

## Postoperative Throat Complications after Tracheal Intubation

N. P. Edomwonyi, I. T. Ekwere, E. Omo and A. Rupasinghe

Department of Anaesthesiology, University of Benin Teaching Hospital, Benin City, Nigeria  
Reprint requests to: Dr. N.P. Edomwonyi, Department of Anaesthesia, University of Benin Teaching Hospital,  
P. M. B. 1111, Benin City, Nigeria. E-mail: [osaphilo@yahoo.com](mailto:osaphilo@yahoo.com)

### Abstract

**Background:** A prospective study was carried out to determine the incidence of sore throat after endotracheal intubation and the associated causative factors.

**Methods:** Two hundred patients aged 18-77 years who had surgery over sixteen months were studied. Sizes 7mm - 8.0mm internal diameter (I.D) portex endotracheal tubes with cuff were used for females while sizes 8.5mm - 9.0mm I.D were used for males. A standardized form was used to collect patients' details, types of surgery, technique of airway maintenance and number of attempts at intubation. The use of nasogastric tubes, throat pack, duration of intubation and status of the anaesthetists were also noted. The presence of sore throat and other throat complications were determined within 24 - 36 hours after surgery.

**Results:** One hundred twenty six (63%) patients experienced throat complications. The incidence of sore throat was similar in both males and females. There was no statistically significant difference  $P=1.0000$ , odd ratio = 1.035, 95% CI: 0.5064 - 2.115. There was no statistical difference between the group whose tubes were lubricated and the one without tube lubrication.  $P = 0.5296$ , odds ratio - 1.255; 95% CI: 0.6702 - 2.351. There was statistically significant difference between the incidence of throat complications in throat related surgery and non- throat related surgery.  $P=0.0001$ , odds ratio-9.771, 95% CI: 3.065-31.148. Multiple attempts at intubation did not contribute to the development of sore throat. Duration of intubation greater than 60 minutes contributed to a higher incidence of throat complications and it was considered statistically significant.

**Conclusion:** Routine endotracheal intubation can result in trauma and pathological changes, which could lead to postoperative throat symptoms. There is need to further evaluate if the use of smaller sized endotracheal tubes could reduce the incidence of throat complications.

**Key words:** Postoperative, sore throat, endotracheal intubation

### Résumé

**Fond:** Une étude éventuelle a été effectuée pour déterminer l'incidence de l'angine après l'intubation endotrachéale et les facteurs causatifs associés.

**Méthodes:** Deux cents malades âgés de 18-77 ans qui ont eu la chirurgie pendant une période de seize mois ont été étudiés. Des tailles des tubes endotrachéaux de portex du diamètre interne (D.I) de 7mm – 8,0mm avec la manchette ont été utilisés pour des femelles tandis que des tailles D.I de 8,5mm - de 9,0mm ont été employées pour des mâles. Une forme normalisée a été employée pour rassembler les détails de malades, les types de chirurgie, la technique de l'entretien de voie aérienne et le nombre de tentatives d'intubation. L'utilisation des tubes gastriques, l'enveloppement de pharynx, la durée de l'intubation et le statut des anesthésies ont été également notés. La présence de l'angine et d'autres complications pharyngées ont été déterminées dans un délai de 24 - 36 heures après chirurgie.

**Résultats:** 126 (63%) malades ont eu des complications pharyngées. L'incidence de l'angine était semblable dans des mâles et des femelles. Il n'y avait aucune différence statistiquement significative  $P=1,0000$ , rapport des cotes = 1,035, 95% CI : 0,5064 – 2,115. Il n'y avait aucune différence statistique entre le groupe dont les tubes ont été lubrifiés et celui sans lubrification de tube.  $P = 0,5296$ , rapport des cotes – 1,255 ;95% CI : 0,6702 - 2.351. Il y avait de différence statistiquement significative entre l'incidence des complications de pharynx dans les chirurgie pharyngées et non-pharyngées.  $P=0.0001$ , rapport des cotes –9,771,95%CI : 3,065-31,148. Les tentatives multiples d'intubation n'ont pas contribué au développement de l'angine. La durée d'intubation plus grande que 60minutes a contribué à une incidence plus élevée des complications pharyngées et on l'a considéré statistiquement significatif.

**Conclusion:** L'intubation endotrachéale courante peut avoir comme conséquence le trauma et les changements pathologiques, qui pourraient mener aux symptômes pharyngés postopératoires. Il y a le besoin d'évaluer de plus si l'utilisation de plus petits tubes endotrachéaux pourrait réduire l'incidence des complications pharyngées.

**Mots clés:** Postopératoire, angine, intubation endotrachéale

## Introduction

Sore throat is a common postoperative problem following the use of endotracheal intubation during general anaesthesia. The incidence of sore throat varies from 14.4-50%<sup>1-4</sup> after endotracheal intubation and from 5.8% to 34% after laryngeal mask insertion.<sup>4,5</sup> Patients tend to concentrate more on symptoms directly related to the operation site and may not consider sore throat as important but it can be quite distressing to the patient. Different factors have been implicated and they include the tracheal tube size, type of tube, cuff contours and pressure of the tube cuff, multiple attempts at endotracheal intubation, duration of intubation, and also the type of surgery (such as throat related surgery).<sup>6,7,8</sup>

A prospective study was carried out to determine the incidence of sore throat after endotracheal intubation and the associated causative factors in the Nigerian population.

## Patients and Methods

Two hundred patients aged 18-77 years who had surgery over sixteen months were studied. There were 154 females (77%) and 46 (23%) males that had undergone different surgical procedures. Patients that had sore throat or throat complications before surgery were excluded from the study. Size 7mm-8.0mm internal diameter (I.D) portex endotracheal tubes with cuff were used for females while sizes 8.5mm-9.0mm I.D were used for males.

One hundred and twenty five (87.5%) endotracheal tubes were lubricated with K-Y jelly while seventy-five (37.5%) were not. Endotracheal tubes were inflated with air until no leaks were heard. All patients had a Guedel oropharyngeal airway inserted after intubation. The technique of anaesthesia varied from spontaneous to controlled ventilation.

A standardized form was used to collect patients' details, types of surgery, technique of airway maintenance and number of attempts at intubation. The use of nasogastric tubes, throat packs, duration of intubation, and status of the anaesthetist were also noted. All the patients were interviewed in the postoperative period within 24-36 hours after surgery. The presence of sore throat: pain during swallowing; hoarseness of voice, dryness of the throat, and cough were noted. The throat related complications were managed accordingly.

The data was entered into Excel spreadsheet and is presented as frequency and percentages. Statistical analysis was done using InStat Graph Pad tm. The

data was analyzed using the Fisher's exact test.  $P < 0.05$  was considered significant.

## Results

Two hundred patients were studied. One hundred and twenty six patients (63%) experienced throat complications ranging from sore throat to cough and hoarseness. Sore throat occurred in 62 (49%) patients, cough 45 (36%) and dryness of the throat 19 (15%).

Sixty-two patients (49%) complained of sore throat. Out of the patients that complained of sore throat, 48 (77.4%) were females and 14 (22.6%) were males. There was no statistically significant difference between males and females ( $P = 1.0000$ , Odds ratio = 1.035, 95% CI; 0.5064 – 2.115).

Table 1 shows the incidence of sore throat in relation to the number of attempts at intubation. There was no statistically significant difference between one attempt and more than one attempt ( $P = 0.8036$ , Odds ratio = 0.8382; 95% CI: 0.3007 – 2.337.4).

Forty one (66%) of the patients that complained of sore throat had had their tubes lubricated while the tubes of 21 (34%) patients were not lubricated. The incidence of sore throat was similar in both groups. There was no statistically significant difference between the two groups ( $P = 0.5296$ , OR = 1.255; 95% CI: 0.6702 – 2.351 using Fisher Exact test).

Throat pack and nasogastric tube insertion were associated with a high incidence of sore throat. 8 patients had throat packs/nasogastric tubes out of which 6 (75%) complained of throat complications. Out of 192 (96%) patients that did not have throat packs/nasogastric tubes, 126 (66%) had throat complications.

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). 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).

Table 2 shows the relationship between the type of surgery and the incidence of sore throat. A greater incidence of sore throat (78%) was recorded among patients who had thyroidectomy and throat – related surgery. It was considered significant ( $P < 0.0001$ , Odds ratio = 9.771, 95% CI: 3.065 – 31.148 using the approximation of Woolf).

The duration of intubation ranged from 15-280 minutes. Table 3 shows the incidence of sore throat

in relation to duration of tracheal intubation. The incidence of sore throat was higher in patients with duration of intubation greater than 60 minutes (statistically significant;  $P=0.0122$ , Odds ratio=0.4309; 95% CI: 0.2261 – 0.8212).

The patients that complained of sore throat were managed with dequadrine lozenges. 22 of the patients had cough syrup (Benylin expectorant) and antibiotics, while few were managed with menthol steam inhalation.

Table 1: Incidence of throat complications in relation to the number of attempts at intubation

No. of attempts	No. of patients intubated (%)	No. of patients with throat complications (%)
1	182 (91)	114 (90.5)
>1	18 (9)	12 (22.6)
Total	200 (100)	126 (100)

Table 2: Type of surgery and incidence of sore throat

Type of surgery	Total No.	No. with sore throat (%)	No. without sore throat (%)
Thyroidectomy, oral/ throat	18	14 (77.78)	4 (22.22)
Obstetrics and gynaecology	77	19 (24.67)	58 (75.31)
General	49	17 (34.69)	32 (65.31)
Orthopaedics	14	5 (35.71)	9 (64.29)
Urology	28	3 (10.71)	25 (89.29)
Cardiothoracic	14	4 (28.57)	10 (71.43)
Total	200	62 (31.00)	138 (69.00)

Table 3: Relationship between duration of intubation and throat complications

Duration of intubation	No. with throat complications (%)	Total (%)
<60	25 (19.8)	52 (26)
≥60	101 (80.2)	148 (74)
Total	126 (100)	200 (100)

## Discussion

Sore throat following the use of endotracheal intubation and laryngeal mask airway is a common minor complication.<sup>1-3,9</sup> The incidence of sore throat obtained in our study was 31%. This was slightly lower than those obtained in similar studies that reported an incidence of 32 – 63%<sup>1,10</sup> but higher than findings by McHardly and Chung.<sup>11</sup> In the study carried out by Obiaya et al, sore throat was the third commonest postoperative complication.<sup>2</sup>

Tracheal tube size has been shown to be an important contributory factor and it has been clearly demonstrated that the use of a small tracheal tube reduces the incidence of sore throat.<sup>1, 6,7,10</sup> This is because of the decreased pressure at the tube-mucosal interface using smaller tubes. In our centre we use sizes 7.5 mm and 8.0 mm portex tubes for women and 8.5 – 9.0mm for males.

Other factors, which have been found to be related to the incidence of sore throat, include (tube, length, shape/conformity, tube design, cuff contours and pressure of the tube cuff i.e. cuff contact area.<sup>6,7,8,12</sup> In our centre, we use high volume/low pressure cuffs made of Polyvinyl Chloride (Portex). High pressures are needed to inflate cuffs of standard red rubber

endotracheal tubes because their shape does not conform to that of the trachea. The high pressure is concentrated on a small area of the tracheal wall, impairing capillary blood flow in the underlying tracheal mucosa.<sup>6, 13 - 15</sup> Also prolonged high cuff pressures could lead to distension of the trachea with eventual erosion of the cartilaginous rings. It has been shown that by using high volume, pre shaped, low-pressure cuffs made of non-irritant material; the severity of tracheal injury can be minimized.<sup>6</sup>

Our study further confirms reports from other centres, which found no significant difference in the incidence of sore throat between sexes.<sup>7, 10</sup> In the studies carried out by Obiaya et al and Chung et al, the incidence was highest in the younger age group<sup>2, 16</sup> and significantly higher in females than in males.<sup>2,4, 16</sup>

Some authors reported that multiple attempts at endotracheal intubation do not affect the incidence of throat complications.<sup>5, 10</sup> Our study showed that multiple attempts at intubation was also not a contributory factor for the development of sore throat.

Insertion of throat packs or nasogastric tubes intra operatively had a significant effect on the incidence of throat complications. Marais et al<sup>13</sup> studied the relationship between the insertion of throat packs and the development of sore throat and noted an increased

incidence. Other studies also reported an increased incidence between the use of nasogastric tubes and the development of sore throat.<sup>1, 10</sup> Most of the patients who had throat related surgery developed sore throat. The increased incidence after thyroid surgery and throat related surgery may be due to many factors. It is known that movement of the tube and cuff in the trachea increases the risk of postoperative throat complaints and because these patients lie on the operation table with their heads fully extended, the tip of the tube may move 3 – 4 cm.<sup>17</sup> Duration of surgery and therefore intubation is claimed not to correlate with the incidence of sore throat.<sup>8</sup> However the findings from our study is supported by that of Kloub et al<sup>10</sup> where a greater incidence of sore throat was found in the longest intubation group.

Our findings further confirmed the findings in previous studies which reported that lubrication of tubes does not reduce the incidence of sore throat.<sup>18, 19</sup> Lubrication with 1% hydrocortisone<sup>18</sup> and lidocaine spray<sup>20</sup> was also found to increase the incidence of sore throat.<sup>18</sup>

Kloub et al<sup>10</sup> reported that the experience of the anaesthetist did not affect the incidence of sore throat. Our study showed a similar finding. Some authors studied the incidence of sore throat using different types of endotracheal tubes. They concluded that the incidence of sore throats after intubation could be significantly reduced by using the Brandt Anaesthesia tube.<sup>12</sup>

The other measures recommended to prevent trauma to the pharynx, larynx and trachea include the use of steroid coated endotracheal tubes<sup>21</sup> and inhalation of steroids.<sup>22</sup> The use of intravenous<sup>23</sup> and transdermal ketoprofen<sup>24</sup> has been found to reduce the severity of sore throat after general anaesthesia with laryngoscopy and tracheal intubation. Postoperative throat complaints frequently arise after tracheal intubation for general anaesthesia in the first two postoperative days, but they are of limited intensity and duration.<sup>25</sup>

Routine endotracheal intubation can result in trauma and pathological changes, which could lead to postoperative throat symptoms. Careful and skillful techniques during intubation could reduce these throat complications. There is need to further evaluate the use of different types of portex endotracheal tubes.

#### Acknowledgement

We are grateful to the nursing staff in the wards, for their support during the period of this study. Our thanks also go to Ugieosa Ima – Edomwonyi, who assisted in preparing the manuscript.

#### References

- Christensen AM, Willemoes-Larsen H, Lundby L, Jokobsen KB. Postoperative throat complaints after tracheal intubation. *Br J Anaesth* 1994; 73: 786 – 787
- Obiaya MO, Okechukwu C, Dakaraju P et al. The incidence of post anaesthetic complications-a follow-up programme. *West Afr J Med* 1984;3:165-169
- Harding CJ, McVey FK. Interview method affects incidence of postoperative sore throat. *Anaesthesia* 1987; 47: 1104 –1107
- Higgins PP, Chung F, Mezei G. Postoperative sore throat after ambulatory surgery. *Br J Anaesth* 2002; 88:582-584
- Herlevsen P, Bredahl C, Hunsholm K, Kruhofferr PR. Prophylactic laryngo-tracheal aerosolized lidocaine against postoperative sore throat. *Acta Anaesthesiol Scand* 1992; 36: 505 – 507
- Hinds CJ. *Intensive care: a concise textbook*. Bailliere-Tindall, London, 1988; 227 – 266
- Sout DM, Bishop MJ, Dwersteg JF, Cullen BF. Correlation of endotracheal tube size with sore throat and hoarseness following general anaesthesia. *Anesthesiology* 1987; 67: 419-421
- Hahnel J, Treiber H, Konrad F, Mutzbauer T, Steffen P, Georgieff M. Performance characteristics of a novel reusable intermediate-volume, low pressure cuffed endotracheal tube. *Acta Anaesthesiol Scand* 1994; 38: 363-367
- Joshi GP, Inagaki Y, White PF et al. Use of the laryngeal mask airway as an alternative to the tracheal tube during ambulatory anaesthesia. *Anesth Analg* 1997; 85:573 – 577
- Kloub R. Sore throat following tracheal intubation. *Middle East J Anesthesiol* 2001; 16: 29 – 40
- McHardy FE, Chung F. Postoperative sore throat: cause, prevention and treatment. *Anaesthesia* 1999; 54: 444 – 453
- Mandoe H, Nikolajsen L, Lintrup U, Jepsen D, Molgaard J. Sore throat after endotracheal intubation. *Anesth Analg* 1992; 74: 897 – 900
- Marais J, Prescott RJ. Throat pains and pharyngeal packing: a controlled randomized double blind comparison between gauze and tampon. *Clin Otolaryngol* 1993; 18: 426-429
- Jensen PJ, Hommelgaard P, Sondergaard P, Eriksen S. Sore throat after operation: influence of tracheal intubation, intra cuff pressure and type of cuff. *Br J Anaesth* 1982; 54: 453 – 457
- Combes X, Schavuliege F, Peyrouset O et al. Intracuff pressure and tracheal morbidity: influence of filling cuff with saline during nitrous oxide anesthesia. *Anesthesiology* 2001; 95: 1120-1124
- Chung F, Mezei G, Tong D. Adverse events in ambulatory surgery- a comparison between elderly and younger patients. *Can J Anaesth* 1999; 46:309-321
- Christiansen CL, Koch J, Halkier P. Throat complaints following brief intubation. *Ugeskrift for Laeger* 1986; 148: 1143-1146
- Loeser EA, Stanley TH, Jordan KB. Postoperative sore throat: influence of tracheal tube lubrication versus cuff design. *Can Anaesth Soc J* 1980; 27: 156-158

19. Stride PC. Postoperative sore throat; topical hydrocortisone. *Anaesthesia* 1990; 45:968 – 971
  20. Marayama K, Sakai H, Miyazawa H et al. Sore throat and hoarseness after total intravenous anaesthesia. *Br J Anaesth* 2004; 92: 541-543
  21. Ayoub CM, Ghobashy A, Koch ME. Widespread application of topical steroids to decrease sore throat, hoarseness and cough after tracheal intubation. *Anesth Analg* 1998; 87:714-716
  22. El-Hakim M. Beclomethasone prevents postoperative sore throat. *Acta Anaesthesiol Scand* 1993; 37:250-252
  23. Basto ER, Waintrop C, Mourey FD, Landru JP, Eurin BG, Jacob LP. Intravenous ketoprofen in thyroid and parathyroid surgery. *Anesth Analg* 2001; 92:1052-1057
  24. Masayuki O, Kouichiro M, Takeyoshi S, Akio S. Transdermal ketoprofen mitigates the severity of postoperative sore throat. *Can J Anaesth* 2001; 48: 1080-1083
  25. Biro P, Seifert B, Pasch T. Complaints of sore throat after tracheal intubation: a prospective evaluation. *Eur J Anesthesiol* 2005;22: 307-311
-