

# Comparison of intubating laryngeal mask airway and fiberoptic bronchoscopy for endotracheal intubation in patients undergoing cervical discectomy

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## Abstract

**Background and Aims:** Direct laryngoscopy is hazardous in patients with cervical posterior intervertebral disc prolapse (PIVD) as it may worsen the existing cord compression. To achieve smooth intubation, many adjuncts such as fiberoptic bronchoscope (FOB), video laryngoscopes, lighted stylets, and intubating laryngeal mask airways (ILMAs) are available. However, there is a paucity of literature comparing ILMA with fiberoptic intubation in patients with PIVD. Hence, this study was designed to compare the effectiveness of ILMA technique with FOB to accomplish endotracheal intubation in patients undergoing cervical discectomy.

**Material and Methods:** Sixty patients of age group 20-60 years, of American Society of Anesthesiologists status I or II, were enrolled in this prospective and randomized study. They were allocated to one of the two groups, ILMA group and FOB group. The patients were intubated orally using either equipment, after dexmedetomidine premedication and induction of general anesthesia. Chi-square and Fisher exact tests were used to find the significance of study parameters on a categorical scale. Paired samples *t*-test and Student's *t*-test were used to find the significance of study parameters on a continuous scale. Significance was assessed at 5% level of significance.

**Results:** Bronchoscopy was a faster method of securing airway as compared with ILMA ( $38.13 \pm 11.52$  vs.  $29.83 \pm 13.75$  s). Tracheal intubation was successful in all 60 patients (100%), belonging to both groups.

**Conclusion:** ILMA and FOB were comparable with regards to ease of intubation in terms of time, the number of attempts and hemodynamic stability.

**Key words:** Cervical spine, endotracheal intubation, fiberoptic bronchoscope, intubating laryngeal mask airway

## Introduction

Conventional laryngoscopy in patients with cervical spine (CS) pathologies may cause or worsen the spinal cord compression due to movement at the CS level. Therefore, endotracheal intubation (ETT) needs to be performed with minimal movement at the CS. Various techniques such as

fiberoptic bronchoscope (FOB) guided intubation, video laryngoscopes, lighted stylets, intubating laryngeal mask airways (ILMAs) allow ETT without much manipulation of the CS in patients with CS disease. The limited availability, high cost, and steeper learning curve preclude the use of FOB across many institutes. ILMA is a useful and an economic alternative that can be used successfully to ventilate as well as intubate patients with unstable CS without causing undue motion at the CS level.<sup>[1-3]</sup>

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ILMA allows passage of a special wire-reinforced silicone cuffed ETT into the trachea blindly with least possible movements at the CS level.<sup>[4-6]</sup>

FOB is a useful technique in situations when the patient's neck cannot be manipulated for example unstable CS, and also when it is not possible to visualize the vocal cords because a straight line view cannot be established from the mouth to the larynx. However, poor visibility due to secretions and blood in the throat would make FOB a futile technique.<sup>[7]</sup>

Therefore, a prospective randomized controlled study was undertaken to compare the time duration, hemodynamic stability, and ease of intubation carried with ILMA technique and with FOB in patients undergoing anterior cervical discectomy under general anesthesia (GA).

## Material and Methods

The present study was conducted after obtaining approval from institutional ethics and scientific committee on patients undergoing elective cervical disc surgeries. Written and informed consent was obtained from each patient participating in this study. Sixty American Society of Anesthesiologists status I and II patients, of age group 20-60 years undergoing elective cervical disc surgeries were assessed prospectively. Patients with severe cardiorespiratory, chronic renal failure, and neurological deficit were excluded from the present study. Patients were randomly distributed to two groups using computer-generated randomization tables. ILMA Group: Patients underwent ILMA guided ETT. Size 3 or 4 ILMA (3 for female, 4 for male) was inserted with the head in a neutral position, and the cuff was inflated with 20-30 ml of air (size 3: 20 ml, size 4: 30 ml). The ILMA was then attached to the breathing system, and adequate ventilation was judged by chest wall movement, capnography, and oropharyngeal leak. A size 7.0 or 7.5 well lubricated reinforced, cuffed tracheal tube was passed through ILMA and then advanced gently into the trachea. If no resistance was felt the cuff was inflated and the circuit reconnected. The correct placement of ETT was confirmed by the presence of bilateral breath sound and capnography. FOB Group: Patients underwent FOB guided oral ETT. The fiberoptic tip was introduced first into the trachea, and then the flexometallic tube was railroaded into mid-tracheal position maintaining neutral head position.

All the patients were kept nil per orally overnight prior to surgery and premedicated with tablet ranitidine 150 mg and tablet diazepam 7.5 mg orally at bedtime the night before

surgery and at 6:00 am on the day of surgery with sips of water. Injection glycopyrrolate 0.004 mg/kg body weight IV was given on arrival to operating room.

Patients were made to lie in the supine position, and monitoring of electrocardiogram, heart rate (HR), oxygen saturation and noninvasive blood pressure (BP) was instituted. Baseline vitals were noted. Peripheral venous access was established, and infusion of ringer lactate started. For invasive BP radial artery with 20G arterial cannula was secured under local anesthesia with 1% lignocaine. The systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial blood pressure (MAP) were obtained thereafter from arterial monitoring.

Induction of anesthesia was carried out in all patients in the following sequence. Dexmedetomidine was infused in the dose of 1 µg/kg over 10 min. Preoxygenation with 100% oxygen was carried for 3 min, and then propofol (1 mg/kg) and pancuronium (0.1 mg/kg) were administered intravenously.

Patients were ventilated with O<sub>2</sub> in N<sub>2</sub>O with isoflurane at 0.5-1% for 2 min 30 s through the facemask and then with 100% O<sub>2</sub> for 30 s. Preservative free lignocaine 2% was given in the dose of 1.5mg/kg intravenously 90 s before intubation to attenuate the presser response. After adequate muscle relaxation as judged by neuromuscular transmission (neuromuscular) monitoring intubation was accomplished by the attending anesthesiologist who was familiar with difficult airway and also had adequate exposure to both the techniques over the duration of 5 years. The second observer recorded the time taken, number of attempts to carry the intubation and also vital parameters. The ease or difficulty of intubation in both the groups was judged from the number of attempts required for successful placement of the endotracheal tube in the trachea. Single attempt meant easy intubation while two or more attempts were considered as difficult intubation. The time taken for intubation was described as the time taken from the placement of ILMA or FOB at the level of lips to the successful placement of ETT into the trachea, confirmed with EtCO<sub>2</sub> tracing and bilateral equal air entry on auscultation in both the groups. In case of failure of any technique alternative means of securing patient oxygenation (classic laryngeal mask airway, transtracheal oxygenation device) were made immediately available.

The vital parameters (HR, SBP, DBP, MAP, and SpO<sub>2</sub>) were noted at intubation, 30 s, 60 s, 2 min, 3 min, 4 min after intubation and 5 and 10 min after removal of ILMA and FOB. The hypertensive response is defined as 20% rise from preintubation (baseline) BP. The tachycardiac

response is defined as 20% rise from preintubation (baseline) HR.<sup>[8]</sup>

Maintenance of anesthesia was carried out with oxygen and nitrous oxide in a ratio of 33:67 and isoflurane 0.5-0.8% supplemented with fentanyl (1 µg/kg/h infusion) and top up doses of pancuronium (0.04 mg/kg). On completion of surgery, the residual paralysis was reversed with neostigmine (0.05 mg/kg) and glycopyrrolate (0.004 mg/kg). Patients were extubated on operation table as per our institution's protocols. Patients were transferred to postanesthesia care unit for monitoring and also for observation of any complications such as sore throat and their management.

Results on continuous scale were presented as mean, standard deviation (minimum-maximum) and results on categorical scale were presented as number (%). Chi-square test and Fisher exact test were used to compare parameters on a categorical scale between two groups. Paired samples *t*-test was used to compare parameters on the continuous scale within the group (intragroup analysis) and Student's *t*-test (two-tailed, independent samples) for between two groups (intergroup analysis). Results were considered significant if *P* value was <0.05.

The calculation of sample size was based on previous literature finding on outcome variables such as duration of intubation with 90% statistical power, 5% level of significance and 95% confidence interval.<sup>[9]</sup>

The statistical software SPSS 16 (SPSS version 16, SPSS, Inc., Chicago, IL, USA) was used for the analysis of the Data.

## Results

The demographic variables of patients in both groups (ILMA vs. FOB) were comparable in terms of age distribution (mean of 43.0 ± 7.8 years, with a range of 26–59 vs. 41.0 ± 8.0 years, with a range of 26-56 years), gender (24 males, 6 females vs. 25 males, 5 females), height 161.0 ± 8.1 (148-184) cm versus 160.2 ± 7.7 (148-177) cm, and weight 61.4 ± 12.1 (40-80 kg) versus 58.5 ± 7.4 (45-74 kg).

Tracheal intubation was successful in all 60 patients (100%), in both groups. Three patients from each group required a second attempt (10%) to intubate. Thus both groups were comparable with respect to ease of intubation. The mean time duration taken for intubation in ILMA group was 38.1 ± 11.5 s whereas for FOB group; it was 29.8 ± 13.7 s. It was significantly longer in ILMA group (*P* = 0.014) [Figure 1].

In ILMA group, the baseline hemodynamic parameters were HR 79.3 ± 9.8 bpm, SBP 131.1 ± 9.4 mmHg, DBP 78.9 ± 7.2 mmHg and MAP 96.7 ± 7.5 mmHg. In FOB group, these parameters were HR 81.3 ± 9.5 bpm, SBP 129.8 ± 11.4 mmHg, DBP 80.0 ± 5.4 mmHg, and MAP 98.1 ± 6.2 mmHg. They were comparable in both groups. There were no significant differences in the HR, SBP, DBP or MAP in the two groups after tracheal intubation and in the postoperative period [Figure 2].

In ILMA group, 4 patients out of 30 complained of a sore throat (13.3%) whereas 3 patients out of 30 complained of a sore throat in FOB group (10%). The difference was not statistically significant (*P* = 0.687).

## Discussion

In our study, both the techniques were comparable with regard to ease of intubation as judged by the number of attempts required for successful intubation.

Tracheal intubation was successful in all the 60 patients (100%) from both the groups in our study, whereas Langeron *et al.* found the rate of successful intubation to be 94% with ILMA and 92% with FOB in 100 patients with anticipated difficult airway.<sup>[10]</sup>

In the ILMA group, the reason for a second attempt in all the 3 patients was slippage of ETT into the esophagus during the primary attempt. The application of suggested adjusting manoeuvres during subsequent attempt made the intubation successful. Thus, only 90% of patients were successfully intubated in the first attempt whereas the remaining 10% required a second attempt.

In the FOB group, a large tongue in 3 patients prevented successful passage of FOB scope into the trachea, which

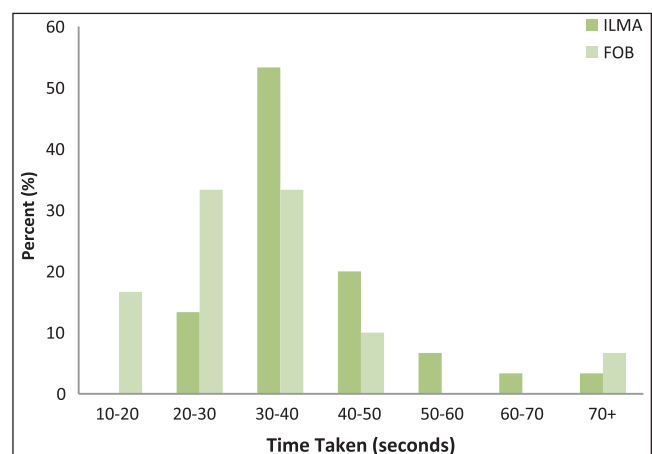
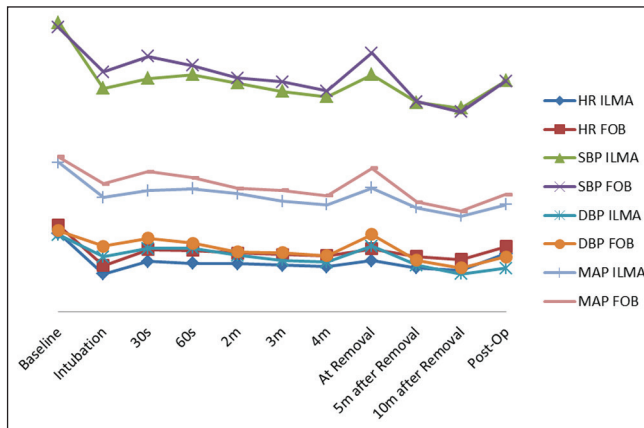


Figure 1: Time taken for intubation



**Figure 2:** Trends of hemodynamic parameters between the study groups

required tongue to be pulled out by a second assistant with the help of Magill forceps. This manoeuvre made the passage of FOB tip into trachea successful in the second attempt.

The mean time taken for intubation in ILMA group ( $38.1 \pm 11.5$  s) was longer than that of FOB group in this study but was less than that reported by Kavitha *et al.* in 60 patients ( $63.6 \pm 14.1$  s). It was noted that lesser the duration of intubation the better was the hemodynamic profile of patients.<sup>[11]</sup> However, Sharma *et al.* reported further lesser time to accomplish successful ETT, using ILMA with PVC tubes and also wire-reinforced silicone tubes ( $14.7 \pm 6.2$  s and  $10.0 \pm 4.4$  s, respectively).<sup>[12]</sup>

No significant difference was observed between the two techniques in the hemodynamic profile (HR, SBP, DBP, and MAP) after intubation at various time intervals, during and after the removal of ILMA or FOB in our series. However, Gupta *et al.* compared hemodynamic responses to ETT with flexible FOB and bonfils rigid intubation endoscope with 30 patients in each group, and concluded that there was a significant increase in HR and BP ( $P < 0.001$ ) in both groups after intubation compared with the baseline and postinduction values. These authors also concluded that there was no significant difference in HR and BP at any of the measuring points or in their maximum values during observation between their two groups.<sup>[13]</sup>

The incidence of a sore throat was 13.3% in ILMA group 10% in FOB group in our study. But Shah *et al.* reported the incidence of a sore throat in 21.4% of cases with polyvinyl tubes as compared to 6.8% with the usage of silicone tubes passed through ILMA.<sup>[14]</sup>

To conclude, in an adult population undergoing elective CS surgeries under GA, we obtained a high success rate of tracheal intubation with both ILMA and FOB techniques, with comparable ease of intubation and stable hemodynamic parameters. However,

ILMA required longer time for intubation. The present study has limitations namely patients with known difficult airway, obesity, diverse, and larger population who were not included.

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## Conflicts of interest

There are no conflicts of interest.

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