ProSeal Laryngeal Mask Airway Placement: A Comparison of Blind versus Direct Laryngoscopic Insertion Techniques

Pooja Chandrakanth Patil, Manjunath Abloodu Chikkapillappa, Vinayak Seenappa Pujara, Tejesh Channasandra Anandswamy, Leena Harshad Parate, Yatish Bevinaguddaiah

Department of Anaesthesia, M. S. Ramaiah Medical College, Bengaluru, Karnataka, India

Abstract

Background and Objectives: The laryngeal mask airway (LMA) ProSeal is most commonly used supraglottic airway device; it is routinely inserted by blind technique. Although blind insertion technique is most widely used, there are many techniques which are available such as priming the drain tube with a guiding instrument such as a suction catheter, a gum elastic bougie, a Flexi-Slip Stylet, direct laryngoscopy, and even a fiber-optic bronchoscope (FOB). The present study was undertaken to compare and assess the placement of LMA ProSeal using blind versus direct laryngoscopy techniques using FOB. Materials and Methods: A prospective randomized comparative study of 110 patients divided into two groups of 55 each as Group I (blind insertion) and Group II (direct laryngoscopic insertion) after satisfying the inclusion criteria. The anatomical position was assessed by flexible FOB and evaluated based on fiber-optic scoring system. Results: In the present study, demographic characteristics, vital parameters, Mallampati score, and Wilson’s score were comparable in both the groups ($P > 0.05$). The fiber-optic score (FOS) I in Group II was 78.18% compared to 60% in Group I, but the difference was statistically not significant ($P > 0.05$). Furthermore, the mean FOS in Group II was slightly high (3.84 ± 0.87) compared to Group II (1.62 ± 0.87), but the difference was statistically not significant ($P > 0.05$). Further hemodynamic parameters ($P > 0.05$) and complications ($P > 0.05$) were comparable in both the groups. Conclusion: The LMA placement scoring was similar in both blind and direct laryngoscopic techniques. Blind insertion technique is a simpler, easier, and has stood the test of time.

Keywords: Direct laryngoscopy, fibreoptic, laryngeal mask airway ProSeal

INTRODUCTION

Laryngeal mask airway (LMA) ProSeal is a reusable supraglottic airway device offering gastric access and was introduced into clinical practice in 2000. The LMA ProSeal offers higher glottic sealing pressure than the LMA classic, facilitating positive pressure ventilation. It has a built-in drain tube that allows gastric contents to bypass the pharynx. This specific feature is designed to decrease the risk of aspiration. It includes all the benefits associated with the LMA airway such as fewer drugs used, lesser incidence of sore throat, reduced coughing and bucking on emergence, and improved hemodynamic stability.

A fiber-optic bronchoscope (FOB) acts as a confirmation tool that assesses the adequacy of its position. Ideal intraoral positioning of an LMA ProSeal may be highly desirable. However, to date, very few studies have assessed whether blind technique or direct laryngoscopic technique of insertion is better. Hence, the present study was undertaken to assess and compare the placement of LMA ProSeal inserted by blind and direct laryngoscopic technique.

MATERIALS AND METHODS

After institutional ethical clearance and written informed consent, 110 American Society of Anesthesiologists (ASA) I or II patients aged 18–60 years of either sex, undergoing routine surgeries under general anesthesia with LMA were randomly divided into two groups of 55 each by a sealed envelope method. Group I blind insertion and Group II laryngoscopic insertion.

Address for correspondence: Dr. Manjunath Abloodu Chikkapillappa, Department of Anaesthesia, M. S. Ramaiah Medical College, Bengaluru, Karnataka, India.
E-mail: mac_acin@yahoo.co.in

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Patil PC, Chikkapillappa MA, Pujara VS, Anandswamy TC, Parate LH, Bevinaguddaiah Y. ProSeal laryngeal mask airway placement: A comparison of blind versus direct laryngoscopic insertion techniques. Anesth Essays Res 2017;11:380-4.
insertion. Patients body mass index >35, previous neck surgeries, and upper airway anomalies were excluded from the study.

Preoperative airway assessment included the recording of Wilson’s score and Mallampati grade. All the patients received oral pantoprazole 40 mg and oral ondansetron 4 mg on the morning of surgery as premedication. Glycopyrrolate 0.2 mg intramuscularly was given half an hour before induction.

In the operating room, intravenous (IV) access was established and Ringer’s lactate infusion started. Standard monitoring included electrocardiograph, noninvasive blood pressure (NIBP), and pulse oximetry (SpO₂). The LMA to be used was prepared for insertion with the cuff completely deflated and shaped, and its dorsal surface lubricated with a clear, water-based gel.

After preoxygenation for 3 min, the patient was induced with propofol 2 mg/kg, fentanyl 2 mcg/kg, and muscle relaxation facilitated by atracurium 0.5 mg/kg IV and ventilated for 3 min. The patient was placed in the sniffing position with the occiput resting on a firm pillow. LMA ProSeal insertion was done by anesthesia provider. The insertion technique for LMA ProSeal was identical to the recommended technique for the LMA ProSeal and included neck flexion, head extension, full deflation of the cuff, and the use of the index finger to press the LMA ProSeal into, and advance it around the palatopharyngeal curve in Group I. Direct laryngoscopy was performed using Macintosh blade to visualize epiglottis, the LMA ProSeal was then inserted until it was felt to seat in the hypopharynx and/or the proximal rim of the LMA ProSeal was all that could be seen in Group II.

All steps were performed with the cuff fully deflated and using a midline approach. Cuff inflation was done after insertion to obtain adequate airway seal. Fixation was done in accordance with the manufacturer’s instructions. LMA placement was confirmed with chest expansion and capnography. Patients were ventilated with 2 L/min fresh gas flow 6–8 ml/kg tidal volume and respiratory rate 12–14/min with circle system. Anesthesia was maintained with air oxygen mixture enriched with isoflurane 1–1.5%, and end-tidal carbon dioxide was maintained between 30 and 35 mmHg.

The anatomical position of the LMA ProSeal was assessed by introducing a flexible FOB into airway tube to a position proximal to the terminal end and graded as fiber-optic score (FOS) (1) clear view of vocal cords, (2) only arytenoid cartilages visible, (3) only epiglottis visible, and (4) no laryngeal structures visible.[7]

At the end of the procedure, after noting the patient’s spontaneous breaths, neuromuscular blockade was reversed with injection neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. After the return of protective airway reflexes, the LMA was removed.

Hemodynamic parameters including systolic and diastolic blood pressure, mean arterial pressure, oxygen saturation, and pulse were recorded at baseline, induction, LMA insertion, 0, 1, and 5 min postinsertion. Presence of visible or occult blood after removal of airway device was also noted.

**Statistical analysis**

Data obtained were coded and entered into Microsoft Excel spreadsheet, using software SPSS version 18.0 (IBM Corp., Armonk, NY, USA). The categorical data were expressed in terms of rates, ratios, and percentage and continuous data were expressed as a mean ± standard deviation. Independent sample t-test was used to compare quantitative variables in the both groups. The categorical data were compared using Chi-square test. *P* ≤ 0.05 was considered statistically significant. Based on a previous study and considering the 95% confidence interval, minimum detectable risk difference between the two groups as 15%, the sample size of 110 patients was arrived at. They were further divided into two groups of 55 each.

**Results**

The demographic data, ASA status, and Mallampati and Wilson score were comparable between the two groups [Table 1]. LMA ProSeal size of 3 was used in 11 patients in Group I and 17 patients in Group II, size 4 was used in 29 (52.73%) patients in Group I and 30 (54.55%) patients in Group II, and size 5 was used in 15 patients in Group I and 8 patients in Group II which was not statistically significant [Table 2]. The FOS of 1 was noted in 33 (60%) patients in Group I and 43 (78.18%) patients in Group II, 2 was noted in 12 patients in Group I and 6 patients in Group II, 3 was noted in 8 patients in Group I and

**Table 1: Demographic profile**

| Variables              | Group I (n=55) | Group II (n=55) |
|------------------------|---------------|-----------------|
| Age (years)            | 37.73±14.58   | 38.89±12.00     |
| Sex (male/female)      | 25/30         | 20/35           |
| Height (cm)            | 159.85±9.66   | 158.58±8.79     |
| Weight (kg)            | 62.42±12.75   | 59.00±11.04     |
| BMI                     | 24.42±4.62    | 23.46±3.82      |
| ASA status (I/II)      | 25/30         | 31/24           |
| Mallampati class (1/2/3/4) | 6/43/5/1 | 6/38/10/1      |
| Wilson’s score (0/1/2/3/4) | 41/7/0/2 | 35/15/4/1     |

BMI=Body mass index, ASA=American Society of Anesthesiologists

**Table 2: Laryngeal mask airway size used and fiber-optic score between the groups**

| Variables | Group I (n=55)* | Group II (n=55)* |
|-----------|-----------------|------------------|
| LMA size  |                 |                  |
| 3         | 11 (20.00)      | 17 (30.91)       |
| 4         | 29 (52.73)      | 30 (54.55)       |
| 5         | 15 (27.27)      | 8 (14.55)        |
| Fiber-optic score |       |                  |
| 1         | 33 (60.00)      | 43 (78.18)       |
| 2         | 12 (21.81)      | 6 (10.91)        |
| 3         | 8 (14.55)       | 6 (10.91)        |
| 4         | 2 (3.64)        | 0               |

*P*<0.05. LMA=Laryngeal mask airway
6 patients in Group II, 4 was noted in 2 patients in Group I and no patients in Group II, was not statistically significant [Table 2 and Figure 1].

The hemodynamic parameters were comparable in both the groups (P > 0.05) [Table 3, Figures 2 and 3]. There was no difference in the incidence of complications in Group I 36.36% and Group II 34.55% [Figure 4]. In this study, the most common complication was sore throat present among 23.64% of the patients in Group I and 29.09% of the patients in Group II. However, all the complications such as sore throat, blood stains, cough, vomiting, nausea, hoarseness, and dysphagia were comparable in Groups I and II [Table 4 and Figure 5].

**DISCUSSION**

Different insertion techniques have been studied to find an optimal method for LMA ProSeal insertion. A variety of techniques have been developed to facilitate insertion of the LMA ProSeal including priming the drain tube with a guiding instrument such as a suction catheter, a gastric tube, a gum elastic bougie, a Flexi-Slip Stylet, and even a FOB.

In a recent study by Choo et al. who evaluated two different techniques of inserting the LMA. Flexible for patients undergoing day-care dental surgery reported LMA placement revealed better scores with the laryngoscopy-guided technique than with the standard technique using fiber-optic assessment. Another study by Campbell et al. on a prospective comparison of 132 patients (38 with the blind technique and 94 with the direct technique) reported ideal position in 91.5% of the patients in direct visual placement group compared to 42% in the blind placement group.

In our study, majority of the patients in Group II 78.18% of the patients had FOS of 1 compared to 60% in Group I. Although the frequency of patients with FOS 1 in Group II was high compared to Group I, the difference was statistically not significant. Our findings are consistent with a study by Chandan et al. that suggest the blind insertion method is as accurate as laryngoscopic method in positioning LMA.

In the present study, the hemodynamic parameters were comparable in Group I and II at all the time intervals. These findings were consistent with findings of Choo et al. where either technique did not produce any significant differences in the hemodynamic parameters at 0, 1, and 5 min postinduction. In contrast, Chandan et al. reported no statistically significant difference in NIBP postinsertion between the two groups, but
there was a statistically significant difference in 1 and 2 min postinsertion pulse rate.

In the present study, 36.36% of the patients in Group I had complications and common complication was sore throat (23.64%). However, no statistically significant difference was observed between Group I and II with regard to the incidence of overall and individual complications. In contrast, Choo et al.\textsuperscript{[11]} reported slightly higher incidence of sore throat in the group of patients who had the LMA flexible inserted using the standard technique of digital manipulation.

### Table 3: Hemodynamic parameters at various intervals

| Variables                  | Group I (n=55)* | Group II (n=55)* |
|----------------------------|----------------|------------------|
| Systolic blood pressure    |                |                  |
| Baseline                  | 138.8±24.12    | 135.4±19.23      |
| Induction                 | 114.5±20.46    | 116.5±18.64      |
| Insertion (min)           |                |                  |
| 0                         | 112.7±23.08    | 112.2±21.46      |
| 1                         | 114.7±19.48    | 112.6±18.20      |
| 5                         | 118.2±20.61    | 114.3±19.40      |
| Diastolic blood pressure  |                |                  |
| Baseline                  | 78.9±11.78     | 79.9±14.70       |
| Induction                 | 68.9±14.66     | 70.2±14.15       |
| Insertion (min)           |                |                  |
| 0                         | 66.8±18.28     | 67.8±15.09       |
| 1                         | 70.5±14.76     | 67.7±14.70       |
| 5                         | 71.0±16.38     | 68.6±14.00       |
| Mean arterial pressure    |                |                  |
| Baseline                  | 96.1±16.00     | 96.0±14.98       |
| Induction                 | 81.8±16.94     | 83.4±14.53       |
| Insertion (min)           |                |                  |
| 0                         | 80.0±19.78     | 80.0±16.48       |
| 1                         | 82.7±15.36     | 80.7±14.83       |
| 5                         | 84.0±16.93     | 81.5±14.69       |
| Pulse rate                |                |                  |
| Baseline                  | 85.7±18.09     | 86.7±13.58       |
| Induction                 | 80.8±17.79     | 83.0±14.19       |
| Insertion (min)           |                |                  |
| 0                         | 80.2±17.52     | 83.6±15.29       |
| 1                         | 75.9±15.99     | 79.9±13.79       |
| 5                         | 76.0±15.96     | 77.5±13.98       |

*P > 0.05

### Table 4: Incidence of complications

| Variables     | Group I (n=55) | Group II (n=55) |
|---------------|----------------|-----------------|
| Complications | 20             | 19              |
| Blood stains  | 5              | 7               |
| Sore throat   | 13             | 16              |
| Hoarseness    | 0              | 1               |
| Dysphagia     | 1              | 0               |
| Cough         | 4              | 0               |
| Vomiting      | 1              | 1               |
| Bronchospasm  | 1              | 0               |

The present study showed that the use of larygoscope was not advantageous as the accuracy of positioning, hemodynamic stability, and incidence of complications were comparable to that of the blind method. These findings were consistent with the study by Chandan et al.\textsuperscript{[12]} who concluded that blind insertion technique is easier and simpler method for insertion of LMA and has a reasonable success during insertion, so it is recommended to be used. In contrast to the results of this study, Campbell et al.\textsuperscript{[7]} reported that when ideal placement is either highly desirable or necessary, the direct visual technique is considered to be a better choice for placement than the blind, classic method. Recently, Choo et al.\textsuperscript{[11]} found that the laryngoscopy-guided group had better placement of the LMA than digital manipulation.

### Conclusion

The grade and placement of LMA ProSeal inserted by laryngoscopic method are comparable to that of blind method based on the fiber-optic assessment. Either method did not show any added advantage over the other in terms of accuracy of positioning, hemodynamics, and incidence of postoperative complications. The findings of our study suggest that the blind method of insertion is easier, simpler, and comparable to laryngoscopic insertion.

### Financial support and sponsorship
Nil.

### Conflicts of interest
There are no conflicts of interest.
References

1. Brimacombe J, Keller C, Morris R, Mecklem D. A comparison of the disposable versus the reusable laryngeal mask airway in paralyzed adult patients. Anesth Analg 1998;87:921-4.

2. Brimacombe J, Keller C, Fullekrug B, Agrò F, Rosenblatt W, Dierdorf SF, et al. A multicenter study comparing the proseal and classic laryngeal mask airway in anesthetized, nonparalyzed patients. Anesthesiology 2002;96:289-95.

3. Lu PP, Brimacombe J, Yang C, Shyr M. Proseal versus the classic laryngeal mask airway for positive pressure ventilation during laparoscopic cholecystectomy. Br J Anaesth 2002;88:824-7.

4. Brain AI, Verghese C, Strube PJ. The LMA ‘Proseal’ – A laryngeal mask with an oesophageal vent. Br J Anaesth 2000;84:650-4.

5. Hohlrieder M, Brimacombe J, von Goedecke A, Keller C. Postoperative nausea, vomiting, airway morbidity, and analgesic requirements are lower for the proseal laryngeal mask airway than the tracheal tube in females undergoing breast and gynaecological surgery. Br J Anaesth 2007;99:576-80.

6. Hohlrieder M, Brimacombe J, Eschertzhuber S, Ulmer H, Keller C. A study of airway management using the proseal LMA laryngeal mask airway compared with the tracheal tube on postoperative analgesia requirements following gynaecological laparoscopic surgery. Anaesthesia 2007;62:913-8.

7. Campbell RL, Biddle C, Assudmi N, Campbell JR, Hotchkiss M. Fiberoptic assessment of laryngeal mask airway placement: Blind insertion versus direct visual epiglottoscopy. J Oral Maxillofac Surg 2004;62:1108-13.

8. Perilli V, Aceto P, Sacco T, Martella N, Cazzato MT, Sollazzi L. Suction catheter guided insertion of ProSeal laryngeal mask airway: Experience by untrained physicians. Indian Journal of Anaesthesia 2014;58:25-9.

9. Barash PG, Cullen BF, Stoelting RK, Cahalan MK, Stock MC. Clinical Anesthesia. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2009.

10. Brimacombe JR, Brain AI, Berry AM. The Laryngeal Mask Airway: A Review and Practical Guide. London: W.B. Saunders Company Ltd.; 1997.

11. Choo CY, Koay CK, Yoong CS. A randomised controlled trial comparing two insertion techniques for the laryngeal mask airway flexible™ in patients undergoing dental surgery. Anaesthesia 2012;67:986-90.

12. Chandan SN, Sharma SM, Raveendra US, Rajendra Prasad B. Fiberoptic assessment of laryngeal mask airway placement: A comparison of blind insertion and insertion with the use of a laryngoscope. J Maxillofac Oral Surg 2009;8:95-8.