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PULMONOLOGIST'S SATISFACTION WITH THE USE OF I-GEL LARYNGEAL MASK AIRWAY (LMA) FOR BRONCHOSCOPY IN DR. WAHIDIN SUDIROHUSODO MAKASSAR CENTRAL GENERAL HOSPITAL

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ABSTRACT

Bronchoscopy is a type of endoscope used to examine internal organs in the body. This examination is performed by competent physicians, by examining the bronchi or the branches for diagnostic or therapeutic purposes. The use of the LMA for airway management during *Fiberoptic Flexible Bronchoscopy* (FFB) was first introduced in 1989 and was described as a safe and favorable tool for airway control during bronchoscopy in both adult and pediatric populations. The advantage of an LMA over an endotracheal tube is that it is equipped with a larger diameter tube, allowing for better visibility and flexibility. The I-gel LMA is the most frequently used type of LMA. This study aimed to determine the satisfaction of pulmonologists with the use of LMA I-gel when performing bronchoscopy in Dr. Wahidin Sudirohusodo Central General Hospital Makassar. The research employed probability sampling with an experimental design, using questionnaires for data collection. There were 36 patients underwent bronchoscopy from June – December 2023. Demographic data were collected (age, sex, body mass index, and American Society of Anesthesiologists physical status), assessment based on the first successful attempt of fiberoptic insertion with a value of p = 0,06, quality of visualization, flexibility of the scope, size of the fiberoptic that can be used, and limitations of performance during bronchoscopy with a value of p < 0,05. It was found that pulmonologists were satisfied with the use of I-gel LMA during bronchoscopy. However, this result was also influenced by the experience of pulmonologists in performing the procedure.

Keywords: Bronchoscopy, LMA I-gel, Satisfaction

INTRODUCTION

Bronchoscopy is a type of endoscope specifically made to examine the internal organs of the body. This procedure can only be performed by competent physicians, by examining the bronchi or the branches for diagnostic or therapeutic purposes.[1,2,3,4] Since its invention, flexible bronchoscopy has revolutionized the field of pulmonary diagnostics. Bronchoscopy has evolved significantly over the last half-century. Ever since Shigeto Ikeda first introduced the flexible fiberoptic bronchoscope in 1968, it has become an important diagnostic tool for pulmonologists.[5] Today's advanced technology allows us to examine beyond the endobronchial tree and into the mediastinum by endobronchial ultrasound bronchoscopy, as well as the alveoli with a confocal microscope.[6]

In 1989, Laryngeal Mask Airway (LMA) was first introduced as a tool for airway management during fiberoptic flexible bronchoscopy (FFB) and was reviewed as safe and favorable for airway control during bronchoscopy in both adult and pediatric populations. As LMA is equipped with tube in a larger diameter, it has better visibility and flexibility for bronchoscopy compared to an endotracheal tube.[7,8] The I-gel LMA can adapt to the curve of the oropharynx without malrotation. However, correct placement is a prerequisite for effective ventilation.[9,10]A thorough examination of the respiratory tract corresponding to the planned anesthetic technique is important for bronchoscopic procedures. Moreover, a comprehensive assessment of the upper respiratory tract is required to determine the patient's ability to maintain an adequate airway.[7]The I-gel LMA is the most frequently used type of LMA. This study aimed to determine the satisfaction of pulmonologists with using I-gel LMA for bronchoscopy in Dr. Wahidin Sudirohusodo Makassar Central General Hospital based on:

1. Successful first attempt of fiberoptic insertion.
2. Result of visualization.

3. Flexibility of the scope used during the procedures.
4. Fiberoptic sizes that can be utilized.
5. Limitation of the procedures.

METHOD

This study employed probability sampling, using an experimental design. Data were collected using questionnaires. The questionnaire has previously been tested to ensure its validity and reliability. The research was carried out in the Bronchoscopy Room at Dr. Wahidin Sudirohusodo Central General Hospital throughout June – December 2023. The samples were patients who underwent bronchoscopy in Dr. Wahidin Sudirohusodo Central General Hospital throughout June – December 2023 and were eligible to participate in the study. The inclusion criteria are age within the range of 18-65 years, Glasgow Coma Scale (GCS) of 15, classified as category 2 or 3 of the American Society of Anesthesiologists (ASA) physical status, and approval from the attending physician. Patients with predicted difficult LMA insertion: limited mouth opening, airway obstruction/disorder, presence of pulmonary fibrosis or neck stiffness, and patients/families who are not willing to take part in the study were excluded. The dropout criteria in this study were death within < 24 hours and being on a ventilator after the procedure.

The sample size was determined using the Harry King Normogram technique.[11] The population in this study was 33, which was obtained from the average number of patients undergoing bronchoscopy at Dr. Wahidin Sudirohusodo Central General Hospital in June – December 2022. The confidence level was 95% or an error rate of 5 %, and the 5% multiplier factor of the confidence level was 1.195. The sample was calculated by drawing a line from the population of 33, passing the 5% error level, then a point will be found below approximately 90%, then the sample size of 0.9 x 33 x 1.195 = 35, 4915 was determined, and eventually rounded up to 36 patients.

This study has been approved by the Hasanuddin University Research Ethics Committee/Dr Wahidin Sudirohusodo Makassar National Central General Hospital under registration number 603/UN4.6.4.5.31/PP36/2023.

Samples who were willing to take part in the study and met the inclusion and exclusion criteria were given a thorough explanation of the objectives, procedures, risks, and side effects that could occur and were asked to sign an informed consent form. In the medical record, authors collected the identity, age, sex, weight, height, body mass index, and comorbidities of the samples. Samples were randomized and a bronchoscopy procedure was carried out with I-gel LMA. When the sample arrived at the bronchoscopy room, the identity, diagnosis, planned management, and intravenous access were re-checked before the procedure began, then a standard monitoring device (blood pressure, TAR, electrocardiogram (EKG), heart rate, oxygen saturation) was installed and numbers were recorded. Samples were anesthetized using I-gel LMA I-gel. Once the procedure was completed, the anesthesia was stopped. The patients were observed in the recovery room. Only patients with an Aldrette score ≥ 9 were acceptable to move to the regular ward. A questionnaire was given by the authors of this study after all of the bronchoscopy procedures were completed by the pulmonologists to assess satisfaction with the successful first attempts of the fiberoptic insertion, the visualization during the procedure, the flexibility of the used scope, the size of the fiberoptic that can be utilized and limitations of the procedure. The filled questionnaires were then collected and analyzed by using the SPSS for Windows 25.0 with descriptive and bivariate analysis (data processed using the Chi-Square Test) and were deemed to be significant if $p < 0.05$.

RESULT

Table 1. Characteristics of samples.

	I-gel LMA	Classic LMA	*P* value
Age (years)	48.94 ± 11.822	49,72 ± 11.795	0.781
BMI* (kg/m^2)	23,033 ± 3.473	22,389 ± 3.784	0.454
Weight (kg)	57.69 ± 9.942	58.89 ± 10.237	0.935
Height (cm)	159.81 ± 6.515	160.53 ± 5.887	0.623
Sex			
Male	23	24	0.804
Female	13	12	
ASA physical status**			
2	13	6	0.063
3	23	30	

*BMI: Body Mass Index, **ASA: American Society of Anesthesiologists

The results of this study were not influenced by age, anthropometric, and sex variables. Therefore, the two study sample groups were homogeneous with a p-value > 0.05. Comparison of age, weight, height, BMI, and ASA physical status between the two groups was tested using the Independent T-test, while sex was tested using the Chi-square test.

Table 2. Number of attempts for fiberoptic insertion using I-gel LMA.

Variable	I-gel LMA (N=36)		P value
	*N	**%	
Successful fiberoptic insertion after 2 or more attempts	3	8.3	0.060
Successful first attempt of fiberoptic insertion	33	91.7	

*N: Frequency, **%: Percentage, Statistic analysis: Chi-square test

Based on the analysis, the were more successful first attempts by fiberoptic using I-gel LMA in 33 samples (91.7%). Meanwhile, only three required more than one attempt of insertion (8.3%). However, there were no significant differences (p-value of > 0.05) during the statistical analysis.

Table 3. Quality of visualization using I-gel LMA.

Variable	I-gel LMA (N=36)		P value
	*N	**%	
Limited visualization	5	13.9	0.012
Adequate visualization	31	86.1	

*N: Frequency, **%: Percentage, Statistical analysis: *Chi-Square Test*

Using I-gel LMA, 31 samples (86.1%) obtained adequate visualization. This was defined by the adequate view from the vocal folds to the bronchus since the beginning of the procedure. Meanwhile, 5 samples (13.9%) had limited visualization. Based on statistical analysis, there was a significant difference with a p-value of <0.05.

Table 4. Flexibility of the scope with I-gel LMA.

Variable	I-gel LMA (N=36)		P value
	*N	**%	
Not flexible	3	8.3	0.001
Flexible	33	91.7	

*N: Frequency, **%: Percentage, Statistical analysis: *Chi-Square Test*

The flexibility of the scope was better using I-gel LMA as admitted by 33 samples (91.7%). Flexibility was disproved by 3 samples (8.3%). A significant difference was found with a p-value of <0.05.

Table 5. Variety of fiberoptic sizes that can be utilized using I-gel LMA.

Variable	I-gel LMA (N=36)		P value
	*N	**%	
Limited	3	8.3	0.001
Not limited	33	91.7	

*N: Frequency, **%: Percentage, Statistical analysis: *Chi-Square Test*

The utilization different of fiberoptic sizes during bronchoscopy was better in I-gel LMAs. This was approved by 33 samples (91.7%), admitting to the flexibility of utilizing various fiberoptic sizes during procedures using I-gel LMA I-gel. However, 3 samples (8.3%) were limited to use different fiberoptic sizes during bronchoscopy. A significant statistical test was found with a p-value of <0.05.

Table 6. Limitation during bronchoscopy using I-gel LMA.

Variabel	LMA I-gel (N=36)		Nilai *p*
	*N	**%	
Limited	4	11.1	0.020
Not limited	32	88.9	

*N: Frequency, **%: Percentage, Statistical analysis: *Chi-Square Test*

The limitations of bronchoscopy when using I-gel LMA were different. Four samples (11.1%) admitted to limitation during the procedure, while 32 samples (88.9%) admitted to no limitation, with a p-value of < 0.05.

DISCUSSION

Thirty-six samples were eligible for this study. The result was found to be homogeneous, based on predetermined statistical tests, namely age, gender, weight, height, body mass index, and physical status according to the American Society of Anesthesiologists (ASA) classification.In this study, the analysis showed 33 samples (91.7%) were satisfied with the successful first attempts of fiberoptic insertion during bronchoscopy using LMA I-gel. Meanwhile, 3 samples (8.3%) needed more than one insertion attempt. However, from the statistical analysis, there were no significant differences with a p-value > 0.05.

Based on statistical analysis, satisfaction in this study assessed that 31 samples (86.1%) obtained adequate visualization during the bronchoscopy procedure using I-gel LMA and 5 samples (13.9%) had limited visualization. There was a significant difference with a p-value of < 0.05. The visualization was defined by the view from the vocal folds to the bronchial tree. Alex Moore et al. described that the level of glottic visualization was better in the I-gel LMA group compared to Fastrach LMA with p < 0.0001.[12,13]The flexibility of the bronchoscopy scope was admitted to be better by 33 samples (91.7%), while 3 samples (8.3%) felt it was not as flexible when using I-gel LMAs. A significant difference was found in pulmonologist satisfaction with a p-value <0.05.

The use of different fiberoptic sizes during bronchoscopy was more applicable to I-gel LMAs. This is proven by 33 samples (91.7%) admitting to the flexibility of utilizing various fiberoptic sizes during bronchoscopy using I-ge LMA. Three samples (8.3%) admitted to being limited in using different fiberoptic sizes procedures with a p-value of < 0, 05.On the limitation during the procedure, 4 pulmonologists' (11.1%) admitted to restraints of performing bronchoscopy. Meanwhile, 32 samples (88.9%) admitted to no limitations, with a p-value of <0.05. This limitation may occur due to the larger fiberoptic size, therefore the fiberoptic range becomes limited.

Table 7. Questionnaire on the operators' satisfaction of using I-gel LMA for bronchoscopy in Dr. Wahidin Sudirohusodo Central General Hospital.

Question	Satisfied (1)	Dissatisfied (0)
Rate of successful first attempts during fiberoptic insertion		
Quality of visualization		
Scope flexibility during bronchoscopy		
Sizes of fiberoptic that can be utilized		
Limitation when performing bronchoscopy		

Score: 1 = Satisfied, 0 = Not satisfied
Total score ≥ 3 = Satisfied with the use of I-gel LMA for bronchoscopy

The table above is a questionnaire given to pulmonologists after carrying out bronchoscopy procedures. A score of '1' is an indicator of satisfaction and '0' means dissatisfaction. In this study, satisfaction is achieved if the overall score is ≥ 3.This study can be used as a future reference for assessing the satisfaction of pulmonologists with the use of I-gel LMA, as seen in pulmonologists who performed bronchoscopy in Dr. Wahidin Sudirohusodo Central General Hospital in Makassar.

The limitation of this study is that there were no specific criteria for pulmonologists who performed bronchoscopy using I-gel LMA, such as the length of experience or the number of successful attempts in bronchoscopy. This is likely to be one of the factors that influence the successful first attempt of fiberoptic insertion in bronchoscopy.

CONCLUSION

Based on the five parameters of assessing pulmonologists' satisfaction with the use of LMA I-gel in bronchoscopy, pulmonologists are satisfied with the use I-gel during bronchoscopy in Dr. Wahidin Sudirohusodo Central General Hospital Makassar.

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