

## Original Research Article

# Comparison of two insertion techniques of classic laryngeal mask airway: standard versus 90-degree rotation

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**Received:** 15 December 2016

**Accepted:** 29 December 2016

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### ABSTRACT

**Background:** Laryngeal mask airway (LMA) devices have been widely utilized as an alternative to tracheal intubation in various clinical situations. The rotation technique has been suggested to improve the insertion success rate of laryngeal masks. The objective of the present study was to compare the ease of insertion of laryngeal mask in terms of, success rate at the first attempt, number of LMA insertion attempts, time duration of LMA insertion and complications like blood stain on LMA and sore throat.

**Methods:** This prospective cohort study was conducted to compare the success rate of insertion at the first attempts between standard technique and 90 degree rotational technique at Department of Anaesthesiology, Amala institute of medical sciences, Thrissur, India during the period from March 2014-september 2015. A total of 160 patients each group consisting of 80 was included in the study after meeting inclusion criteria. Success rate of insertion at first attempts, number of insertion attempts, and insertion time of successful attempt, overall success rate, blood staining of laryngeal mask airway (LMA) and postoperative sore throat were recorded.

**Results:** Significant difference was existed between the two groups with regard to gender. Statistically insignificant differences were observed for demographics like age, weight, ASA grades between the two study groups. Significant differences were observed among the study groups on all findings of LMA insertion. Statistically insignificant difference was detected for the time of duration of LMA insertion and change in heart rate, but mean arterial pressure was found statistically significant between the two groups.

**Conclusions:** This study found that 90 degree rotational technique has high success rate of insertion at first attempt & is less traumatic than standard technique.

**Keywords:** Airway management, LMA insertion, Rotational technique

### INTRODUCTION

Airway management is the most essential skill in anaesthesiology and inability to secure the airway is one of the most common reasons for major anaesthesia related morbidities and mortalities.<sup>1</sup> Laryngeal mask airway (LMA) has established role in modern anaesthetic practice. It is used for airway maintenance of spontaneously breathing patients who are undergoing elective short surgical procedures.<sup>2</sup> Controlled ventilation

via LMA has been successfully used at modest level of airway pressures.<sup>3</sup>

Insertion of LMA by using the standard technique based on Brain's recommendation is not always successful. Previous studies have reported success rates of 67–93% for the first attempt at inserting LMA.<sup>4-6</sup> In addition, a degree of skill is required to place LMA correctly, and suboptimal positioning of the device can give rise to such problems as air leakage or airway obstruction.<sup>7</sup>

Various techniques have been described to ensure a high successful insertion rate.<sup>8-10</sup> Among them rotation technique with a 90- or 180-degree rotation found to have more success rate compared to other techniques. T

he purpose of this study was to compare the ease of insertion of LMA through rotational technique and standard technique in terms of success rate at the first attempt, number of LMA insertion attempts, time duration of LMA insertion and complications like blood stain on LMA and sore throat.

## METHODS

This was a prospective cohort study. After getting approval from institutional ethical committee and written informed consent form from the patients a total of 160 patients after meeting inclusion criteria were included in the study. This study was conducted at Department of Anaesthesiology, Amala institute of medical sciences, Thrissur for a period 18 months i.e. from March 2014-september 2015.

Patients of age between 18-80 years, ASA I and II, MPC I and II scheduled for elective short surgical procedures requiring general anaesthesia with spontaneous breathing were included in the study. Patients refused for the procedure, with BMI >30 kg/m<sup>2</sup>, known or predicted difficult airway (MPC 3 & 4), recent sore throat, difficulty in mouth opening <2.5cm, anticipated risk of aspiration [non fasted or h/o GERD] and bleeding disorders were excluded from the study.

### Procedure

A total of 160 patients posted for short elective surgeries requiring general anaesthesia with spontaneous ventilation using laryngeal mask airway (LMA) was consecutively placed in the standard and rotational technique group. Tablet Alprazolam 0.5 mg and Tablet Ranitidine 150 mg was given as premedication on preoperative day.

ECG, Pulse oximetry, NIBP, end tidal carbon dioxide, temperature probe attached and baseline heart rate (HR) and mean arterial pressure (MAP) were recorded. Preoxygenation done with 100% oxygen. Midazolam 0.05 mg/kg and fentanyl 1.5 mcg/kg was administered intravenously 10 minutes before induction. Intravenous induction done with propofol 2 mg/kg with the patient in supine position and all techniques was performed in sniffing position.

The correct size of LMA was selected as per the weight of the patients. Absence of a motor response to jaw thrust is a reliable method for assessing the adequacy of anaesthesia and assesses the time for LMA insertion.<sup>9</sup> In the standard technique (ST) group (n=80), classic laryngeal mask airway insertion was performed by a single experienced anaesthesiologist (more than 500 uses

of standard technique) using digital manipulation. The posterior of the deflated mask was coated with 2% lignocaine jelly and held like a pen and inserted while pressing up along the palatopharyngeal curve using the index finger. The LMA was advanced into the hypopharynx until definite resistance was felt.

In the rotational technique (RT) group (n=80), the classic laryngeal mask airway was lubricated on the posterior and both lateral aspects with the 2% lignocaine jelly and was inserted until the entire cuff was inside the mouth, rotated counter clockwise or clockwise through 90 degrees and advanced until the resistance of the hypopharynx was felt, and then straightened out in the hypopharynx.

The cuff was inflated with air until an effective airway is established. If both techniques failed, the patient was either intubated or mask ventilated & was excluded from the study. An effective airway was judged by a good capnograph trace, adequate chest wall expansion and no audible leak with peak airway pressures of 15 cm of H<sub>2</sub>O or lesser during manual ventilation.

The ease of insertion was assessed by the success rate at first attempt. Heart rate and mean blood pressure were recorded 1 min before and 1 min after insertion. At the end of surgery, the LMA was removed when protective upper airway reflexes returned. Blood staining of LMA was noted on removal and the incidence of postoperative sore throat was asked.

### Statistical analysis

All data collected was coded and entered in Microsoft Excel sheet and was analysed using SPSS software. Statistical test was done using Chi-square test and Fisher test. A p value of <0.05 was considered significant.

## RESULTS

The total number of patients was 160. Eighty patients were assigned in each group. None of the patient dropped out from the study. A significant difference was existed between the two groups with regard to gender. The two groups were comparable in terms of demographic data as there were no significant differences between two groups in terms of age, weight and ASA classification. Majority of the patients were under the age group of 21-30 years in both the groups as given in Table 1.

As shown in Table 2, the success rate of insertion at the first attempt was 100% for the rotational technique & 84% for the standard technique (p =0.0001). There was significant increase in insertion attempts in ST group when compared with 90 degrees RT group with p value =0.0001. A significant 100% overall success rate was observed in rotational technique than the standard technique (93%). The incidence of blood staining and sore throat was significantly lower with the rotational

technique (9% and 8%) than the other group (36% and 29%) respectively.

**Table 1: Demographic characteristics of the patients among the study groups.**

Parameters	Groups		P value
	90RT	ST	
<b>Sex</b>			P = 0.0001
F	75	51	
M	5	29	
<b>Age (in years)</b>			P = 0.743
<20	5	11	
21-30	23	20	
31-40	15	15	
41-50	17	17	
51-60	11	10	
61-70	6	6	
>71	3	1	
<b>Weight (in Kg)</b>			P = 0.708
≤50	39	34	
51-60	23	27	
≥61	18	19	
<b>ASA grading</b>			P = 0.677
1	67	65	
2	13	15	

In present study, statistically insignificant difference was detected for the time of duration of LMA insertion among the study groups. There was no significant change in heart rate, but mean arterial pressure (78.58 and 79.87) was found statistically significant between the two groups as presented in Table 3.

**Table 2: Findings of LMA insertion in both the groups.**

Parameters	Groups		P value
	90RT	ST	
<b>Success rate at first attempt</b>			P = 0.0001
0	0	13	
1	80	67	
<b>Insertion attempts</b>			P = 0.0001
1	80	67	
2	0	4	
3	0	9	
<b>Overall success rate</b>			P = 0.003
0	0	6	
1	80	74	
<b>Blood staining of LMA</b>			P = 0.0001
0	73	52	
1	7	28	
<b>Postoperative sore throat</b>			P = 0.0001
0	74	57	
1	6	23	

0=unsuccessful and 1=successful

**Table 3: Haemodynamic changes among study groups.**

	Groups		P value
	ST	90RT	
Insertion time	12.56±0.916	12.54±0.927	0.894
HR_1	69.77±7.82	70.54±5.54	0.477
HR_2	71.35±7.79	72.18±5.54	0.445
MAP_1	78.58±4.57	76.42±4.96	0.005
MAP_2	79.87±4.55	77.85±4.86	0.008

## DISCUSSION

From the results of present study, we found that rotational technique was more successful than the standard technique. Although both methods of insertion were satisfactory, the 90-degree rotational technique improved the ease of insertion as assessed by the success rate at the first attempt.

Our 84% success rate for the standard technique was similar to those in previous studies.<sup>11,12</sup> The main cause of failed insertion is impaction with the back of the mouth.<sup>13</sup> The rotational technique is more successful because the lateral edge reduces resistance between the LMA and the posterior pharyngeal wall.

In the present study, the success rate of insertion at the first attempt and the overall success rate were higher for the rotational technique (100%). This result was similar to the previous study conducted by Hwang et al in 160 patients and Jeon et al in 120 patients.<sup>9,14</sup> It was observed that there were multiple attempts in standard technique. Four patients in ST group had two insertion attempts & nine patients had three insertion attempts.

In this study, the most significant clinical findings were blood stained LMA due to pharyngeal trauma and sore throat. The incidence of blood staining and sore throat was lower with the rotational technique than the standard technique. This might be due to the potential advantage of the rotational technique in which the finger insertion into the oropharynx is not necessary and also due to the reduced resistance between the lateral edge and the pharyngeal wall.<sup>7</sup> We speculate that reduction in sore throat is because the lateral edge causes less trauma.

The trauma incidence with the present rotational technique was 9%, which was reasonably similar to Nakayama finding.<sup>15</sup> The incidence of sore throat with the both the techniques in our study was 29% vs. 8% respectively. These findings are in accordance with the observations made by Hwang et al.<sup>9</sup>

However, the development of sore throat is not solely dependent on pharyngeal trauma. It is multifactorial such as the use of lubrication for LMA insertion, maintaining the LMA cuff pressure and the user's skill of LMA handling.<sup>16</sup>

## CONCLUSION

We conclude that the 90 degrees rotational technique has more success rate than the standard technique and is associated with less pharyngeal mucosal trauma, as evidenced by a lesser incidence of sore throat & blood staining of LMA.

### Limitations of the study

Our study had certain limitations. Blinding was not possible for recording insertion time & number of attempts; the insertion technique could not be disguised, a potential source of bias. As it is cohort study, the error due to non-randomisation can occur. The two groups are not comparable in terms of sex, which may have contributed to false results. Fiberoptic assessment of position is not performed in the routine clinical setting, and perfect positioning is not necessary for maintaining satisfactory airway function. Postoperative sore throat can have subjective variation contributing to bias.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Raghavan P, Raju MP, Plazid AT. Comparison of two insertion techniques of classic laryngeal mask airway: standard versus 90-degree rotation. *Int J Res Med Sci* 2017;5:420-3.