European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 09, Issue 06, 2022

Original Research Article

AN OBSERVATIONAL STUDY TO COMPARE AMBU AURAGAIN LARYNGEAL MASK AIRWAY AND LARYNGEAL MASK AIRWAY SUPREME FOR CONTROLLED VENTILATION DURING GENERAL ANESTHESIA

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Abstract

Introduction: Securing airway with laryngeal mask airway is the preferred technique in modern world. We compared Ambu Auragain with Laryngeal Mask Airway Supreme in this study for controlled ventilation under general anesthesia.
Material and Methods: Fifty patients of ASA-I and II of American Society of Anesthesiologists, of either gender aged 18 to 50 years, weight 30 to 70 kg, with MPG -I/II posted for elective surgeries under general anesthesia held in supine position were included in the study. They were randomly divided patients into 2 groups of 25 patients each. In present study we observed the ease and attempt of insertion, time taken for insertion, ease of gastric tube insertion, pharyngeal leak pressure and the hemodynamic stability for both Ambu Auragain and laryngeal mask airway supreme.
Result: Ambu Auragain and Laryngeal Mask Airway Supreme both are statistically comparable in relation to ease of insertion, time of insertion and number of attempts for placement. Ambu Auragain has higher pharyngeal leak pressure compared to Laryngeal Mask Airway Supreme. Both of these provided stable hemodynamics during surgery.
Conclusion: Ambu Auragain can be a better alternative to Laryngeal Mask Airway Supreme for controlled ventilation under general anesthesia as pharyngeal leak pressure is higher in Ambu Auragain.

Keywords: Ambu Auragain, laryngeal mask airway supreme, ease of insertion, time of insertion, no. of attempts, oropharyngeal leak pressure, hemodynamic stability

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Introduction

Dr. Archie Brian, a British anesthesiologist, for the first time introduced the laryngeal mask airway designed to be positioned around the laryngeal inlet by removing complications associated with tracheal intubation along with ease of placement [1].The benefits of using Laryngeal Mask Airway are easy and quick placement by anesthetist, better hemodynamic stability during induction and emergence, minimal rise in intraocular and intracranial pressure, less incidence of coughing during Emergence and less incidence of sore throat in adult [2].

Most first-generation SADs develop an air leak during PPV of 16-20 cm H_2O. So, controlled ventilation is not always possible as there are chances of Aspiration. However, clinically satisfactory conditions during laparoscopic surgery, in which abdominal pressures are necessarily high, second-generation devices maintain pharyngeal seal with pressure of 25-30cm H_2O.

The Ambu Auragain Laryngeal Mask Airway is intended for use as an alternative for attaining control of the airway during routine and emergency anesthetic procedures. The device is intended for use as a conduit in cannot intubate cannot ventilate scenario. The device is not intended as a replacement of an endotracheal tube.

Laryngeal Mask Airway Supreme allowing gastric drainage has become available for clinical use. The Laryngeal Mask Airway Supreme is a latex free laryngeal mask airway, made of medical grade polyvinyl chloride (PVC). The firm, elliptical and anatomically shaped airway tube shaped at 90^o angle facilitates easy insertion [3-5].

The performance of the two devices in patients in supine position have been reported to be similar, however, slight differences in seal pressure favoring the Ambu Auragain or in ease of insertion favoring the Laryngeal Mask Airway Supreme have been demonstrated [6,7,8]. So we undertook this study to compare Ambu Auragain with Laryngeal Mask Airway Supreme in terms of No. of attempts for insertion of device, Time taken for insertion, Ease of insertion of Nasogastric tube, Oropharyngeal leak pressure, Changes in hemodynamic parameters and Postoperative Side effects and complications (if any).

Material & Methods

This study was conducted at Dhiraj General Hospital in Department of Anesthesiology in 2016-2019. After taking permission from the ethical committee and an informed consent, 50 patients of American Society of Anesthesiologists (ASA) grade I and II between ages 18-50yrs posted for elective surgeries requiring supine position were included in the study. All the patients participating in the study were explained clearly about the purpose and nature of the study in the language they could understand. Randomization was done by opening a sealed envelope just before induction of anesthesia.

- Group A (25 patients) for Ambu Auragain insertion.
- Group S (25 patients) for Laryngeal Mask Airway Supreme insertion.

Patients with difficult airway assessment, ASA III and above, having higher risk of aspiration, requiring emergency procedure were excluded from the study. The study was prospective and interventional in nature.

Anaesthetic technique: All selected patients were advised standard Nil per oral guidelines. Tablet Alprazolam 0.25 mg and Tablet ranitidine 150mg on night prior to the surgery to allay anxiety and aspiration prophylaxis respectively. Patients were randomly divided into 2 groups of 25 each and informed written consent was acquired and then shifted to OT. Base line vital parameters (pulse, blood pressure, respiratory rate, SpO^2 and temperature) were noted. An IV line was secured with 18G Vasofix, a slow infusion of lactated Ringer's solution was started. All resuscitation equipments were kept ready. Pre-induction was started with IV Inj. Ondansetron (1mg/kg), Inj. Glycopyrrolate (0.004 mg/kg), Inj. Midazolam (0.1mg/kg) and

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Inj. Fentanyl (2µg/kg). Patient was preoxygenated with 100% oxygen for 5 minutes, induction was achieved with Inj propofol (2mg/kg) followed by inj. Succinylcholine (1.5mg/kg) after confirming bag and mask ventilation. IPPV with 100% oxygen via bag and mask was done. After adequate relaxation either Ambu Auragain or Laryngeal Mask Airway Supreme was inserted as per random allotment of patient to the group. Device size selection was as per patient weight category, 30-50 kg: size 3 and 50–70 kg: size 4 for both. A fully deflated device was initially lubricated on its posterior surface with water soluble jelly. Ambu Auragain was then gently placed in the midline in the "sniffing" position using the index finger against the hard palate and pushed down into the hypopharynx till resistance was met. Laryngeal Mask Airway Supreme was gently inserted in the "semi sniffing" position using a smooth circular rotating movements until definite resistance was felt when the device was in the hypopharynx. The Laryngeal Mask Airway cuff was then inflated gradually as per manufacturer's instructions. The device was then fixed from maxilla to maxilla after confirming bilateral air entry. Each device was inserted by an anesthesiologist who had an experience of insertion of supraglottic devices. Maintenance of anesthesia on controlled ventilation with 50% oxygen, 50% nitrous oxide (N_2O), Inhalational agent (sevoflurane at MAC 2) and dose of Non-depolarizing muscle relaxant (Atracurium) loading dose 0.5mg/kg and maintenance dose 0.1mg/kg. Fluid requirement was calculated and replaced accordingly. At the end of the operation, Anesthetic gases were discontinued and oral suction was done. Neuromuscular blockade was reversed by giving reversal in form of inj. Glycopyrrolate (0.008mg/kg) and inj. Neostigmine (0.05 mg/kg), then the device was gently removed after partially deflating the cuff when the patient regained consciousness and responded to verbal command**.** Postoperative Incidence of airway complications caused by insertion of devices were recorded and reassessed within 24 hours.

Study parameters

1. Number of attempts of insertion consisting of time more than 60 seconds was not considered for single attempt. If placements failed after two attempts, the case was excluded from the study and the airway was maintained through other airway device as suitable and this case was considered as a failed attempt.
2. Time taken for insertion: was calculated by taking into account the time interval between picking up the device and securing an effective airway after connecting to the anesthetic machine and check ventilation
3. **Ease of insertion of gastric tube:** It was calculated by ease of insertion score

Ease of insertion of gastric tube	
Easy	Insertion at first attempt without any tactile resistance
Difficult	Insertion successful at second attempt
Failed	Insertion failed at second attempt

Oro-pharyngeal Leak Pressure was determined by transiently stopping ventilation and closing the adjustable pressure limiting valve with fresh gas flow of 3L/min (for safety, the airway pressure was not allowed to exceed over 40 cm of water). This was the airway pressure generated when a leak was detected by an audible leak over the mouth.

4. **Hemodynamic parameters:** All patients were monitored continuously for following parameters:

- Percentage oxygen saturation (SPO_2) prior to insertion of the device (baseline), after insertion of device. Thereafter, monitoring was done at 15-minute intervals till 2 hours or the end of surgery. After reversal and removal of Laryngeal mask airway, vitals were recorded.
- Heart rate (HR).
- Systolic, Diastolic blood pressure (SBP, DBP).

- Postoperative complications caused by insertion of devices was observed for 24 hours
- Blood staining on device
- Lip/tongue/dental injury
- Dysphagia, dysphonia
- Sore throat
- Nausea/vomiting

Statistical methods

- Data was collected, tabulated into an Excel spreadsheet, coded then analyzed using SPSS® computer software version 12.0. Numerical variables were presented as mean & standard deviation (SD) while categorical variables were presented as percent. As regard numerical variables; unpaired student-t test was done.

P value

>0.05	Non-Significant
<0.05	Significant
<0.001	Strongly Significant

Observation & Results

Both groups were comparable with statistically no significant difference in terms of Age, Sex, Weight and ASA grade. Supraglottic airway device insertion was 100% successful in both the study groups. First attempt success rate was 92% in group A compared to 88% in group S with statistically no significant difference (p=0.89). The time taken for insertion of device in group A was 15±2.76 seconds and in group S was 17±2.88 seconds there was statistically highly significant difference between both groups (p=0.037). Insertion of gastric tube was 100% successful in both groups with similar level of difficulty. The Oro-pharyngeal leak pressure (OLP) was higher in Group A (32±1.34) compared to Group S (26.0 ± 1.21) with highly statistically significant difference (P=0.0001). Mean heart rate, Systolic blood pressure and Diastolic blood pressure were comparable with statistically no significant difference between both groups. Complication rate was very low in our study and both groups were comparable with statistically no significant difference in terms of blood on device, dysphagia or sore throat. None of our patients experienced laryngospasm, bronchospasm, regurgitation or aspiration.

Table 1: Demographic Characteristics

	Group A	**Group S**	**P Value**
Age (Years)	35.03±10.11	34.66±9.18	0.64
Sex (M/F)	10/15	11/14	0.89
Weight (Kg)	55.0±7.09	48.83±8.35	0.57
ASA Grade (I or II)	19:6	17:8	0.10

Table 2: Various Intraoperative Parameters

Parameters		**Group A**	**Group B**	**P-Value**
Number of Attempts	I	23 (92%)	22(88%)	0.89
	II	2 (8%)	3 (12%)	
Time of Insertion in sec		15±2.76	17±2.88	0.037
Ease of Insertion of Gastric	Easy	24 (96%)	24	

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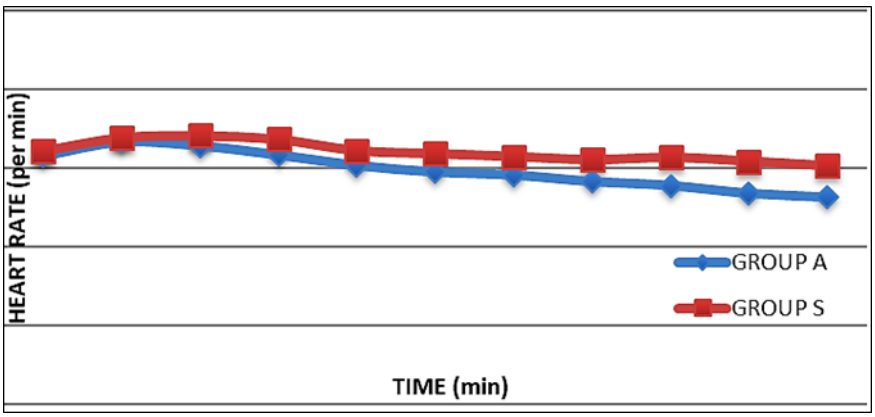
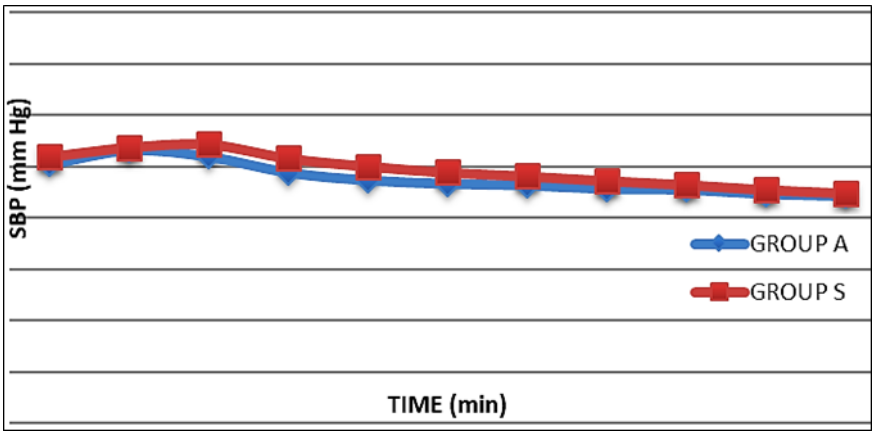
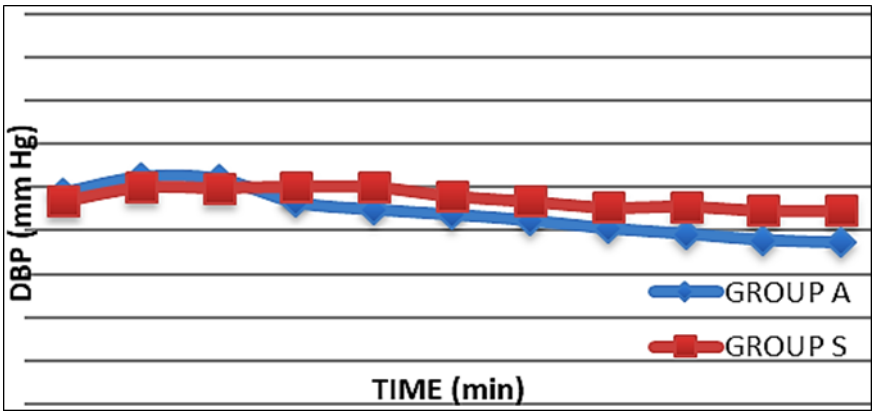
Tube			(96%)	
	Difficult	1 (4%)	1 (4%)	
	Failed	-	-	
Oropharyngeal Leak (mmHg)		32±1.37	26±1.21	0.0001



Graph 1: Showing Heart Rate at different time intervals in Group A and Group S



Graph 2: Mean SBP at different time interval in Group A and Group S



Graph 3: Mean DBP at different time interval in Group A and Group S

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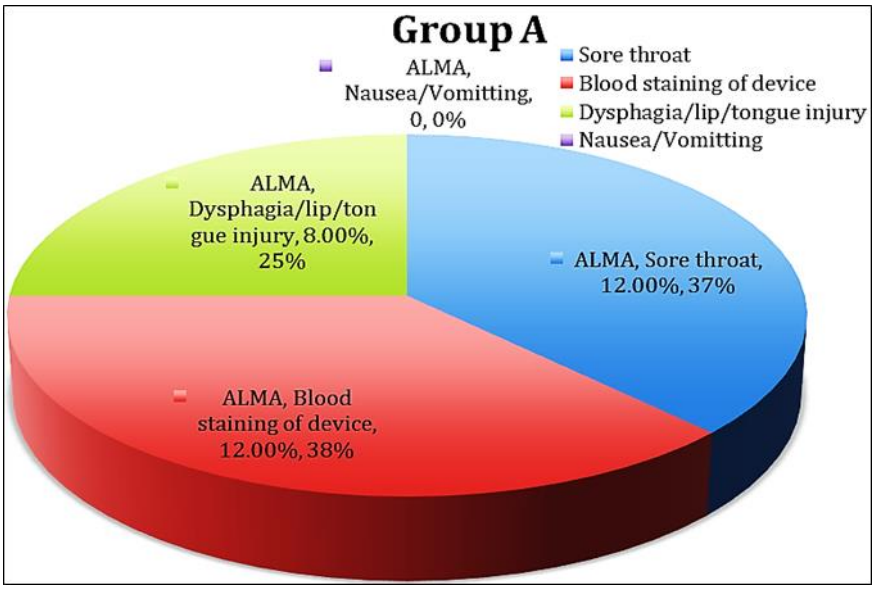
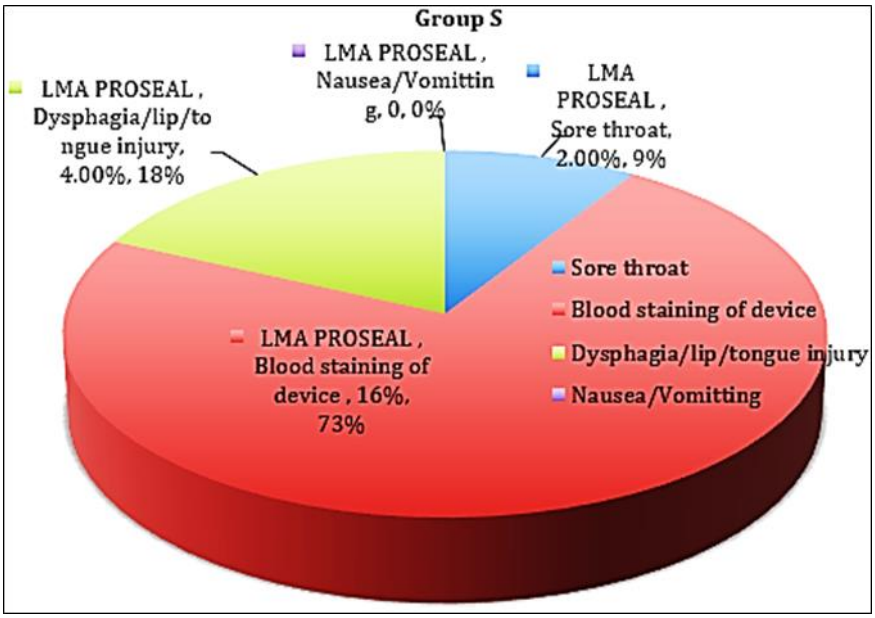


Graph 4: Showing postoperative complications in Group A



Graph 5: Showing postoperative complications in Group S

Discussion

Supraglottic airway devices (SGAD) are nowadays more frequently used in laparoscopic surgeries and even in lateral or prone position of patients [9]. They are safer over endotracheal intubation as they have less chances of damage of soft tissue, teeth, vocal cords, trachea and larynx, changes in hemodynamic parameters and barotrauma. They have been included in the difficult airway algorithm as lifesaving rescue airway devices in emergency situations.

In the present study Ambu Auragain was easier to insert in first attempt as compared to Laryngeal Mask Airway Supreme. Our results were quite similar to Jagganathan N *et al.* [10], Lopez AM *et al.* [11].

In a study of Shariffuddin I *et al.* [12] inspite of having more first attempt success rate with Ambu Auragain, only 48% insertions were found to be easy. They assigned it to the

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inexperience with the use of new Ambu Auragain. It could also be because their study was done on spontaneously breathing patients. Time taken to insert Ambu Auragain was significantly less as compared to Laryngeal Mask Airway Supreme in our study.
Similarly, Mehta H *et al.* [13] also reported significantly less time to insert Ambu Auragain as compared to Laryngeal Mask Airway Supreme (15.53s v/s 22.60s). In the contrary more time taken to insert Ambu Auragain than Laryngeal Mask Airway Supreme by Wong DT[14] was attributed to bulky curvature of Ambu Auragain.
Studies of Jagannathan N [10] and Lopez AM *et al.* [11] found no significant difference regarding insertion time in both the groups. It could be due to the fact that all these studies were done in spontaneously breathing patients which could have led to more insertion time with Ambu Auragain. For both the devices in all 50 patients, there was no significant difference in first attempt insertion of gastric tube.
Shariffuddin I *et al.* [12] also observed ease of gastric tube insertion was faster and easier for both Laryngeal Mask Airway which was similar to our findings.
The Ambu Auragain achieved a slight but significantly higher airway seal pressure (32 v/s 26 cm of water) achieved by the Laryngeal Mask Airway Supreme (P value< 0.05), it could be due to the large cuff of the Laryngeal Mask Airway.
Joshi R *et al.* [15] in their study concluded that Ambu Auragain provides significantly better seal pressure than Laryngeal Mask Airway Proseal. These results are in line with Wong DT *et al.* [14] observed that Laryngeal Mask Airway was inserted using a standard technique with the cuff inflated to 60 cm H_2O.
Hemodynamic parameters (pulse, systolic blood pressure and diastolic blood pressure) were comparable between the 2 groups throughout the course of the surgical procedures. In present study, no significant statistical differences were observed between the groups. Ambu Auragain and Laryngeal Mask Airway Supreme being supraglottic devices do not require laryngoscopy and probably does not evoke a significant sympathetic response [16].
Almost all the studies including Lakesh K Anand *et al.* [17] demonstrated that hemodynamic and ventilator parameters are comparable in both groups.
In our study incidences of complications post operatively were low and comparable in both groups. None of the group patients suffered laryngospasm, bronchospasm, regurgitation or aspiration.
The cuff pressure in our study was maintained by inflating the cuff with prescribed volume of air only; therefore, there were fewer postoperative complications.

Conclusion

From the present study, we conclude that Ambu Auragain is a preferred alternative over Laryngeal Mask Airway Supreme as it requires less no of attempts, less time for insertion and easy to insert with lower incidence of injury.
Ambu Auragain can be a better alternative to Laryngeal Mask Airway Supreme for controlled ventilation under general anaesthesia as pharyngeal leak pressure is higher in Ambu Auragain.

References

1. Pennant JH, White PF. The laryngeal mask airway its uses in anaesthesiology. Anaesthesology. 1993;79:144-63.
2. Brimacombe J. The advantages of the LMA over the tracheal tube or facemask: a meta-analysis. Can J Anaesth. 1995;42:1017-23.
3. Verghese C, Ramaswamy B. LMA-Supreme: a new single-use LMA with gastric access: a report on its clinical efficacy. Br J Anaesth. 2008;101:405-10.
4. Hosten T, Gurkan Y, Ozdamar D, *et al*. A new supraglottic airway device: LMA-supreme, comparison with LMA-Proseal. Acta Anaesthesiol Scand. 2009;53:852-7.

5. Eschertzhuber S, Brimacombe J, Hohlrieder M, Keller C. The laryngeal mask airway Supreme: a single use laryngeal mask airway with an oesophageal vent. A randomised, cross-over study with the laryngeal mask airway Pro Seal in paralysed, anaesthetized patients. Anaesthesia. 2009;64:79-83.
6. Lee AK, Tey JB, Lim Y, Sia AT. Comparison of the single-use LMA Supreme with the reusable Pro Seal LMA for anaesthesia in gynaecological laparoscopic surgery. Anaesth Intensive Care. 2009;37:815-9.
7. Seet E, Rajeev S, Firoz T, *et al*. Safety and efficacy of laryngeal mask airway Supreme versus laryngeal mask airway Pro Seal: a randomized controlled trial. Eur J Anaesthesiol. 2010;27:602-7.
8. Timmermann A, Cremer S, Eich C, *et al*. Prospective clinical and fiberoptic evaluation of the Supreme laryngeal mask airway. Anesthesiology. 2009;110:262-5.
9. Singh K, Gurha P. Comparative evaluation of Ambu AuraGain™ with ProSeal™ laryngeal mask airway in patients undergoing laparoscopic cholecystectomy. Indian J Anaesth. 2017;61:469-74.
10. Jagganathan N, Sohn L. A randomised comparison of the Ambu® AuraGain™ and the LMA ® supreme in infants and children. Anaesthesia. 2016;71:205-12.
11. Lopez AM, Agusti M, Gambus P, *et al*. A randomized comparison of the Ambu Auragain versus LMA Supremein patients undergoing gynaecologic laproscopic surgery. J Clin Monit Comput. 2017;31:1255-62.
12. Shariffuddin II, Teoh WH, Tang E, Hashim N, Loh PS. Ambu® AuraGain™ versus LMA Supreme™ Second Seal™: a randomised controlled trial comparing oropharyngeal leak pressures and gastric drain functionality in spontaneously breathing patients. Anaesth Intensive Care. 2017;45:244-250.
13. Mehta H, Sharma TH, Desai J. An Observational Study to Compare Ambu Auragain and Supreme Laryngeal Mask Airway for Controlled Ventilation Under Anaesthesia. Indian J Anesth Analg. 2019;6:438-4.
14. Wong DT, Ooi A, Singh KP, Dallaire A, Meliana V, Lau J, *et al*. Comparison of oropharyngeal leak pressure between the Ambu® AuraGain™ and the LMA ® Supreme™ supraglottic airways: a randomized-controlled trial. Can J Anaesth. 2018;65:797-805.
15. Joshi R, Rudingwa P, Kundra P, Panneerselvam S, Mishra SK. Comparision of Ambu AuraGain™ and LMA ® ProSeal in children under controlled ventilation. Indian J Anaesth. 2018;62:455-460.
16. Saraswat N, Kumar A, Mishra A, Gupta A, Saurabh G, Srivastava U. The comparison of proseal laryngeal mask airway and endotracheal tube in patients undergoing laparoscopic surgeries under general anaesthesia. Indian J Anaesth. 2011;55:129-34.
17. Anand LK, Goel N, Singh M, Kapoor D. Comparison of the Supreme and the ProSeal laryngeal mask airway in patients undergoing laparoscopic cholecystectomy: A randomized controlled trial. Acta Anaesthesiol Taiwan. 2016;54:44-50.