ISSN: 2692-5206
AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

DIAGNOSIS AND SURGICAL TREATMENT OF BRONCHIECTASIS IN CHILDREN

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Abstract: Bronchiectasis is a chronic respiratory disease characterized by abnormal dilation of the bronchi, which leads to persistent cough, sputum production, and recurrent respiratory infections. In pediatric populations, bronchiectasis can occur for a variety of reasons, including infections, congenital anomalies, and immunodeficiency. This article reviews the methods of diagnosis and surgical treatment of bronchiectasis in children, emphasizing the importance of early detection and intervention. Bronchiectasis in children requires prompt diagnosis and tailored treatment strategies to prevent morbidity and improve long-term outcomes. Surgical approaches can provide significant benefit for selected patients, emphasizing the need for individualized management plans based on etiology and disease severity.

Key words: bronchiectasis, pediatrics, chronic cough, surgical treatment, segmentectomy, bronchial resection, cystic fibrosis.

Bronchiectasis is defined as permanent dilatations of bronchi with destruction of the bronchial wall. Bronchiectasis was first described by Laenec in 1819 and, before the antibiotic era, was considered a morbid disease with a high mortality rate from respiratory failure and cor pulmonale. The clinical picture varies greatly and may involve repeated respiratory infections alternating with asymptomatic periods or with chronic production of sputum. Bronchiectasis should be suspected especially when there has been no exposure to tobacco smoke.

The sputum may be bloody or hemoptysis might be recurrent. Treatment of bronchitis is a long and difficult process. In any case, the recommendations of a qualified doctor are necessary, because different forms of the disease require the use of specific treatment methods. Treatment methods are also different: etiotropic - elimination of the causative factor (virus or bacteria), symptomatic treatment - elimination of life-threatening symptoms,

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AMERICAN ACADEMIC PUBLISHER
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in case of obstructive bronchitis and bronchiolitis, hospital treatment is recommended. Bronchitis caused by a virus is usually not treated etiotropically.

However, bronchitis caused by the flu virus can be treated with drugs such as arbidol, relenza or tamiflu. There is no etiotropic treatment for bronchitis caused by ARVI infection, rhinovirus, adenovirus, parainfluenza virus, so the disease is often treated symptomatically. In some cases, the doctor may prescribe drugs that strengthen the immune system. However, such drugs are strictly prescribed by a doctor, because these drugs also have side effects. Antibiotics are usually used in bacterial bronchitis. The type of antibiotic is selected depending on the type of pathogen that caused the disease. Antibiotics cannot be used on their own, antibiotics have no effect on bronchitis caused by a virus or allergic bronchitis, on the contrary, they can have a negative effect on the body. Penicillin and tetracycline antibiotics, macrolides, cephalosporins (amoxicillin, amoxiclav, erythromycin) can often be used in the treatment of bronchitis. Tablet forms of antibiotics are prescribed in mild forms of the disease. When severe bronchitis is observed, especially in young children, antibiotics are administered parenterally. The effect of antibiotics is manifested by the improvement of the general condition of the child, reduction of symptoms and lowering of body temperature.

Otherwise, the type of antibiotic is changed. The duration of antibiotic therapy in acute bronchitis is 1 week and in chronic form it is 2 weeks. Etiological treatment of allergic bronchitis consists in limiting exposure to allergens that cause bronchitis, such as dust, animal dander, plants, insect venom, chemicals, etc. In the treatment of acute bronchitis in children, inflammation of mucous membranes and cough should be eliminated first. It is also important not to forget that cough is a defense mechanism of the body, through coughing the body tries to get rid of foreign bodies (regardless of whether it is a virus, bacteria, allergen or toxic substance).

Due to this, a lot of mucus is produced in the mucous membranes and it is expelled from the body in the form of sputum. The only problem is that this sputum is very sticky and difficult to move, especially in young children, because their lungs and bronchi are weak, they cannot separate the sputum by coughing.Mucolytics and expectorants are used to facilitate sputum movement. Mucolytic agents (ASS, Ambrohexal, Bromhexine) soften sputum and make it easier to move. Expectorants (Ascoril, Gerbion, Gedelix, Prospan, Dr. Mom) facilitate the passage of sputum from the respiratory tract during coughing. Most of these preparations are prepared on the basis of medicinal plants. In addition, some antitussive drugs have the ability to block the cough center in the brain. Such drugs are prescribed when a long-lasting dry cough is observed. A dry cough is an early sign of the disease. However, it is not possible to take antitussive drugs during a wet cough when expectoration is observed. Because such tools block the cough center and prevent the release of sputum. Drugs that expand the bronchial cavity (berodual, eufillin) are used in spasm of bronchial branches. They can be in the form of an aerosol for inhalation or in the form of tablets. Baking soda and saline inhalations can be used as anti-inflammatory agents.

Types of bronchitis in children.

Acute bronchitis: Appears suddenly and lasts up to 2-3 weeks. Often caused by viral infections such as influenza or rhinovirus.

ISSN: 2692-5206
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Chronic bronchitis: Lasts more than three months of the year and recurs for two consecutive years. Often associated with long-term exposure to irritants such as tobacco smoke.

Obstructive bronchitis: Characterized by narrowing of the bronchi and difficulty breathing. It is more common in young children.

Bronchiolitis: Inflammation of the small bronchioles, most common in children under two years of age. The main causes of bronchitis in children are viral infections (in 90% of cases), bacterial infections, allergies and irritating substances (tobacco smoke, polluted air). Weakened immunity, respiratory tract infections and chronic diseases also contribute to bronchitis. Symptoms of bronchitis in children

Cough: First dry, then effective (with sputum).

Temperature: An increase in body temperature, sometimes high

Wheezing: Heard when breathing in, especially when exhaling.

Shortness of breath: Shortness of breath, especially during exercise.

General discomfort: Weakness, fatigue, headache.

Chest pain: A feeling of discomfort or pain behind the breastbone that gets worse when you cough Surgical treatment was considered if the symptoms persisted in spite of several courses of treatments and if the extent of diseased lung to justify operations is localized to achieve complete resection. Non surgical treatments included appropriate antibiotic therapy, postural drainage, and possibly bronchodilators. The persisting symptoms justifying operations were recurrent pneumonia that requires hospitalization and recurrent significant hemoptysis.

A double-lumen endotracheal tube was used in order to avoid contralateral contamination of secretions. A posterolateral thoracotomy was used for all patients. Complete resection is defined as an anatomic resection of all affected segments that were assessed preoperatively by computed tomography. If the disease is limited to one lobe, lobectomy was done and when the whole lung was affected, pneumonectomy was performed. When the disease is fairly limited, segmentectomy was performed. During pulmonary resection, excessive bronchial dissection was avoided, and peribronchial tissues were preserved. The bronchial stump was closed by using a polypropylene suture in two layers. Usually, we use a flap of mediastinal pleura or tissue for covering the bronchial stump. All resected specimens were subjected to histo-pathological examination in order to confirm the diagnosis.

Postoperative management included intensive chest physiotherapy and administration of antibiotics and analgesics. Operative mortality included patients who died within 30 days after thoracotomy or those who died later but during the same hospitalization. All patients were followed up in our outpatient clinic.

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In children, bronchiectasis can significantly impact quality of life and respiratory health. Early diagnosis and appropriate management are crucial for improving outcomes.

Clinical Evaluation:

• History: a thorough medical history is essential, focusing on symptoms such as chronic cough, sputum production, recurrent respiratory infections, and any history of underlying conditions (e.g., cystic fibrosis, immunodeficiency).

• Physical examination: signs may include wheezing, crackles, or decreased breath sounds on auscultation.This is the gold standard for diagnosing bronchiectasis. It allows visualization of bronchial dilation, wall thickening, and mucus plugging.

While less sensitive than HRCT, it can provide initial insights into lung pathology.These tests assess lung function and help determine the extent of obstruction. They may show mixed obstructive and restrictive patterns.Sputum cultures can identify pathogens contributing to chronic infections, guiding antibiotic therapy.To rule out cystic fibrosis. If cystic fibrosis or other genetic conditions are suspected.

May be performed for direct visualization and to obtain cultures or biopsies if necessary.Surgical intervention is considered in select cases of bronchiectasis, particularly when conservative management fails or when localized disease is present. Localized bronchiectasis due to a specific cause (e.g., foreign body aspiration, congenital malformations). Significant disease burden affecting quality of life.Recurrent infections despite optimal medical management.

Surgical Options:

• Lobectomy: removal of a lobe of the lung may be indicated in cases of localized disease.

• Segmentectomy: resection of a segment of the lung can be performed for more limited disease.

• Bronchial resection: in cases where a specific bronchus is affected, resection may help alleviate symptoms.

• Lung transplantation: considered in severe cases with end-stage lung disease. Close monitoring for complications such as infection or respiratory failure.Rehabilitation programs to improve lung function and overall health.Management of bronchiectasis in children often requires a multidisciplinary approach involving pediatric pulmonologists, thoracic surgeons, infectious disease specialists, and physical therapists. This collaboration ensures comprehensive care tailored to the child's needs.Early diagnosis and appropriate management of bronchiectasis in children are vital for improving respiratory health and quality of life. While medical management is the cornerstone of treatment, surgical options exist for select patients with localized disease or significant morbidity. Ongoing research and clinical trials will further enhance our understanding and treatment strategies for this challenging condition.

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