

ORIGINAL ARTICLE

Endotracheal Tube Size and Post-Operative Sore Throat in Women

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ABSTRACT

Aim: To determine the proportion of women with postoperative sore throat an hour after elective surgery in women intubated with a size 6 endotracheal tube versus size 7 endotracheal tube.**Study design:** Randomized controlled trial**Place and duration of study:** Department of Anesthesiology, The Indus Hospital, Karachi from 22-09-2016 to 2109-2017.**Methodology:** Patients were divided two equal groups through randomization i.e. endotracheal tube size 6 versus endotracheal tube size 7. Prior to intubation the endotracheal tube is to be lubricated with normal saline. In group ETT 6, trachea intubated with a high volume low pressure endotracheal tube with internal diameter 6.0 and in group ETT 7 with a 7.0 diameter tube respectively. Immediately after intubation the endotracheal tube was verified by a five-point auscultation technique and the cuff inflated with room air until no air leakage could be heard. No humidifiers or moisture exchangers were used.**Results:** The mean age of ETT 6 and ETT 7 group was 34.36±9.46 and 37.34±10.96 years respectively. The mean duration of surgery in ETT 6 and ETT 7 group was 117.70±30.57 and 125.17±55.0 minutes respectively. When both groups were postoperative sore throat was noted in 38 (59.4%) in ETT 6 group whereas 62 (96.9%) noted in ETT7 group (p=0.0001).**Conclusion:** Highly significant difference was found in postoperative sore throat between the group endotracheal tube size 6 in comparison to the group endotracheal tube size 7.**Keywords:** Endotracheal intubation, Sore throat, Hoarseness, Postoperative complications, Elective surgery

INTRODUCTION

Endotracheal tube is used to maintain free airway in anesthetized patient during surgery. It is basically used to minimize the risk of aspiration and for providing positive pressure ventilation.¹ Postoperative sore throat (POST) is a common complication of anaesthesia it can lead to dissatisfaction and discomfort after surgery and can lead to delay in recovery of patients routine activities. Many factors can contribute to postoperative sore throat include trauma to pharyngolaryngeal mucosa from laryngoscopy, nasogastric tube placement, oral suctioning, cuff design, cuff pressure affecting tracheal mucosal capillary perfusion and contact of the tracheal tube with the vocal cords and posterior pharyngeal wall resulting in edema or mucosal lesions.² The incidence has been found to vary with the method of airway management, incidence is the highest after tracheal intubation and various causative agents has already been identified include size of ETT tube, pH and non-optimal Intubation conditions^{2,3}.

Historically, anaesthetists have used ETT size 8.0 to 9.5 has been used for men and 7.0 to 8.5 for women.⁴⁻⁶ However, more and more studies in the West have been looking at the size of ETT and the risk of postoperative sore throat and hoarseness and to find measures for its prevention. The presence of racial differences in the incidence of postoperative complications.^{7,8} A study⁹ done in Sweden in 2012 assessed the associate risk factors with POST after placing endotracheal tube in female patients undergoing elective ENT. Biro et al⁶ reported that age >60 years, usage of throat pack and ETT size 7 to be the significant risk factors of POST (POST=64%, 64% and 51% respectively, p-value<0.05). POST occurred in 52% of patients with ETT 7 versus 27% in ETT.

Several factors may contribute in the progression of this problem including vocal cord injury⁵ mucosal injury in the trachea⁷, size of the ETT cuff, duration of surgery and grade of difficulty in intubation^{4,10-11}. Different age groups were reported in different studies¹²⁻¹⁵. Thomas and Beevi⁴ reported the 30-39 as the highest risk age group to experience these symptoms. On the other hand, patients with >60 years of age were more prone to the disease severity¹².

One of my most important role is to ensure that the patients maintain a free airway during surgery. This can be done with different devices, such as an endotracheal tube (ETT) or a laryngeal mask airway (LMA). Irrespective of the device used, I have encountered many patients who complain about a sore throat on their way to the post anaesthesia care unit (PACU).

The objective of the study was to determine the proportion of women with postoperative sore throat an hour after elective surgery in women intubated with a size 6 endotracheal tube versus size 7 endotracheal tube.

MATERIALS AND METHODS

This randomized controlled trial study was conducted in the Department of Anesthesiology after permission from Institutional Ethical Review Board. The Indus Hospital Karachi from 22nd September 2016 to 21st September 2017 and comprised 128 patients. All female patients, ASA Status 1-2, Mallampati Class I or II, age 16-60 years and elective surgery lasting for more than 30 minutes but less than 180 minutes were included. Pregnant females, pre-existing hoarseness/sore throat, Procedure that involves dye oral, pharyngeal or laryngeal cavity, currently on corticosteroids, multiple laryngoscopies more than 2 attempts by consultant, trauma during laryngoscopy and elective surgery expected to last less than 30 minutes were excluded. After allocating the study arms, anesthesia method was according to general anesthesia with IV and inhalations anesthetic agents. Induction shall be with Propofol 2mg/kg, nalbuphine 0.1 mg/kg and atracurium 0.5mg/kg. Before intubation ventilation shall be controlled with 100% oxygen via facemask. Direct laryngoscopy shall be attempted by resident R2 to R4 three minutes after the administration of atracurium with a Macintosh blade #3 or #4. Prior to intubation the endotracheal tube is to be lubricated with normal saline. In group ETT 6, trachea was intubated with a high volume low pressure endotracheal tube with internal diameter 6.0 and in group ETT7 with a 7.0 diameter tube respectively. Immediately after intubation the endotracheal tube shall be verified by a five- point auscultation technique and the cuff inflated with room air until no air leakage could be heard. No humidifiers or moisture exchangers are to be used. Anesthesia shall be maintained with 50% oxygen and 50% air mixture, Isoflurane to be

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kept between 1% to 2% and atracurium top-up doses as required. End-tidal CO₂ shall be kept between 35 and 40 mmHg. At the end of surgery, all anesthetic gases are to be turned off and 100% supplemental oxygen is to be started and after the return of spontaneous ventilation the patients are to be given neostigmine and glycopyrolate (Neo-pyrolate) intravenously and spontaneous ventilation shall be continued till patient is fully awake and obeying commands. After gentle aspiration of secretions, the cuff is to be deflated fully and the endotracheal tube is to be removed. The patient is then to be transferred to the recovery area and was monitored in accordance to the protocols of The Indus Hospital. Post-operatively all patients received nalbuphine 0.1 mg/kg and paracetamol 4 times a day according to hospital routine. If needed prophylactic administration of antiemetic drugs was done. One hour after surgery, the patient was being assessed if they have any sore throat. A score of 0 was considered no sore throat. Data was entered and analyzed using SPSS version 21. Both groups were compared by age, duration of surgery, BMI, ASA grade and Mallampati class wise stratification by using Chi-square/Fisher-exact test to see the impact of these on outcome variables consider $P \leq 0.05$ as significant.

RESULTS

The mean age of ETT 6 and ETT 7 group was 34.36 ± 9.46 and 37.34 ± 10.96 years. Mean BMI of ETT 6 and ETT 7 group was 27.33 ± 2.73 and 27.70 ± 2.31 kg/m² and mean duration of surgery in ETT 6 and ETT 7 group was 117.70 ± 30.57 and 125.17 ± 55.0 minutes respectively (Table 1).

In ETT 6 group 33(51.6%), 31(48.4%) were enrolled in ASA grade 1, 2 similarly in ETT7 group 26(40.6%), 38(59.4%) were included in ASA grade 1, 2 respectively (Table 2).

In ETT 6 group 28(43.8%), 36 (56.2%) were enrolled in Mallampati class 1, 2 similarly in ETT 7 group 19(29.7%), 45 (70.3%) were included in Mallampati class 2 group (Table 3).

The frequency of postoperative sore throat in ETT 6 and ETT 7 group was 26(40.6%), 2(3.1%) had no sore throat, 36(56.2%), 47(73.4%) mild, 2(3.1%), 15(23.4%) moderate and no severe throat was seen in both group (Table 4).

When both groups no postoperative sore throat was noted in 26(40.6%) in ETT 6 group whereas 2(3.1%) was noted in ETT 7 group and p value found to highly significant ($p=0.0001$) [Table 5].

Table 1: Descriptive statistics of age, BMI and duration of surgery in both groups (n=128)

Variable	ETT 6 Group	ETT7 Group	P value
Age (years)	34.36 ± 9.46	37.34 ± 10.96	0.102
BMI (kg/m ²)	27.33 ± 2.73	27.70 ± 2.31	0.409
Duration of surgery (minutes)	117.70 ± 30.57	125.17 ± 55.0	0.344

Table 2: Frequency of ASA grade in both groups (n=128)

ASA Grade	ETT 6 Group	ETT 7 Group
1	33 (51.6%)	26 (40.6%)
2	31 (48.4%)	38 (59.4%)

Table 3: Frequency of Mallampati Class in both groups (n=128)

Mallampati Class	ETT 6 Group	ETT 7 Group
1	28 (43.8%)	19 (29.7%)
2	36 (56.2%)	45 (70.3%)

Table 4: Frequency of severity of postoperative sore throat in both groups (n=128)

Postoperative sore throat	ETT 6 Group	ETT 7 Group
No	26 (40.6%)	2 (3.1%)
Mild	36 (56.2%)	47 (73.4%)
Moderate	2 (3.1%)	15 (23.4%)
Severe	-	-

Table 5: Comparison of postoperative sore throat between groups (n=128)

Postoperative sore throat	ETT 6 Group	ETT7 Group	P value
Yes	38 (59.4%)	62 (96.9%)	0.0001
No	26 (40.6%)	2 (3.1%)	

DISCUSSION

Endotracheal intubation many times results in post-operative complications mainly sore throat and hoarseness during general anaesthesia. Studies has proved that, POST is more common in females.^{3,4,12} Sometimes it is resolve instantaneously but in fewer patients it persists for several days to week.⁶ Therefore, care must be taken and these symptoms should take into consideration for patient wellbeing and safety. Studies proved that older females are more prone to post-operative sore throat as compared to the younger patients.¹² Possible mechanism of POST in older females is hormonal changes that occur after menopause which make dryness of mucosa in upper airway.

Size of endotracheal tube plays a critical role in POST development of POST.^{16,17} Risk increased upto 3 times if cuff of the tube inflated more as compared to the normal size. Greater number of females was reported as compared to the males and the difference in frequency is still unclear. But certain anatomical alterations exist in larynx between males and females.¹⁸⁻²¹ Similarly, another important factor is the intracuff pressure during surgery as it also leads to the progression of POST^{13,22}. This might happen due to the irritation of narrowest airway part, that leads to hoarseness. This could happen if tube is not properly placed or fixed in lumen.

Scoring system that used for the evaluation of POST should be reliable and valid otherwise it leads to false interpretations. Result of present study is comparable to other international and national studies^{14,15,23,24}. Systematic and scientific calculations were used in present study to determine study design, sample size and in exclusion and inclusion criteria.

CONCLUSION

Highly significant difference was found in postoperative sore throat between the group endotracheal tube size 6 in comparison to the group endotracheal tube size 7.

Conflict of interest: Nil

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