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# Comparision of Laryngeal Mask Airway and Endotracheal Tube for Post-Operative Sore Throat and Hoarseness of Voice

**Nauman Habib, Aftab Hussain, Muhammad Akram, Ahsan Ali, Usman Saqib, Shanza Khan**

Department of Anesthesia, Combined Military Hospital, Lahore/National University of Medical Sciences (NUMS) Pakistan

## ABSTRACT

***Objective:*** To compare effectiveness of Laryngeal mask airway versus endotracheal tube to evaluate post-operative sore throat and hoarseness of voice among anesthetized adults.

***Study Design:*** Prospective comparative study

***Place and Duration of Study:*** Operation Theatre Complex, Surgical Ward 1 and 2, Combined Military Hospital, Lahore Pakistan, from Jun to Oct 2020.

***Methodology:*** A total of 70 patients of both gender undergoing elective surgeries were included. Afterwards a lottery method was applied to segregate patients randomly into Group-L and Group-T. In Group-L, airway was secured with laryngeal mask airway while in Group-T, airway was secured with endotracheal tube. Hoarseness of voice was evaluated at time of extubation and 24 hours post extubation.

***Results:*** Demographic data was comparable in both groups. Mean time of anesthesia was 71.31±22.87 and 82.86±32.34 minutes for Group-L and Group-T respectively with *p*-value of 0.09. Sore throat was seen in 12(34.29%) patients in Group-L as compared to 19(51.43%) in Group-T (*p*-value=0.094). Hoarseness of voice was seen in 3(8.57%) patients in Group-L as compare to 13(37.14%) in Group-T (*p*-value= 0.005).

***Conclusion:*** There was less occurrence of postoperative sore throat and hoarseness of voice in patients undergoing elective surgery with laryngeal mask airway as compared with endotracheal tube.

**Keywords:** Endotracheal tube, Hoarseness of voice, Laryngeal mask airway, Sore throat.

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## INTRODUCTION

In routine practice of general anesthesia, airway management holds prime importance. Most commonly used airway devices used during general anesthesia include Laryngeal mask airway (LMA) and endotracheal tube (ETT). They serve the purpose of maintaining ventilation and delivering inhaled anesthetic agents. Complications of airway management could be life threating but fortunately, these are very rare.[1]

The LMA is one of the supraglottic airway devices.[2,3] invented by English Anesthesiologist Dr. Archi Brain. Since 1988, it has been commonly used in various medical set ups which include but not limited to operation theatres, emergency rooms and out of hospital care. As it is very user friendly and requires little experience thus can be easily used and airway can be secured by relatively inexperienced person in emergencies. The success rate for placement of a LMA of is over 90% in the operating rooms. Its use results in less gastric distention than with bag valve mask ventilation, which reduces but does not eliminate the risk of aspiration.[4] Other LMA associated complications include dislodgment during surgery, post-operative sore throat and pharyngeal mucosal abrasions, cranial nerve damage secondary to pressure neuropraxia, dysphonia and dysphagia.[5] Being a supraglotic airway device, LMA's position remains superior to the larynx, resultantly causes less tracheal irritation. Thus, use of LMA during general anesthesia can reduce the incidence of postoperative sore throat when compared with ETT.[6]

ETT is a catheter that is inserted into the trachea for establishing and securing airway to ensure the adequate ventilation. First ETTs were uncuffed produced by Portex Medical. Later, ETTs were modified and cuff was incorporated. After further improvement of design, disposable ETTs with murphy eye were produced by Maeterlinck GmbH. Murphy Eye was added to decrease the risk of ETT occlusion, should the distal tube opening is accidently occluded by the carina. The possible complications of placement of ETT in a patient range from a very benign condition like mild sore throat to a life threatening complication like inability to intubate and ventilate.[1,7]. Fortunately, the

**Correspondence: Dr Aftab Hussain,** Department of Anesthesia, Combined *Military* Hospital, Lahore, Pakistan
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most commonly observed complications are not so grave. Complications of ETT placement include injury to lips, gums, tongue and teeth during laryngo-scopy, sore throat, hoarseness of voice which could be transient or permanent due to damage to the vocal cords, tachycardia, raised blood pressure, triggering of asthmatic attack, brain damage and death secondary to inability to intubate and ventilate.[6-9].

This study was designed to compare effectiveness of LMA versus ETT to evaluate post-operative sore throat and hoarseness of voice in patients who were given general anesthesia. If its usefulness is justified in our study, it will recommend the refinement in quality of anesthesia provided to patients.

## METHODOLOGY

The prospective comparative study was conducted at Operation Theatre Complex, Surgical Ward 1 and 2 of Combined Military Hospital, Lahore Pakistan from June 2020 to October 2020. Patients were selected using nonprobability consecutive sampling technique. WHO sample size calculator was used, with power of test 80%, level of significance 5%, anticipated population proportion (P1) of 57%, anticipated population proportion (P2) of 33%.[9] Total of 70 patients undergoing elective surgery under general anesthesia were selected for study and were divided into two equal groups.

**Inclusion Criteria:** Patients of either gender with age range 20-60 years, Body mass index between 18-26 Kg/m$^2$ having American Society of Anesthesiology Status I and II were included for study.

**Exclusion Criteria:** Patients having sore throat prior to surgery, patients of head and neck surgery, patients with nasogastric tube in place and patients in whom surgery lasted more than 4 hours were excluded from the study.

Selection of patients was done after approval from institutional ethical committee (Ltr no: 596/2020/Trg/Adm). A written informed consent was taken and detailed pre-anesthesia evaluation was carried out 24 hours prior to surgery. All patients were kept nil per oral at least eight hours before surgery. A lottery method was applied to segregate patients randomly into Group-L and Group-T. In Group-L Airway was secured with LMA while in Group-T, airway was secured with ETT.

Patients were brought in operation theatre under institutional protocols and intravenous access was established. Baseline monitoring comprising of non-invasive blood pressure, electrocardiography, pulse-oximetery, heart rate and temperature was monitored. Patients were pre-oxygenated with 100% oxygen for 3-5 minutes and premedication including intravenous injection of nalbuphine, dexamethasone and metoclo-pramide in accordance with institutional standard operating procedures were given. Induction of general anesthesia was done with intravenous injection pro-pofol. Intravenous atracurim injection was given for muscle relaxation. Airway devices were inserted after 3 minutes of giving muscle relaxant in both groups. Appropriate sizes of LMA and ETT were used for all patients. Cuff pressure was kept between 20-25 cm$^2$ $H_2O$ and 40-60 cm$^2$ $H_2O$ for LMA respectively to prevent air leak. Cuff pressure was monitored with cuff pressure gauge.

Mainstay for maintenance of anesthesia was isoflurane 1.2-2% minimum alveolar concentration. Muscle relaxation was maintained with maintenance dose of intravenous atracurium. All patients were given tidal volume of 7-10ml/kg while maintaining normal range of end tidal $CO^2$. At termination of surgery, neuromuscular blockade was reversed by intra-venous neostigmine and Glycopyrrolate with gentle suctioning of orpharynx. 100% $O^2$ was administered and inhalational agents were discontinued when there was return of muscular activity. All patients were extubated fully awake. Sore throat and hoarseness of voice was evaluated at time of extubation and 24 hours post extubation.

A performa was used to collect data and SPSS version 20.0 was used to analyze recorded data. Qualit-ative variables like gender, type of surgery, hoarseness was measured as frequency and percentage. Quanti-tative variables like age, BMI and duration of anes-thesia were measured as mean and standard deviation. Chi square test was applied to compare hoarseness between Group-L and Group-T with *p*-value kept ≤0.05 as significant.

## RESULTS

Age range of the patients selected for this study was from 21-59 years with mean age of 42.00±9.61 years in Group-L while 37.65±9.44 years in Group-T with a *p*-value of 0.061. Mean BMI was 24.97±1.38 Kg/m$^2$ in Group-L and 24.14±2.18 Kg/m$^2$ in Group-T. Male gender was dominant in both groups. Group-L had 24(68.57%) male and 11(31.42%) female patients while Group-T had 21(60%) male and 14(40%) female patients. Mean time of anesthesia was 71.31±22.87 and 82.86±32.34 minutes for Group-L and Group-T respec-

tively with *p*-value of 0.09. Details of frequency and percentage of type of surgery in both groups is shown in Table-I.

**Table-I: Frequency and Percentage of type of Surgery in both Groups (n=70)**

| Type of surgery | Group-L (n=35) | Group-T (n=35) |
|---|---|---|
| Urological | 9(25.7%) | 12(34.3%) |
| Orthopedic | 6(17.1%) | 8(22.9%) |
| General surgery | 20(57.1%) | 15(42.9%) |

Sore throat was seen in 12(34.29%) patients in Group-L as compared to 19(51.43%) in Group-T. Hoarseness of voice was seen in 3(8.57%) patients in Group-L as compare to 13(37.14%) in Group-T. Detailed comparison is shown in Table-II.

**Table-II: Comparison of Efficacy in both Groups (n=70)**

| | Group-L (n=35) | Group-T (n=35) | *p*-value |
|---|---|---|---|
| Sore throat | 12(34.29%) | 19(51.43%) | 0.094 |
| Hoarseness of voice | 3(8.57%) | 13(37.14%) | 0.005 |

## DISCUSSION

The results of our study showed that compared with the ETT, use of LMA during elective surgery reduced the occurance of postoperative sore throat and hoarseness of voice.

In a study conducted by Gemechu *et al*. concluded that prevalence of postoperative sore throat is very common and they recommended that awareness should be created about this problem for health professionals and a comprehensive post-operative sore throat management protocol should to be employed for better patient satisfaction.[10]

Similar to results of our study, Lee *et al.* concluded in their study that, occurrence of post-operative sore throat was high when ETT was used. They further observed that, cuff pressure of ETT has a direction relation with post-operative sore throat. The incidence of sore throat was higher when ETT cuff pressure was kept >17cmH2O and in patients who experienced cough at emergence.[11]

In our study we observed that use of LMA decreases the occurrence of postoperative hoarseness of voice. A study conducted by Xu *et al*. showed similar results. They also found out that, use of flexible LMA decreased rate of other complications like cough and desaturation as compared to ETT. However a methodical review revealed that great care should be taken while doing pharyngeal surgeries, changing position of head and neck as flexible LMA can easily displace and result in upper airway obstruction as well as there is increased risk of aspiration with this device.[12]

In another study conducted by Safaeian *et al*. and Chinachoti *et al.* showed that there was deceased incidence of complications like cough, hoarseness, breathlessness and sore throat when LMA was used. The incidence of hoarseness was calculated as 3.5% with LMA and 24.4% in intubated patients.[13,14]

A study carried out by Venugopal *et al*. manifested similar results to our study. They observed that there is increased occurrence of hoarseness, painful speech and raw throat while using ETT as compared to LMA. Although accidental pharyngeal wall injury during placement, difficulty in swallowing and odynophagia was more prevalent with LMA as airway adjunct in general anesthesia.[15]

In a systematic review by El-Boghdadly *et al.* concluded that the use of LMA, oral, nasal ETT intubation, uncuffed ETT intubations help in reducing the incidence of postoperative sore throat. Using LMA and ETT with limited cuff pressure may also reduce the incidence of this complication.[16]

In two different local studies conducted by Ahmed *et al*. and Naz *et al*. observed similar results to our study. They concluded that LMA is better than ETT in terms of laryngeal complications of sore throat and cough.[17,18]

In our study, since the anesthesia was provided by anesthesiologist with at least 3 years of experience, our observations and conclusion may not be applicable in medical set ups deficient with experienced staff. This could be the limitation of this study.

Post-operative sore throat and hoarseness of voice are very common and bothersome complications of various commonly used airway devices as proved in our study. Further research and innovations are required to develop airway devices that can counter these complications and improve the safety of anesthesia.

## CONCLUSION

Patients undergoing elective surgery under general anesthesia had less occurance of sore throat and hoarseness of voice when LMA was used as compared to ETT.

**Conflict of Interest:** None.

**Author's Contribution**

Following authors have made substantial contributions to the manuscript as under:

NH: & AH: Study design, drafting the manuscript, approval of the final version to be published.

MA: & AA: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

US: & SK: Critical review, concept drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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