Cohort Study

A prospective study on the incidence of sore throat after use of laryngeal mask airway during general anesthesia

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ABSTRACT

Background: Laryngeal mask airway (LMA) is a useful alternative to intubation of the trachea to maintain the airways. The aim of this study was to evaluate the incidence of sore throat after LMA during general anesthesia in short-duration elective surgery.

Method: In this prospective study, 76 patients undergoing surgery with general anesthesia in (XXX) during 2018 and 2019 were selected and their demographic information were entered into the data collection form. Laryngeal mask airway was used in the subjects for airway maintenance during the surgery. The incidence of sore throat at postoperative 0, 6, 12 h was measured using Visual Analogues Scale (VAS) as primary outcome and it was then compared with demographic parameters as secondary outcomes.

Result: The mean age of the patient was 45.48 ± 14.89 years and 46 (60.5 %) of the patients were women. The mean BMI was 24.02 ± 3.05 kg/m². The average duration of surgery was 56.9 ± 15.9 min. The incidence of sore throat immediately after the surgery and at 6 and 12 postoperative hours was 26.3 %, 23.7 %, and 19.7 %, respectively. The incidence of sore throat after the use of LMA was not significantly correlated with age, sex, and BMI (P > 0.05).

Conclusions: The findings of our study showed that pain due to sore throat following laryngeal mask airway was reported to be mild in our study. The postoperative sore throat may not associated with demographic variables.

1. Introduction

Tracheal intubation is one of the invasive procedures used in patients undergoing surgery that causes many problems for patients in the postoperative phase [1]. Although tracheal intubation is largely successful the consequences of doing so are sometimes very dangerous and life threatening [2,3].

Hemodynamic changes occur after direct laryngoscopy and further increase in heart rate and blood pressure occurs following endotracheal tube implantation [4,5]. To reduce hemodynamic alteration in direct laryngoscopy and intubation, the depth of anesthesia can be increased. The use of N2O can also be useful [6]. The use of regional anesthesia has is effective in reducing hemodynamic changes [7]. However, due to the stimulatory effects that result from direct laryngoscopy and endotracheal intubation (ETT), these changes are fewer when laryngeal masks are used, since it does not stimulate the trachea [8]. One of the relatively common complications after intubation is sore throat, which is caused by damage to the throat during intubation and is seen in 26 % cases [9, 10] and reduces the quality of surgery and results in patient dissatisfaction [11].

In patients under general anesthesia, laryngeal mask airway (LMA) method is used as an alternative to endotracheal intubation to maintain the airway, and its use had been increased. The LMA method was designed in 1981 and is superior to ETT in terms of no tracheal damage during insertion and removal of the tube, less airway stimulation, less invasion of airway tissue, easier implantation and airway establishment [12,13]. Relative to endotracheal intubation, LMA has greater incidence of sore throat, however the intensity of sore throat may be mild and might not affect the choice of LMA [14].

We hypothesized that incidence of sore throat following LMA would
be less, and would be associated with reduced postoperative throat pain and greater patients’ satisfaction. Furthermore, demographic variables like gender, age and BMI are likely to affect the incidence of postoperative sore throat [15–17]. In this study we investigated the incidence of sore throat after laryngeal mask surgery under general anesthesia and the factors affecting it in elective surgeries among patients referred to (XXX).

2. Method

In this interventional study, all patients with American Society of Anesthesiology Physical Status Classification (ASA) I-II, undergoing elective surgery under general anesthesia in (XXX) during 2018 and 2019 were enrolled. The patients underwent surgery where laryngeal mask airway method was used for general anesthesia. The study was approved by research ethics committee (XXX).

The incidence of sore throat, in terms of pain during speaking, at postoperative hours 0, 6 and 12 were obtained using visual analogue scale (VAS). Patients (men and women weighing 50–70 kg) were admitted after evaluation before anesthesia and assurance of at least 8 h of NPO (nothing by mouth). The procedure was explained to all the patients and written consent was obtained prior to the participation in the study.

2.1. Inclusion and exclusion criteria

Patients who underwent single elective surgery during the study duration were included in the study. Patients who didn’t consent to participate, those with latex allergy, requiring emergency surgery, allergic to general anesthesia, previous maxillofacial and intraoral surgery and family history of previous malignant hyperthermia were excluded from the study.

2.2. Procedure

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After entering the operating room and performing the necessary monitoring including NIBP (non-invasive blood pressure), ECG (electrocardiography) and pulse oximetry, 500 ml of normal saline was administered intravenously, as per surgery protocol. 3 µg/kg fentanyl and 0.03 mg/kg midazolam were injected and after 5 min of pre-oxygenation with 100 % oxygen, thorietopinal sodium 5 mg/kg anesthesia was induced. Due to the type of surgery and the short duration (less than 120 min) of surgery, muscle relaxants were not required.

In all patients, according to weight, LMA No. 3 (Tuoren, Xinxiang, China) was used and was inserted with the help of lidocaine-free lubricant gel. The cuff was completely deflated before the insertion and was inserted with digital intraoral manipulation. The cuff pressure was 40cmH₂O, monitored by manometer and oropharyngeal leak pressure was maintained within the normal range (25–35 cm H₂O). The position of LMA was established based on the visualization of more than 35 cm H₂O. The average BMI of the patients was 24.4 ± 5.6 kg/m². The average age of the patients was 45.48 years, 2.8 % of the subjects were under 20 years old, 11.1 % were between 21 and 30 years old, 30.6 % were between 31 and 40 years old, 19.4 % were between 41 and 50 years old, 15.3 % were between 51 and 60 years old and 20.8 % were over 60 years old. 46 (60.5 %) of the total patients’ population were women.

The subjects were in the age range of 13–80 years with a mean of 45.48 years. 2.8 % of the subjects were under 20 years old, 11.1 % were between 21 and 30 years old, 30.6 % were between 31 and 40 years old, 19.4 % were between 41 and 50 years old, 15.3 % were between 51 and 60 years old and 20.8 % were over 60 years old. 46 (60.5 %) of the total patients’ population were women.

The work has been reported in line with the STROCSS criteria [18].

3. Results

The subjects were in the age range of 13–80 years with a mean of 45.48 years. 2.8 % of the subjects were under 20 years old, 11.1 % were between 21 and 30 years old, 30.6 % were between 31 and 40 years old, 19.4 % were between 41 and 50 years old, 15.3 % were between 51 and 60 years old and 20.8 % were over 60 years old. 46 (60.5 %) of the total patients’ population were women.

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Table 1 Investigate the distribution of data related to quantitative variables.

| Tests of Normality | Kolmogorov-Smirnov a | Shapiro-Wilk b |
|-------------------|----------------------|----------------|
|                    | Statistic | Df | Sig.  | Statistic | df | Sig.  |
| Age                | 0.110     | 68 | 0.042 | 0.979     | 68 | 0.323 |
| Weight             | 0.154     | 68 | 0.000 | 0.823     | 68 | 0.000 |
| Height             | 0.255     | 68 | 0.000 | 0.629     | 68 | 0.000 |
| BMI                | 0.466     | 68 | 0.000 | 0.227     | 68 | 0.000 |
| The amount of sore throat immediately before leaving recovery | 0.405 | 68 | 0.000 | 0.589 | 68 | 0.000 |
| Sore throat immediately after 6 h | 0.429 | 68 | 0.000 | 0.574 | 68 | 0.000 |
| Sore throat immediately after 12 h | 0.460 | 68 | 0.000 | 0.527 | 68 | 0.000 |
| Duration of surgery | 0.271 | 68 | 0.000 | 0.848 | 68 | 0.000 |
Society of Anesthesiologists) classification, 78.1 patients were classified in ASA I and 21.9 % in ASA II class (Table 1). The most common procedures performed were fistula surgery in 13.1 %, hernia in 19.6 %, carpal tunnel syndrome and breast surgery in 9.2 %, respectively (Table 2).

The frequency of sore throat immediately after entering recovery ward and 6 and 12 h after the surgery was 26.3 %, 23.7 % and 19.7 %, respectively. Considering the 5 % calculation error, it can be said that the prevalence of sore throat after laryngeal mask use immediately after, 6 and 12 h after the surgery was 26.3 %, 23.7 % and 19.7 %, respectively. Pain scores were reported after laryngeal mass surgery under general anesthesia based on the 10 cm VAS scale immediately before leaving recovery, after 6 and 12 h, 1.1 ± 1.5 cm, 0.8 ± 1.4 cm and 0.6 ± 1.3 cm, respectively.

The incidence of sore throat after laryngeal mask surgery under general anesthesia based on age (Table 3).

Spearman correlation test showed that there was no significant relationship between the intensity of sore throat after laryngeal mask surgery under general anesthesia and age of the patients, P-value = 0.829, 0.563, 0.620, respectively. The intensity of the sore throat at surgery under general anesthesia and age of the patients, P-value = 0.119, 0.309 and 0.471, respectively. Pain scores were also not significantly associated with BMI, P-value = 0.026, 0.069 and 0.059, respectively. Considering the 5 % calculation error, it can be said that the prevalence of sore throat after laryngeal mask use immediately after, 6 and 12 h after the surgery was 26.3 %, 23.7 % and 19.7 %, respectively. Pain scores were reported after laryngeal mass surgery under general anesthesia based on the 10 cm VAS scale immediately before leaving recovery, after 6 and 12 h, 1.1 ± 1.5 cm, 0.8 ± 1.4 cm and 0.6 ± 1.3 cm, respectively.

The incidence of sore throat after laryngeal mask surgery under general anesthesia based on gender (Table 4).

4. Discussion

Postoperative sore throat is caused by mechanical trauma to mucosa as a result of intubation that leads to inflammation [19]. Our study reported mild postoperative sore throat following LMA among patients who underwent surgery with general anesthesia. The intensity pain was not associated with gender, BMI and age of the patients at 0, 6 and 12 postoperative hours. In ETT, due to small size of the tube, the incidence of sore throat is reported to be greater in female patients [20]. A study by Ahmed, Abbasi [21] showed that in advanced age increased the risk of postoperative sore throat following ETT. Whereas, Higgins, Chung [22] showed that young age is a risk factor. Our study showed that sore throat following LMA is not associated with age. Intubation can also be difficult in morbidly obese individuals and the size of LMA is likely to affect the outcomes in over weight and obese patients [23].

The overall incidence of sore throat after the surgery at different intervals was lesser compared to other studies [10], however it also depends on factors such as cuff pressure [24], lubrication of the cuff, type of anesthesia, gender and size of the tube [25,26]. In the interventional study by Safaeian et al. [27] 171 patients were included where they received laryngeal mask or endotracheal intubation. There was no significant difference in the frequency of sore throat among the two group. 44.2 % patients in tracheal intubation were presented with sore throat. However, hoarseness, shortness of breath and cough were significantly more in tracheal intubation group. Similar findings were reported in the study by Jaensson, Gupta [28]. The results showed that 32 % sore throat complication was reported in LMA group and 57 % in endotracheal tube group. Peirovifar et al. conducted a study on 80

### Table 2

| Type of surgery                              | Frequency | % | Valid percentage |
|----------------------------------------------|-----------|---|-----------------|
| Abdominoperineal resection (APR)             | 2         | 2.6 | 2.6             |
| APR repair/Tubectomy                         | 1         | 1.3 | 1.3             |
| Carpal tunnel syndrome                       | 7         | 9.2 | 9.2             |
| CYSTO GRETRO SEOPY                           | 1         | 1.3 | 1.3             |
| Dilatation and curettage (D&C)               | 2         | 2.6 | 2.6             |
| Tubectomy                                    | 1         | 1.3 | 1.3             |
| Transurethral lithotomy (TUL)                | 2         | 2.6 | 2.6             |
| Transurethral resection of the prostate (TURP)| 1         | 1.3 | 1.3             |
| Perianal abscess                             | 1         | 1.3 | 1.3             |
| Hand nerve release                           | 1         | 1.3 | 1.3             |
| Endometriosis                                | 1         | 1.3 | 1.3             |
| temporal artery biopsy                       | 1         | 1.3 | 1.3             |
| Thoracoscopic biopsy                         | 1         | 1.3 | 1.3             |
| Breast biopsy                                | 1         | 1.3 | 1.3             |
| Rectal prolapse                              | 1         | 1.3 | 1.3             |
| Chest tube                                   | 1         | 1.3 | 1.3             |
| duct stenosis                                | 1         | 1.3 | 1.3             |
| Axillary lymph nodes                         | 1         | 1.3 | 1.3             |
| Hand Ganglion                                | 2         | 2.6 | 2.6             |
| Thigh Ganglion                               | 1         | 1.3 | 1.3             |
| Unerarm Ganglion                             | 1         | 1.3 | 1.3             |
| Breast mass                                  | 7         | 9.2 | 9.2             |
| Toe surgery                                  | 1         | 1.3 | 1.3             |
| Foreign Body Removal                         | 1         | 1.3 | 1.3             |
| Fistula                                      | 10        | 13.1 | 13.1          |
| Bartholin’s cyst                              | 2         | 2.6 | 2.6             |
| Conization                                   | 1         | 1.3 | 1.3             |
| Bunion                                       | 1         | 1.3 | 1.3             |
| Hernia                                       | 14        | 19.6 | 19.6          |
| Hemorrhoids                                  | 1         | 1.3 | 1.3             |
receiving either laryngeal mask or endotracheal tube during low-flow anesthesia with controlled ventilation. The postoperative complications such as cough, sore throat and difficulty in swallowing were significantly greater in endotracheal group [29]. In a study, L’Hermite and colleagues examined the occurrence of sore throat following the use of a laryngeal mask. For this purpose, 546 patients underwent elective surgery with a duration of general anesthesia of less than 2 h where 23.9 % of the subjects had sore throat [30]. Chinachoti et al., evaluated risk factors for sore throat following surgery under general anesthesia, and 2503 people were included in the study. The study concluded that postoperative sore throat is correlated with postoperative hoarseness and is significantly greater in endotracheal intubation patients [17]. In a recent single-blinded trial, Gong, Xu [31] assessed the incidence of sore throat in patients after thyroid surgery. Postoperative sore throat was significantly greater in endotracheal intubation group, along with alterations in blood pressure and heart rate. Buckling was also greater in intubation patients.

In our study, there was no significant relationship between the incidence of sore throat and age, sex and BMI. In the study by Grady et al. large and small were placed Large LMA for size 5 men and size 4 for women, respectively. Based on the results of this study, it was concluded that there was no significant difference between the two sexes in terms of sore throat with LMA of both the sizes [32]. In a systematic review, El-Boghdady et al. examined the sore throat following general anesthesia and reported that LMA-associated postoperative sore throat is greater in children and endotracheal intubation is a preferable method [16].

4.1. Limitations and future recommendation

Our study does not evaluate the other complications like dysphagia and odynophagia associated with LMA. The findings of this study are merely based on pain during speaking. Furthermore, we do not compare our outcomes with endotracheal intubation and hemodynamic parameter. Future studies are recommended with larger sample size, variable demographics and more parameters. We also suggest that pediatric, adult and geriatric groups should be separately assessed in this regard.

5. Conclusion

Our study reported mild postoperative sore throat immediately after the surgery and at 6 and 12, postoperative hours among patients undergoing elective surgery under general anesthesia. The incidence of sore throat was not associated with gender, age and BMI of the patients.

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