

CAUSES OF COMPLICATIONS OF THE LUNG ARTIFICIAL VENTILATION APPARATUS CHARACTIRISTICS

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Abstract:

The article is devoted to the peculiarities of the diagnosis of post-intubation complications, in particular, tracheal stenosis. The materials of treatment of 132 patients with neurosurgical and neurological profiles during prolonged intubation were studied. A retrospective analysis of 263 autopsies was carried out. Postmortem changes in tracheal tissue were noted in 4.5% of men and 0.7% of women. A prospective analysis revealed various postintubation complications in 69% of patients. Early complications prevailed (4-6 days) endobronchitis 2 and 3 art. in 13.6%, bedsores of the trachea and fibrin tracheitis in 7.6%, bedsores of the vocal cords in 3.8%, edema of the supravascular space in 3%. Late complications (more than 10 days) were represented by inflammatory stenosis in 9.8%, cicatricial stenosis in 6.8%, tracheoesophageal fistula in 1.5%. Expiratory stenosis (supra or infrastenotic malformation) occurred in 6.9% of patients. Postintubation complications are more common in men than in women; postmortem changes in the trachea are 15 times lower than the frequency of life-time diagnosed postintubation complications. There was no connection between purulent endobronchitis and the frequency of tracheal stenosis formation.

Keywords: prolonged tracheal intubation; complications; fibrotracheobronchoscopy stenosis.

Introduction

The problem of postintubation complications, primarily tracheal stenoses, despite many years of development, is far from being solved and remains one of the urgent issues of modern medicine in general and endoscopy in particular. According to various authors, the incidence of postintubation complications with prolonged artificial lung ventilation (ventilator) through an orotracheal tube or tracheostomy ranges from 0.1% to 90% [1-4]. Tracheal strictures after intubation are diagnosed from 0.2% to 25% of patients, on

average in 4-6% [5]. Many authors consider tracheal injury to be the most likely cause.: for every 100 intubations, there are from 20 to 50 injuries [6-8]. The authors do not come to a consensus on the timing and frequency of postintubation complications. At the same time, patients with post-intubation changes in the trachea are not definitively differentiated by gender, age and main disease, which could complement the main picture and determine additional directions in the prevention of these complications in certain groups of patients.

The purpose of the study

To study the frequency and structure of postintubation complications during prolonged ventilation in the intensive care unit in patients with neurosurgical and neurological profiles during prolonged tracheal intubation.

Material and methods

The work includes the results of a retrospective analysis of the results of treatment and autopsy of 5,263 deceased patients (202 men, 61 women) who were on long-term ventilation (more than 10 days) in the departments of RAO and FIOR in 2001-2005. In retrospective analysis, changes in the trachea were observed according to autopsy protocols. In addition, the results of a prospective cohort study conducted among 132 patients with TBI and strokes (69 men, 63 women) in these departments in 2005-2007 who survived a period of prolonged ventilation were studied. Gender, age, basic diagnosis, timing of occurrence and nature of post-intubation changes of the trachea were taken into account. In a prospective study, all patients underwent fibrobronchoscopy. Indications for this study were predicted tracheal intubation (ventilator) for more than 4 days. Fibrobronchoscopy was performed under local anesthesia of 1% of the wound: it was performed under local anesthesia with 1% dicaine solution (5.0 ml) through an intubation tube or tracheostomy. When the cuff was unfilled, the tube was pulled up to inspect the place where the cuff was standing. The amount and nature of TBD secretion, tracheal mucosa, and relief were visually assessed. Attention was paid to hyperemia, swelling of the mucous membrane at the site (i.e. cuffs, defects, fibrin plaque on the walls, the cause of narrowing of the lumen, inflammatory or scarring. The vocal folds were examined, their symmetry and mobility were assessed, as well as the supravascular and subclavian spaces. Endoscopy was performed on the 4th, 6th, and 10th days after intubation and before extubation and/or before tracheostomy.

Statistical processing of the data was carried out according to the Statistica 6.0 program using the Mann-Whitney criterion and χ^2 . The critical level of significance when testing statistical hypotheses in this case.

As can be seen, the overwhelming majority of patients subjected to prolonged ventilation were men of working age. The absolute majority of the examined patients had the following diagnoses: craniocerebral or spinal injury in 254 people, volumetric

brain process in 41 people, vascular diseases of the brain in 56 Words. The autopsy results are presented in Table 2. Of the 263 deceased (202 men, 61 women), changes in the trachea were detected in 14 patients (12 men, 2 women; $\chi^2 = 0.60$; $df = 1$; $p = 0.41$). Men were mostly exposed to prolonged ventilation, and the majority of complications were also detected in men - 4.5%. It should be borne in mind that these data are clearly limited, since such changes are not always recorded against the background of the leading cause of death.

A prospective analysis of the treatment of 132 patients revealed various postintubation complications in 91 people (69%). The structure of the identified complications according to the results of fibrobronchoscopy with prolonged ventilation is presented. Most often, signs of purulent-necrotic changes were found on the 4th and 6th days: endobronchitis 2 and 3 art., fibrinous tracheitis, tracheal and vocal cord protrusion, granulation and swelling of the suprasplastic and subclavian spaces, protrusion and paresis of the vocal cords. Inflammatory narrowing of the lumen occurred both in the early stages (4th and 6th days), and at the time and after the imposition of a tracheostomy, and after extubation. At a later date (from 10 days), formed organic changes were encountered: tracheoesophageal fistula and cicatricial strictures of the trachea (for several months). During the prospective analysis, the frequency and types of stenotic changes in the trachea were evaluated in dynamics.

The frequency of postintubation stenoses was 16.7%. In terms of gender, men predominated in this group. Significant differences in the frequency of scarring were inflammatory narrowing. Cicatricial stenoses were also localized in the upper third, their length was 1-2 rings of the trachea. In the middle third of the trachea, stenoses were noted in 2% of observations, multilevel stenoses occurred in 1% of observations. In one patient in this group, we observed multilevel stenosis. The tracheal lumen narrowed to 1.0 cm in diameter, extending along 1 ring, with localization in the upper and middle third of the trachea. Deformation of the tracheal lumen was noted throughout. Tracheal fistula was found in two patients, with localization in the upper and middle third of the trachea. Expiratory tracheal stenosis (local hypotension, malacia) is more severe than bed sore or stenosis or at the level of tracheal bed sore in 9 patients (6.9%), of which 2 men (1.5%) and 7 women (5.3%).

Discussion

The true frequency of postintubation complications remains controversial and is subject to further study [1, 4, 9-11]. The interest in the frequency and structure of early postintubation complications is determined by their significance as prognostic risk factors for the occurrence of long-term complications of prolonged ventilation - cicatricial stenosis of the trachea and bronchi. The assessment of the frequency of such complications varies significantly. For example, in a retrospective study, the overall incidence of post-incubation complications was low and amounted to only 5.3%, while some authors indicate.

Our data from a prospective analysis showed that inflammatory changes in the trachea during prolonged intubation are more common than in every second patient. According to many authors, along with such indisputable causes in the occurrence of post-tubal complications and stenosis as a negative effect on the tracheal mucosa of an inflated cuff of an intubation tube or tracheostomy, the attachment of an infection resulting from aspiration, leakage of contents from the oropharynx, and attachment of nosocomial infection plays an important role [5, 13]. At the same time, prospectively, during prolonged ventilation in 24 people (26%) among 91 patients with complications, we detected stenotic changes in the trachea.

During the five-year period we analyzed, we did not find any cases of the relationship between the occurrence of tracheal stenosis and the presence of purulent endobronchitis (when assessing the relationship of factors, sensitivity was 55%, specificity 30%, $p = 0.05$). This may indicate that purulent inflammation is not such a significant factor and requires additional consideration of this problem.

According to the results of our studies, the frequency of post-intubation complications, including tracheal stenosis, turned out to be significantly lower than the literature data. In our studies, there was a clear predominance of men in terms of the frequency of intubation complications. Apparently, the male sex may be a risk factor for post-intubation complications, 1. which is consistent with the data of N.V. Lafutkina [6], but contradicts other sources [14]. The timing of post-intubation complications in the literature is subdivided into inflammatory 2 - stenosis, which occurred from 7 to 14 days of intubation and/or tracheostomy [6]. According to our data, 9.8% of inflammatory tracheal stenoses were detected already on the 6th day from the moment of intubation and later. We have revealed that post-operative complications, according to Lafutkina N.V., occur within a period of more than 14 days from the moment of intubation. At the same time, during intubation for 10 days or more, we detected scarring changes of 6.7%, which is not consistent with the 1st literature data [6]. In general, during the period of prolonged ventilation 1. In 11 people (12% of 91 patients with complications), we revealed already formed changes in the trachea - cicatricial stenoses and organ fistulas. However, according to some authors, for the non-occurrence of post-intubation tracheal stenosis, only the intubation period of more than 10-12 days is important [15].

Conclusions

The frequency of postintubation complications during targeted examination exceeds the revealed pathoanatomical findings by 15 times (4.5% vs. 69%). The male sex can be a predictor of the risk of postintubation complications, since the frequency of postintubation complications in men is 5 times higher than that of women. During prolonged tracheal intubation, stenotic changes of the trachea are formed in 18% of cases, but no association with purulent endobronchitis was found among such patients (sensitivity was 55%, specificity -30%, $p > 0.05$).

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