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Evaluation of the Complications Effectiveness and Frequency When Using Second-Generation Supraglottic Air Ducts in Laparoscopic Interventions in the Trendelenburg Position

L.V. Arsentev[1], A.A. Andreenko[1], A.T. Gettuev[2], A.D. Halikov[3], V.P. Govorushkina[4], B.N. Bogomolov[1], A.G. Klimov[1], A.V. Shchegolev[1]*

Department of Military Anesthesiology and Reanimatology

1 S.M. Kirov Military Medical Academy of the Ministry of Defense of the Russian Federation

6 Akademika Lebedeva St. Petersburg 194044, Russian Federation

2 Elizavetinskaya Hospital

14, lit. A Vavilovykh St., St. Petersburg 195257, Russian Federation

3 City Clinical Oncological Dispensary

56 Veterans Avenue, St. Petersburg 198255, Russian Federation

4 St. Petersburg State University

7/9 Universitetskaya Emb., St. Petersburg 199034, Russian Federation

*** Contacts:** Leonid V. Arsentev, Adjunct of the Department of Military Anesthesiology and Reanimatology, S.M. Kirov Military Medical Academy. Email: arsentevlvmd@gmail.com

RELEVANCE The supraglottic air ducts (SAD) are now more and more often used as devices of the first choice for providing ventilation during surgical interventions of low trauma and duration, during laparoscopic operations as well. Nevertheless, some concerns remain about the possibility of using these devices in operations accompanied by a significant increase in intra-abdominal pressure, for example, when performing laparoscopy, especially in the Trendelenburg position.

AIM OF STUDY Comparison of the efficiency and safety of ventilation, the incidence of postoperative complications when using two different types of SAD during laparoscopic surgical interventions performed in the Trendelenburg position.

MATERIAL AND METHODS Eighty-three gynecological patients who were scheduled to undergo laparoscopic surgery in the Trendelenburg position were randomly assigned to two groups. In the 1st group, a laryngeal tube was installed for general anesthesia, in the 2nd group patients had a laryngeal mask. The adequacy of ventilation, gas exchange rates, oropharyngeal leakage pressure, rate of successful placement, mean and peak airway pressure at various stages of surgery, as well as the frequency of intra- and postoperative complications were assessed.

RESULTS In all observations, there were normal indicators of gas exchange and capnography, no leakage of the breathing mixture from the circuit. The level of oropharyngeal leakage pressure was statistically different in the groups and was 32 (28; 35) in the 1st group and 28.5 (27; 31.8) cm of water column in the 2nd group. (p=0.007). The time to the onset of ventilation was 19s (18; 21) in the laryngeal tube group, 21s (19; 22.5) in the laryngeal mask group; statistically significant differences were not obtained by this criterion (p=0.059). The first installation attempt was successful in 40 cases (93%) in the 1st group and in 38 cases (95%) in the 2nd group; there was no significant difference in this indicator (p=0.94). The peak and mean airway pressure at the stages of surgery also did not differ. The study did not reveal such intraoperative complications as dislocation of the air duct and aspiration of gastric contents. When analyzing postoperative complications, statistical differences were obtained in terms of the level of sore throat 3 hours after removal of SAD. In terms of sore throat after 5 minutes, 6, 12, 24 hours, the frequency of hoarseness, no differences were found.

CONCLUSION 1. The use of different types of 2nd generation supraglottic air ducts with inflatable cuff (s) provides reliable protection of the upper airway during anesthesia and effective ventilation during laparoscopic surgery in the Trendelenburg position. 2. The laryngeal mask and laryngeal tube did not differ significantly in the frequency of successful insertion, ventilation efficiency, airway pressure levels at various stages of surgery, and the incidence of intra- and postoperative complications. 3. The use of a laryngeal tube provided a higher level of oropharyngeal leakage pressure, while the differences with the laryngeal mask for this indicator were statistically significant.

KEYWORDS: aspiration of gastric contents, supraglottic air ducts, residual gastric volume, regurgitation, laryngeal mask, laryngeal tube

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CONFLICT OF INTEREST Authors declare lack of the conflicts of interests

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AFFILIATIONS

Leonid V. Arsentev	Adjunct of the Department of Military Anesthesiology and Reanimatology, S.M. Kirov Military Medical Academy; https://orcid.org/0000-0002-5886-9900, arsentevlvmd@gmail.com; 20%, concept and design of the study, collection and processing of material, writing a text
Alexander A. Andreenko	Candidate of Medical Sciences, Deputy Head of the Department of Military Anesthesiology and Reanimatology, S.M. Kirov Military Medical Academy; https://orcid.org/0000-0002-5542-9280, aaa010803@gmail.com; 20%, research concept and design, text writing
Alim T. Gettuev	Head of the Department of Anesthesiology and Reanimation No. 2, Elizavetinskaya Hospital; https://orcid.org/0000-0003-2341-7290, alim_07_86@mail.ru; 10%, collection and processing of material
Azam D. Halikov	Candidate of Medical Sciences, Professor, Head of the Department of Anesthesiology and Reanimation, City Clinical Oncological Dispensary; https://orcid.org/0000-0001-9864-1284, jawlan2@gmail.com; 10%, collection and processing of material, statistical processing of data
Valeria P. Govorushkina	Student of St. Petersburg State University; https://orcid.org/0000-0002-7922-9005, govorlera@mail.ru; 10%, text writing, statistical data processing

Boris N. Bogomolov	Doctor of Medical Sciences, Professor of the Department of Military Anesthesiology and Reanimatology, S.M. Kirov Military Medical Academy; https://orcid.org/0000-0002-9587-766X, borisbogomolov@yandex.ru; 10%, editing
Alexey G. Klimov	Doctor of Medical Sciences, Associate Professor, Professor of the Department of Military Anesthesiology and Reanimatology, S.M. Kirov Military Medical Academy; https://orcid.org/0000-0003-2289-6867, alexklim1957@mail.ru; 10%, editing
Alexey V. Shchegolev	Doctor of Medical Sciences, Professor, Head of the Department of Military Anesthesiology and Reanimatology, S.M. Kirov Military Medical Academy; https://orcid.org/0000-0001-6431-439X, alekseischegolev@gmail.com; 10%, editing

ALV - artificial lung ventilation
BMI - body mass index
SAD - supraglottic air duct

INTRODUCTION The supraglottic air ducts (SAD) are now widely used in the provision of prehospital care, cardiopulmonary resuscitation in a hospital, and also as a backup plan for general anesthesia in case of failed tracheal intubation [1]. In addition, SAD are now increasingly used as a first-choice device for providing ventilation in surgical interventions of low trauma and duration. The frequency of using these devices during general anesthesia has already reached more than half of the total number of cases [1]. The advantages of using this type of device are widely known: ease of installation, low invasiveness, and fewer complications [2–5]. There is an increasing number of publications confirming the possibility of using SAD in those areas of surgery in which tracheal intubation is traditionally used, for example, during laparoscopic surgical interventions. A significant number of works have been published showing the effectiveness and safety of using these devices in laparoscopic operations performed in the Fowler position [6–10]. Currently, the preference is given to devices of the second generation with a channel for gastric drainage, the design of which allows to maintain tightness in the inspiratory phase, and the additional channel makes it possible to insert a probe into the stomach to prevent regurgitation due to the timely removal of gastric contents [11, 12]. Nevertheless, there are not enough data indicating the possibility of using SAD in laparoscopic interventions performed in the Trendelenburg position [13, 14]. Specific problems associated with the use of the Trendelenburg position are well known, such as deterioration of respiratory mechanics, increased intra-abdominal pressure, increased risk of regurgitation and aspiration, which requires a more detailed study of the issue of the possibility of using SAD in this type of surgery [15–17].

Objective: to compare the efficiency and safety of ventilation, the incidence of postoperative complications when using two different types of SAD during laparoscopic surgery performed in the trendelenburg position.

MATERIAL AND METHODS

The study was carried out in the St. Petersburg State Budgetary Healthcare Institution "City Clinical Oncological Dispensary" and in the St. Petersburg State Budgetary Healthcare Institution "Elizavetinskaya Hospital" after the approval of the Independent Ethics Committee No. 219 dated February 26, 2019. For the study, 83 female patients were selected, each of whom was randomly assigned to one of two study groups. The study included gynecological patients aged 18 to 60 years, who were to undergo laparoscopic intervention lasting up to 90 minutes. The exclusion criteria were: obesity (body mass index - BMI 30 or more), predicted difficult airways (LEMON 3 or more), the presence of diabetes mellitus and gastroesophageal reflux disease, the presence of data on impaired gastric evacuation function of any genesis, refusal to participate in the study.

Group 1 used Laryngeal Tube Suction ™, group 2 - LMA Supreme ™ laryngeal mask. In both groups, the selection of the size of the SAD was carried out according to the manufacturer's recommendation: in the laryngeal tube group No. 3 with a height of less than 160 cm, No. 4 - with an increase of 160 to 180 cm, No. 5 - with an increase above 180 cm; in the group of laryngeal mask No. 3 - with a body weight of up to 50 kg, No. 4 - with a body weight of 50–70 kg, No. 5 - with a body weight above 70 kg.

After admission to the operating room, monitoring of electrocardiography, pulse oximetry, measurement of non-invasive blood pressure began. After providing intravenous access, preoxygenation was started. For the induction of anesthesia, propofol 2–2.5 mg / kg, fentanyl 3–5 μg / kg, rocuronium 0.6 mg / kg were used. Anesthesia was performed by an anesthesiologist-resuscitator (hereinafter referred to as an anesthesiologist), who has experience in using both types of devices under study. Installation of both types of SAD was performed according to the generally accepted technique, after which the inflation of the cuff was carried out under the control of a manual manometer to a level of 60 cm H2O. The installation time and the number of attempts required by the anesthesiologist were recorded.

The correct position of the laryngeal mask was determined by carrying out the test “with a drop of gel”: a drop of water-soluble gel was applied to the drainage channel, after which the presence or absence of air bubbles entering through the gel was recorded. In the absence of air supply, the position of the laryngeal mask was considered correct and passed to the "pressure on the jugular notch" test. For this test, a series of pressure was applied just above the sternum. If the level of the gel in the drainage canal shifted synchronously with the pressure, the position of the laryngeal mask was considered correct. In the case of verification of the flow of air through the gel in the drainage canal or in the absence of displacement of the gel when pressing on the jugular notch, the laryngeal mask was repositioned.

After the installation of the SAD, a test was performed to determine the oropharyngeal leak pressure. To do this, the valve for regulating the pressure level in the circuit was blocked at the level of 35 cm Hg, the ventilation mode was switched to the spontaneous breathing mode, the flow of the fresh gas mixture was set at 3 L / min. The level of pressure in the airways was recorded, at which an audible auscultatory discharge of the gas mixture from the oral cavity began or a plateau of pressure in the airways was reached.

Artificial lung ventilation (ALV) was started in VC mode with parameters V = 6–7 ml / kg, f = 10–12 per minute. Anesthesia was maintained with sevoflurane at a dosage of 0.9–1.0 MAC (minimum alveolar concentration), analgesia was maintained by administering fentanyl 0.1 mg fractionally every 25–30 minutes.

A gastric tube of maximum possible diameter was installed through the drainage channel of the SAD in accordance with the manufacturer's recommendations: in the 1st group - a 16 Fr tube for tube No. 3, 18 Fr for tubes No. 4 and No. 5; in the 2nd group - a 14 Fr probe for masks No. 3–5.

The correct position of the probe in both groups was confirmed by auscultation of the epigastric region against the background of injection of 50 ml of air. Carbon dioxide insufflation was optimized so that the pressure in the abdominal cavity did not exceed 12 mm Hg. The supply of the gaseous anesthetic was stopped at the time of the last suture on the surgical wound. After desufflation, the gastric tube was removed with active aspiration. The SAD was removed after the restoration of clear consciousness and muscle tone.

The primary endpoint was the level of oropharyngeal leakage pressure. Secondary points of analysis were the time and number of attempts to place the SAD, the peak and average airway pressure immediately after the placement of the SAD and after the imposition of carboxyperitoneum and the transfer of the patient together with the operating table to the Trendelenburg position. The frequency of complications such as dislocation of SAD during surgery (the appearance of leakage from the circuit more than 10% of the tidal volume, which cannot be eliminated by correcting the position of the device within 60 seconds) and aspiration of gastric contents, detected by high-precision pH-metry using a test was recorded. pHScan strips. After removal of the SAD, the test strip was applied to the proximal portion of the distal laryngeal tube cuff and to the ventral surface of the laryngeal mask cuff. Aspiration was considered to be a decrease in the pH of the secretion below 4.2. In the postoperative period, the presence of a sore throat was assessed after 5 minutes, as well as 3, 6, 12, 24 hours after surgery and the presence of hoarseness (assessed 15 minutes after removal of the SAD).

For statistical analysis, the SPSS 23 statistical processing program was used. For comparative studies between groups, the Mann – Whitney test and two-sided Fisher's exact test were used. Data are presented as median and first and third quartiles.

The scheme for randomizing patients and forming study groups is shown in Fig. 1.

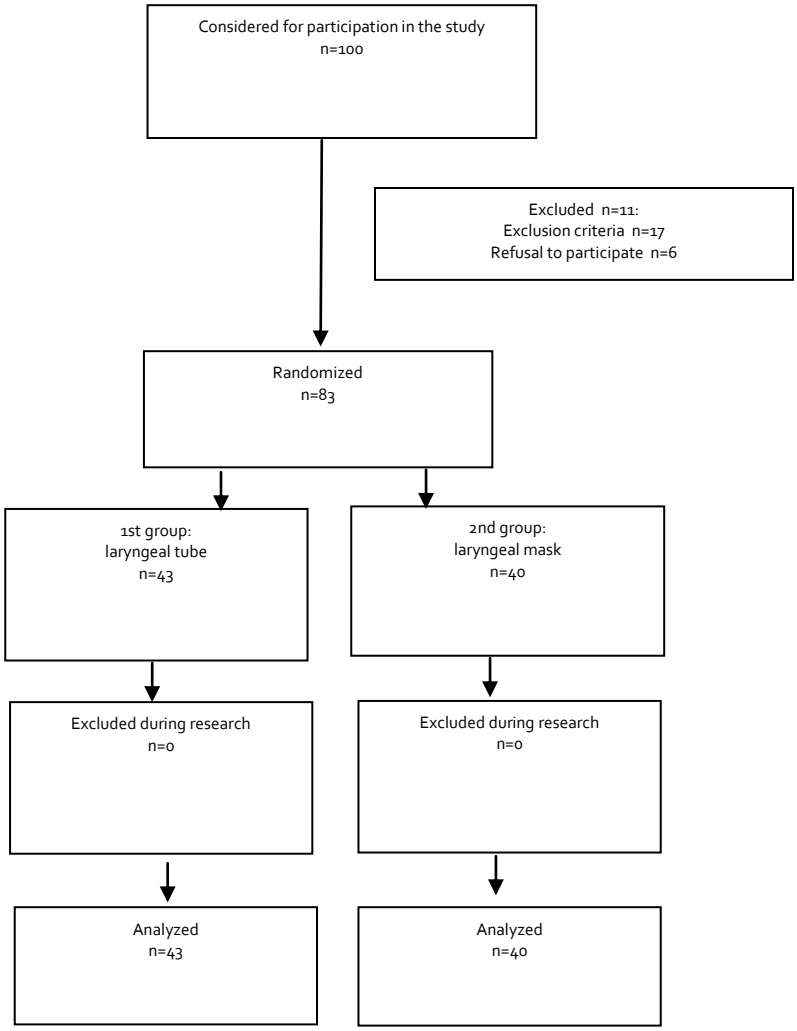

Fig. 1. Scheme of randomization and formation of study groups

RESULTS

The characteristics of the study groups are presented in Table. 1. Patients of the studied groups were comparable in age, height, anthropometric parameters.

Table 1

Characteristics of patients in studied groups

Group	Age, years	Height, cm	Body weight, kg	Body mass index
1st (laryngeal tube)	43 (34; 50)	169 (162; 178)	66 (59; 76)	23,5 (20,6, 26,1)

2nd (laryngeal mask)	38,5 (33; 49)	169 (162; 173)	67 (60,3; 75,8)	23,9 (21,9; 27,2)
Significance level, p	0,22	0,27	0,84	0,4

The level of oropharyngeal leakage pressure was statistically significantly different in the groups and amounted to 32 (28; 35) cm H2O in the 1st group. Art. and in the 2nd group 28.5 (27; 31.8) cm H2O (p = 0.007). The time to ventilation did not differ in both groups and was 20 (18, 23) s in group 1 and 20 (19, 22) s in group 2 (p = 0.52).

The first attempt to install an SAD was successful in 40 cases (93%) in group 1 and in 38 cases (95%) in group 2. There was no statistically significant difference in this indicator (p = 1). The second attempt to install the SAD was successful in all remaining cases.

The peak and average airway pressure after the installation of the SAD and after the application of carboxyperitoneum and the transfer of the operating table to the Trendeleburg position did not differ statistically significantly (Table 2).

Table 2

Airway pressure levels at different stages of surgery

	Airway pressure levels			
	After installing the supraglottic ducts		After applying carboxyperitoneum and moving the table to the Trendeleburg position	
	Ppeak	Pmean	Ppeak	Pmean
Group 1	15 (14; 16)	10 (9; 11)	23 (23; 25)	16 (15; 18)
Group 2	14 (13; 16)	9 (8,25; 10,75)	23 (21,25; 25,0)	17 (16; 18)
Significance level, p	0,29	0,42	0,41	0,4

There were no cases of SAD dislocation in any group. When analyzing the frequency of aspiration, not a single case of a decrease in pH to the critical level of 4.2 was noted, the minimum recorded pH level was 5.8. In the laryngeal tube group, the pH level was 6.2 (6.2; 6.4), in the laryngeal mask group – 6.2 (6.2; 6.4), (p = 0.8).

In the analysis of postoperative complications, statistical differences were obtained in terms of the level of sore throat 3 hours after removal of SAD. There were no differences in terms of pain in the throat after 5 minutes, 6, 12, 24 hours, the frequency of hoarseness (Table 3).

Table 3

Complications in the postoperative period

	Sore throat through					Hoarseness, n (%)
	5 minutes	3 hours	6 hours	12 hours	24 hours	
Group 1	2 (2; 4)	2 (1; 2)	0 (0; 1)	0 (0; 0)	0 (0; 0)	5 (11,6 %)
Group 2	2 (1,25; 2)	1 (0; 2)	0 (0; 1)	0 (0; 0)	0 (0; 0)	3 (8,1%)
Significance level, p	0,51	0,02	0,28	0,38	0,11	0,47

DISCUSSION

Currently, SAD is increasingly used as the main device for maintaining the patency of the upper airways and for mechanical ventilation during laparoscopic interventions [6, 7, 12, 13]. A fairly large number of publications consider the possibility of using various types of SAD in operations performed in the Trendelenburg position in patients without an increased risk of regurgitation. Reducing the invasiveness of manipulations on the upper airway due to the refusal to perform tracheal intubation during short and low-traumatic surgical interventions in patients with a low risk of aspiration allows avoiding a number of potential complications of this method, ensuring safety and increasing patient comfort [3, 5].

Structurally, SAD can now be conditionally divided into laryngeal masks and the so-called pharyngeal-esophageal obturators, which include the most commonly used laryngeal tubes. In the literature, there are conflicting data on the advantages of a particular class of devices in the success of the installation, the quality of ventilation and the number of complications [2, 4].

Oropharyngeal leakage pressure is a traditionally used metric that characterizes the success of insertion, the level of airway protection, and the ability to perform positive pressure ventilation [18, 19]. Evaluation of this indicator is an important aspect in determining the safety of the use of SAD during anesthesia, since a higher level of leakage pressure indicates the possibility of performing mechanical ventilation through one or another SAD at sufficiently high levels of pressure in the airways, especially during laparoscopic surgical interventions.

In our study, it was shown that the laryngeal tube has a higher level of leakage pressure, which may be of clinical significance in surgical interventions accompanied by increased levels of pressure in the airway and abdominal cavity. The frequency of successful installation of both studied devices was comparable and rather high in both groups, which indicates the simplicity and efficiency of using both classes of devices. As expected, the mean and peak pressure indicators did not differ between the study stages. Postoperative complications were also comparable. In our study, the incidence of sore throat was low, comparable in both groups, did not exceed 4 points on a visual analogue scale, and quickly regressed.

CONCLUSIONS

1. The use of different types of 2nd generation supraglottic airway ducts with inflatable cuff (s) provides reliable protection of the upper airway during anesthesia and effective ventilation during laparoscopic surgery in the Trendelenburg position.

2. The laryngeal mask and laryngeal tube did not differ significantly in the frequency of successful insertion, ventilation efficiency, airway pressure levels at various stages of surgery, and the incidence of intra- and postoperative complications.

3. The use of a laryngeal tube provided a higher level of oropharyngeal leakage pressure, while the differences with the laryngeal mask for this indicator were statistically significant.

REFERENCES

1. Cook T, Woodall N, Frerk, C. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: Anaesthesia. *Br J Anaest*. 2011;106(5):617–631. PMID: 21447488. https://doi.org/10.1093/bja/aer058
2. Badheka JP, Jadliwala RM, Chhaya VA, Parmar VS, Vasani A, Rajyaguru AM. I-gel as an alternative to endotracheal tube in adult laparoscopic surgeries: A comparative study. *J Minim Access Surg*. 2015;11(4):251–256. PMID: 26622115. https://doi.org/10.4103/0972-9941.140210
3. Michalek P, Donaldson W, Vobrubova E, Hakl M. Complications Associated with the Use of Supraglottic Airway Devices in Perioperative Medicine. *BioMed Res Int*. 2015:746560. PMID: 26783527. https://doi.org/10.1155/2015/746560
4. Van Esch BF, Stegeman I, Smit A. Comparison of laryngeal mask airway vs tracheal intubation: a systematic review on airway complications. *J Clin Anesth*. 2017;36:142–150. PMID: 28183554. https://doi.org/10.1016/j.jclinane.2016.10.004
5. Yu SH, Beirne OR. Laryngeal mask airways have a lower risk of airway complications compared with endotracheal intubation: A systematic review. *J Oral Maxillof Surg*. 2010;68(10):2359–2376. PMID: 20674126. https://doi.org/10.1016/j.joms.2010.04.017
6. Beleña J, Gracia J, Ayala J, Núñez M, Lorenzo J, de los Reyes A, et al. The Laryngeal Mask Airway Supreme for positive pressure ventilation during laparoscopic cholecystectomy. *J Clin Anesth*. 2011;23(6):456–460. PMID: 21911191. https://doi.org/10.1016/j.jclinane.2011.01.004
7. Yoon SW, Kang H, Choi GJ, Ryu C, Park YH, Baek CW, et al. Comparison of supraglottic airway devices in laparoscopic surgeries: A network meta-analysis. *J Clin Anesth*. 2019;55:52–66. PMID: 30597453. https://doi.org/10.1016/j.jclinane.2018.12.044
8. 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 Anesth*. 2019;72(6):576–582. PMID: 31426623. https://doi.org/10.4097/kja.19195
9. Gupta R, Mahajan R, Jatinder M, Gulati S, Mehta A, Nazir R. A comparison between ProSeal laryngeal mask airway and Air-Q Blocker in patients undergoing elective laparoscopic cholecystectomy. *J Anaesthesiol Clin Pharmacol*. 2019;35(3):340–347. PMID: 31543582. https://doi.org/10.4103/joacp.JOACP_397_17
10. Sabuncu U, Kusderci HS, Oterkus M, Abdullayev R, Demir A, Uludag O, et al. AuraGain and i-Gel laryngeal masks in general anesthesia for laparoscopic cholecystectomy. Performance characteristics and effects on hemodynamics. *Saudi Med J*. 2018;39(11):1082–1089. PMID: 30397706. https://doi.org/10.15537/smj.2018.11.22346
11. Cook T, Kelly F. Time to abandon the 'vintage' laryngeal mask airway and adopt second-generation supraglottic airway devices as first choice. *Br J Anaesth*. 2015;115(4):497–499. PMID: 25995266. https://doi.org/10.1093/bja/aev156
12. Andreenko AA, Dolbneva EL, Stamov VI. Airway Management in Hospital. Russian Federation of Anesthesiologists and Reanimatologists Guidelines (second edition, 2018). *Annals of Critical Care*. 2019;(2):7–31. (In Russ.) https://doi.org/10.21320/1818-474X-2019-2-7-31
13. Mukadder S, Zekine B, Erdogan K, Ulku O, Muharrem U, Saim Y, et al. Comparison of the Proseal, Supreme, and I-Gel SAD in Gynecological Laparoscopic Surgeries. *Scientific World J*. 2015:634320. PMID: 25802890. https://doi.org/10.1155/2015/634320
14. Lemos J, De Oliveira GS Jr, de Pereira Cardoso HE, Lemos LD, de Carvalho LR, Módolo NS. Gastric regurgitation in patients undergoing gynecological laparoscopy with a laryngeal mask airway: a prospective observational study. *J Clin Anesth*. 2017;36:32–35. PMID: 28183569. https://doi.org/10.1016/j.jclinane.2016.07.038
15. Roth H, Genzwuerker HV, Rothhaas A, Finteis T, Schmeck J. The ProSeal™ Laryngeal Mask Airway and the Laryngeal Tube Suction™ for ventilation in gynaecological patients undergoing laparoscopic surgery. *Eur J Anaesthesiol*. 2005;22(2):117–122. PMID: 15816590. https://doi.org/10.1017/S0265021505000220
16. Paul PG, Mathew T, Shintre H, Bulusu S, Paul G, Mannur S. Postoperative pulmonary complications following laparoscopy. *J Minim Invasive Gynecol*. 2017;24(7):1096–1103. PMID: 28735736. https://doi.org/10.1016/j.jmig.2017.06.029
17. Böttger TC, Hermeneit S, Müller M, Terzic A, Rodehorst A, Elad L, et al. Modifiable surgical and anesthesiologic risk factors for the development of cardiac and pulmonary complications after laparoscopic colorectal surgery. *Surg Endosc*. 2009;23(9):2016–2025. PMID: 19462205. https://doi.org/10.1007/s00464-008-9916-x
18. Singh K, Gurha P. Comparative evaluation of Ambu AuraGain™ with ProSeal™ laryngeal mask airway in patients undergoing laparoscopic cholecystectomy. *Indian J Anaesth*. 2017;61(6):469–474. PMID: 28655951. https://doi.org/10.4103/ija.IJA_163_17
19. Zhang L, Seet E, Mehta V, Subramanyam R, Ankichetty SP, Wong DT, Chung F, et al. Oropharyngeal leak pressure with the laryngeal mask airway Supreme™ at different intracuff pressures: a randomized controlled trial. *Can J Anesth*. 2011;58(7):624–629. PMID: 21533663. https://doi.org/10.1007/s12630-011-9514-6

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