COMPARISON OF PHARYNGOLARYNGEAL COMPLICATIONS AFTER ENDOTRACHEAL TUBE AND LARYNGEAL MASK AIRWAY INSERTION FOLLOWING GENERAL ANAESTHESIA

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ABSTRACT

BACKGROUND

Pharyngolaryngeal discomfort is a common cause of patient dissatisfaction after elective surgery. The difference in incidence of pharyngolaryngeal complications between endotracheal tube and Laryngeal Mask Airway (LMA) has popularised the use of the laryngeal mask airway.

MATERIALS AND METHODS

This prospective, randomised study included 60 patients of ASA class I and II of age 15 to 60 years undergoing elective minor surgeries. Postoperatively, interviews were performed at 6, 12 and 24 hours after anaesthesia. Post-anaesthetic sore throat and dysphagia were graded using a predefined verbal analogue scale. Voice analysis was done using computer software, Dr. Speech.

RESULTS

The incidence of sore throat at 6, 12 and 24 hours was significantly higher in ETT group than LMA. Dysphagia was more common in ETT at 6, 12 and 24 hours, but significant only at 6 hrs. There was significant difference in postoperative values of jitter, shimmer and HNR in ETT group when compared with preoperative values. Postoperative values of jitter and shimmer were significantly higher than preoperative values in LMA group.

CONCLUSION

Our study concludes that pharyngolaryngeal complaints occur more commonly with endotracheal tube than laryngeal mask airway.

KEYWORDS

Laryngopharyngeal Complications, Laryngeal Mask Airway, Endotracheal Intubation.

HOW TO CITE THIS ARTICLE: Mohite S, Bakhshi R, Mehta M, et al. Comparison of pharyngolaryngeal complications after endotracheal tube and laryngeal mask airway insertion following general anaesthesia. J. Evid. Based Med. Healthc. 2016; 3(104), 5746-5755. DOI: 10.18410/jebmh/2016/1186

BACKGROUND

Endotracheal intubation is a rapid, straightforward and safe nonsurgical technique for maintaining airway patency, protecting lungs from aspiration, permitting leak free ventilation during mechanical ventilation and thus remains the gold standard procedure for airway management.

The laryngeal mask airway was invented by Dr. Archie Brain in 1988. Initially, the laryngeal mask airway was used mostly during spontaneous ventilation. Several direct comparative studies have indicated that laryngeal mask airway is less invasive than the endotracheal tube in relation to the pharyngolaryngeal complications. The difference in incidence of pharyngolaryngeal discomfort between endotracheal tube and laryngeal mask airway is one of the strongest arguments in favour of the laryngeal mask airway.

Pharyngolaryngeal discomfort is a universal cause of patient dissatisfaction after surgery and even after discharge. Dysphonia, dysphagia and sore throat complaints are well known following use of endotracheal tube. These complications persist as a permanent phenomenon on many occasions. Sore throat is a complication of anaesthesia that may have pharyngeal or laryngeal sources and may occur even in the absence of endotracheal tube. Factors that may affect the incidence of sore throat include area of cuff-trachea contact, use of lignocaine ointment, size of endotracheal tube and cuff pressure.

Studies have shown that following general anaesthesia using laryngeal mask airway with positive pressure ventilation might cause involuntary vibration and irritation of the unparalysed vocal cords and results in postoperative dysphonia. It was revealed that with regards to minor

Financial or Other, Competing Interest: None.
Submission 05-12-2016, Peer Review 15-12-2016,
Acceptance 24-12-2016, Published 29-12-2016.
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DOI: 10.18410/jebmh/2016/1186

pharyngolaryngeal complaints, the advantage of laryngeal mask airway over endotracheal tube is questionable.

The present study was designed to compare the incidence of individual discomfort such as voice quality changes manifested by alteration in acoustic variables like fundamental frequency, jitter, amplitude, shimmer, (signal to noise ratio) SNR, (harmonic to noise ratio) HNR and voice tremor, sore throat and dysphagia in general anaesthesia with endotracheal tube and laryngeal mask airway.

Subtle voice changes may not be immediately expressed by the patient or picked up by the observer during the interview. Moreover, subjective variations are likely to occur in between the patients during their interview due to their personal preference, experience and culture. Hence, in order to eliminate the subjective bias, we decided to use Dr. Speech (computer software) to identify dysphonia.

MATERIALS AND METHODS

Study Design- This prospective randomised study was carried out after obtaining local ethics committee approval and written informed consent to participate in the study from patients.

Inclusion Criteria

a. Age group- 18-60 yrs.
b. ASA (American Society of Anaesthesiologists) grade I and ll.
c. Elective surgery under general anaesthesia.
d. Surgery Duration- 20 minutes to 2 hrs.

Exclusion Criteria

a. Consent not given.
b. Patients with signs and symptoms of upper respiratory tract infection within 15 days prior to surgery.
c. Patients who had undergone general anaesthesia within the 2 weeks prior to this surgery.
d. Smoker.
e. ENT (ear, nose, throat) surgery.
f. Ryle's tubes insertion intraoperatively.
g. When number of attempts for placing laryngeal mask airway or endotracheal tube exceeded two.
h. Patients who had vomiting within the first 24 hrs. period after anaesthesia.

Randomisation

Allocation of patients into two groups was done by lot system. The patient was asked to select a chit from a box containing 60 chits (30 laryngeal mask airway and 30 endotracheal tube) and case was conducted according to protocol in these groups.

Preoperative Requirements

1. Hb, CBC (complete blood count), LFT (liver function test), RFT (renal function test) and chest x-ray (age related).
2. Name, age, sex, weight, ASA grade and Reg. No. was documented in study.
3. Informed consent of the patients for the procedures was undertaken.
4. Indirect laryngoscopy findings were done by ENT surgeon to rule out any preoperative cause for voice changes.

Anaesthesia

1. Preoperative blood pressure, pulse rate, saturation (SPO_2) were noted.
2. Premedication-
   IV glycopyrrolate 0.004 mg/kg.
   IV midazolam 0.03 mg/kg.
   IV pentazocine 0.6 mg/kg.
3. Preoxygenation for 3 minutes.
4. Induction with 2-2.5 mg of Propofol till loss of eyelash reflex. Ventilation was checked. IV succinylcholine 1.5 mg/kg was given. Patient was ventilated with 100% oxygen for 45 seconds.
5. Lubrication with thin layer of 2% water soluble K-Y Jelly on cuff of the endotracheal tube and back of laryngeal mask airway.

Group A- A PVC endotracheal tube manufactured by Portex Company with a high volume low pressure cuff size 7/7.5 for female, 8.5/9 for male was used.
Group B- A laryngeal mask airway (size 3 for females and 4 for males) was inserted by the classical method as described by Brain.

Maintenance

O_2 (50%) + N_2O (50%) + propofol infusion + IV vecuronium 0.01 mg/kg (loading dose). Maintenance dose (one-fourth of loading dose) was given when there were two or more visual responses for train of four stimuli with peripheral nerve stimulator.
Pain relief- Diclofenac suppository 100 mg.
IV Fluids- RL (Ringer lactate).

Cuff Pressure Monitoring

The cuff pressure was monitored every 15 minutes using SIMS Portex low pressure aneroid. Cuff of the endotracheal tube was inflated with room air controlled to a volume needed for the cuff pressure of 30 cm H_2O and it was maintained at 30 cm H_2O either by deflation or inflation of the cuff.

Cuff in laryngeal mask airway group was inflated with room air. The cuff pressure was initially reduced to a minimum pressure at which an airtight seal between the laryngeal mask airway and the laryngeal inlet was provided with positive pressure of 20 cm H_2O during manual bag ventilation and cuff was deflated or inflated to maintain airtight seal during manual bag ventilation.

Reversal- IV atropine 0.02 mg/kg + IV neostigmine 0.05 mg.

Extubation Criteria

Propofol infusion was continued till just before extubation at 2 mg/kg/hr.

Endotracheal tube and laryngeal mask airway were removed after cuff deflation in a deep plane of anaesthesia.

Postoperative Monitoring Interviews-

The interviews were performed by the same person after surgery at 6, 12 and 24 hours after anaesthesia. Specific questions were asked concerning post-anaesthetic sore throat and dysphagia.

The dysphagia was graded using verbal analogue scale-

0- No pain.
2- Intermediate.
4- Moderate.
6- Severe.
8- Very severe.
10- Extreme.

The sore throat was graded using verbal analogue scale- Nil, mild, moderate and severe.

Voice Analysis

The voice analysis was done for the patients both pre and postoperatively in a special room in speech therapy department. A microphone (type- ECM-717) was placed at a distance of 15 cm from the mouth at an angle of 50°. Each patient was asked to produce "an/a" as a sustained vowel using a comfortable pitch and loudness for at least 5 seconds. The task was demonstrated by the user before the patient recording. The vocal effort produced by the patient was seen in the computer. Only 3 seconds (the mid vowel segment of the five seconds) of the recorded sounds were used for analysis. Various acoustic parameters were used for analysis by using doctor speech (DRS), Tiger Electronics, Neu-Ansar, Germany (subprogram vocal assessment version 4.0).

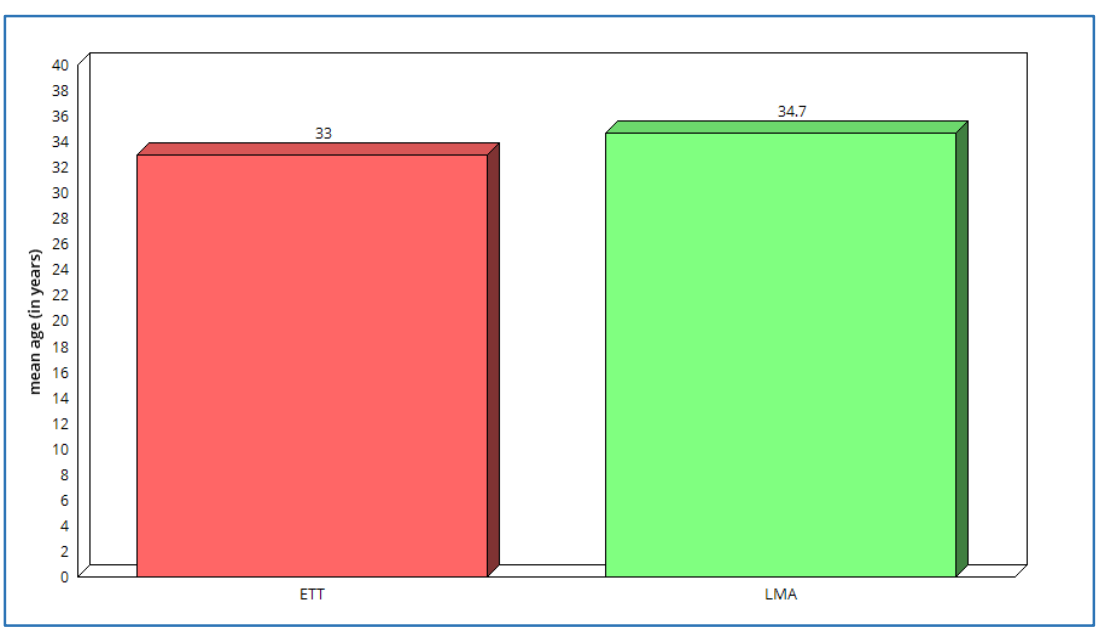
RESULTS

The observation and results of the two groups, laryngeal mask airway group and endotracheal tube group are mentioned below.

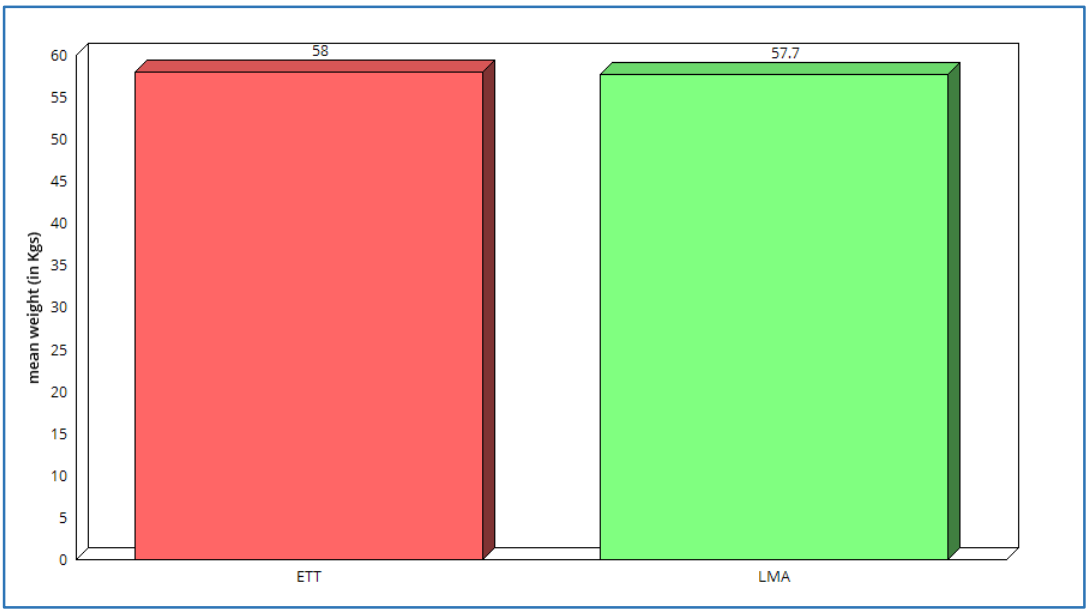
Groups were comparable with regard to all the demographic data like age, weight and smoking habit. The mean duration of anaesthesia in endotracheal tube group was 62 mins. and that of laryngeal mask airway group was 60.8 mins. and there was no statistically significant difference between the two groups (P<0.05) (Table 1; Graphs 1, 2 and 3).

		Mean	Std. Deviation	Std. Error	P value	Significance
Age	ETT	33.03333	10.078	1.83984		
	LMA	34.76667	6.694	1.2221	P >0.05	Not significant
Weight	ETT	58.16667	7.901	1.44245		
	LMA	57.76667	9.6514	1.76211	P >0.05	Not significant
Duration	ETT	62	19.7222	3.60077		
	LMA	60.83333	24.179	4.41447	P >0.05	Not significant

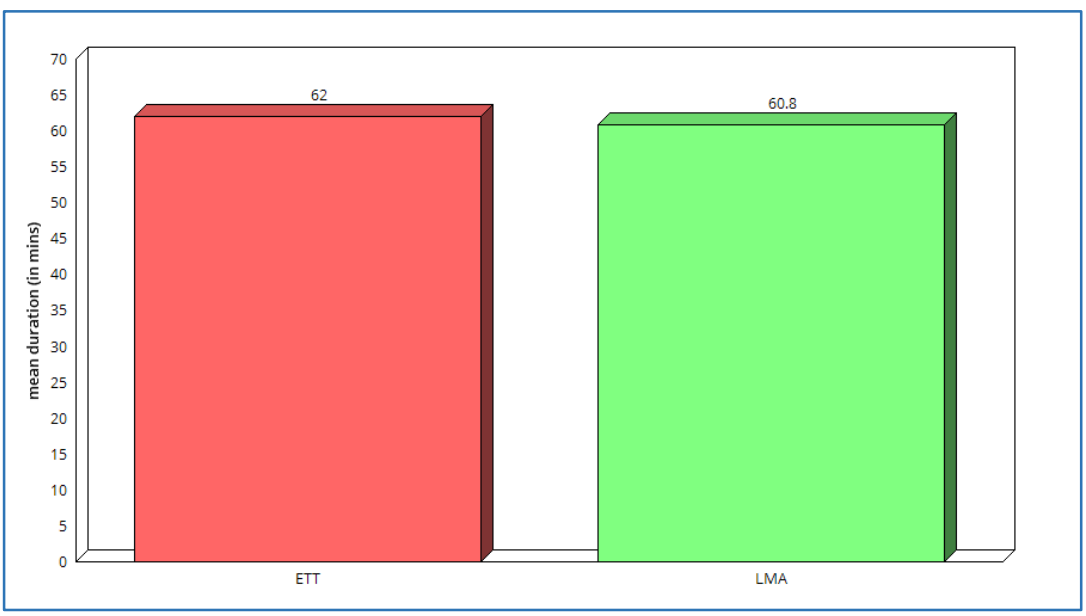
Table 1. Comparison of Demographic Data in ETT and LMA Group



Graph 1. Comparison of Age in ETT Group and LMA Group



Graph 2. Comparison of Weight in ETT Group and LMA Group



Graph 3. Comparison of Duration of Surgery in ETT Group and LMA Group

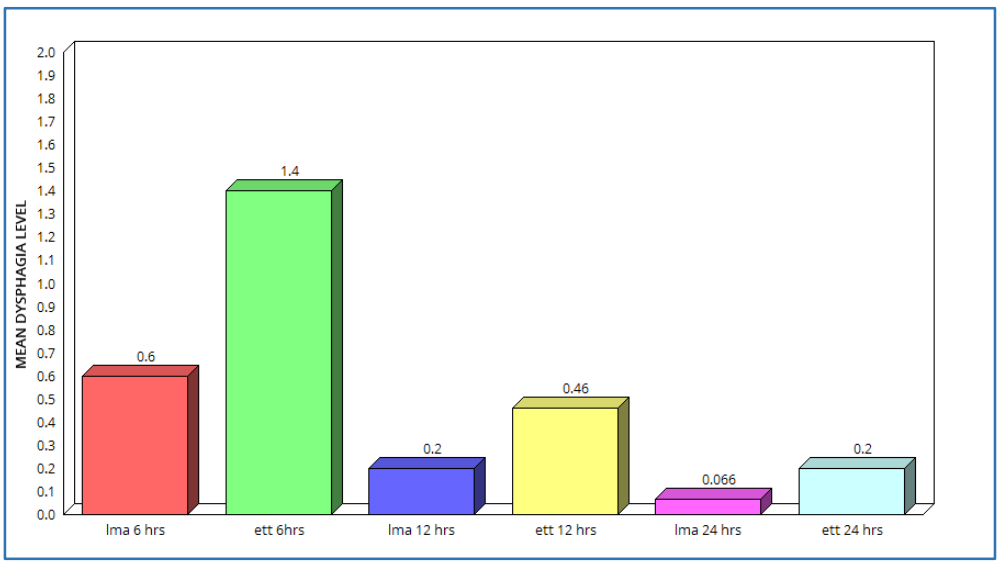
The overall success rate of airway management was 100% in each group. Laryngeal mask airway positioning was satisfactory following the first attempt in 80% of patients, whereas endotracheal intubations were successful in 83.3% of patients. During anaesthesia and post-anaesthesia period, vomiting and aspiration did not occur in any patients. Postoperative analgesic management was comparable in both the groups.

Comparison of Dysphagia

There was a significant difference between the two groups in the incidence of dysphagia. The incidence of dysphagia in endotracheal tube group at 6, 12 and 24 hrs. were comparably more than laryngeal mask airway group, but it was significantly more than laryngeal mask airway group only at 6 hrs. (P=0.0025) (Table 2, Graph 4).

	Mean	Std. Deviation	Std. error	P value	Significance
LMA 6 hrs.	0.6	1.19193	0.21762	P >0.05	
ETT 6 hrs.	1.4	1.49943	027376	P = 0.05	Significant
LMA 12 hrs.	0.2	0.61026	0.11142	P >0.05	
ETT 12 hrs.	0.46667	1.00801	0.18404	P >0.05	Not significant
LMA 24 hrs.	0.06667	0.36515	0.06667	P >0.05	
ETT 24 hrs.	0.2	0.61026	0.11142	P >0.05	Not significant

Table 2. Comparison of Dysphagia in ETT and LMA Groups



Graph 4. Comparison of Dysphagia in ETT Group and LMA Group

The incidence and severity of dysphagia increased with duration as explained below. The incidence of dysphagia in endotracheal tube group with duration less than 1 hour was 47% with 11% of cases having dysphagia at 24 hrs. post-anaesthesia.

The incidence of dysphagia in endotracheal tube group with duration more than 1 hr. was 64% with 9% of cases having dysphagia at 24 hrs. post-anaesthesia.

The incidence of dysphagia in laryngeal mask airway group with duration less than 1 hr. was 12%, with no cases having dysphagia at 24 hrs. The incidence of dysphagia in laryngeal mask airway group with duration more than 1 hr. was 38% with 8% of cases having dysphagia at 24 hrs.

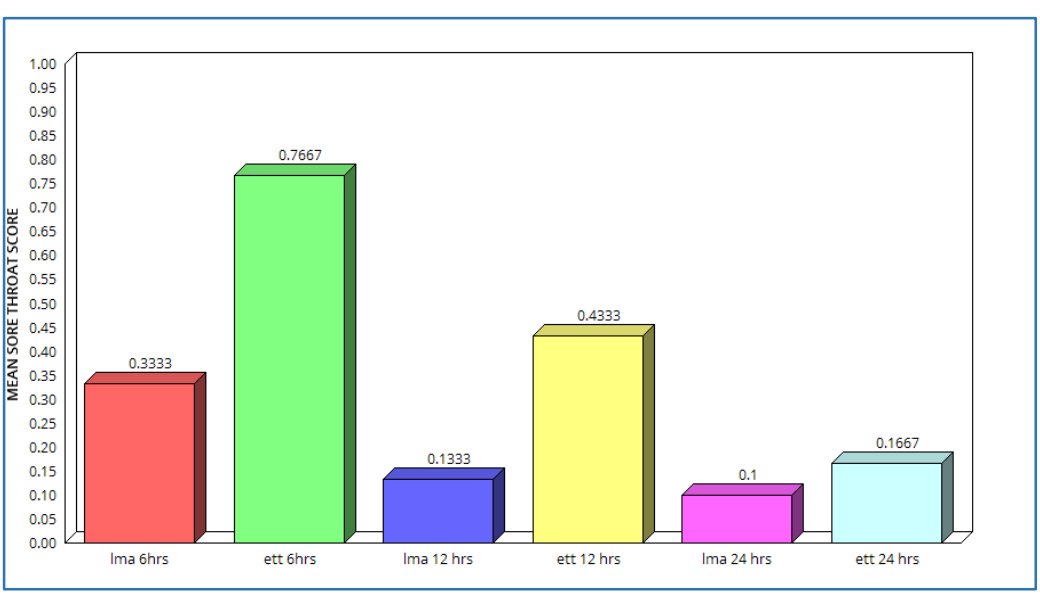
Comparison of Sore Throat in Laryngeal Mask Airway and Endotracheal Tube Groups-

The incidence of sore throat in endotracheal tube group was 76.6% and laryngeal mask airway group was 40%.

The incidence of sore throat in endotracheal tube group was significantly more than laryngeal mask airway group at 6, 12 and 24 hrs. (p value at 6, 12 and 24 hrs. was 0.08, 0.01 and 0.01, respectively) (Table 3, Graph 5).

	Mean	Std. Deviation	Std. Error	P value	Significance
LMA 6 hrs.	0.33333	0.54667	0.09981	P >0.05	
ETT 6 hrs.	0.76667	0.67891	0.12395	P = 0.08	Significant
LMA 12 hrs.	0.13333	0.34575	0.06312	P >0.05	
ETT 12 hrs.	0.43333	0.56832	0.10376	P = 0.01	Significant
LMA 24 hrs.	0.1	0.30513	0.05571	P >0.05	
ETT 24 hrs.	0.16667	0.46113	0.08419	P = 0.01	Significant

Table 3. Comparison of Sore Throat in LMA and ETT Group



Graph 5. Mean Sore Throat Score in LMA and ETT Groups

The incidence of sore throat increased with duration of anaesthesia. The incidence of sore throat at 6 hrs. postoperative was 24% in laryngeal mask airway group with duration of anaesthesia less than 60 mins. and all cases had mild sore throat. None of the patients had sore throat at 24 hrs., postoperatively. The incidence of sore throat at 6 hrs. postoperative was 38% in laryngeal mask airway group with duration of anaesthesia greater than 60 mins., of which one case was moderate and incidence of sore throat at 24 hrs. postoperative was 23%.

The incidence of sore throat at 6 hrs. postoperative in endotracheal tube group with duration less than 1 hr. was 58%. 5% of cases had sore throat at 24 hrs. post-anaesthesia. The incidence of sore throat at 6 hrs. postoperative in endotracheal tube group with duration greater than 60 mins. was 73% and 27% of cases had sore throat at 24 hrs. post-anaesthesia.

Comparison of Dysphonia in Laryngeal Mask Airway and Endotracheal Tube Groups-

Various parameters were included in the voice analysis of patients of which fundamental frequency, NNE (normalised voice energy), SNR, amplitude tremor and perceptual analysis (hoarseness, harshness and breathiness) were not significant in both endotracheal tube and laryngeal mask airway group. Of the various acoustic variables analysed, there was significant difference in postoperative values of jitter, shimmer and HNR (p values were <0.001, <0.001 and 0.02, respectively) in endotracheal tube group when compared with preoperative values. Postoperative values of jitter and shimmer were significantly higher than preoperative values in laryngeal mask airway group (P value for jitter and shimmer was 0.001 and 0.02, respectively).

The comparative changes in the voice parameters between preoperative and postoperative have been depicted for laryngeal mask airway group in table 4 and graphs 6, 7, 8 and endotracheal tube group in table 5 and graphs 9, 10 and 11.

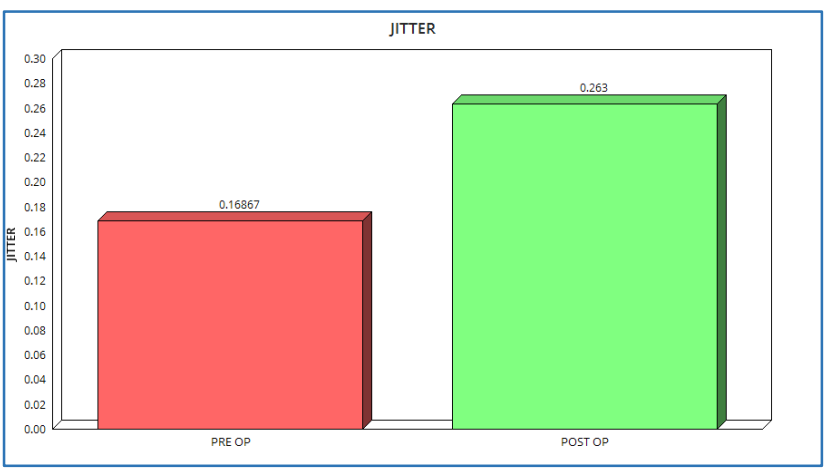
		Mean	S.D	S.E	P value	Significance
FO tremor	Preop	173.881	54.8874	10.02102		
	Postop	165.0437	50.33012	9.18898	P >0.05	Not significant
NNE	Preop	2.35333	2.11139	0.38549		
	Postop	2.17033	1.86331	0.34019	P >0.05	Not significant
SNR	Preop	-10.5247	5.15503	0.94188		
	Postop	-11.459	6.05999	1.1064	P >0.05	Not significant
Amp tremor	Preop	24.96133	4.70676	0.85933		
	Postop	25.716	5.33214	0.97351	P >0.05	Not significant
Hoarseness	Preop	1.459	0.62329	0.1138		
	Postop	1.51933	0.60034	0.10961	P >0.05	Not significant
Harshness	Preop	0.16667	0.37905	0.0692		
	Postop	0.3	0.46609	0.0851	P >0.05	Not significant
Breathiness	Pretest	0	0	0		
	Posttest	0	0	0	P >0.05	Not significant
FO	Preop	0.2	0.40684	0.07428		
	Postop	0.43333	0.85836	0.15671	P >0.05	Not significant
Jitter	Preop	0.16867	0.06474	0.01182		
	Postop	0.263	0.12855	0.02347	P <0.001	Significant
Shimmer	Preop	1.38867	0.63087	0.11518		
	Postop	1.906	1.05334	0.19231	P = 0.02	Significant
HNR	Preop	25.124	4.892	1.099		
	Postop	27.266	5.214	1.235	P <0.02	Significant

Table 4. Comparison of Voice Parameters in LMA Group

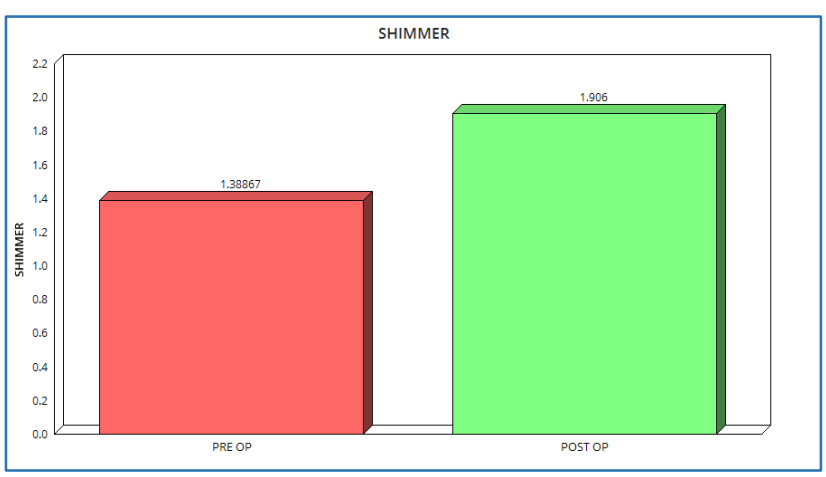
		Mean	S.D	S.E	P value	Significance
FO	Preop	171.231	39.74751	7.25687		
	Postop	167.4733	41.03916	7.49269	P >0.05	Not significant
FO tremor	Preop	1.72833	0.98935	0.18063		
	Postop	2.22345	2.2706	0.42164	P >0.05	Not significant
NNE	Preop	-12.8193	4.09861	0.7483		
	Postop	-11.5917	4.69688	0.85753	P >0.05	Not significant
SNR	Preop	24.85767	5.14626	0.93957		
	Postop	25.499	4.73015	0.8636	P >0.05	Not significant
Amp tremor	Preop	1.63733	1.1238	0.20518		
	Postop	1.404	0.39784	0.07264	P >0.05	Not significant

Hoarseness	Preop	0.23333	0.67891	0.12395		
	Postop	0.46667	0.77608	0.14169	P >0.05	Not significant
Harshness	Preop	0.33333	0.7581	0.13841		
	Postop	0.3	0.70221	0.12821	P >0.05	Not significant
Breathiness	Pretest	0.56667	1.0063	0.18372		
	Posttest	0.93333	1.11211	0.20304	P >0.05	Not significant
Jitter	Preop	0.16867	0.06474	0.01182		
	Postop	0.263	0.12855	0.02347	P <0.001	Significant
Shimmer	Preop	1.38867	0.63087	0.11518		
	Postop	1.906	1.05334	0.19231	P <0.001	Significant
HNR	Preop	27.0456	5.672	1.098		
	Postop	27.128	5.702	1.123	P >0.05	Not Significant

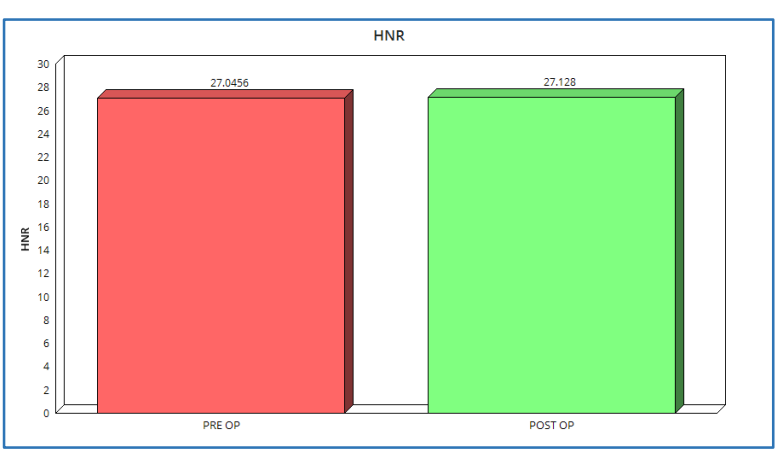
Table 5. Comparison of Voice Parameters in ETT Group



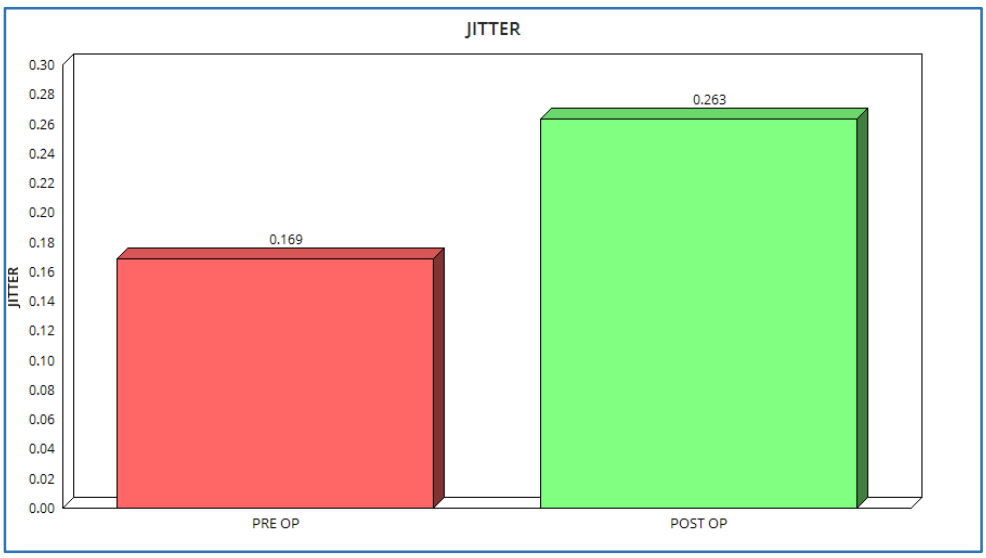
Graph 6. Voice Parameter (Jitter) Analysis in LMA Group



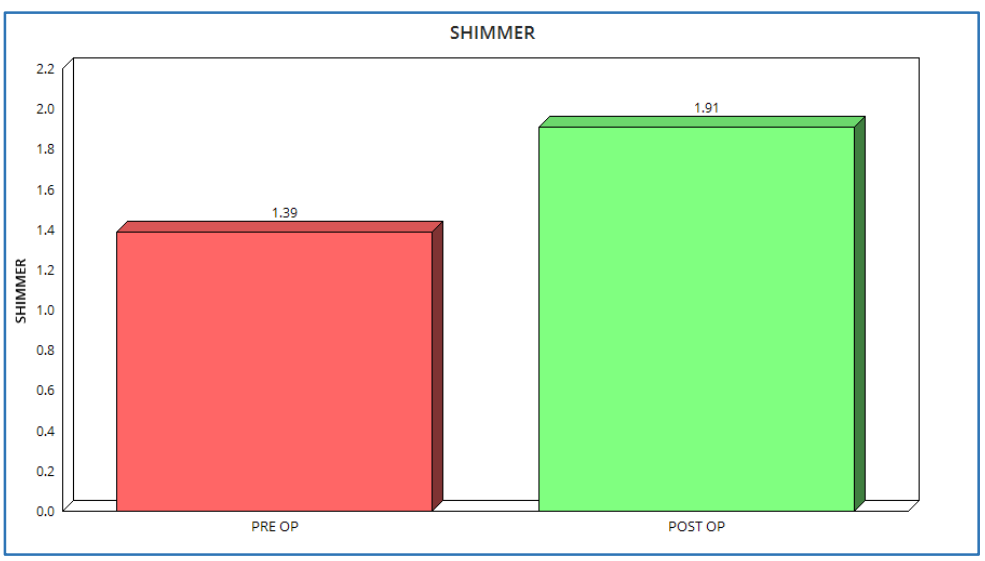
Graph 7. Voice Parameter (Shimmer) Analysis in LMA Group



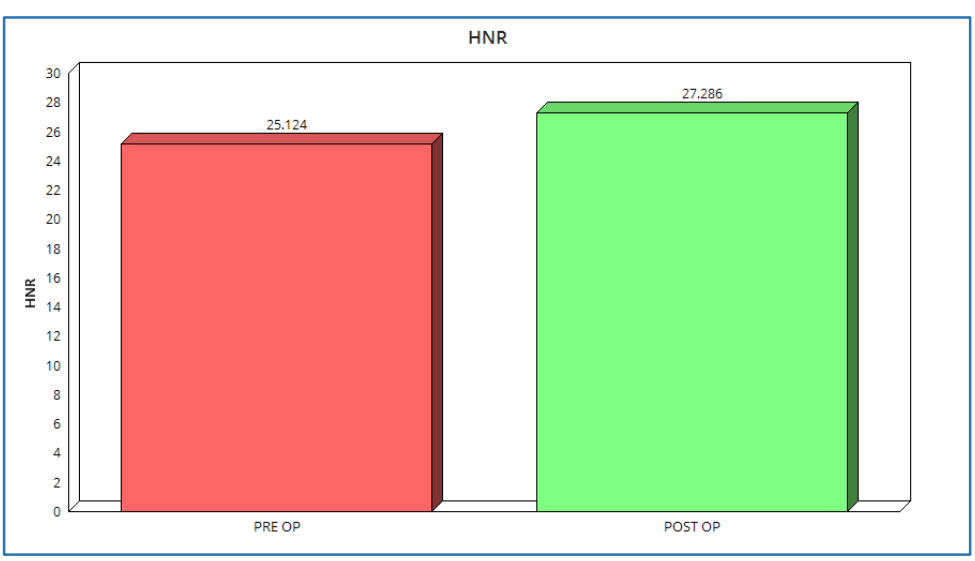
Graph 8. Voice Parameter (HNR) Analysis in LMA Group



Graph 9. Voice Parameter (Jitter) Analysis in ETT Group



Graph 10. Voice Parameter (Shimmer) Analysis in ETT Group



Graph 11. Voice Parameter (HNR) Analysis in ETT Group

DISCUSSION

The present study was carried out to compare the incidence and severity of postoperative laryngopharyngeal complaints following airway management with the laryngeal mask airway and the endotracheal tube in short surgical procedures.

Sixty (60) patients were randomly divided into two groups of thirty (30) each for laryngeal mask airway and endotracheal tube insertion. The two groups were statistically comparable in age, gender distribution and duration of surgery.

In the laryngeal mask airway group, we chose a fixed size laryngeal mask airway for men and women (size 4 and 3, respectively). Some studies have used a larger laryngeal mask airway (size 5 for men and 4 for women) to reduce postoperative oropharyngeal morbidity. But, in a study, Grady et al concluded that a larger laryngeal mask airway was associated with a high incidence of sore throat.[1]

In our study, we used controlled ventilation in laryngeal mask airway and endotracheal group to maintain uniformity in both the groups, even though many studies have used spontaneous ventilation in laryngeal mask airway group. Direct trauma to vocal cords by laryngeal mask airway is not common, but it is presumed that flow of inhaled cold and dry anaesthetic gases over the vocal cords may substantially contribute to transient voice changes following laryngeal mask airway insertion.[2]

During controlled ventilation, intermittent positive pressure ventilation with paralysed vocal cords alters the frequency and amplitude of the vibratory cycle of the vocal cords transiently. The laryngopharyngeal discomfort is manifested as sore throat, dysphagia and dysphonia.

In this study, voice changes were detected by computerised method in the speech laboratory. With the advent of electronics and computers, the voice analyses can be done by using software programs, which do not replace the perceptual judgment by trained speech therapist, but they are quick and simple to use by medical and paramedical people and still allow more precise diagnosis and recording of the voice changes, thus providing to be important tools for the therapeutic interventions and feedback for patients in speech therapy.[3]

In this study, two groups were analysed for dysphonia. Comparison of pre-test and post-test values was done for each group separately. In our study, we have analysed various acoustic parameters like fundamental frequency, jitter, shimmer, HNR, SNR and amplitude tremor.

If the intubations have actually caused some oedema on vocal folds, the vibrating folds may have had additional mass resulting in decrease in fundamental frequency.[4]

The incidence of sore throat in endotracheal tube group was 76.6% and laryngeal mask airway group was 40%. In our study, the incidence of sore throat was higher in endotracheal tube group than the laryngeal mask airway group and was significant at 6 hrs. 12 hrs. and 24 hrs. (endotracheal tube- 63.3%, 39.97%, 13.33% vs. laryngeal mask airway- 30.33%, 13.33%, 10%).

Higgins et al[5] (2002) compared the incidence of sore throat after tracheal intubation, laryngeal mask airway insertion and face mask ventilation. The analysis showed that 45.5% of patients with endotracheal tube, 17.5% of patients with laryngeal mask airway and 3.3% of patients with face mask had sore throat.

Mizutamari et al[6] 2004 compared the degree of Postoperative Sore Throat (PST) after the use of laryngeal mask airway by two techniques and a tracheal tube in adult patients. The degree of sore throat immediately after anaesthesia was similar in the three groups; however, on first postoperative day, the severity in the laryngeal mask airway groups was greater than tracheal tube group. The severity of PST was similar with both the laryngeal mask airway insertion techniques. They concluded that laryngeal mask airway inserted with the cuff inflated or deflated, worsened PST compared with TTs.

The incidence of dysphagia in laryngeal mask airway group was 26.6% and endotracheal tube was 60%. In our present study, the incidence of dysphagia was higher in the endotracheal tube group than the laryngeal mask airway group at 6 hrs. 12 hrs. and 24 hrs. (endotracheal tube- 60%, 20% and 2% vs. laryngeal mask airway 23.33, 10% and 3.33%), but significant difference was only at 6 hrs.

In our study, in laryngeal mask airway group jitter and shimmer postoperatively were significantly higher than preoperative values (P value for jitter and shimmer were 0.001 and 0.02, respectively). In endotracheal tube group, jitter, shimmer and HNR postoperatively were significantly higher than preoperative values (P value for jitter and shimmer were <0.001 and P value for HNR was 0.02). When compared with laryngeal mask airway group, there was significantly more increase in shimmer and HNR in endotracheal tube group. Thus, when comparing both the groups, significant changes in voice parameters are more common after endotracheal intubations than laryngeal mask airway insertion.

The present results on sustained phonations are in general agreement with those of Yoshyuki Horii et al with regard to endotracheal tube group. In their study effects of endotracheal intubations on acoustic characteristics of voices were investigated using a miniature neck accelerometer and computerised analysis methods.

Variables extracted from sustained vowels were; (1) Spectral slopes of the average waveforms, (2) Harmonies-to-noise ratios (HNR), (3) Coefficients of Variation for Amplitude (CVA), (4) Coefficients of Variation for Fundamental Frequency (CVF), (5) Amplitude perturbation (shimmer) and (6) Fundamental frequency perturbation (jitter). Fundamental frequency (Fo) distributional statistics (mean Fo, Fo standard deviation and Fo mid-90% range) were also obtained from oral readings. Results for the sustained vowel samples showed that after extubation;

1. Spectral slopes were less steep.
2. Both shimmer and jitter were greater than before intubation.

In contrast to our study, Zimmert et al 1999 showed that there was no significant difference in any of the voice parameters between endotracheal intubation and laryngeal mask airway insertion.[7]

Variation in size of laryngeal mask airway and endotracheal tube, design and type of endotracheal tube and lubricating material used, cuff pressure of laryngeal mask airway and endotracheal tube, duration and % of nitrous oxide used also matters in the incidence of sore throat. Even when all these factors have been idealised, still sore throat and dysphagia can occur in the immediate postoperative period. The sore throat and dysphagia that occurs in the postoperative period is usually present for short period only.

Thus, the effects of intubations and laryngeal mask airway insertion observed within 24 hrs. of anaesthesia in the present study generally are expected to diminish within a few days.[8] Endotracheal intubations change the patient's voice nevertheless the changes are neither too serious nor irreversible.[9] As Leonard and Charpred[10] and Kean et al[8] reported traumatic responses such as changes in connective tissues and granulomas can develop and persist for a few weeks to few months. Jitter can be used as a measure in evaluation of laryngeal and vocal pathology. In our study, jitter and shimmer postoperatively were significantly higher than preoperative values in both endotracheal tube and laryngeal mask airway group, but were within the normative values (normative values using Dr. Speech for jitter is 0.5% and shimmer is 3%). If jitter and shimmer postoperatively are higher than normative values, then they subsequently require a follow up after a week for further voice analysis and if necessary speech therapy and laryngologist evaluation.

CONCLUSION

The study titled "comparison of pharyngolaryngeal complications (dysphonia, dysphagia and sore throat) after endotracheal tube and laryngeal mask airway insertion following general anaesthesia" concludes that pharyngolaryngeal complaints occur more commonly with endotracheal tube than laryngeal mask airway.

Subjective analysis of patients in the immediate postoperative period showed that the dysphagia and sore throat are more common after endotracheal intubation than laryngeal mask airway insertion.

Objective analysis of dysphonia using signal analysis software (Dr. Speech) showed that there were significant differences in few voice parameters postoperatively when compared with preoperative values after both laryngeal mask airway insertion and endotracheal intubation. The analysis of voice parameter indicates mild and transient hoarseness and harshness in voice after both laryngeal mask airway insertion and endotracheal intubation, but the changes observed were more after endotracheal intubation.

ACKNOWLEDGEMENTS

Dr. Shubha Mohite is responsible for the study concept and design and it is only with her guidance and support that this study could be materialised.

Dr. Rochana Bakhshi contributed to the critical revision of the manuscript and study revision. Her valuable inputs and suggestions were indispensable throughout the study period.

Dr. Misha Mehta, Dr. Nasir Jeelani and Dr. Khyati Patel helped in acquisition, analysis and interpretation of data.

We are thankful to D. Y. Patil University School of Medicine for providing technical support and infrastructure to carry out this study.

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