ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 07 | July - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"A COMPARATIVE CLINICAL STUDY OF PROSEAL LARYNGEAL MASK AIRWAY VERSUS AMBU AURA GAIN FOR INSERTION PARAMETERS AND AIRWAY DYNAMICS IN LAPAROSCOPIC CHOLECYSTECTOMY PATIENTS. "

Anaesthesiology

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ABSTRACT

Background: Supraglottic airway devices are now routinely used in patient posted for surgery under general anaesthesia for obvious reason of stable hemodynamics and better outcome. The ProSealTM laryngeal mask airway has a modified cuff to improve the seal and a drain tube whereas Ambu® AuraGainTM (Ambu, Ballerup, Denmark), a relatively novel supraglottic airway device is integrated with gastric access and intubation capability. **Material and methods:** 66 patients posted for surgeries under general anaesthesia were enrolled for the study after clearance from institutional ethical committee. Patients of group A: received Proseal and group B received Ambu aura gain(AAU). Anesthesia technique was standardized. Ease of insertion, Number of attempt, Insertion time, Oropharyngeal seal pressure, Initial peak airway pressure, Peak airway pressure after insufflations, Pharyngolaryngeal adverse events and Hemodynamic parameters were recorded. **Results:** Demographic profile in both the groups was comparable.The ease of device insertion was more smooth in PLMA than AAU group (p=0.042). The mean time taken for insertion of AAU was longer than PLMA p=0.007. mean oropharyngeal seal pressure was significantly more in AAU than PLMA group. Whereas no of attempts, initial peak airway pressure (cm H2O), peak airway pressure after insufflations (cm H2O), complications and hemodynamics were comparable in both the groups. **Conclusion:** Present study recommends that both Ambu Aura Gain and Proseal LMA can be effectively used in elective laparoscopic cholecystectomies under general anaesthesia.

KEYWORDS

PLMA, Ambu Aura Gain, Airway management, general anaesthesia

INTRODUCTION

Introduction of laparoscopic cholecystectomy techniques has made a revolution in gastro intestinal surgery in recent years. Minimal invasive surgery, cure and safety of patient are the priority of the modern surgical method. Cholelithiasis the most common digestive disorder was traditionally being dealt by convention or open surgery.[1] Laparoscopic cholecystectomy has proved and increased the importance of minimal access. It is very safe and easy because of better magnification.[2] Airway management is very crucial for an anaesthesiologist despite significant advances in the anaesthetic practice from time to time. The cuffed endotracheal tube was considered as the gold standard for providing an adequate and effective glottic seal for positive pressure ventilation, prevents gastric insufflation and aspiration particularly for laparoscopic procedures under general anaesthesia where pneumoperitoneum decreases the pulmonary compliance, reduces functional residual capacity and increases airway pressures.[3,4] Supraglottic airway devices form a group of airway devices that are inserted into the pharynx for ventilation.[5] Secondgeneration supraglottic airway devices (SADs) are routinely used these days during anaesthesia, after failed tracheal intubation as airway rescue, facilitating tracheal intubation by acting as a conduit and to secure airway during emergencies.[6]

The ProSeal™ laryngeal mask airway (PLMA, Laryngeal Mask Company, Henley-on-Thames, UK) is a relatively new laryngeal mask device with a modified cuff to improve the seal and a drain tube to:

(i) Prevent gastric aspiration;
(ii) Prevent gastric insufflation;
(iii) Facilitate gastric tube insertion; and
(iv) Provide information about position.[7,8]
(v) Recently, it has been shown that the drain tube can also function as a highly effective guide to insertion.[9]

Ambu® AuraGainTM (Ambu, Ballerup, Denmark), a relatively novel supraglottic airway device, has been introduced recently. It is a disposable, preformed second generation SGA with integrated gastric access and intubation capability.[10] AuraGain has an inflatable cuff and a curved body. It is a single use SAD made of polyvinyl chloride (PVC) and is anatomically curved to follow the human airway and promises to provide high seal pressures.[11] In addition, because the airway tube of AuraGain is wide, it can be used as a conduit for tracheal intubation.[12]

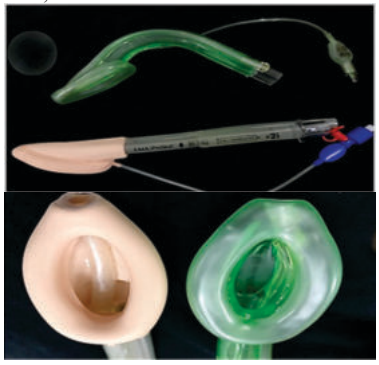

Figure 1: (a) The preformed AmbuAuraGain™ size 2 and the LMA ProSeal® size 2.
(b) Mask bowls of LMA ProSeal® (left) and that of AmbuAuraGain™ (right) which is slightly bigger in size

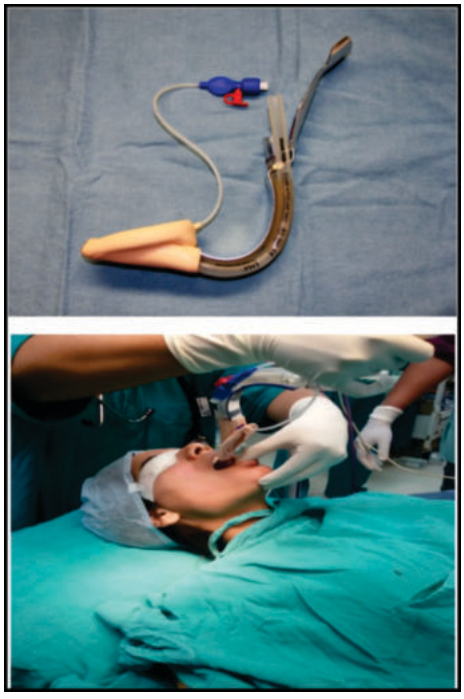

Fig 2 : Proseal LMA insertion with metal introducer tool

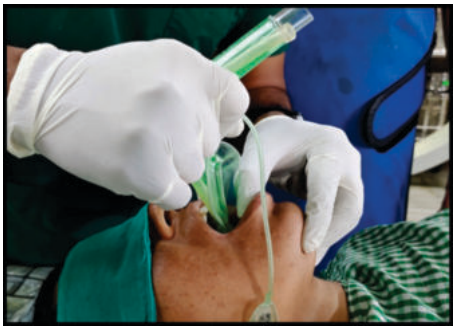

Fig. 3: Insertion of Ambu Aura Gain

MATERIAL AND METHOD

After approval from the Institutional Ethical Committee of Swami Vivekanand Subharti University, Meerut, the present study was conducted at Department of Anaesthesiology and Critical Care at Chhatrapati Shivaji Subharti Tertiary Hospital, affiliated to Subharti Medical College, Meerut. Patients of either sex, fulfilling the following criteria posted for elective laparoscopic cholecystectomy under general anaesthesia were included in the study Age 18-60 years, ASA grade I and II Weight between 40-70 kgs Mallampatti grade I and II. Patients of ASA III or greater, morbidly obese and severe cardiovascular disease were excluded.

Preliminary sample size has been calculated in consultation with statistician. At 80% study power and alpha error of 0.05, for minimum detectable mean difference in airway pressure of 4cmH_2O, a minimum of 30 patients were required in a group. Keeping 10% drop out rate a total of 66 patients were enrolled and distributed equally in both the groups. A sample size of total 66 patients were taken divided in two groups randomly into two groups Group A : Pro Seal Laryngeal Mask Airway and Group B : Ambu Aura Gain.

All patients posted for elective laparoscopic cholecystectomy under general anaesthesia were subjected to the pre-anaesthetic assessment prior to enrolment in the study. Along with proper preanaesthetic checkup, a thorough airway examination was done including Mallampati grading, inter incisor gap, flexion and extension at neck of all the patients. Patients were kept nil per oral overnight and an intravenous access was established in the operation theatre and received aspiration prophylaxis with intravenous ranitidine 50mg. Standard monitoring including heart rate, ECG, non-invasive blood pressure (NIBP), end tidal carbon dioxide ($etCO_2$) and arterial oxygen saturation (SpO_2) was applied.

Intravenous paracetamol 10mg/kg was administered as analgesics 15mins prior to induction. After pre-oxygenation, patients were pre-medicated with intravenous midazolam 0.05mg/kg and fentanyl 2.0mcg/kg. All patients were induced with intravenous propofol 2.0mg/kg. Neuromuscular blockade was provided by intravenous Vecuronium bromide 0.1mg/kg. After 3 min oxygenation with bag and mask ventilation. When complete neuromuscular blockade was achieved (i.e. with complete suppression of TOF, as guided by nerve TOR 272 neuromuscular monitor of Fisher and Paykel Healthcare), one of the device insertion (PLMA or AAU) as per group was attempted with head in extension.

Insertion Technique:

In group A Proseal laryngeal mask airways (PLMA) insertions were performed by an experienced investigator who stands at the head end of the patient. A PLMA size 3.0/4.0 (according to weight of the patient) mounted on metal introducer tool was used in this study with cuff fully deflated and back surface lubricated. With the head in sniffing position, PLMA was advanced around the palatopharyngeal curve until slight resistance is felt as the tip of the device is positioned into the hypopharynx using a single hand technique. After positioning, metal introducer was removed and cuff was inflated with maximum recommended volume (20ml) of air. Gastric tube of 14/16f was inserted according to the size of PLMA through the drain tube using 2% lignocaine jelly.

In group B Ambu Aura gain (AAU) size 3.0/4.0 (according to weight of the patient) an insertion was performed. Before insertion the cuff is fully deflated and the lubricant applied on the posterior surface of the cuffs of the AAU. With the head in neutral position, completely deflated and lubricated AG, was inserted after application of jaw thrust, using the midline approach. The cuff was inflated with 20ml of air. Through the drain tube the gastric tube size 16f was inserted using 2% lignocaine jelly.

After the device (PLMA or AAU) insertion, mechanical ventilation was initiated with Volume control mode ventilation with Tidal volume 7ml/kg, I:E ratio 1:2, respiratory rate 12/minute and anaesthesia was maintained between 1.5-2.0 MAC (minimum alveolar concentration) with N_2O:O_2 (50:50) with sevoflorane at gas flow of 2.0L/minute, to maintain normocapnia ETCO2 to be kept between 35 - 45 mmHg.

Following Parameters Were Recorded

A. Ease of insertion: Ease of insertion was defined as whether the device was inserted into the hypopharynx smoothly or with resistance.

B. Number of attempt: An attempt was counted when the distal edge of the respective devices as per group crossed the incisor level with either further advancement to hypopharynx position or withdraws and exteriorised. A maximum of two attempts were allowed for the insertion of the device. After that, endotracheal intubation was done and patient was excluded from the study.

C. Insertiontime: Insertion time was defined as the time from the moment the mask was taken away from the patient's face to the moment stable capnography was traced on the monitor with the presence of sufficient ventilation.

D. Oropharyngeal seal pressure.

E. Initial peak airway pressure.

F. Peak airway pressure after insufflation. Adequate functioning of the devices (PLMA and AAU) was assessed by measuring airway seal pressure by shifting to bag mode, completely closing the APL valve, at a continuous gas flow of 5L/minute. With bag squeezed record the airway pressure at which leak began to be audible. Airway pressure was not permitted to exceed 40 cm H_2O. Measurement was done immediately after positioning and cuff insufflation.

G. End tidalCO_2 ($etCO_2$) was recorded for values, recorded after positioning and cuff inflation (baseline) then at 15min, 30min, 45min and 60 min.

H. Pharyngolaryngeal adverse events: Post operative pharyngolaryngeal complications were assessed:

a. Sore throat- defined as constant pain or discomfort in the throat independent of swallowing.

Management for sore throat-Aspirin Gargle/Steroid Administration/Nebulisation
b. Blood staining of device.
c. Lip / tongue injury.
d. Dysphagia - difficulty or pain provoked by swallowing.

G. **Hemodynamic Parameters:** including heart rate, systolic, diastolic blood pressure and mean arterial blood pressure were observed at baseline (before induction), immediately after positioning and cuff inflation, then subsequently at every 15 minutes upto 60mins. Bradycardia <60/min: give atropine 0.6mg iv and for Systolic blood pressure <90mmHg give mephentermine 6mg/kg iv.

Data was collected and subjected to statistical analysis. Data was then tabulated and presented mean ± SD. Statistical analysis was done using SPSS 22.00 (SPSS in Chicago USA) software. Two group comparison for numerical data was done by Student t test and for categorical data Chi square test was used. P value <0.05 was considered significant and <0.001was considered highly significant.

RESULTS

Demographic profile of patients between the two groups was comparable.(table 1)

Table 1: Demographic profile between the study groups

Variables	Group A (PLMA)	Group B (AAU)	P-value
	n=33	n=33	
Age (in years)	38.72±9.51	40.37±8.68	0.43
Weight (kg)	65.89±7.52	63.91±8.07	0.43
Height (cm)	162.82±11.24	163.58±10.08	0.61
Gender ratio (M/F)	14/19	13/21	0.86
ASA Grade I/II	20/13	18/15	0.79

Data are expressed as mean+/-SD or absolute numbers. P value <0.05 is significant, <0.001 is highly significant

Ease of device insertion in PLMA group was found smooth in 25 patients (72.73%) and 18 patients (60.60%) in group B. In group A device was inserted with resistance in 8 patients (27.27%) and in group B 15 patients (39.40%). Thus, the ease of device insertion was more smooth in PLMA than AAU group.(Table 2). The difference was found to be statistically significant using Chi square test. (p=0.042).

Table 2:Comparison of Ease of insertion between thetwo groups.

Ease of Insertion	Group A (PLMA)		Group B (AAU)		p value
	n=33	%	n=33	%	
Smooth	25	72.73	18	60.60	0.042*
Resistance	8	27.27	15	39.40	

P value <0.05 is significant, <0.001 is highly significant

More attempts were required to successfully place the device in AAU group as compared to PLMA group. Chi Square test was used and difference was found statistically insignificant. (p=0.16) (Table 3)

Table 3: Comparison of no. of attempts between the two groups

No. of Attempts	Group A(PLMA)		Group B (AAU)		p value
	n=33	%	n=33	%	
1	25	75.76	21	63.64	0.16
2	8	24.24	12	36.36	

P value >0.05 is insignificant

The mean time taken for insertion of AAU (13.68 seconds) was longer than PLMA (11.53 seconds) with statistically significant difference as p=0.007.Data was compared using Student t test.

Table 4: Comparison of Oropharyngeal seal pressure (cm H_2O), Initial peak airway pressure (cm H_2O) and Peak airway pressure after insufflations (cm H_2O) between the two groups

Parameters	GroupA (PLMA)		Group B(AAU)		p value
	Mean	SD	Mean	SD	
Oropharyngeal seal pressure (cm H2O)	27.25	6.93	28.89	5.09	0.031 *
Initial peak airway pressure (cm H2O)	14.62	2.96	14.75	2.87	0.81
Peak airway pressure after insufflations (cm H2O)	20.79	2.82	20.92	3.07	0.88

P value <0.05 is significant, <0.001 is highly significant

The mean oropharyngeal seal pressure in group A was 27.25cm of H2O and in group B was 28.89cm of H2O with a significant p value of 0.031.

The mean Initial peak airway pressure (cm H2O) in group A was 14.62cm of H2O and in group B was 14.75cm of H2O. The mean peak inspiratory airway pressures after insufflation was 20.79cm of H2O in group A and 20.92cm of H2O in group B. The Initial peak airway pressure and peak inspiratory airway pressures after insufflation in both groups were comparable and statistically insignificant. Data was compared using student t test. (table 4).

Complications between the two groups were compared using Chi square test. In group A (PLMA) blood staining of device was seen in 3 patients, sore throat post operatively in 2 patients, minor lip and tongue injury in 2 patients. In group B (AAU), blood staining of device was seen 2 patients, sore throat postoperatively in 1 patient, minor lip and tongue injury in 2 patients. No complaints of postoperative dysphagia shown in any of the patients in either group. Post-operative complications were statistically comparable in both groups.

The mean heart rate at baseline was 85.13±6.41 in patients of Group A and 85.73±6.82 in patients of Group B. Heart rate was compared using student t test and was found comparable among both the groups at all the intervals asp>0.05

Before InductionAverage Mean Arterial pressure in group A and B was 96.77±7.59 and 97.73±8.77 mmHg respectively with statistically insignificant difference (p>0.05).

Immediately After positioning, Mean Arterial pressure increased in both the groups. Mean Arterial pressure was approximately similar in both the groups (p>0.05).After 15^{th}, 30^{th}, 45^{th}-60^{th} minute, Mean Arterial pressure was comparable among all the groups with statistically insignificant difference (p>0.05). Student t test was used to compare mean arterial pressure between the two groups.

DISCUSSION

Supraglottic Airways (SGAs) have revolutionized the airway management during general anaesthesia. Besides serving as a rescue device in the difficult airway, and as a conduit for the endotracheal tube insertion, SGAs provide a less invasive and less traumatic means of securing the airway in surgical patients. These have an advantage of being more definitive airway compared to face-mask and are less invasive than endotracheal intubation. They are easy to insert, less invasive, have stable haemodynamics. The second generation devices have been designed for safety with improved airway seal and a drainage tube.Ithas an added advantage of reduced risk of gastric insufflation, regurgitation, aspiration of gastric contents and are proved to be efficient in laparoscopic surgeries where increased intra-abdominal pressure created by pnemoperitoneum required higher peak airway pressures for adequate pulmonary ventilation.[13,14]

PLMA is an established airway device introduced in the year 2000 with several modifications in its design and material for use in laparoscopic surgeries. It is made of medical grade Silicon cuff, wired PVC airway tube and is reusable for upto 40 times. The large wedge shaped double cuff improves oropharyngeal seal which enables the separation of gastrointestinal and respiratory tract, providing opportunity for controlled as well as spontaneous ventilation.

Ambu® AuraGainTM (Ambu, Ballerup, Denmark), a relatively novel supraglottic airway device, has been introduced recently. It is a disposable, preformed second generation SGA with integrated gastric access and intubation capability.[15]AuraGain has an inflatable cuff and a curved body. It is made of polyvinyl chloride (PVC) and is anatomically curved to follow the human airway and promises to provide high seal pressures. In addition, because the airway tube of AuraGain is wide, it can be used as a conduit for tracheal intubation. Ambu Aura Gain is comparatively less expensive than PLMA and being a newer device we have very less knowledge about its safety parameters. Only a limited number of studies have been conducted on the performance of AmbuAuraGain, and very few have been reported that it is a clinically safe and an effective device.[16] present study was planned and designed to compare Proseal Laryngeal mask airway and Ambu Aura Gain for insertion parameter, airway dynamics and pharyngolaryngeal adverse events in Laparoscopic cholecystectomy.

In present study study we included 33 patients in each group, PLMA (group A) and the AAU (group B). The preoperative airway evaluation for inter incisor gap and the Mallampati scoring was done in all the patients. A p value of <0.05 was considered as statistical significance

and p value of <0.001 as statistically highly significant. All demographic parameters were comparable in both groups.

Ease of insertion was defined as whether the device was inserted into the hypopharynx smoothly or with resistance. An attempt was counted when the distal edge of the respective devices as per group crossed the incisor level with either further advancement to hypopharynx position or withdraws and exteriorized. A maximum of two attempts were allowed for the insertion of the device. After that, endotracheal intubation was done and patient was excluded from the study.

Insertion time was defined as the time from the moment the mask was taken away from the patient's face to the moment stable capnography was traced on the monitor with the presence of sufficient ventilation. The time taken for insertion of AAU (13.68 seconds) was longer than PLMA (11.53 seconds) with statistically significant difference as p<0.05. This may be attributed to its rigid PVC preformed structure in contrast to the flexible silicone structure of the PLMA. The insertion time for Proseal LMA was significantly lesser than that of AAU as they used the introducer tool for the insertion of PLMA.

Singh K et al conducted a study on comparative evaluation of AmbuAuraGain™ with ProSeal™ laryngeal mask airway in patients undergoing laparoscopic cholecystectomy. Number of insertion attempts, ease of insertion, time required for placement and calculated pharyngeal mucosal pressure were compared. The ease of insertion and success rate at first attempt was similar between the groups. Time taken for insertion in Group AAU was longer than Group PLMA (13.57 ± 1.94 vs. 11.60 ± 2.22 s). Therewas no significant difference in the Oropharyngeal seal pressure in both groups. Authors concluded that AAU provides adequate sealing pressures and effective ventilation with lower calculated pharyngeal mucosal pressure, compared to PLMA. The results in our study were very similar to this study.[17]

Parikh DA et al conducted a prospective observational study to assess the ease of Ambu Aura Gain placement in paralyzed patients, determine its position and alignment to the glottis and assess its utility as a conduit for intubation in One hundred patients. The ease and number of attempts for successful insertion, ease of gastric tube insertion, leak pressures, fibreoptic grade of view, number of attempts and time for tracheal intubation, time for AG removal and complications were recorded. AG was successfully inserted in all patients. The mean (SD) time taken for insertion was 17.32 (8.48) s. In the above study 88 out of 100 patients were inserted the device smoothly in first attempt.[18]In our study the mean time of insertion with AAU was 13.68 seconds which was similar with the above study.

Mehta H et al conducted a study on an observational study to compare ambu aura gain and supreme laryngeal mask airway for controlled ventillation under anaesthesia. Group A (ambu aura gain) and group S (LMA supreme). Both groups were compared for numbers of attempts and time taken for insertion of device, ease of insertion of nasogastric tube (NGT). Result showed that both groups were statistically comparable in regard to number of attempts for placement and time of insertion of device, ease of insertion of NGT and haemodynamic stability.[19]

Shariffuddin et al compared the oropharyngeal seal pressures among Aura Gain and LMA Supreme and found no significant difference between them. In contrasting from the findings of the above study the Oropharyngeal seal pressure of AAU was higher than the PLMA in our study. Whereas the results of initial peak airway pressure and peak airway pressures after insufflation were comparable between the groups.This significant difference could be because of the larger study group used by this study than our study .[20]

Mehta H et al also found that hemodynamic parameters were comparable between both groups in their study.[19] Almost all the studies including **Lakesh K Anand et al,** demonstrated that hemodynamic parameters were comparable in both groups.[21]

In our study the hemodynamic parameters were stable throughout the operative procedure in both the groups. This may be due to the non invasive nature of the devices used in the study which provide fewer traumas to the airway and less sympathetic stimulation. These airway conduits can be used safely and efficiently with a little expertise.

CONCLUSION

Present study concludes that Ambu Aura Gain and Proseal LMA provide reliable and secured airway with stable intraoperative hemodynamics and lesser postoperative complications. Ambu Aura Gain provides adequate sealing pressures and effective ventilation though Proseal LMA has superior insertion parameters. Hence present study recommends that both Ambu Aura Gain and Proseal LMA can be effectively used in elective laparoscopic cholecystectomies under general anaesthesia.

Source of Support: NIL

Conflicts of interest: NIL

Acknowledgement-The authors acknowledge the contribution of technical and non-technical staff of operation theatre for their unconditional support.

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REFERENCES

1. Glenn F, Grafe WR Jr. Historical Events in Biliary Tract Surgery. Arch Surg.1966; 93: 848-52.
2. David RR. Laparoscopic Cholecystectomy. In: Zinner MJ, Schwartz SI, Ellis H editors. Maingot's abdominal operations volume 2.10th edn. Connecticut A Simon and Schuster Company. 1997;1855.
3. King BD, Harris LC Jr, Greifenstein FE, Elder JD Jr, Dripps RD. Reflex circulatory responses to tracheal intubation performed during general anesthesia. Anesthesiol 1951;12: 556.
4. Sharma B, Sood J, Sahai C, Kumar VP. Efficacy and Safety Performance of Proseal TM Laryngeal Mask Airway in Laparoscopic Surgery: Experience of 1000 Cases. Indian J Anaesth. 2008; 52(3): 288- 96.
5. Verghese C, Brimacombe JR. Survey of laryngeal mask airway usage in 11,910 patients: Safety and efficacy for conventional and nonconventional usage. AnesthAnalg. 1996; 82: 129–33.
6. Brimacombe J, Keller C. The ProSeal laryngeal mask airway. Anesthesiol Clin North America.2002; 20: 871-91.
7. Brain AIJ. The laryngeal mask – a new concept in airway management. Br J Anaesth. 1983; 55: 801-5.
8. Howarth A, Brimacombe J, Keller C. Gum elastic bougie-guided insertion of the ProSeal laryngeal mask airway. A new technique. AnaesthIntens Care. 2002; 30: 624–7.
9. Brimacombe J, Keller C, Vosoba Judd D. Gum elastic bougie-guided insertion of the ProSeal laryngeal mask airway is superior to the digital and introducer tool techniques. Anesthesiol. 2004; 100: 25–9.
10. Maltby JR, Beriault MT, Watson NC, Liepert D, Fick GH. The LMA-ProSeal is an effective alternative to tracheal intubation for laparoscopic cholecystectomy. Can J Anaesth. 2002; 49: 857-62.
11. Cook TM, Lee G, Nolan JP. The ProSeal laryngeal mask airway: A review of the literature. Can J Anaesth. 2005; 52: 739-60.
12. Jagannathan N, Hajduk J, Sohn L. A randomised comparison of the Ambu(R) AuraGain and the LMA(R) supreme in infants and children. Anaesthesia. 2016;71: 205–12.
13. Kumar V, Lalitha K, Lone T. Use of classic laryngeal mask airway inserted in prone position for controlled ventilation: A feasibility study. Indian J Anesth. 2008; 52: 813-7.
14. Gaitini LA, Vaida SJ, Somri M. A randomized controlled trial comparing the Proseal Laryngeal Mask Airway with the Laryngeal Tube Suction in mechanically ventilated patients. Anesthesiology.2004; 101: 316-20.
15. Maltby JR, Beriault MT, Watson NC, Liepert D, Fick GH. The LMA-ProSeal is an effective alternative to tracheal intubation for laparoscopic cholecystectomy. Can J Anaesth. 2002; 49: 857-62.
16. Jagannathan N, Hajduk J, Sohn, L. A randomised comparison of the Ambu(R) AuraGain and the LMA(R) supreme in infants and children. Anaesthesia. 2016; 71; 205–12.
17. Singh K, Bhalotra AR, Anand R. A comparative evaluation of ProSeal laryngeal mask airway, I-gel and Supreme laryngeal mask airway in adult patients undergoing elective surgery: A randomised trial. Indian J Anaesth. 2018; 62: 858-6.
18. Parikh DA, Jain RA, Lele SS, Tendolkar BA. A cohort evaluation of clinical use and performance characteristics of AmbuAuraGain. A prospective observational study. Indian J Anaesth. 2017; 61:636-42.
19. Mehta H, Sharma TH, Desai T. An Observational Study to Compare Ambu Auragain and Supreme Laryngeal Mask Airway for Controlled Ventillation Under Anaesthesia. Indian J AnesthAnalg. 2019;6(2):438-42.
20. Shariffuddin. 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(2): 244- 50.
21. 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(2): 44- 50.