

Surgical treatment of congenital bronchiectasis

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Key words: congenital bronchiectasis.

Abstract. The experience of surgical treatment of 433 patients with congenital bronchiectasis is presented. The age of patients ranged from 2 to 65 years. Number of children and adolescents (60.9%) was more than adults (39.1%).

The most frequently performed are lower lobectomy (35.1%), extirpation of the bronchi (22.2%), and combined resection (17.6%). In children and adults, the character of surgical interventions was similar, except for the phased bilateral lung resections, which performed more than in adults (3.4% vs. 10.0%). Adult patients have a longer history of the disease, so they more frequent (84,1%) have dense and extensive adhesions in the pleural cavity. The incidence of early postoperative complications in children was 10.6%, while adult reached 20.7%. The most frequent complications in the operated children were intrapleural bleeding (2.65%) and atelectasis (2.65%) of the operated lobe or lung. Adults more often had bronchial fistulas (4,1%) and festering wounds (7,7%).

In the long-term period from 1 year to 22 years 190 operated patients were examined. Good results (complete recovery) were observed in 63.8% of children, which was significantly higher than the results of surgical treatment of adult patients (47.9%). All unsatisfactory results were observed in patients with bilateral lesions in the lungs and residual bronchiectasis in the operated lung.

Examination of patients in the long term period showed that timely diagnosis and early surgery reduces the risk of postoperative complications, improves long-term results.

УДК: 616.233-007.64

Хирургическое лечение врожденных бронхоэктазов

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Ключевые слова: врожденные бронхоэктазы

Аннотация. В статье представлены результаты диагностики и хирургического лечения 433 больных с врожденными бронхоэктазами. Установлено, что ближайшие и отдаленные результаты оперативного лечения детей лучше, чем у взрослых больных.

Aims of the Study: Congenital bronchiectasis is related to fetal developmental abnormalities and formed by a series of pre-and postnatal developmental defects of the tracheobronchial system. Most thoracic surgeons have expressed opinion about the necessity of early surgery on children, because congenital bronchial dilation leads to infection of the bronchial contents and re-aggravation of the inflammatory process. [1, 2, 3, 4]. But some pediatricians have the reserved attitude towards surgery in children, adhering to long-term follow tactics for sick children and re-examinations to decide of necessity of surgical intervention [5, 6].

Methods: Over the last 25 years in our clinic there were operated 433 patients with congenital bronchiectasis. This constituted 50.9% of all operated patients with congenital lung disease in the same period. The age of patients ranged from 2 to 65 years. Children and adolescents (60,9%) were more than adults (39,1%).

For examination of patients a chest radiography, CT scan of the lungs, bronchography, bronchoscopy, spirometry, lung scintigraphy and angiopulmonography were used. In all cases of congenital bronchiectasis was confirmed by postoperative pathologic studies.

In 2.1% of cases the disease was asymptomatic and detected at routine radiological surveys. The first symptoms of disease in the majority patients (72.7%) from early childhood were persistent cough with mucous and purulent sputum, intermittent fever, malaise and weakness. Diagnostic bronchoscopy observed a direct correlation between the volume of anatomical changes in the bronchi, the nature and prevalence of inflammatory changes.

Computed tomography was performed on 132 patients with suspected congenital bronchiectasis. Verification was carried out according to bronchography and surgical intervention. Bronchiectasis was detected in 78 patients. Sensitivity of computed tomography in diagnosis of bronchiectasis was 93.6% and specificity - 88.8%. Thus, computer tomography allows to establish the localization of bronchiectasis, its prevalence and to identify the volume of surgery without invasive procedures.

Bronchographic studies have shown that most congenital bronchiectasis was localized in the left lung - 66,7%. The most common combination was congenital bronchiectasis of the lower lobe with lingula or with middle lobe, and most rare - a combination of lesions of the upper and middle lobes. Bilateral lung involvement was detected in 22.4% of patients, the most frequent combinations were bronchiectasis of the lower and the middle lobe (Pic. 1).



Pic. 1 – Bronchography. Bronchiectasis of the lower lobe of the left lung

Objective information about the state of the pulmonary capillary blood flow gives scintigraphy. 67 patients were examined. In assessing the scintigraphic data in 33 (49.3%) patients there was found a decrease in accumulation of the radiopharmaceutical in the form of focal changes with rounded shape, lung picture was deformed. In 34 (50.7%) patients there was noted a sharp decline in the alveolar-capillary blood flow up to its complete absence in pathological areas of the lung tissue.

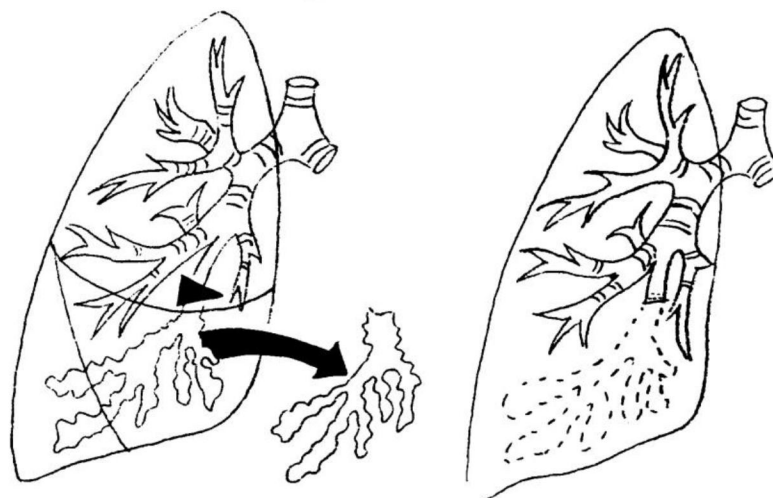
Angiopulmonography showed complete absence of contrast in the affected part of the lung in 8 (12.5%) patients. During angiopulmonography there was determined pulmonary artery pressure. In all patients, regardless of the prevalence of bronchiectasis, pulmonary artery pressure was within the normal range (average dynamic blood pressure below 20 mm Hg).

Almost all patients were operated in the period of remission. Volume and character of surgical interventions are presented in Table 1. The most commonly performed are lower lobectomy (35.1%), extirpation of bronchi (22.2%) and combined resection (17.6%). Surgeries on left lung were performed in more than 1.5 times more often. In children and adults surgery technique was similar, except staged bilateral lung resections, which performed more in adults (3.4% vs. 10.0%).

Table 1 - Character of surgical interventions in patients with congenital bronchiectasis

Type of surgery	Children	%	Adults	%	Total	%
Pneumonectomy	2	0,8	2	1,2	4	0,9
Bilobectomy	13	4,9	14	8,3	27	6,2
Lobectomy						
upper	1	0,4			1	0,2
middle	24	9,1	15	8,9	39	9,0
lower	96	36,4	56	33,1	152	35,1
Combined resection	53	20,1	23	13,6	76	17,6
Segmental resection	8	3,0	4	2,4	12	2,8
Extirpation of bronchi	58	21,9	38	22,5	96	22,2
Staged bilateral lung resection	9	3,4	17	10,0	26	6,0
Total	264	100	169	100	433	100

In determining the most appropriate surgical tactics is striving for maximum removal of the affected part of the lung which irreversibly lost its function, and at the same time striving for maximum preservation of unaltered lung tissue [7]. Therefore, while maintaining the airiness and blood flow in the localization of bronchiectasis, we often used the method of extirpation altered bronchus in children (21.9%), and adults (22.5%) (Pic. 2).



Pic. 2 - Scheme of extirpation of bronchi in congenital bronchiectasis.

Adult patients have a longer history of the disease, so they are more likely (to 84.1%) have a dense and extensive adhesions in the pleural cavity. This leads to an increase of traumatism and duration of the operation that extends the postoperative period. The frequency of early postoperative complications in children was 10.6%, and in adults reached 20.7%. The most frequent complications in the operated children were intrapleural bleeding (2.65%) and atelectasis (2.65%) of the operated lung lobe. In adults more commonly bronchial fistulas (4.1%) were found. Early postoperative complications occurred more often combined lung resections (53.6%), lobectomy (25.0%) and the extirpation of the bronchi (10.7%), which coincides with the frequency of their performance.

Results: In the long-term period from 1 year to 22 years were examined 190 operated patients.

Good long-term results were evaluated with the full recovery and full ability to work, absence of cough, acute inflammation (bronchitis, pneumonia), normal or near-normal indicators of external respiration (VC, FVC, MVL) , absence of inflammatory changes during bronchoscopy and pathological

changes in X-ray studies and bronchoscopy.

Under satisfactory long-term results, we realized a state of patients with persistent improvement of general condition, but with occasional cough with mucopurulent or purulent sputum, exacerbation of inflammatory diseases (bronchitis, pneumonia), which were no more than once a year. External breathing parameters may be reduced to 60% and bronchoscopy mainly limited endobronchitis different characteristics.

Unsatisfactory postoperative results were evaluated when the inflammatory process has progressed in the bronchopulmonary system: the presence of persistent cough with purulent sputum, and frequent pneumonia (more than 2 times per year). Usually the presence of varying degrees of disability. External breathing parameters, less than 60%. At bronchoscopy widespread or diffuse purulent endobronchitis, and bronchograms residual or recurrent presence of bronchiectasis.

The survey results are presented in Table 2.

Table 2. character of long-term results in operated patients

long-term results	Good results		Satisfactory results		Unsatisfactory results	
age	children	Adults	children	Adults	children	Adults
number	60	46	13	19	21	31
%	63,8%	47,9%	13,8%	19,8%	22,4%	32,3%
P	<0,05		>0,05		>0,05	

Good results (practical recovery) were observed in 63.8% of children, which are significantly higher than the results of surgical treatment of adult patients ($P < 0,05$). All unsatisfactory results observed in patients with bilateral lesions and residual bronchiectasis in the operated lung.

Conclusion: For early diagnosis of congenital bronchiectasis it is needed for comprehensive examination, the active use of such highly informative and non-invasive methods, such as computer tomography. Examination of the patients in the long term showed that timely diagnosis and early surgery reduces the risk of postoperative complications and improves long-term results.

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Туа біткен бронхоэктаздың хирургиялық емі

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Кілт сөздер: туа біткен бронхоэктаздар,

Аңдатпа. Мақалада туа біткен бронхоэктаздары бар 433 науқастың диагностикасы мен хирургиялық емдер нәтижелері көрсетілді. Жақын арадағы және алшақтық көрсеткіштерінде балалардың операциялық емі ересектерге қарағанда жақсы нәтиже көрсетуде.

Поступила 05.03.2015 г