External laryngeal manipulation done by the laryngoscopist makes the best laryngeal view for intubation

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ABSTRACT

Purpose: External laryngeal manipulation (ELM) is used to get better laryngeal view during direct laryngoscopy. This study was designed to test the hypothesis that ELM done by the intubating anesthetist (laryngoscopist) offers the best laryngeal view for tracheal intubation.

Materials and method: A total of 160 patients underwent different surgical procedures were included in this study. Percentage of glottic opening (POGO) score and Cormack and Lehane scale were used as outcome measures for comparison between different laryngoscopic views. Four views were described; basic laryngoscopic view and then views after ELM done by the assistant, by the laryngoscopist and finally by the assistant after the guidance from the laryngoscopist respectively. The last three views compared with the basic laryngoscopic view.

Results: ELM done by the laryngoscopist or by the assistant after guidance from the laryngoscopist showed significant improvement of Cormack grades and POGO scores compared with basic laryngoscopic view. Number of patients with Cormack grade1 increased from 39 after direct laryngoscopy to 97 and 96 patients (P < 0.001 by Fisher’s exact test), after ELM done by the laryngoscopist and that done by the assistant after guidance from the anesthetist respectively. Furthermore, the number of patients with POGO scores of 100% increased from 39 after direct laryngoscopy to 78 and 61 (P < 0.01) patients after ELM done by the laryngoscopist and that done by the assistant after guidance from the anesthetist respectively.

Conclusion: It appeared from this study that ELM done by the anesthetist makes the best laryngeal view for tracheal intubation.

Key words: Cormack and Lehane scale, external laryngeal manipulation, glottic opening score, laryngeal view

INTRODUCTION

Tracheal intubation is considered the gold standard in securing the airway in a variety of patient populations and operations. It is most commonly performed by using direct laryngoscopy technique.

External laryngeal manipulation (ELM) is a simple maneuver that facilitates laryngeal visualization during laryngoscopy. It coordinates the operator’s right hand with what it is being simultaneously visualized, allowing fine tuning of the manipulation to maximize the laryngeal exposure.

ELM has been shown to improve laryngeal exposure and makes better intubating conditions. ELM used to be done by the intubating person to guide the assistant to the best way of doing it to maximize the laryngeal view.

This study was designed to test the hypothesis that ELM done by the operator offers the best laryngeal view for intubation.

The aim of this study was to examine the changes in laryngoscopic views after ELM done by the intubating person with that done by the assistant with or without guidance from the intubating anesthetist.

METHODS

After local research ethical committee approval and patients’ informed consent 160 patients underwent different elective surgical procedures were included in this
study. Patients aged from 17 to 75 years. Patients requiring direct laryngoscopic intubations were included in this study. Patients scheduled for fiber-optic intubation were excluded from the study.

All patients received the same anesthetic technique. Patients were premedicated with midazolam 1-2 mg intravenously approximately 10 min before induction of anesthesia. Induction of anesthesia was done by fentanyl 1 μg/kg, propofol 1.5-2 mg/kg and cisatracurium 0.15 mg/kg.

All laryngoscopies were done by five experienced anesthetists with curved Macintosh blades 3-5.

Percentage of glottic opening (POGO) scores\(^4\) and Cormack and Lehane scale\(^5\) were used as outcome measures for comparison between different views.

POGO ranged from 0% to 100%. A POGO of 100% denotes full visualization of the larynx from the interarytenoid notch to the anterior commissure of the vocal cords and a POGO score of zero means none of the glottis opening is seen.\(^4,6\)

Cormack and Lehane scale\(^5\) consisted of four grades; Grade 1 full view of the glottis, Grade 2 partial view of the glottis or arytenoids, Grade 3 only epiglottis visible and Grade 4 neither glottis nor epiglottis visible.

POGO scores and Cormack and Lehane grades were recorded after basic laryngoscopic view, after ELM done by the assistant without guidance from intubating anesthetist, after ELM done by the intubating anesthetist and ELM done by the assistant after guidance from the intubating anesthetist.

All data were analyzed with statistical package for the social sciences (SPSS) version 13 for Windows (SPSS Inc., Chicago, IL). Data was presented as numbers, percentages, mean (SD or 95% confidence interval) unless otherwise stated. Wilcoxon signed ranks test was used for comparison with baseline values. Fisher’s exact test was used for analyzing the number of the patients having better laryngeal view after ELM. \(P < 0.05\) was considered as significant.

RESULTS

A total number of 160 patients were included in this study. Demographic data presented in Table 1.

There was no significant difference in mean Cormack and Lehane scale between baseline laryngoscopic view and ELM done by the assistant without the guide of the laryngoscopist [Figure 1]. However, a significant improvement in mean Cormack and lehane scale after ELM done by the laryngoscopist and that done by assistant after guidance from the laryngoscopist compared with baseline laryngoscopic view [Figure 1].

Number of patients with Cormack grade1 increased from 39 after direct laryngoscopy to 97 and 96 patients respectively \(P < 0.001\) by Fisher’s exact test and the number of patients Cormack grade 3 significantly decreased after ELM done by the laryngoscopist and that done by the assistant after guidance from the laryngoscopist respectively [Table 2].

Also, POGO scores were significantly improved after ELM done by the laryngoscopist and that done by the assistant after the guidance from the laryngoscopist compared with the baseline laryngoscopic view [Figure 2]. While there was no improvement in mean POGO scores after ELM done by the assistant without guidance from the laryngoscopist compared with baseline laryngoscopic view [Figure 2].

Furthermore, more patients significantly had better POGO scores after ELM done by the laryngoscopist and that done by assistant after the guide from the laryngoscopist compared with baseline laryngoscopic view [Table 2].

Fourteen patients were intubated using gum elastic bougie, one patient by using glide scope and 145 patients had direct intubation.

DISCUSSION

Our study showed improvement of Cormack grades and POGO scores with better intubating conditions after ELM
Shaaban-Ali, et al.: ELM done by the laryngoscopist and the best laryngeal view

Direct laryngoscopy has been used as a standard technique for tracheal intubation. ELM has been used as a simple maneuver to get good laryngeal view for tracheal intubation. ELM used to be done initially by the operators’ right hand then the assistant used to take the hand over from the operator to free the operators’ right hand for intubation. However, different intubating views obtained after doing ELM by the assistant or the operator have not compared in previous reports.

ELM helps the laryngeal exposure by improving the alignment of the larynx with the line of vision, elevating the epiglottis and reducing the anterior tilt of larynx.\[7,8\]

Optimal ELM can be done by identifying the exact area on the neck by the laryngoscopist and the amount of pressure with his own free right hand.\[9\]

Several studies have used ELM to improve laryngeal view for tracheal intubation.\[7-9\] In Prabhakar et al.\[10\] study ELM was done by the intubating anesthetist at the same time as performing the laryngoscopy and the assistant (anesthesia technician or other anesthetist) passes the endotracheal tube under direct vision. The authors recommended that particularly in difficult cases, anesthetists should consider maintaining the ELM themselves and calling on their assistant to pass the endotracheal tube.

Others have done ELM by modified bimanual laryngoscopy, which involved direct guidance of the assistant’s hand by a laryngoscopist to optimize laryngeal exposure. The authors have found that ELM done by modified bimanual laryngoscopy is more effective for obtaining the optimal laryngeal view than conventional ELM.\[11\] The previous reports showed that the ELM done or guided by the intubating anesthetist offers the best laryngeal view for intubation.\[10,11\] However, the previous reports did not compare different laryngeal views during ELM done by the operator with that done by the assistant with or without guidance by the laryngoscopist.

![Figure 1: Mean and 95% confidence interval of Cormack and Lehane scale. *P < 0.05 by Wilcoxon signed ranks test compared with laryngoscopic view](image1)

![Figure 2: Mean and 95% confidence interval of glottic opening scores (POGO) (%). *P < 0.05 by Wilcoxon Signed Ranks test compared with laryngoscopic view (POGO1)](image2)

**Table 3: Number of patients with different glottic opening scores (POGO) (%)**

| Percentage of POGO | POGO1 | POGO2 | POGO3 | POGO4 |
|-------------------|-------|-------|-------|-------|
| 0                 | 56    | 58    | 2*    | 5*    |
| 10                | 0     | 0     | 0     | 1     |
| 20                | 2     | 0     | 8     | 5     |
| 60                | 1     | 7     | 44*   | 46*   |
| 70                | 18    | 25    | 9*    | 6*    |
| 80                | 44    | 29    | 2*    | 2*    |
| 90                | 0     | 0     | 17*   | 34*   |
| 100               | 39    | 41    | 78*   | 61*   |

*P < 0.05 by Fisher’s Exact test compared with POGO scores after direct laryngoscopy; POGO1: Percentage of glottic opening during laryngoscopy; POGO2: Percentage of glottic opening during external laryngeal manipulation done by the assistant without the guide from the laryngoscopist; POGO3: Percentage of glottic opening during external laryngeal manipulation done by the laryngoscopist; POGO4: Percentage of glottic opening during external laryngeal manipulation done by the assistant after the guide from the laryngoscopist.
Furthermore, operator directed ELM improves POGO scores than the activation of the articulating laryngoscope blade (McCoy blade).\textsuperscript{[8]} The previous studies are in agreement with our study.\textsuperscript{[8,10,11]}

Our study showed marked improvement in Cormack grades and POGO scores after ELM done by laryngoscopist and that done by the assistant after guidance from the laryngoscopist. Lack of improvement Cormack grades and POGO scores after ELM done by the assistant without guidance from the intubating anesthetist may be due to inability to identify the exact area of doing ELM or due to improper pressure over the larynx.

Our results supports the hypothesis that ELM done by laryngoscopist makes the best laryngeal view and offers better intubating conditions.

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