INTRODUCTION:
Since 1980, several supraglottic airway devices have been developed of which the Laryngeal mask airway is the most popular one. In 1999, Dr. Brain improvised upon the classic LMA by introducing a drainage tube and presented a newer version called Proseal LMA (PLMA). PLMA is an advanced LMA which enhances safety and scope of the device particularly during positive pressure ventilation. Closed claim studies1 have shown that it provides a more effective seal than the classic LMA and it facilitates easy gas exchange particularly during positive pressure ventilation. Closed claim studies1 have shown that it provides a more effective seal than the classic LMA and it facilitates easy gas exchange particularly during positive pressure ventilation. Closed claim studies1 have shown that it provides a more effective seal than the classic LMA and it facilitates easy gas exchange particularly during positive pressure ventilation.

Successful insertion of PLMA without any untoward effects such as gagging and coughing requires adequate depth of anaesthesia and suppression of upper airway reflexes but neuromuscular blocking drug is not required. Propofol is a well known IV induction agent with rapid induction and recovery. A randomized study was carried to compare conditions for PLMA insertion using Propofol and Sevoflurane in 60 ASA I & II patients undergoing laparoscopic and non laparoscopic surgeries.

Patients & Methods: Patients were divided into two groups, Group P patients received IV Propofol 3 mg kg-1 and group S patients, Sevoflurane 8% & 100% O2 with vital capacity induction technique. After loss of eyelash reflex, inj. Fentanyl 2 μg kg-1 IV was injected and PLMA insertion was done. Induction time, effective airway time, conditions for PLMA insertion attempts for PLMA & Ryle’s tube insertion, changes in haemodynamic parameters, oxygen saturation and EtCO2 and post operative complications were studied.

Results: Induction was more rapid in Propofol group. Excellent to satisfactory insertion conditions were obtained in more than 90% of patients in group P & 96.66% of patients in group S. PLMA was inserted at the first attempt in 96.66% of patients in group P and 93.33% of patients in group S. There was a significant decrease in heart rate in group S at 2 min after PLMA insertion in comparison to group P. Decrease in both systolic and diastolic blood pressure, changes in oxygen saturation and EtCO2 were comparable in both the groups. In our study 20 patients were those posted for laparoscopic surgery. There were no complications like regurgitation, aspiration or gastric insufflations, failed oxygenation or failed ventilation.

Conclusion: We conclude from our study that insertion of PLMA is easy and comparable with both Propofol and Sevoflurane.
adult male patients or patients weighing 50-70kg) inserted with the introducer insertion technique by an experienced anaesthesiologist blinded to the induction technique and cuff inflated with appropriate amount of air (size 3, 20ml and size 4, 30ml).

Proper placement of PLMA was confirmed by

- B/L equal air entry
- B/L equal chest movements
- Bite block should lie between the teeth
- Absence of gastric insufflation by auscultation over epigastrium
- Gel displacement test: Absence of bubbling or movement of column of the lubricant placed on proximal end of drainage tube during IPPV
- Absence of audible leak on gentle IPPV
- Passing an orogastric tube easily through the drain tube and
- Square wave capnography

In both the groups, effective airway time was recorded as the time between picking up the PLMA and obtaining an effective airway judged by gentle manual ventilation. The conditions obtained for PLMA insertion were assessed using the six point variables as shown in table 3. Overall grading of PLMA insertion score was done as score 18- excellent, 16-17 - satisfactory, < 16- poor.

If the first attempt was unsuccessful, second attempt was tried after repeat administration of Propofol or Sevoflurane. The total number of attempts for insertion of PLMA was recorded in both the groups. Anaesthesia was maintained with 50%N₂O + 50%O₂, Isoflurane and Vecuronium bromide. We have inserted Ryle's tube in all the patients and the number of attempts was recorded.

Haemodynamic parameters like heart rate, systolic and diastolic blood pressure as well as percentage oxygen saturation were recorded before and after induction, during PLMA insertion, after PLMA insertion at 1, 2, 3 and 5 min, throughout the operation and in the immediate post operative period as shown in graphs 1, 2 & 3. When SpO₂ was 94- 90% oxygenation was graded as suboptimal and failed if it was < 90%.

In patients posted for laparoscopic surgery, monitoring of EtCO₂ was done and values were recorded at base line, after PMA insertion, 15 and 30 min after pneumoperitoneum, before removal of trocar and in the immediate post operative period as shown in table 5. With EtCO₂ readings, suboptimal ventilation was between 45.6-55.5 mmHg (6.0-7.3 kPa) and failed if the reading was > 55.5 mmHg (7.3 kPa). The following intra operative complications were recorded: aspiration, hypoxia (<90%), bronchospasm, arrhythmias, coughing, hiccups, airway obstruction and minor tongue - lip - dental trauma.

At the end of surgery, patients were reversed with inj. Neostigmine 50μg kg⁻¹ IV & inj. Glycopyrrolate 10μg kg⁻¹ IV and PLMA was removed after full return of reflexes and consciousness. Secretions, if present, over both the ventral and dorsal aspect of PLMA were noted and pH tested with a litmus paper. Post operatively, patients were asked for complications like nausea, vomiting, dysphagia, dysphonia and sore throat. Enquiry about sore throat was made 24 hrs later and was graded, score 0: no complaints, score 1: mild discomfort, score 2: severe discomfort.

Statistical analysis was performed using Student’s unpaired t-test for demographic data, changes in haemodynamic parameters, O₂ saturation and EtCO₂. Chi-square test incorporating Fishers exact test and the Mann- Whitney test were used for the variables of induction, conditions for PLMA insertion and attempts for PLMA insertion. P<0.05 was taken as statistically significant.

**RESULTS**

Demographic data and surgical procedures were comparable in both the groups as shown in table 1. Induction time and effective airway time are shown in table 2. Induction was significantly earlier in Protocol group (Group P - 73.9±5.72 sec and Group S - 103.33±10.49 sec). Effective airway time was comparable in both the groups (Group P - 20.76±2.22 sec and Group S - 21.5±2.24 sec). Conditions for PLMA insertion were comparable in both the groups (table 3). Attempts for PLMA insertion (table 4) and Ryle’s tube insertion were comparable in both the groups.
Both the groups exhibited stable haemodynamic profiles. There was a significant decrease in heart rate in Sevoflurane group at 2 min after PLMA insertion as shown in graph 1. There was a decrease in systolic and diastolic blood pressure in both the groups but intergroup comparison was statistically insignificant as shown in graphs 2 & 3. There was no significant change in oxygen saturation in both the groups. There was a significant increase in EtCO₂ at 15 and 30 min after pneumoperitoneum and before removal of trocar but intergroup comparison was statistically insignificant (table 5).

Two (6.66%) patients in Group S complained of nausea in the post operative period. This was statistically insignificant. 10% of the patients in group P and 13.33% of the patients in group S complained of mild sore throat (grade 1 severity). None of the patients in either group complained of severe sore throat. There was no statistically significant difference between the two groups. 30% of the patients in group P complained of pain on injection of Propofol.

One patient in group P and two patients in group S had blood stain over the dorsal surface of PLMA. pH of the secretions over dorsal surface of PLMA was in the range of 7.0-7.5 in all the patients in both the groups. None of the patients in both the groups had secretions in the bowl of the mask, hence no pulmonary aspiration.

DISCUSSION


Propofol is a standard induction agent for insertion of PLMA without need for muscle relaxant. Sevoflurane is also used for insertion of PLMA without need for muscle relaxant.

In our study, induction was significantly earlier in group P as in other studies by B.Fredman et al, Thwaites et al, V.Priya et al and S.B.Ganatra et al. P.Sivalingam et al. Effective airway time was comparable in both the groups (table 2).

The time for PLMA insertion was comparable in both the groups in studies by V.Priya et al and Ravikumar et al.

Jaw opening was comparable in both the groups. Jaw opening was comparable in studies by Ravikumar et al and S.B.Ganatra et al. However V.Priya et al and Lian Kah et al observed that jaw relaxation was excellent in Propofol group as compared to Sevoflurane group (72% vs. 44% and 78.9% vs. 55.2% respectively). Overall conditions for PLMA insertion were comparable in both the groups.

Attempts for PLMA insertion was comparable in both the groups (table 4). A second attempt for PLMA insertion was required only in 1 patient in group P and 2 patients in group S. Ravikumar et al and V. Priya et al observed that attempts for PLMA insertion were similar in both the groups. Lian Kah et al in their study found that patients in Sevoflurane group required more attempts at LMA insertion and this was because of inadequate mouth opening.

There was a significant decrease in heart rate at 2 min after PLMA insertion in group S in comparison to group P (graph 1). This might be because of Sevoflurane induced inhibition of β-adrenoreceptor system and its depressant effect on myocardial Ca++ channels. V. Priya et al and Thwaites et al observed that changes in heart rate were comparable in both the groups.

There was a significant decrease in systolic and diastolic blood pressure in both the groups but inter group comparison was statistically insignificant (graphs 2 & 3). W. Scott Jellish et al also observed decrease in blood pressure which was comparable in both the groups. Thwaites et al, V.Priya et al, Lian Kah et al and S.B.Ganatra et al observed a significant decrease in blood pressure in group P.

There were no cases of regurgitation in both the groups as evidenced by the pH of secretions which was in range of 7.0 to 7.5. None of the patients in both the groups had secretions in the bowl of mask indicating an effective seal around the glottis and hence no pulmonary aspiration.

Two patients experienced postoperative nausea in Sevoflurane group compared with none when Propofol was the induction agent. Propofol is known to have antiemetic effects which persist into the postoperative period. Incidence of sore throat was comparable in both the groups. Lian Kah et al and Ravikumar Koppula et al observed that incidence of sore throat was similar in both the groups.
We studied PLMA insertion in 40 patients undergoing elective non–laparoscopic procedures. We also studied PLMA insertion in 20 patients undergoing laparoscopic surgery and included them in this study. We studied the incidence of gastric distension, regurgitation, aspiration, haemodynamic changes and changes in oxygen saturation and EtCO2 to evaluate PLMA as an airway device. In our study, there were no cases of failed ventilation or failed oxygenation and no crossovers from PLMA to Endotracheal tube. Ryle’s tube insertion was successful at the first attempt in all patients undergoing laparoscopic surgery.

In our study, patients didn’t have regurgitation or aspiration as evidenced by the litmus test and maintenance of oxygen saturation and endtidal carbon dioxide within normal limits.

Thus Propofol provides faster induction compared to Sevoflurane but pain at the site of injection offsets its antiemetic effect as well. Finally we can say that insertion of Proseal LMA is easy and comparable with both Propofol and Sevoflurane. Also PLMA can be used as a safe airway device in patients undergoing laparoscopic surgeries.

SCHEMATIC OF INTRODUCER TOOL INSERTION TECHNIQUE

REFERENCE