https://doi.org/10.33472/AFJBS.6.6.2024.1808-1813

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Oropharyngeal Airway Seal Pressure Using Baska Mask Versus I-Gel Laparoscopic Abdominal Surgeries- A Randomized Controlled Trial

Dr. Akanksha N. Upase[1], Dr. Anjali R. Bhure2, Dr. Siddhi R. Rathod[3], Dr. Ketaki S. Marodkar[4], Dr. Aishwarya S. Pingley[5*], Dr. Sumita V. Bhargava[6], Dr. Rucha P. Patil.[7]

[1,3,5,7]Junior Resident, Nkp Salve Institute of Medical Sciences & Research Centre & Lata Mangeshkar hospital, Nagpur
[2]Professor and HOD, Nkp Salve Institute of Medical Sciences & Research Centre & Lata Mangeshkar hospital, Nagpur
[4,6]Associate Professor, NKP Salve Institute of Medical Sciences & Research Centre & Lata Mangeshkar hospital, Nagpur

Article Info

Volume 6, Issue 6, June 2024

Received: 16 March 2024

Accepted: 26 April 2024

Published: 01 June 2024

doi: 10.33472/AFJBS.6.6.2024.1808-1813

ABSTRACT:

Background-The supraglottic airway device is an appropriate alternative to tracheal intubation in laparoscopic surgery. In present study, we evaluated the oropharyngeal airway seal pressure using Baska mask versus i-gel in laparoscopic abdominal surgeries.
Material & Methods-Present study was a hospital based randomized controlled studyconducted in the Department of Anaesthesiology at NKPSIMS & LMH, Hingna, Nagpur,M.S., India from January 2021 to December 2022, among 100 patients who underwentlaparoscopic abdominal surgeries.
Results- In present study, out of 100 cases, airway sealing pressure at 5 minutes in Group A was 29.02± 1.921 and Group B was 25.72 ± 1.050. At 30 minutes in Group A, it was 29.94 ± 1.910 and in Group B, it was 27.12 ± 1.042. At the end of surgery in Group A, it was 31.66 ± 1.985 and in Group B, it was 28.32 ± 1.058. First attempt success rate was higher in i-gel group compared to Baska mask but was not statistically significant.
The insertion time was lower in i-gel group compared with Baska mask group. i-gel group had better ease of insertion than Baska mask group. The mean oropharyngeal seal pressure amongBaska mask group was statistically higher when compared with Group i-gel.
Post-operative complications in group i-gel- 4 cases of audible air leak, 2 cases of blood stainon device and 7 cases of PONV were observed when compared to Baska mask group which had 3 cases of audible air leak, 3 cases of blood stain on device and 2 cases of PONV. These differences were statistically not significant.
Conclusion-Both the devices were comparable in many terms. Baska mask can be preferredover i-gel because of its superior airway sealing pressure in case of laparoscopic surgeries.

Keywords: Oropharyngeal, Airway Seal Pressure, Baska Mask, i-gel, Laparoscopy.

1. Introduction

The supraglottic airway device (SAD) is an appropriate alternative to tracheal intubation. Its advantages are stable hemodynamic and decreased airway morbidity. It maintains adequate ventilation in laparoscopic surgery, with increased peak airway pressure (PAP) under general anesthesia.[1]

I-gel (intersurgical, Wokingham, Berkshire, UK) is a single use second generation SGD with noninflatable cuff made from medical grade thermoplastic elastomer. It is designed to anatomically fit peri laryngeal and hypopharyngeal structures. It provides reliable peri laryngeal seal with oropharyngeal seal pressure (OSP) of 23.58±4.9 cmH2O.[2]

Baska Mask (Baska Versatile Laryngeal Mask (BVLM) Pty Ltd, Strathfield NSW, Australia), is anew third generation SGD made of medical grade silicone with self-sealing membranous recoiling cuff. It reduces the risk of their damage. Increase in airway pressure during positive pressure ventilation, increases oropharyngeal seal with Baska mask. It inflates and deflates proportionally with each positive pressure inspiration and expiration respectively.[3]

The introduction of third-generation SADs like Baska mask with a noninflatable cuff and better sealing pressure provide more efficient ventilation. It overcomes thedisadvantages of lower generation SAD like risk of pulmonary aspiration.[4]

In present study, we evaluated the oropharyngeal airway seal pressure using Baska mask versus i-gel in laparoscopic abdominal surgeries.

Aims and Objectives

- To evaluate oropharyngeal airway seal pressure with Baska mask versus i-gel in patients undergoing laparoscopic abdominal surgeries.
- To evaluate the postoperative complications of Baska mask versus I-gel.

2. Material & Methods

This was a hospital based randomized controlled study conducted among 100 patients in the Department of Anaesthesiology at NKPSIMS & LMH, Digdoh, Nagpur, M.S., India from January 2021 to December 2022, among patients who underwent laparoscopic abdominal surgeries Clearance from Institutional Ethics Committee was obtained. Written informed consent from the study participants was obtained.

Inclusion Criteria

1. American Society of Anaesthesiologists' (ASA) physical status I/ II
2. Patients aged between 18 years and 70 years.
3. Body mass index (BMI) of (< 30 kg/m2)
4. Patients posted for laparoscopic abdominal surgeries.
5. Patients willing to participate in the study.

Exclusion Criteria

1. Anticipated difficult airway.
2. Patients with neck pathologies.
3. Pregnant and lactating women.
4. Patients with high risk of aspiration.
5. Patients not willing to participate in the study

Statistical Analysis

Data was entered in MS Excel and analysed using Statistical Package for Social Sciences

(SPSS) software.

3. Results

Table 1**:** Insertion time & Duration in oropharynx

Sr. No.	**supraglottic device parameters**	**Group A Mean ± SD**	**Group B Mean ± SD**	**P value**
1	Insertion time (Seconds)	14.46 ± 6.69	13.84 ± 4.76	0.594
2	Duration in oropharynx (Minutes)	57.22 ± 12.29	61.34 ± 23.75	0.278

In present study, out of 100 cases, insertion time (seconds) found in Group A was 14.46 ± 6.69 and in Group B 13.84 ± 4.76. Duration in oropharynx (minutes) found in Group A was 57.22 ± 12.29 and in Group B 61.34 ± 23.75**.** (Table 1)

Table 2: Airway Sealing Pressure

Sr. No.	**Airway Sealing Pressure**	**Group A Mean ± SD**	**Group B Mean ± SD**	**P Value**
1	At 5 minutes	29.02 ± 1.921	25.72 ± 1.050	< 0.0001
2	At 30 minutes	29.94 ± 1.910	27.12 ± 1.042	< 0.0001
3	At end of surgery	31.66 ± 1.985	28.32 ± 1.058	< 0.0001

In present study, out of 100 cases, airway sealing pressure at 5 minutes in Group A was 29.02 ± 1.921 and Group B was 25.72 ± 1.050. Airway sealing pressure at 30 minutes in GroupA was 29.94 ± 1.910 and Group B was 27.12 ± 1.042. Airway sealing pressure at end of surgeryfound in Group A was 31.66 ± 1.985 and Group B was 28.32 ± 1.058. (Table 2)

Table 3: Ease of insertion grading

Sr. No.	**Ease of insertion grading**	**Group A N (%)**	**Group B N (%)**	**Total N (%)**
1	Easy	42 (42%)	44 (44%)	86 (86%)
2	Slightly difficult	8 (8%)	6 (6%)	14 (14%)
3	Difficult	0 (0%)	0 (0%)	0 (0%)
Total		50 (50 %)	50 (50 %)	100 (100 %)

In present study, out of 100 cases, easy insertion grading in Group A was in 42 (42%) and Group B was 44 (44%). Slightly difficult insertion grading found in Group A was 8 (8%) and Group B was 6 (6%). Difficult insertion grading was 0 (0%) in both Group A and Group B **(**Table 3).

Table 4: LMA Device Parameters

Sr. No.	Insertion time	Leak Fraction Mean ± SD		Plateau Pressure Mean ± SD	
		Group A Better 30	Group B 20	Group A Better	Group B
1	At insertion (T0)	3.52 ± 0.506	5.32 ± 0.894	32.76 ± 1.623	28.2 ± 1.298
2	5 min after insertion (T1)	3.5 ± 0.507	5.30 ± 0.885	32.16 ± 1.360	27.46 ± 1.198
3	10 min after insertion (T2)	3.43 ± 0.498	5.28 ± 0.878	31.64 ± 1.289	27.24 ± 1.238
4	15 min after insertion (T3)	3.39 ± 0.492	5.25 ± 0.879	31.16 ± 1.094	26.86 ± 1.195
5	20 min after insertion (T4)	3.35 ± 0.489	5.2 ± 0.871	30.78 ± 1.035	26.46 ± 1.073
6	30 min after insertion (T5)	3.34 ± 0.489	5.18 ± 0.869	30.26 ± 0.964	26.12 ± 1.099
7	40 min after insertion (T6)	3.33 ± 0.480	5.17 ± 0.863	29.88 ± 1.154	25.8 ± 1.010
8	50 min after insertion (T7)	3.32 ± 0.475	5.15 ± 0.857	29.26 ± 1.174	25.34 ± 0.960
9	60 min after insertion (T8)	3.32 ± 0.475	5.15 ± 0.857	28.92 ± 1.468	25.12 ± 0.982

In present study, out of 100 cases, at the baseline insertion (T0), leak fraction in GroupA was 3.52 ± 0.506 and Group B was 5.32 ± 0.894, plateau pressure in Group A was 32.76 ± 1.623 and in Group B was 28.2 ± 1.298. 15 min after insertion (T3), leak fraction in Group A was 3.39 ± 0.492 and Group B was 5.25 ± 0.879, plateau pressure in Group A was 31.16 ± 1.094 and in Group B was 26.86 ± 1.195. 30 min after insertion (T5), leak fraction in Group Awas 3.34 ± 0.489 and Group B was 5.18 ± 0.869, plateau pressure in Group A was 30.26 ± 0.964 and in Group B was 26.12 ± 1.099. 60 min after insertion T8, leak fraction in Group A was 3.32 ± 0.475 and Group B was 5.15 ± 0.857, plateau pressure in Group A was 28.92 ± 1.468 and in Group B was 25.12 ± 0.982.(Table 4)

Table 5: Intra & Post-operative Complications

Sr. No.	Complications	Group A N (%)	Group B N (%)	Total N (%)	Odds Ratio (95 % CI)	P Value
1	Intraoperative desaturation	0 (0 %)	0 (0 %)	0 (0 %)	-	
2	Laryngospasm	0 (0 %)	0 (0 %)	0 (0 %)	-	
3	Audible air leakage	3 (3 %)	4 (4 %)	7 (7 %)	1.362	0.696
4	Lip damage	0 (0 %)	0 (0 %)	0 (0 %)	-	
5	Blood staining on removal	3 (3 %)	2 (2 %)	5 (5 %)	0.652	0.648
6	Post-operative nausea and vomiting	2 (2 %)	7 (7 %)	9 (9 %)	3.9070	0.1001
7	Throat discomfort	2 (2 %)	1 (1 %)	3 (3 %)	0.4898	0.565
8	Dysphagia	0 (0 %)	0 (0 %)	0 (0 %)	-	
9	Dysphonia	0 (0 %)	0 (0 %)	0 (0 %)	-	

In present study, out of 100 cases, audible air leakage was found in 3 cases in Group Aand 4 cases in Group B. Blood staining on removal was found in Group A in 3 and Group B in2 cases. Post-operative nausea and vomiting was found in Group A in 2 and Group B in 7 cases.Throat discomfort was found in Group A in 2 and Group B in 1 case. No other complications were found in both group A & B.

4. Discussion

In present study, out of 100 cases, iinsertion time (Seconds) found in Group A was

14.46 ± 6.69 and in Group B 13.84 ± 4.76. Duration in oropharynx (Minutes) found in Group A was 57.22 ± 12.29 and in Group B 61.34 ± 23.75**. (Table 1)**

In present study, out of 100 cases, airway sealing pressure at 5 min, 30 min and at the end of surgery was significantly more in Group A (study) when compared to Group B (control). ($p < 0.001$) Baska mask is characterized by an advanced self-sealing variable pressure cuff, which produces an oropharyngeal seal that increases proportionately with increasing airway pressure during PPV**,** hence having better airway sealing property. Also, the advanced airway opening provides superior patency of seal. (Table 2)

Similarly, Chaudhary UK et al reported that the mean OLP was significantly higher inthe Baska mask group when compared to the i-gel group at insertion (29.54 ± 1.41 cm H2 O vs. 23.16 ± 3.07 cm H2 O, P = 0.02) and 30 min after insertion (33.54 ± 1.16 cm H2 O vs. 25.97 ± 2.25 cm H2 O, P = 0.001.[5]

Table 3 shows distribution of cases according to Ease of insertion grading. Easy insertion grading found in Group A was 42 (42%) and Group B was 44 (44%). Slightly difficultinsertion grading found in group (Group A) was 8 (8%) and Group B was 6 (6%). Difficult insertion grading was 0 (0%) in both Group A and Group B (Table 3).

Agrawal N et al found that Baska mask was successfully inserted in 27 patients (90%) and i-gel in 29 patients (96.67%) in first attempt leading to comparable first attempt success rate (p value 0.604). Rolling up of tongue during insertion was responsible for unsuccessful attempts. Overall insertion success rate in both groups was 100%.[6]

Choi SR et al found that most of the devices were successfully inserted in the firstattempt, except for one i-gel device, which was successfully inserted on the second attempt (P = 0.320).[7]

In present study, mean leak fraction was significantly less in Group A (study) when compared to Group B (control) ($p < 0.0001$), & mean plateau pressure was significantly higher in Group A when compared to Group B ($p < 0.0001$). This lesser leak may contribute to a better seal with less operative room pollution. (Table 4)

This is attributed due to better sealing pressure of Baska mask when compared to i-gel.Choi SR et al found that OLP was higher in the Baska Mask group (29.6 ± 6.8 cmH_2O) than in the i-gel group (26.7 ± 4.5 cmH_2O) (P = 0.014).

In the present study, most of the post-operative complications were minimal or absent in both groups. Audible air leakage was found in 3 cases in Group A (study) and 4 cases in Group B (control). Blood staining on removal was found in Group A (study) in 3 and Group B (control) in 2 cases. Post-operative nausea and vomiting was found in Group A in 2 and Group B in 7 cases. Throat discomfort was found in Group A in 2 and Group B in 1 case. There was no statistically significant difference between the two groups. ($p > 0.05$).

Sharma P et al found that none of the patients, in any of the three groups, haddesaturation, bronchospasm, distension, aspiration, change of voice, and lip/tongue or dental injury. Pain in throat was observed in 5 (16.6%) patients in Group BM, 7 (23.1%) patients in Group IG, and 9 (29.7%) patients in Group LS. In Group BM, difficulty in swallowing was seen in 1 (3.3%) patient, cough in 3 (10%), and blood on device in 1 (3.3%) patient. Same findings were in 1 (3.3%), 4 (13.2%), and 3 (10%) patients in Group IG and 2 (6.6%), 1 (3.3%), and 2 (6.6%) patients in Group LS, respectively. For none of the complications, the difference in any of the three groups was significant statistically ($P > 0.05$).[8]

Thanesh Kumar et al found that there was a significant difference in sore throat betweenthe two groups (P = 0.042). Group IG showed higher percentage of no throat pain than GroupBM (67.5 % and 42.5 %, respectively). There were no significant differences in othercomplications, like blood staining on the device, PONV, and airway trauma.[9]

Ramakrishna AKM et al observed that post-operative sore throat was significantly higher in the Baska mask group than i-gel group (56.7 % vs 23.3 %). In two cases, blood stainswere noted

on the Baska mask upon removal. None in the i-gel group had such findings.[10]

5. Conclusion

Both the devices are comparable in many terms. Baska mask can be preferred overI gel because of its superior airway sealing pressure in case of laparoscopic surgeries.

6. References

1. Park SK, Ko G, Choi GJ, Ahn EJ, Kang H. Comparison between supraglottic airway devices and endotracheal tubes in patients undergoing laparoscopic surgery: A systematic review and meta-analysis. Medicine (Baltimore) 2016;95: e4598. [PMC free article] [PubMed] [Google Scholar] [Ref list]
2. Kini G, Devanna GM, Mukkapati KR, Chaudhuri S, Thomas D. Comparison of i-gel with Proseal LMA in adult patients undergoing elective surgical procedures under general anesthesia without paralysis: A prospective randomized study. J Anaesthesiol Clin Pharmacol. 2014;30(2):183–7. doi:10.4103/0970-9185.130008.
3. Zundert TV, Gatt S. The Baska Mask - A new concept in self-sealing membrane cuff extraglottic airway devices using a sump and two gastric drains: A critical evaluation. J Obstet Anaesth Crit Care. 2012; 2:23–30.
4. Alexiev V, Salim A, Kevin LG, Laffey JG. An observational study of the Baska®mask: A novel supraglottic airway. Anesthesia 2012; 67:640-5.
5. Chaudhary UK, Mahajan SR, Mahajan M, Sharma C, Sharma M. A comparative analysis of the Baska mask versus i-gel for general anaesthesia in surgical patients undergoing laparoscopic cholecystectomy. Acta Med Int 2018;5(2):69-73.
6. Agarwal N, Singh GP, Saigal D, Comparison of baska mask with i-gel as ventilatory device inadult patients undergoing laparoscopic cholecystectomy, Panacea Journal of Medical Sciences, 2021;11(3):477-83
7. Choi SR, Lee TY, Kim SW, Park SY, Chung CJ, Kim JH, Comparison of clinical performance of i-gel® and Baska Mask® during laparoscopic cholecystectomy, Korean J Anesthesiol. 2019 Dec; 72(6): 576–582.
8. Sharma P, Raj S, Tripathi M, Malviya D, Kumari S, Midhra S, Comparison of LMA supreme, i-gel, & baska mask for airway management during laparoscopic cholecystectomy: A prospective randomized comparative study from North India,Anesth Essays Res 2022:16:42-8
9. Thanesh Kumar Sinasamy, Wan Mohd Nazaruddin Wan Hassan, Rhendra Hardy Mohamad Zaini, Praveena Seevaunnamtum, Laila Ab Mukmin. Comparison of the Baska mask and the i-gel supraglottic airway devices in patients undergoing elective surgery. Anaesthesiol Intensive Ther 2020; 52, 5: 383–388
10. Ramakrishna AKM, Shetty SM, Ramachandragowda AN, Sriram V, Sohail S, Shivashankar A. A randomised clinical trial to compare the effectiveness of Baska mask versus i-gel in patients undergoing laparoscopic surgeries in a tertiary centre. J Evid Based Med Healthc 2021;8(24):2040-4.