laryngo-pharyngeal morbidities like sore throat, dysphagia, dysphonia and dysarthria, hence it requires better alternative.[1]

Supraglottic airway devices with gastric drainage ports are being used.[2] Supraglottic airway device also has special part to play in difficult airway algorithm for both anticipated and unanticipated difficult airway.[3] Newly designed second generation supraglottic airway devices Like Baska mask have cuff with high sealing pressure and allow to drain the gastric contents through a gastric drain tube.[4]

## Methods

A prospective randomised comparative clinical study was conducted after taking approval from ethical committee at Rajarajeswari medical college and hospital. This study involved 60 patients with age ranging from 18-40yr and BMI ranging 25-35, belonging to ASA I and II undergoing elective laparoscopic cholecystectomy surgeries. All relevant investigations and workup were done keeping in view of patients co-morbidities if any. Consent was obtained for the procedure after explaining to patients in their own understandable language.

Patients were randomised into two groups as group B and E. The sample size was calculated as per the previous study conducted by Kara D et.al., considering a mean second generation supraglottic airway device insertion time of about 10-12 seconds with the power (1-β) of 80% and an alpha error (α) of 5%, 30 patients in each group were selected for our study. This was done with the help of computer generated code where group B involvedstudy population who received Baska Mask insertion and the other group receivedEndotracheal intubation for their airway management.[8]

Patients with Mouth opening (interincissor gap) of <2.5cm, Cervical spine pathology, Risk of aspiration of gastric contents (history of gastroesophageal reflux disease, hiatus hernia, uncontrolled diabetes mellitus and gross obesity, Pregnant woman), difficult intubation based on history of difficult airway, thyromental distance <6.5cm, modified Mallampatti grading III/IV, smokers who are not well optimised, and patients who refused for the study were not considered.

Patients scheduled for surgery were kept nil per oral for 6 hours before surgery. Tablet pantoprozole 40mg was given orally in the previous night half an hour before food and tablet alprazolam 0.5mg was given a night prior to surgery to allay anxiety and apprehension. An intravenous line was secured and intravenous injection of pantoprazole 40mg and metoclopromide 10mg were given on the morning of surgery.

Anaesthesia machine and other apparatus were checked along with cylinders and volatile anaesthetics. All drugs about to be administered were loaded and labelled. After shifting the patient inside the operation theatre, all standard ASA monitors were attached. The baseline readings of heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, and oxygen saturation were recorded. All patients were pre oxygenated with 100% oxygen for 3-5 minutes. At the same time patients were premedicated with injection Midazolam 0.02mg/kg, injection Glycopyrrolate 0.005mg/kg and injection fentanyl (for analgesia)1-2mcg/kg. Patients were induced with injection propofol 2-2.5mg/kg till the loss of verbal commands, injection veccurronium 0.08-0.1mg/kg was given for neuromuscular blockade after ensuring adequate ventilation.

After induction and adequate muscular paralysis, Group B patients received appropriate size Baska Mask insertion after lubricating the dorsal surface of it and Group E patients had direct laryngoscopy and endotracheal intubation with appropriate sized well lubricated endotracheal tube along with adequate cuff pressure monitoring to prevent trauma.

The number of attempts of insertion and time interval from holding the airway device to confirmation of correct placement of airway by checking bilateral air entry on auscultation was recorded as intubation time. If Baska Mask was not able to insert or ventilate through it properly, two more attempts were tried. It was considered as “easy insertion”, if insertion was successful with first attempt of insertion and “difficult insertion” if inserted with resistance or inserted during 2nd attempt. If third attempt was unsuccessful to establish an airway then it was considered as failed attempt and airway was managed with tracheal intubation under direct laryngoscopy with endotracheal tube.

Once the airway was secured, we maintained the anaesthesia under controlled ventilation with oxygen, nitrous oxide, isoflurane and intermittent doses of injection vecurronium 0.01mg/kg as and when required for muscular paralysis.

Hemodynamic parameters like heart rate, mean arterial blood pressure, oxygen saturation were recorded before intubation, at the time of insertion, at 10 seconds, 1,3,5 minutes intervals after insertion, after achieving pneumoperitoneum and during removal of devices along with end tidal carbon dioxide ($ETCO_2$) monitoring.

When the surgery was completed, residual muscular paralysis was reversed with injection of mixture of injection glycopyrrolate 0.01mg/kg and inj neostigmine 0.05mg/kg. When the patient was fully awake with adequate respiration, with normal hemodynamics, thorough suctioning was done and then airway device was removed or extubated.

Post extubation-coughing, laryngospasm or bronchospasm, blood stain on the airway device, oral injuries, regurgitation or aspiration were noted. Postoperative sore throat, dysphagia, dysphonia were asked and noted in both the groups.

The collected data were entered and tabulated in Microsoft Excel and were subjected to analysis using Statistical software namely SPSS 22.0, and R environment ver.3.2.2. Student t test ( two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters.

A t-test is a statistical test that is used to compare the means of two groups. Chi-square/Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis. Fisher Exact test was used when cell samples are very small. P value: 0.05<P<0.10 suggestive of significant, 0.01<P ≤0.05 suggests moderately significant, P≤0.01 suggests strongly significant.

## Results

60 patients were enrolled for the study as per the study protocol mentioned above. There were no dropout of patients in any of the groups. Both the groups B and E were comparable with respect to age (Table1, Graph 1), sex distribution (Table 2, Graph 2), BMI in kg/mt2 (Table 3, Graph 3), ASA grading (Table 4, Graph 4) and mallampatti grading (table 5, Graph 5).

**Table 1:** Age distribution of patients studied.

| Age in Years | Group B | Group E | Total |
|---|---|---|---|
| 21-30 | 60 | 43.3 | 51.7 |
| 31-40 | 40 | 56.7 | 48.3 |
| Total | 100 | 100 | 100 |
| Mean ± SD | 29.73±5.11 | 31.13±5.34 | 30.43±5.23 |

Samples are age matched with P=0.304, student t test.

**Graph 1:** Graphical representation of Age distribution of patients studied between groups.

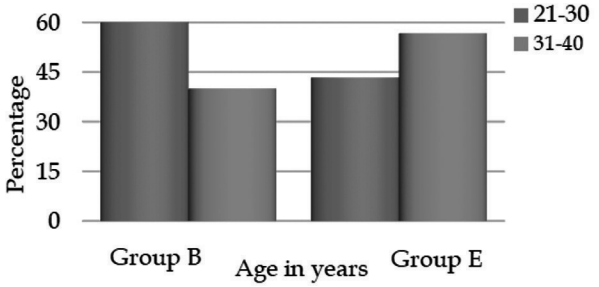



**Table 2:** Gender distribution of patients studied.

| Gender | Group B | Group E | Total |
|---|---|---|---|
| Female | 50 | 53.3 | 51.7 |
| Male | 50 | 46.7 | 48.3 |
| Total | 100 | 100 | 100 |

Samples are gender matched with P=0.796, student t test.

**Graph 2:** Graphical representation of Gender distribution of patients between groups.

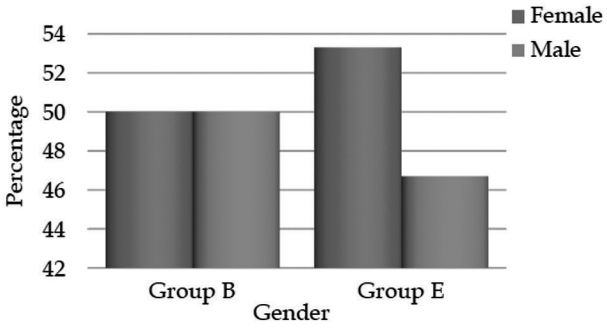



**Table 3:** Comparison of BMI in kg/mt$^2$

| BMI (kg/m$^2$) | Group B | Group E | Total |
|---|---|---|---|
| <18.5 | 1(3.3%) | 0(0%) | 1(1.7%) |
| 18.5-25 | 17(56.7%) | 18(60%) | 35(58.3%) |
| 25-30 | 12(40%) | 12(40%) | 24(40%) |
| >30 | 0(0%) | 0(0%) | 0(0%) |
| Total | 30(100%) | 30(100%) | 60(100%) |

P=1.000 which is Not Significant, Fisher Exact Test was used

**Graph 3:** Graphical representation of BMI (kg/m$^2$) distribution in two groups of patients studied.

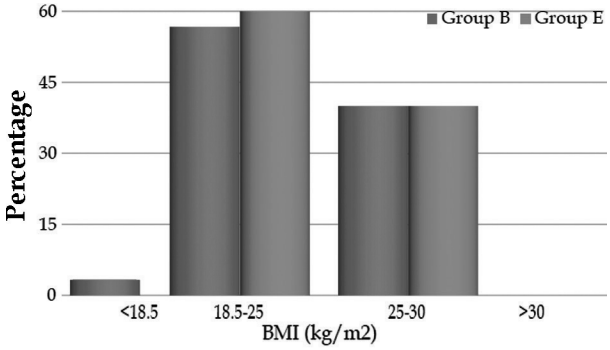



**Table 4:** ASA Grade – distribution in two groups of patients studied.

| ASA Grade | Group B | Group E | Total |
|---|---|---|---|
| I | 22(73.3%) | 16(53.3%) | 38(63.3%) |
| II | 8(26.7%) | 14(46.7%) | 22(36.7%) |
| Total | 30(100%) | 30(100%) | 60(100%) |

P=0.108, Not Significant, Chi-Square Test was used.

**Graph 4:** Graphical representation of ASA Grade–distribution in two groups of patients studied.

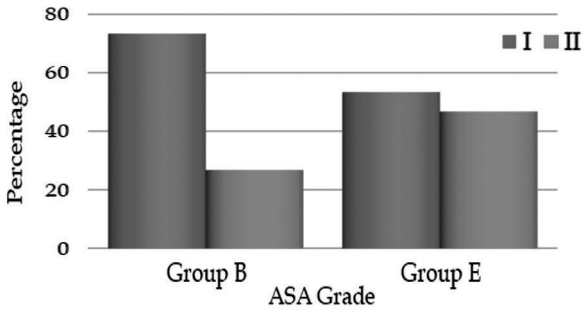



**Table 5:** MPG distribution in two groups of patients studied.

| MPG | Group B | Group E | Total |
|---|---|---|---|
| I | 11(36.7%) | 14(46.7%) | 25(41.7%) |
| II | 19(63.3%) | 16(53.3%) | 35(58.3%) |
| Total | 30(100%) | 30(100%) | 60(100%) |

P=0.432 which is Not significant, Chi-Square test was used.

**Graph 5:** Graphical representation of MPG distribution in two groups of patients studied.

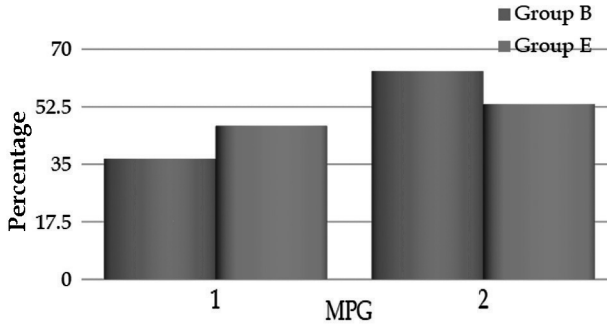



**Table 6:** Heart rate (bpm)- A Comparison in two groups of patients studied.

| Heart rate (bpm) | Group B | Group E | Total | P value |
|---|---|---|---|---|
| Pre induction | 84.53±9.32 | 81.40±7.33 | 82.96±8.46 | 0.153 |
| 10sec after insertion | 92.80±13.27 | 106.33±10.11 | 99.57±13.54 | <0.001** |
| 1minute after insertion | 88.93±11.7 | 106.00±12.76 | 97.47±14.88 | <0.001** |
| 3minute after insertion | 83.73±10.66 | 90.00±10.56 | 86.87±10.99 | 0.026* |
| 5minute after insertion | 80.53±9.69 | 84.63±8.57 | 82.58±9.31 | 0.088+ |
| At Pneumo-peritoneum | 85.27±10.42 | 84.80±10.33 | 85.03±10.29 | 0.862 |
| At Extubation | 97.13±7.32 | 108.50±9.47 | 102.82±10.16 | <0.001** |

Student T test was used.

**Graph 6:** Graphical representation of Heart rate (bpm)- A Comparison in two groups of patients studied.

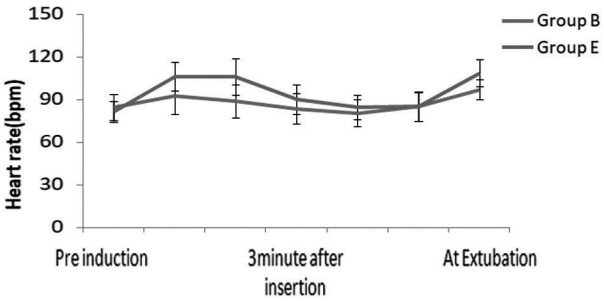



**Table 7:** MAP (mm Hg)- A Comparison in two groups of patients studied.

| MAP (mm Hg) | Group B | Group E | Total | P value |
|---|---|---|---|---|
| Pre induction | 84.37±7.46 | 82.63±4.78 | 83.50±6.27 | 0.289 |
| 10sec after insertion | 87.10±7.93 | 102.47±9.14 | 94.78±11.49 | <0.001** |
| 1minute after insertion | 85.10±7.31 | 102.37±8.74 | 93.73±11.81 | <0.001** |
| 3minute after insertion | 80.30±6.8 | 86.70±10.74 | 83.50±9.48 | 0.008** |
| 5minute after insertion | 79.37±7.48 | 80.93±9.95 | 80.15±8.76 | 0.493 |
| At Pneumo-peritoneum | 87.90±9.35 | 83.17±10.67 | 85.53±10.23 | 0.073+ |
| At Extubation | 92.83±8.20 | 101.27±11.71 | 97.05±10.88 | 0.002** |

Pre-induction heart rate mean values in group B and group E were 84.53 and 81.40 respectively and we obtained a p value of 0.153 which shows that pre induction heart rate were matched. Where the mean heart rate at 10 seconds after insertion, 1

minute after insertion and at extubation in group B were 92.80, 88.93 and 97.13 respectively, the mean heart rate at 10 second, 1 minute after insertion and at extubation in group E were 106.33, 106.00 and 108.50 respectively.

**Graph 7:** Graphical representation of MAP (mm Hg)-A Comparison in two groups of patients studied.

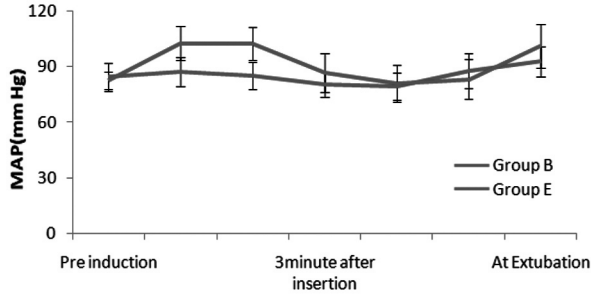
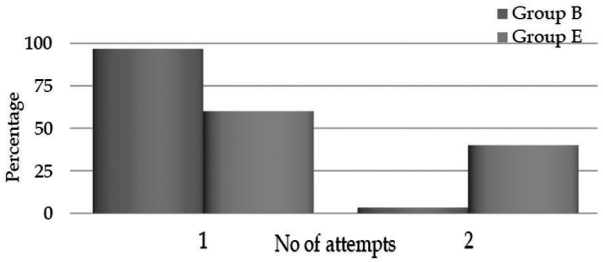



**Table 8:** No. of Attempts- distribution in two groups of patients studied.

| No. of Attempts | Group B | Group E | Total |
|---|---|---|---|
| 1 | 29(96.7%) | 18(60.0%) | 47(78.3%) |
| 2 | 1(3.3%) | 12(40.0%) | 13(21.7%) |
| Total | 30(100%) | 30(100%) | 60(100%) |

P<0.001** which is statistically Significant, Fisher Exact Test was used.

**Graph 8:** Graphical representation of No. of Attempts- distribution in two groups of patients studied.




We obtained a p value of <0.001 at the time mentioned above and it showed mean heart rate at 10 sec, one minute after insertion and at extubation in group E was high with statistical significance when compared with that of group B. At 3 minutes after insertion, mean heart rate in group E was significantly high with a p value of <0.05 when compared with group B (Table 6, Graph 6).

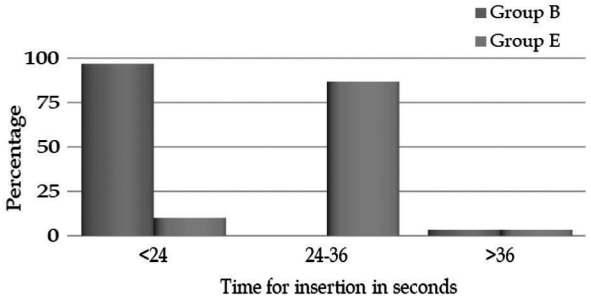
Pre-induction mean MAP(mmHg) value in group B and group E were 84.37 and 87.10 respectively and we derived a p value of 0.289 which shows that pre-induction mean MAP(mmHg) values were matched. The mean MAP(mmHg) at 10 seconds after insertion, 1 minute after insertion in group B were 87.10 and 85.10 respectively as when compared with mean MAP(mmHg) at 10 seconds, 1 minute after insertion in group E which were 102.47 and 102.37 respectively, p value of <0.001 was obtained at the time mentioned above. This shows that mean MAP(mmHg) at 10sec, one minute after insertion in group E was high which was statistically significant when compared with group B. At 3 minutes after insertion mean MAP(mmHg) in group E was significantly high with a p value of 0.026 when compared with group B. At extubation, the p value for MAP was 0.002 which was also statistically significant (p value<0.05) (Table 7, Graph 7).

**Table 9:** Time to secure airway in seconds- distribution in two groups of patients studied.

| Time for insertion in seconds | Group B | Group E | Total |
|---|---|---|---|
| <24 | 29(96.7%) | 3(10%) | 32(53.3%) |
| 24-36 | 0(0%) | 26(86.7%) | 26(43.3%) |
| >36 | 1(3.3%) | 1(3.3%) | 2(3.3%) |
| Total | 30(100%) | 30(100%) | 60(100%) |
| Mean ±SD | 13.50±5.49 | 28.53±3.82 | 21.01±8.91 |

P<0.001** which is statistically Significant, Student t test was used.

**Graph 9:** Graphical representation of Time to secure airway in seconds- distribution in two groups of patients studied.




In group B, 96.7% of patients airway was secured with Baska Mask at first attempt where remaining 3.3% of patients airway secured with Baska Mask in second attempt. In group E, 60.0% of patients airway was secured with endotracheal tube in first attempt where remaining 40.0% of patients airway secured with endotracheal tube in second attempt. Both groups were compared using Chi-Square test and obtained a p value of 0.001 which was statistically significant (Table 8, Graph 8).

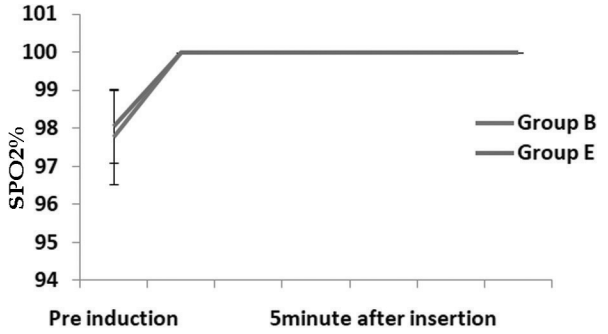
In group B patients, the mean time taken for insertion of Baska Mask was 13.50seconds and the mean time taken to secure endotracheal tube among group E patients is 28.53seconds. The time taken to secure airway in seconds between two groups were compared using Student t test and obtained a p value <0.001 which was statistically significant (Table 9, Graph 9).

**Table 10:** $SpO_2$% A Comparison in two groups of patients studied.

| $SpO_2$% | Group B | Group E | Total | P value |
|---|---|---|---|---|
| Pre induction | 97.77±1.25 | 98.06±0.98 | 97.91±1.12 | 0.315 |
| 10sec after insertion | 100.00±0.00 | 100.00±0.00 | 100.00±0.00 | - |
| 1minute after insertion | 100.00±0.00 | 100.00±0.00 | 100.00±0.00 | - |
| 3minute after insertion | 100.00±0.00 | 100.00±0.00 | 100.00±0.00 | - |
| 5minute after insertion | 100.00±0.00 | 100.00±0.00 | 100.00±0.00 | - |
| At Pneumo-peritoneum | 100.00±0.00 | 100.00±0.00 | 100.00±0.00 | - |
| At Extubation | 100.00±0.00 | 100.00±0.00 | 100.00±0.00 | - |

Student T test used, p values are not significant.

**Graph 10:** Graphical representation of $SpO_2$% Comparison in two groups of patients studied.




In group B and group E, $SpO_2$ was compared using student T test and we obtained the result stating that both groups were comparable and maintained saturation throughout the procedure (Table 10, Graph 10).

**Table 11:** ETCO2 (mmhg)- A Comparison in two groups of patients studied.

| $ETCO_2$ | Group B | Group E | Total | P value |
|---|---|---|---|---|
| 10 sec after insertion | 35.20±3.39 | 36.53±12.02 | 35.87±8.78 | 0.561 |
| 1minute after insertion | 34.40±2.40 | 33.37±2.59 | 33.88±2.53 | 0.115 |
| 3minute after insertion | 34.30±2.10 | 33.83±1.90 | 34.07±2.00 | 0.370 |
| 5minute after insertion | 33.90±2.16 | 34.07±2.10 | 33.98±2.11 | 0.763 |
| At Pneumo-peritoneum | 36.80±2.94 | 36.63±2.33 | 36.72±2.63 | 0.809 |
| At Extubation | 37.03±2.57 | 37.57±2.42 | 37.80±2.59 | 0.120 |

Student T test was used to obtain p values which are not significant.

**Graph 11:** Graphical representation of $ETCO_2$ (mmhg) Comparison in two groups of patients studied.

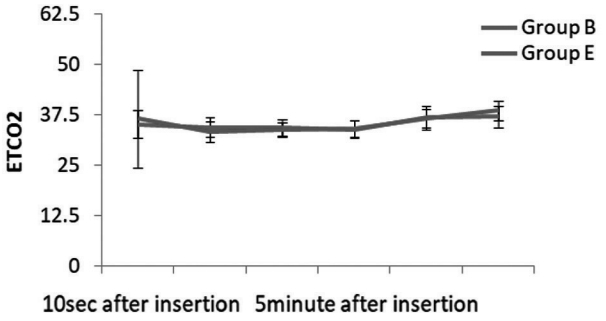



**Table 12:** Comparison of complications At removal of airway device between groups of patients studied.

| At Removal | Group B (n=30) | Group E (n=30) | Total (n=60) | P value |
|---|---|---|---|---|
| Coughing | 1(3.3%) | 11(36.7%) | 12(20%) | 0.001** |
| Blood staining of device | 0(0%) | 4(13.3%) | 4(6.7%) | 0.112 |
| Trauma to lip, teeth, tongue | 0(0%) | 1(3.3%) | 1(1.7%) | 1.000 |

Chi-square test was used.

**Graph 12:** Graphical representation of Comparison of complications at removal of airway device between groups of patients studied.

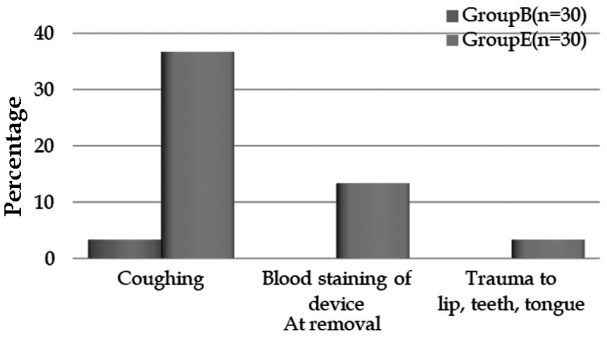



**Table 13:** Comparison of postoperative complications of airway device between groups of patients studied.

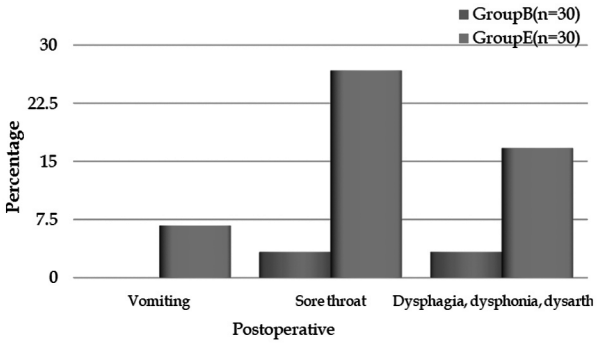
| Postoperative | Group B (n=30) | Group E (n=30) | Total (n=60) | P value |
|---|---|---|---|---|
| Vomiting | 0(0%) | 1(3.3%) | 1(1.7%) | 0.192 |
| Sore throat | 1(3.3%) | 8(26.7%) | 9(15%) | 0.026* |
| Dysphagia, dysphonia, dysarthria | 1(3.3%) | 2(6.7%) | 3(5) | 0.195 |

Chi-square test was used.

In group B and group E, $ETCO_2$ (mmhg) was compared and found that both groups were comparable and maintained saturation throughout procedure. p value obtained was 0.561, 0.115, 0.370, 0.763, 0.809, 0.120 when $ETCO_2$ was compared between two groups at 10sec after insertion, 1

minute after insertion, 3 minute after insertion, 5minute after insertion, at pneumoperitoneum, at extubation respectively which were statistically not significant (p value >0.05)(Table 11, Graph 11).

**Graph 13:** Graphical representation of Comparison of postoperative complications of airway device between groups of patients studied.




Only 3.3% of Group B patients developed coughing after removal of Baska Mask whereas 36.7% of group E patients developed coughing at removal of endotracheal tube which was statistically significant (pvalue<0.001). This shows that the incidence of cough while removal of airway device was more in group E when compared to group B.

The number of patients in whom blood staining was observed among both the groups was almost less and statistically insignificant (p value 0.112).

The incidence of trauma to lip, teeth, tongue when observed between both the groups was found statistically not significant (Table 12, Graph 12). (p value 1.000)

When incidence of postoperative vomiting between these two groups were compared, 1 patient in group E had one episode of vomiting. No patients in group B had vomiting. But statistically the inference was insignificant (p value was 0.192).

The incidence of postoperative sore throat in group E (26.7%) was more when compared with group B (3.3%) (p value of 0.026). One patient in group B (3.3%) and two patients in group E (6.7%) had incidence of postoperative dysphagia, dysphonia, dysarthria but was statistically not significant (Table 13, Graph 13). (p-value of 0.195)

## Discussion

Dr Kanag Baska (Australian Anaesthetist) and Dr Meena Baska (retired GeneralMedical Practitioner) were the people who designed SGAD named Baska Mask. It consists of

1. *Cuff:* thin membranous, variable pressure, self sealing and recoiling cuff, non inflatable.
2. *Sump area:* is aninbuilt cushion device which provides internal cricoid pressure to maintain communication between sump area and upper end of oesophagus for the clearance of gastric fluids efficiently via two tubes which is located alongside the airway.
3. *Airway Tube:* is oval shaped which matches the shape of mouth and prevents rotation within pharynx and it has bite block throughout length to prevent kinking. While removal, if the mask is bitten/ the main airway opening gets blocked by tongue, then the two tubes alongside the airway allow air entry and maintains oxygenation.
4. *Shape and Design:* single molding without any joints except a 22mm connector inserted at top end. Shape and flexibility improvises ease of insertion, without head/neck extension.
5. *Tab:* makes intubation easier and faster by pulling the Tab and prevents insertion of finger for insertion or positioning of Baska Mask.
6. *Suction elbow*: accessible for suction port connection on one port, second port with dual role one as suction port and as free airflow access point. Nowadays in elective surgeries under general anaesthesia, Supraglottic airway devices are found to be good alternative to endotracheal intubation. Among numerate Supraglottic airway devices, Baska Mask is the new generation Supraglottic airway device which is designed in such a way to increase the ease of insertion and reduce hemodynamic complications which will be developed in relation to other airway devices insertion.[5]

Supraglottic airway devices offer an excellent non invasive option for maintenance of airway instead of endotracheal intubation. They are now mostly useful in emergency situations where in rapid access to airway is provided. These include ease of insertion even with limited training in emergency situations.

Other advantages include rapidity, low post operative complications and reduced autonomic imbalance during insertion. The advanced innovations of Supraglottic airway devices improve the safety of patients in terms of efficacious ventilation. Baska mask can also be used for short gynaecological procedures such as dilatation and curettage, hysteroscopy and tubal ligation. This short surgical procedures can be done using monitored anaesthesia care using propofol itself. In

such scenarios Baska mask helps in early recovery as suggested by Anurag Garg et.al.[6]

In another study Alexiev et.al identified unique advantages when they used baska mask during surgeries. They opined that non inflatable cuff of Baska mask leads to a good airway seal with integrated bite block and also has a good conduit to aspirate the pharyngeal contents, there by minimising the risk of aspiration. The overall success rate was 100% with minimal complication rates. They compared Baska Mask insertion with I Gel insertion and concluded that Baska Mask gave a superior airway seal and acceptable interoperation $ETCO_2$ values when compared to I Gel.[7]

Our study also correlated with a study conducted by Duygu Kara et.al who also postulated that postoperative hoarseness and dysphagia were less common in patients where Baska Mask was used though it requires a longer insertion time. They also opined that there is gradual improvement in Baska Mask seal against the glottis over the first 2-3 minutes, which might be due to the mobility of membranous mask, making it more adaptable to the shape of laryngeal outlet over time.[8] Hemodynamic changes were also minimal after insertion of Baska mask.

As per the article published by William Donaldson et.al., the second generation Supraglottic airway device does not cause any complication during and after insertion with very minimal adverse effects such as hoarseness, sore throat and swallowing difficulties. Though there is still a lack of high quality evidence associated with the use of second generation Supraglottic airway devices but still it is clinically very useful for all types of surgeries with lower incidence of hemodynamic complications, complications where these observations are also noted by us.[9]

According to Tom Van Zundert et.al. (Journal of Obstetric anaesthesia and critical care), they also found in their study that Baska Mask can be used successfully during anaesthesia for a large variety of surgical interventions. They did not demonstrate any significant leak around the cuff. They also confirmed that on fiberoptic evaluations of the anatomical position of the Baska Mask, that a perfect or a near perfect position of the vocal cords could be obtained. Accordingly we also did not demonstrate any significant leak around the cuff.[10]

A study conducted by J.M.Bellina et.al. where in comparison was made in between Baska mask and LMA Supreme. Where in they concluded that both devices were similar regarding intraoperative and postoperative events. According to them, Baska Mask is a good device for patients undergoing laparoscopic cholecystectomy under general anaesthesia, which provided an enough seal pressure to perform positive pressure ventilation. They found no differences when relating to incidence of hemodynamic changes, postoperative sore throat, dysphagia and hoarseness between the two groups.[11]

Though some authors found that Baska Mask required more number of insertion attempts and took longer time for insertion. AL Ravahi et.al., concluded that Baska mask has faster time of insertion when compared to Proseal LMA. Accordingly we also took minimum attempts for insertion of Baska Mask.[12]

### *Hemodynamic Changes*

Heart rate, mean arterial pressure, oxygen saturation, end tidal carbon dioxide has been compared between group B and group E. The comparison of hemodynamic changes between the two groups in our study was our primary objective. We found that there is less increase in heart rate (88.93±11.7, 83.73±10.66, 80.53±9.69bpm) (Table 5), mean arterial pressure (87.10±7.93, 85.10±7.31, 80.30±6.8mmHg) (Table 6) at 10seconds, 1, 3minutes after insertion respectively and with faster recovery to baseline values in group of patients who received Baska Mask when compared with group of patients who recieved endotracheal intubation. The oxygen saturation and end tidal carbon dioxide was also maintained within normal limits throughout the procedure.

This can be compared with the study conducted by Ranjana Khetarpal et.al., Rajan Kumar et.al., who came up with statistically significant rise in heart rate, mean arterial pressure in group of patients with endotracheal intubation when compared with group of patients who received Baska Mask in adults undergoing elective non laparoscopic surgeries under general anaesthesia. This also proves accordingly that Baska Mask has a favourable profile when compared to endotracheal intubation.[13]

### *Ease of Insertion*

In our study, 96.7% of patients of group B, airway was secured with Baska Mask at first attempt with mean time of insertion of 13.50±5.49 seconds when compared with group E, 60% of patients airway was secured with endotracheal intubation at first attempt with mean time of insertion of

28.53±3.82 seconds.(Table 7 and table 8) Which can be comparable with the results of study done by Anil Kumar et.al., who found 94% success rate on first attempt insertion of Baska Mask to secure the airway in executive surgeries under general anaesthesia with mean insertion time of 10.21 seconds.[14]

The number of attempts of insertion and mean duration of insertion is less in patients who received Baska Mask when compared with endotracheal intubation because of ease of insertion and less technical expertisation with steep learning curve.

### *Complications*

*Intraoperative:* In our study, none of our cases had any intraoperative complications like airway leak, gastric insufflation, regurgitation or aspiration in both the groups of patients who received Baska Mask and endotracheal intubation. Airway was well secured in both the groups.

*At removal:* At removal of device, in our study we found that the incidence of cough while removal of airway device is more in group E (36.7%) when compared with group B patients (3.3%). The incidence of blood staining of device in group E (13.3%) is more when compared with group B (0%). The incidence of trauma to lip, teeth, tongue in group E (3.3%) was more when compared with group B (0%).

*Postoperative:* Postoperatively in our study, the incidence of vomiting in group E(3.3%) was more when compared with group B(0%). The incidence of postoperative sore throat in group E (26.7%) was more when compared with group B (3.3%).The incidence of postoperative dysphagia, dysphonia, dysarthria in group E (6.7%) is more when compared with group B(3.3%).

When compared with the study conducted by Ranjana Khetarpal et.al., and Rajan Kumar et.al., we also found that postoperative cough, vomiting, sore throat more common in patients who received endotracheal intubation when compared with group of patients who received Baska Mask for airway management in elective surgeries under general anaesthesia, which was in accordance with our study.[13]

Although there are few limitations in our study, Baska mask has emerged as widely used SGAD due to its better seal and negligible adverse effects with a superior safety profile when compared to ETT. Further studies may be warranted with larger samples to validate these observations including its use in morbidly obese patients and in various clinical situations as there were very less human clinical trials.

## Conclusion

Our study shows that less hemodynamic fluctuations in patients who received Baska mask for airway management when compared with patients who received endotracheal intubation for their airway management. We also concluded that number of attempts of insertion along with mean time duration of insertion of airway device is less in group of patients who received Baska Mask with less postoperative laryngopharyngeal comorbidities when compared with group of patients who recieved endotracheal intubation for airway management.

We finally conclude that Baska Mask can be considered as an alternative airway to endotracheal intubation for elective laparoscopic cholecystectomy surgeries under general anaesthesia with positive pressure ventilation in adult patients.

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