



Anaesthesiology

TO STUDY THE INCIDENCE AND RISK FACTORS OF POST-OPERATIVE SORE THROAT IN PATIENTS UNDERGOING ELECTIVE SURGERIES UNDER GENERAL ANAESTHESIA WITH ENDOTRACHEAL TUBE

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ABSTRACT **Background:** A prospective observational study to study the incidence and risk factors of post-operative sore throat (POST) in patients undergoing elective surgeries under general anaesthesia with endotracheal tube.

Methods: This was a prospective observational study done on 1000 patients to study the incidence and risk factors of POST. The data was analysed using SPSS-10 for Windows statistical software. Pearson's Chi Square test was the statistical test of significance.

Results: ETT size 7.0 decreased and ETT tube size 8.0 and above increased the risk for POST and hoarseness in both sexes in the early postoperative period. It was noted that the incidence of POST was more in elective cases (26.2%) compared to emergency cases (17.7%). Intubation by a trained anaesthesiologist caused lesser cases of POST (32.5% vs. 23.5%). The symptoms of POST surfaced mostly at 8 hour after surgery (35.5%). Men developed more POST than women (59.3% vs. 40.7%). A low cuff pressure decreased the incidence of POST. Incidence of POST increases with the duration of surgery.

Conclusion: Endotracheal tube size 7.0 decreased postoperative sore throat. Incidence of POST was more in elective cases compared to emergency cases and surfaced mostly at 8 hour after surgery. Men more prone to POST than women. Incidence of POST increases with the duration of surgery many attempts and increasing cuff pressure.

KEYWORDS : Post-operative sore-throat, cuff-pressure, endotracheal-tubes, general anaesthesia

Introduction:

Postoperative sore throat is a common complication of anaesthesia. It can lead to dissatisfaction and discomfort after surgery and can delay a patient's return to normal routine activities. Many factors can contribute to postoperative sore throat and the incidence has been found to vary with the method of airway management⁽¹⁾. The incidence is the highest after tracheal intubation and varies from 14.4% to 50%, while after laryngeal mask airway insertion the incidence has been found to vary from 5.8% to 34% and it is much less when a face mask is used for the maintenance of anaesthesia^(1,2). The wide variation in these figures is presumably due to different skills and techniques among anaesthetists and to differences between individual anaesthetists and patients in the definition of sore throat. The reporting of a sore throat is also affected by the method of interview, i.e., whether the questions regarding sore throat are asked directly or indirectly⁽³⁾. After indirect questioning of 129 patients, only two complained of sore throat, whereas after direct questioning of 113 patients, 28 complained of sore throat⁽⁴⁾. This difference may be due to the fact that patients concentrate on symptoms directly related to the operative site and do not immediately associate sore throat with anaesthesia and surgery.

This study was done to evaluate the incidence of sore throat after general anaesthesia and to analyse the contributory factors for the same. As mentioned above, there are many factors contributing to POST. And there are a lot of difference of opinion on the optimal precautions and the individual strong risk factors contributing to the same. By filling these gaps in our knowledge, we may be able to reduce the risk of unnecessary suffering from POST and/or PH for patients undergoing general anesthesia. This will help us in the long run to improve patient satisfaction and provide good anaesthetic care.

Materials and Methods:**Criteria for Selection of Subjects**

1. Ages of 18 and 65, both sexes
2. Classified as ASA physical status I or II
3. Undergoing elective surgery lasting no longer than 180 minutes, and were not undergoing ear, nose, or throat surgery.

Criteria for Exclusion

1. Pre-existing sore throat
2. History of gastric reflux
3. Nasogastric tube

4. Recent anti-inflammatory medications
5. Oral or nasal pharyngeal airway
6. Position other than supine or lithotomy
7. Coughing or bucking on intubation
8. Coughing or bucking prior to extubation
9. Difficult or traumatic intubation
10. Re-intubation
11. Postoperative vomiting
12. Unable to communicate with the researcher
13. Undergoing emergency surgical procedure

Study Population: Randomly selected 1000 patients undergoing elective surgeries under general anesthesia with endotracheal tube.

Methodology

Patients' age, sex, weight, and ASA physical status will be recorded on a standardized information sheet (appendix II). The type and duration of surgery, operative airway management (ETT – PVC/FM) tracheal tube size, cuff pressure, patient position during surgery, drugs (muscle relaxants, Inj. Glycopyrolate) given, and duration of stay in the post-anaesthetic care unit will also be recorded. No double lumen ETT will be used.

An aqueous lubricant jelly will be applied to the tracheal tube. A standard method will be used for placement of tracheal tubes. After ETT, patient's lungs will be mechanically ventilated. After intubation anaesthesia will be maintained with an inhalation agent in a mixture of oxygen and nitrous oxide. Airway devices will be removed when patients were able to open their eyes to command.

The clinical management of the patients will be left to the discretion of the anaesthetist. Modified Aldrete Recovery Score will be used to decide when to discharge the patient. Patients will be interviewed at 0, 0.5, 1, 2 and 8 hours and the incidence of sore throat was noted by using standardized direct questions. Patients were asked directly whether they had a sore throat, and whether they had any hoarseness of voice.

A four-grade scale was used with a cold as a point of reference:

- 0= No sore throat
- 1= Mild sore throat (less than with a cold)
- 2= Moderate sore throat (as with a cold)

3= Severe (more severe than with a cold).
The degree of POST was evaluated several different times during the post-operative period.

Discomfort

To investigate if the emergence of airway symptoms uncomfortable for the patient, a four-grade scale was used:

- 0= No discomfort
- 1= Mild discomfort
- 2= Moderate discomfort
- 3= Severe discomfort

The degree of discomfort was evaluated several different times during the postoperative period.

Localization of POST

In order to determine where the sore throat was localized in the throat, a photograph was developed by the researcher (Figure 1). Initially, ten persons who had reported POST after anesthesia were contacted irrespective of whether they had had an ETT or an LMA. They were asked to locate POST, and requested to describe the symptom by using an adjective that they found easy to understand. They described the location in the throat, that had been sore (the pharynx, and above or below the larynx). None of the ten persons described pain in the mouth, a category that included the lips and tongue, but we added this category. One patient had POST for 14 days, high up in her chest, after an intubation. The researcher interpreted this likely to be in the carina, and therefore a fifth category was added (high up in the chest). The photograph was then shown to ten new patients in the PACU, and they all confirmed that it was easy to understand and use (face and content validity)⁹. The color photograph was then laminated.

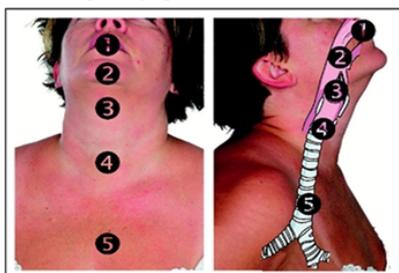


Figure 1 Photograph for localization of the sore throat-frontal and lateral views of a woman. 1. In the mouth. 2. In the pharynx. 3. Above the larynx. 4. Below the larynx. 5. High up in the chest

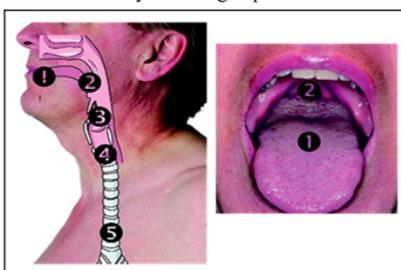
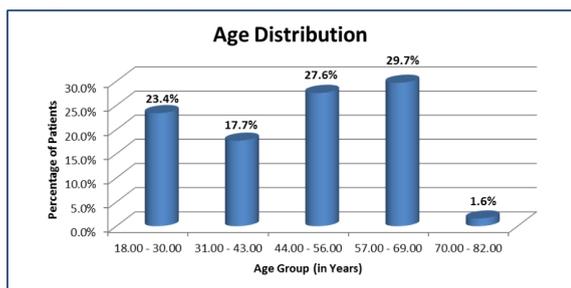


Figure 2 Photograph of localization of the sore throat-a lateral view of a man and in the mouth. 1. In the mouth. 2. In the pharynx. 3. Above the larynx. 4. Below the larynx. 5. High up in the chest

Results:

1. Age Distribution

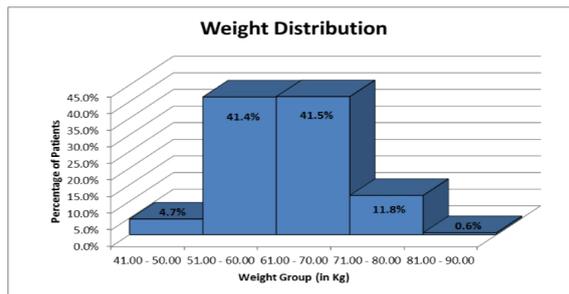


Results Figure 1

Though the inclusion criteria for the study were patients in the age group of 18-65, we included the patients with the maximum age of 82 who were in the ASA Physical Status I or II. 234 patients were in the age group of 18-30yrs. 177 in 31-43yrs. 276 in 44-56yrs. 297 in 57-69yrs and 16 in 70-82yrs.

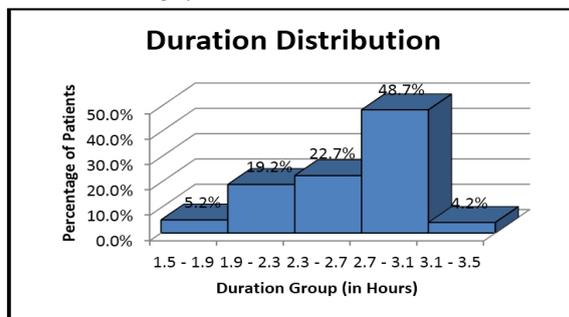
The maximum number of patients were in the age bracket 44 – 56yrs (276).

2. Weight Distribution



Results Figure 2

3. Duration of Surgery



Results Figure 3

4. Type of Surgery

Contrary to expectation, it was seen that elective cases caused more sore throat than emergency cases. Incidence of POST was 26.2% in elective cases against a 17.7% in emergency cases.

5. ASA and POST

In our study we had analysed patients only who were accepted in ASA I or ASA II. When we compared the incidence of POST in both of these populations, no significant difference could be seen. The incidence of ASA II patients were marginally more (4.9%).

6. Level of expertise

Intubator Trained	POST		Total	Incidence	P-Value
	NO	YES			
NO	124	59	183	32.2%	Chi-Squared Test
YES	625	192	817	23.5%	Fisher's Exact Test (Sig. (1-sided))
	749	251	1000	25.1%	Fisher's Exact Test (Sig. (2-sided))

Results Table 1

7. Onset time

It was seen that the symptoms of POST surfaced most frequently at 8 hrs after extubation. Immediately after extubation, very few patients complained of POST.

8. Gender predisposition

Sex	POST		Total	Incidence	P-Value
	NO	YES			
Female	316	91	407	40.70%	P = 0.1136
Male	433	160	593	59.30%	
Total	749	251	1000	100.00%	

Results Table 2

Against earlier studies that showed that female gender was an independent risk factor for developing POST, our study results disapprove the same. Prevalance of POST was found more in male gender than females.

9. Number of Attempts

With increasing number of attempts, the chances for airway and soft tissue injury increases, which is one of the mechanisms for developing POST. The study showed expected results. With increasing number of attempts, the incidence of POST also increased.

10. Age pre-disposition

Age Groups (Years)	POST			Incidence	P-Value
	NO	YES	Total		
0.00 - 14.00	20	0	20	0.0%	<0.0001
15.00 - 28.00	140	39	179	21.8%	
29.00 - 42.00	161	109	270	40.4%	
43.00 - 56.00	215	65	280	23.2%	
57.00 - 70.00	207	37	244	15.2%	
71.00 - 84.00	6	1	7	14.3%	
Total	749	251	1000	25.1%	

Results Table 3

11. Duration of Surgery

Duration of surgery plays a major role in developing POST. The longer the inflated cuff remains in contact with the tracheal mucosa, the more are the chances for the patients to develop inflammatory changes in the tissues. The study shows that the incidence of POST is directly related to the hours of the surgery.

12. Cuff Pressure

Ratnaraj et al studied the effect of reducing ETT cuff pressures in 51 patients undergoing anterior cervical spine surgery. Patients were questioned at several post-operative time intervals, and they found that 74% of patients in the control group where cuff pressure was not adjusted complained of POST while only 51% of patients whose cuff pressures were adjusted to 20 mm Hg reported POST. Research also reflected a disparity between the sexes as 65% of women and only 35% of men reported POST. This study concludes that reducing ETT cuff pressures to 20 mm Hg may be helpful in decreasing POST⁽⁶⁾.

Our results show that cuff pressure shows a strong correlation to the incidence of sore throat. Greater the pressure in the cuff, greater prevalence of POST was noted.

Discussion:

The incidence of postoperative sore throat (POST) is as high as 100% in some studies, and is ranked as a patient's 8th most undesirable postoperative event⁽⁷⁾. The method of airway management has been shown to be the most significant predictor of POST, but the selection of an airway device is a multi-factorial decision based upon the patient and the procedure. Awareness of the variables associated with an increased incidence of POST can allow providers to minimize combinations of risk factors, reduce the incidence and severity of POST, and improve a patient's anesthesia experience.

We compared a number of patients and perioperative factors and their significance in contributing to POST. We analysed age, sex, weight, type of surgery, ASA grading, muscle relaxant used, emergency/elective cases, expertise of the intubator, number of attempts at intubation, type of ET tube, ID of the ET tube, duration of surgery and cuff pressure. We documented to incidence of POST in the cases. The time of onset was noted and also the severity of POST.

Many findings in the study matched the literature in results while others brought out differing conclusions.

Christenson reported the greatest frequency of POST in the age group of 30-49 years⁽⁸⁾. Higgings also reported an inverse association between age and sore throat⁽⁹⁾. In our study the maximum number of patients belonged in the age group of 57-69 years. However, the incidence of sore-throat was maximum in the age group 31-43 years. This equals with the studies done in the past.

P Biro et al in their analysis - Complaints of sore throat after tracheal intubation: a prospective evaluation⁽¹⁰⁾, concluded that the female

gender has greater incidence of POST. Our results however show that gender does not have a significant role to play in POST. In our study male population had a higher incidence of sore throat.

The appropriate ETT size in women and men is still unclear and debated in the anesthesia community⁽¹¹⁾. However, there seems to be some evidence that women benefit from a smaller size ETT⁽¹²⁾. In our study, the incidence of POST was highest with the ETT ID 8.5 and lowest with ID 7.

To the best of our information only Joergensen et al.⁽¹³⁾ have studied the location of POST as assessed by the patient. One reason for not asking about the precise location of POST may be that it is difficult to explain correctly. Despite the complexity of pain localization, we did find that our patients seem to be able to localize pain in the throat. We found that more patients located the pain below the larynx after an ETT compared to an LMA, probably due to the design and shape of the cuff in the ETT. Pain above the larynx, was more common after an LMA than an ETT (52% vs. 37%), which is likely because the LMA cuff exerts pressure on the mucosa above the larynx. However, pain above the larynx after an ETT could also be caused by laryngoscopy.

Higgings et al reported a direct association between duration of surgery and sore throat⁽¹⁴⁾. In another study by Sumathi, P. A., et al. they concluded that the incidence of developing POST was nearly 85% if the surgery time exceeded >240mins⁽¹⁵⁾. In our study patients showed an increasing trend with the increasing duration of surgery, with the incidence of POST 25.1% in cases that lasted more than 3.1 hrs.

The drugs used for inducing and maintaining anesthesia and their propensity to cause POST were studied in great detail by many researchers. We in our study tried to find the association with commonly used muscle relaxants. Suxamethonium was not used in any patient who had been included in the study. From our study, we concluded that although 28.6% of the patients who had POST was intubated with Rocuronium, the correlation was not significant, with a p-value of 0.711. Use of suxamethonium for intubation was associated with POST in a significant proportions of patients as per earlier studies with an incidence as high as 62%. No other anesthetic drug was found to have an association with sore throat.

A comparison of prevalence of POST between elective and emergency cases was done in our study. Routinely emergency surgeries are excluded because of variability in the pre-operative period in almost all studies done so far. It was seen that the prevalence of POST was higher in elective cases than emergency cases with incidence of 26.2% and 17.7% respectively.

Higgins in his research documented that - Patients with ASA physical status III had a significantly smaller risk of developing sore throat compared with patients with ASA physical status I and II (OR 0.45)⁽¹⁴⁾. In our study we had excluded all ASA III patients. However on analysis of the incidence of POST in ASA I & II patients, no significant correlation could be found and p-values for the same were 0.076 and 0.086 respectively.

Edomwonyi, N. P., et al. found that in 36 (58%) out of the 62 patients that complained of sore throat, tracheal intubation was carried out by experienced and senior anaesthetists (consultants and senior registrars)⁽¹⁸⁾. Tracheal intubation of 26 (42%) of the patients who had sore throat was performed by junior anaesthetists. With regard to skills of the anaesthetist, there was no statistical significant difference (P = 0.6175, OR = 0.8040; 95% CI: 0.4194 – 1.541).

Conflicts of interest

All authors have none to declare.

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