

Clinical and endoscopic diagnostics of foreign bodies of the respiratory tract in children

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ABSTRACT

For the period from January 2000 to June 2019, 1355 children with suspected foreign bodies of the respiratory tract were inpatient treatment and examination in the department of thoracic surgery of the 2 SamMI clinic. The main group of children consisted of children of the first 7 years of life (88.6%), of which the most numerous was the group of children of early age (56.3%). Of the 1355 children hospitalized with suspected foreign bodies of the respiratory tract, 407 (30.0%) had the diagnosis excluded, and 948 (70.0%) had the diagnosis confirmed.

Among the examined patients, 858 boys (63.3%) prevailed, compared with 497 girls (36.7%). Children from rural areas prevailed 4.5 times over urban areas, 1107 (81.7%) versus 248 (18.3%). 1162 (85.8%) children were admitted in a moderately serious condition. A serious condition was noted in 167 (12.3%) patients. An extremely serious condition when seeking help was observed in 24 (1.8%) children. In addition, children who aspirated organic foreign bodies into the respiratory tract 759 (80.1%) significantly prevailed, compared with children who aspirated inorganic foreign bodies 172 (18.1%). 17 (1.8%) have self-withdrawal.

Keywords: *bronchoscopy, foreign bodies.*

Introduction

Removal of foreign bodies from the bronchi is the oldest problem in bronchopulmonology. It was for the extraction of a foreign body from the right main bronchus in 1897 that G. Killian performed the world's first bronchoscopy using a rigid esophagoscope. The creation of flexible bronchoscopes and video bronchoscopes, as well as the availability of special extractors in the arsenal of endoscopists, opens up wide opportunities for improving the diagnosis of foreign bodies of the bronchi [6, 7].

Main Part

Bronchoscopy for aspirated foreign bodies is not only a diagnostic but also a medical procedure [9]. Often, in the absence of radiographic data and clear anamnestic indications of the possibility of aspiration, doctors refuse to perform bronchoscopy [8]. Many authors [2, 5, 10] pointed out that complete occlusion of the bronchus by a foreign body is the main pathogenetic cause of bronchial stenosis and the development of the inflammatory process in the suprasthenotic section of the lung. Therefore, knowledge of the clinical picture allows you to choose the correct treatment tactics and avoid serious complications.

The purpose of the work is to evaluate the data of clinical and X-ray symptoms and endoscopic picture of foreign bodies of the bronchi and to develop therapeutic tactics depending on the duration of the presence of foreign bodies in the tracheobronchial tree.

Materials and methods

For the period from January 2000 to June 2019, 1355 children with suspected foreign bodies of the respiratory tract were inpatient treatment and examination in the department of thoracic surgery of the 2 SamMI clinic.

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Of the 1355 children hospitalized with suspected foreign bodies of the respiratory tract, 407 (30.0%) had the diagnosis excluded, and 948 (70.0%) had the diagnosis confirmed.

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1162 (85.8%) children were admitted in a moderately serious condition. A serious condition was noted in 167 (12.3%) patients. An extremely serious condition when seeking help was observed in 24 (1.8%) children.

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The nature of the symptoms depends on the type of foreign body and the duration of its presence in the bronchi, which, according to our data, can range from several hours to several years. The stay of a foreign body in the bronchus > 24 h should be considered long [1, 3, 4].

In the first hours after the ingress of a foreign body into the bronchi, 9 patients had a persistent cough, 6 - paroxysmal.

The greatest diagnostic difficulties arise when foreign bodies have been aspirated for a long time, since patients have no characteristic anamnestic data.

With a long stay of a foreign body in the bronchi, all patients (100%) complained of a constant cough with sputum.

Results of our own observations

Upon admission, all patients underwent an X-ray examination of the chest organs, in which foreign bodies were detected in 26.6% of people.

In the rest of the patients, foreign bodies were not found, since they were non-radiopaque.

For rigid bronchoscopy, breathing bronchoscopes "Karl Storz" are most often used, provided with a ventilator. RBS can be performed with preserved spontaneous breathing using inhalation anesthetics or against the background of mechanical ventilation. The first type of anesthesia is used quite often, however, insufficient depth of anesthesia and hypoventilation can cause laryngospasm and bronchospasm [1, 3]. For the induction and maintenance of anesthesia during RBS, halogen-containing inhalation anesthetic sevoflurane or intravenous (iv) propofol is most often used [4, 5]. Muscle relaxation is provided by succinylcholine. After intravenous administration of muscle relaxants, the trachea is intubated with a bronchoscopy, followed by bronchoscopy. Mechanical ventilation is carried out through the tube of the bronchoscope. Tubes of rigid bronchoscopes have a wide canal with a small outer diameter, which allows you to freely perform bronchial sanitation even in newborns (including premature babies). The presence of an additional channel for the introduction of instruments provides the possibility of biopsy and surgical endobronchial interventions without the development of alveolar hypoventilation. If video monitoring with the study recording is necessary, it is possible to connect a video camera with direct and side optics [5, 6].

Despite the provision of adequate ventilation during endoscopic examination, RBS has a number of disadvantages: the risk of injury, edema of the vocal cords and subglottic space increases due to the age-related anatomical features of the child's airways. The difficulty of access and examination of the vocal cords, the impossibility of visualizing the upper lobe and segmental bronchi - all this limits the use of RBS in pediatric practice. To minimize complications, it is necessary to adequately select the size of the rigid bronchoscope tube in accordance with the age group [6].

To remove foreign bodies, special extractors were used.

The indication for diagnostic bronchoscopy in 27 patients with long-aspirated foreign bodies was a prolonged, recurrent suppurative process in the lungs that did not respond to traditional therapy. 18 patients, in whom no pathology was detected on radiographs, consulted a doctor due to prolonged persistent cough and hemoptysis.

All patients during the 1st diagnostic bronchoscopy around foreign bodies had a pronounced inflammatory shaft, which sharply narrowed the lumen of the bronchus. In addition, foreign bodies were completely closed with granulations, which were located on the walls of the main bronchi in 5 patients, in the upper lobe bronchus on the right - in 1, in the intermediate bronchus on the right - in 8, in the lower lobe bronchus on the right - in 10, on the left - in 13, in the mid-lobe bronchus - in 7. Granulations were gray, lobular, dull, soft, bleeding easily with instrumental palpation, in appearance they were very similar to tumor tissue. When taking a biopsy from the granulations, foreign bodies were found.

Beans, seeds of an apple, orange, sunflower, pieces of meat, liver, if they enter the bronchi, are especially dangerous, since, swelling, they obstruct the lumen of the bronchus. Removing them presents significant difficulties: when fixing the instrument, such foreign bodies are easily fragmented. The edematous mucous membrane of the bronchus is often injured, which causes bleeding during extraction and makes it impossible to further perform therapeutic endoscopic intervention.

It is generally accepted that the method for studying capillary blood circulation is non-specific. The

following foreign bodies were extracted from the patients: bones and pieces of meat, fish bones, cartilage, sunflower and apple seeds, beans, pieces of liver, cloves of garlic, onions, herbs, a piece of pepper, a membrane from a walnut, a sprig of spruce, foil, pieces of glass, button, teeth and dental crowns, pipette. Their sizes were cut from 0.5 to 2 cm.

During diagnostic bronchoscopy, 5 patients were found to have a nail (1), shurupas (2), a ballpoint pen cap (2). All patients underwent rigid bronchoscopy in the operating room under general anesthesia, during which lavage was performed to wash off pus and granulate. Under the influence of lavage fluid, the edema of the mucous membrane decreased, the foreign body was gradually freed from granulations and became available for capture by the extractor.

After the removal of long aspirated foreign bodies, narrowing and deformation of the bronchus, granulation at the place of fixation of the foreign body remained in all patients. Subsequently, 1 to 5 courses of sanitation bronchoscopy were performed. At the end of the 1st course of sanitation bronchoscopy, patients underwent bronchography or CT to assess the condition of the bronchi of the long-term atelectasized part of the lung. All patients were diagnosed with deforming bronchitis based on the following symptoms. Small bronchi, U-UP orders, did not narrow to the periphery, but looked like tubes of the same caliber throughout. The contours of the affected bronchi are jagged, their outlines are uneven. The lumen of the bronchi is uneven: areas of expansion alternated with areas of narrowing of the bronchus. Some of the bronchi of the IV-VI orders were not contrasted, and they looked as if chopped off. The most constant and characteristic sign of deforming bronchitis is the absence of filling small bronchial branches with a contrast agent.

Findings:

1. 73.4% of foreign bodies of the bronchi are not radiopaque, therefore, with a persistent course of chronic suppurative process in the lung and negative data of an X-ray examination, one should resort to diagnostic bronchoscopy.

2. Prolonged stay of a foreign body in the bronchi leads to the development of an inflammatory process in the lung, in particular deforming bronchitis and bronchial stenosis, which is an indication for medical bronchoscopy after removal of the aspirated object.

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