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Complicated hydatid disease of the lung in children

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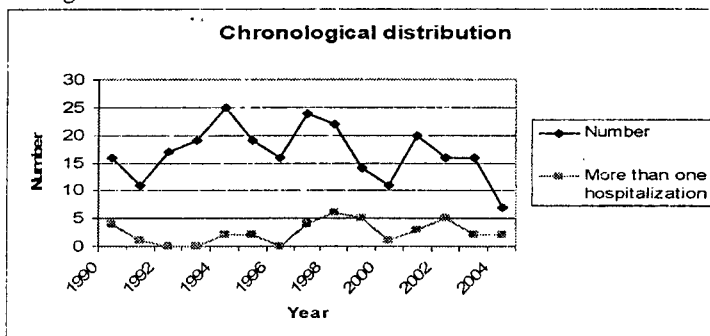
Echinococcosis is one of the most wide-spread helminthozoonoses in human. It is endemic in the countries where sheep are raised. The frequency of the disease in Bulgaria is 7,64 per 100 000, with this value raising considerably in recent years.

Pediatric patients most often are 4 to 10 years of age. Pulmonary localization is more frequent in children (>50%) than in adults. The increasing number of complicated or associated forms of the disease puts forth the problems of the choice of surgical technique.

The purpose of the study is to analyze the clinical characteristic of the complicated hydatid lung cysts in children and the appropriate surgical techniques according to the stage and developed complication.

Clinical material

Over a fifteen –year period (1990-2004) a total of 284 children were treated for hydatid lung disease at the Department of Pediatric Thoracic Surgery – Emergency Hospital “N.I.Pirogov” – Sofia, Bulgaria. The chronological distribution of the cases is presented in figure 1:



37 (3.52%) patients were admitted more than one time, of which 25 (8.8%) with recurrence, 6 (2.11%) for second stage surgical treatment due to multiple echinococcosis and 6 (2.11%) for treatment of late postoperative complications.

Most of the patients were boys – 182 (64.08%), and girls were 102 (35.92%). Complication of the cyst was more common for males too – 89 (63.12%), while females with complicated hydatid cysts were 52 (36.88%).

The majority of the children were aged from 4 to 10 years. The distribution of complicated lung echinococcosis is presented on table 1:

Age	Intact	%	Complicated	%
0 to 3	7	50	7	50
4 to 10	84	66	66	44
11 to 18	52	43,33	68	56,67

Localization: Solitary hydatid cysts develop more often in the left lung 30.63% while right lung is affected in 27.11%. 6.34% of the cases are presented with two cysts in one of the lungs (left or right). 3.87% are with bilateral localization. Association with liver echinococcosis is found in 15.49%, and multiple echinococcosis – in 16.55%. In cases with multiple hydatid disease except in lungs, cysts have developed in other tissues – spleen (1.06%), kidney (0.7%), diaphragm (1.06%), pleural cavity (1.41%), chest wall (0.35%), anterior mediastinum (0.35%), under the skin of the back (0.35%). The data are presented in table 2:

	Left lung	Right lung	2 cysts in one lung	Bilateral	Associated with liver	Multiple
Complicated	46 patients	40 patients	9 patients	6 patients	21 patients	19 patients
Intact	41 patients	37 patients	9 patients	5 patients	23 patients	28 patients
Total	87patients (30,63%)	77 patients (27,11%)	18patients (6,34%)	11 patients (3,87%)	44patients (15,49%)	47patients (16,55%)

Complications of pulmonary echinococcosis are variable:

A. Pneumonia – developed in 26 patients (18.43%). Pneumofibrosis was found in 5 (3.55%) children.

B. Rupture

1. In bronchus – this was the prevalent form of perforation
 - without pneumonia – 23 (14.89%) patients
 - with pneumonia - 9 (6.38%) patients
 - with suppuration of the cyst - 31 (21.99%) patients
2. In pleural cavity
 - with pneumothorax – one patient (0.71%) presented with perforation of the cyst in the pleural cavity, leading to pneumothorax.

- with hydropneumothorax – 1 case
- with empyema – 4 cases (2.84%)

3. In a. pulmonalis with embolia and shock – 1 patient (0.71%)

C. Suppuration - This form of complication is comparatively frequent – according to our data 24.82% (35 patients). In untreated patients the inflammation process around the cyst becomes chronic and pneumosclerosis develops in the pulmonary parenchyma. One child (0.71%) was with such a complication.

D. Gangrene – extremely rare complication (1 case – 0.71%), which is result of serious destructive inflammation around the cyst, leading to severe damage of the general status of the patient.

E. Fistula

- bronchoesophageal – 1 case (0.71%)
- bronchopleural – 1 case

Clinical symptoms. The clinical signs depend on the stage of the disease. In the first latent stage, symptoms of intoxication may occur – headache, loss of appetite, weakness. 8 children (2.82%) were diagnosed accidentally in the course of another illness implying chest radiograph. In the second stage the symptoms are result of the cyst growth. They are diverse and non-specific – chest pain, cough, slightly elevated body temperature, weakness, loss of appetite. Allergic rashes are characteristic. In the third stage of complications “vomique” may be observed (3 cases – 1.06%) after rupture of the cyst in bronchus. When inflammation develops cough is more common (73.05%), expectoration appears, the temperature is high or septic (64.54%), there are haemoptoe (13.34%), respiratory failure (5.67%), and signs of severe intoxication of the organism. Nettle rashes are two times more frequent compared to the second stage.

Diagnosis. Basic diagnostic method is routine X-ray study. Complicated cysts are visualized as round formations with irregular borders due to the pericyclic inflammation; the content of the cyst is not homogenous, and a crescent-sign could be seen. Infiltrates are seen in the surrounding lung parenchyma. If the cyst has perforated in bronchus typical X-ray signs may be found – air-fluid level, floating hydatid membrane. Pleural empyema occurs when the cyst perforates in the pleural cavity. Some other methods are used when the diagnosis is uncertain (most often in complicated cysts) or in cases of multiple echinococcosis – CT(33.33%), bronchography (0.71%), bronchoscopy (5.37%), angiopulmography (1.42%). Ultrasound is used for evaluation of the liver status in all children with pulmonary hydatid disease.

Surgical treatment. Surgery is the treatment of choice with most used surgical approach lateral thoracotomy (95.05%). Some of the patients with bilateral cyst localization underwent one-stage surgical procedure – bilateral thoracotomy in 6 children (2.11%) and sternotomy in 3 children (1.06%). Association with liver echinococcosis in 5.63% of the patients was managed by one-stage surgery – thoracophrenolaparotomy (0.7%), thoracotomy with laparotomy (1.76%), thoracotomy with phrenotomy (3.17%).

The surgical techniques used may be divided into two major groups: closed and open echinococcectomy. The closed technique consists of removal of the cyst without damage of the germinative membrane, while the open technique includes aspiration of the

contents, cystotomy, scolical treatment and closure of the remaining cavity by different methods performed. The methods used are presented per cent for some patients had more than one cyst.

1. Closed echinococcectomy – 2.84%

- Pericystectomy (perfect echinococcectomy) – Fontana method – atypical resection which includes removal of the fibrous membrane together with the surrounding lung parenchyma (0.71%)
- Marginal resection – 7%
- Lobectomy – 1.42%

2. Open echinococcectomy – 95.04%. The stages of the operation are two:

- A. Cystotomy, aspiration of the contents and scolical treatment of the cavity.
- B. Closure of the remaining cavity by different techniques:
 - Delbec method – closure by round stitches (capitonnage) – 56.02%. In some cases atypical resection of the surrounding parenchyma is performed (37.61%)
 - Typical resection of the lung – segmentectomy (8.51%), lobectomy (4.96%), pneumonectomy (0.71%)

In 9.22% decortication and pleurectomy were performed.

The volume of the surgical procedure performed directly depends on the level of progress of the complication.

Postoperative complications. They may be divided into early and late. Early complications are suppuration of the operative wound (2.13%), pneumonia (5.67%), empyema (0.71%), hydrothorax (2.13%), hemorrhage (1.42%), pneumothorax (6.32%), hydropneumothorax (0.71%), atelectasis (9.22%). Surgical treatment of early postoperative complications was performed in 6 children – thoracocentesis (2.84%) and rethoracotomy (1.42%).

Late postoperative complications were foreign body (needle tip) with capsulated pneumothorax, pneumothorax, atelectasis (2 cases), bronchopleurocutaneous fistula with chronic empyema of the left pleural cavity, pneumosclerosis. Rethoracotomy was performed in 3 children (2.13%), and drainage in 2 patients.

Results:

The rate of children with pulmonary echinococcosis relatively decreases in recent years. New trend is the increasing rate of complicated hydatid disease. The major part of the patients is of school age. According to our data the pulmonary localization (with left lung prevailing) is more frequent in pediatric patients, compared to the hepatic localization.

The asymptomatic course of the disease lasts till inflammation develops in the surrounding pulmonary parenchyma or in the cyst itself. This is the most common reason for diagnosing echinococcosis in children. Most of the patients with complicated hydatid cysts are in damaged general condition, with or without signs of respiratory failure.

Ground diagnostic method is the conventional X-ray study, which in most cases is enough for the diagnosis. Our study shows that in cases of complicated cysts, because of the non-characteristic symptoms and the need of differentiating echinococcosis from other

congenital or acquired diseases of the lungs, some other methods are used – CT, Bronchography, bronchoscopy, etc.

All children undergo pre-operative antiallergic and antibacterial treatment. The surgical technique is chosen in every case depending on the age and general condition of the child as well as the number, size and localization of the cysts. Patients with complicated cysts are treated perioperatively with antibiotics.

The exact surgical method is chosen intraoperatively. The comparative analysis shows great number of extended in volume surgical resections because of pneumosclerosis, atelectasis or inflammatory changes in the surrounding parenchyma in cases with complicated cysts. Although very rarely, in cases with huge cysts, resulted in destruction of one of the lungs, pulmonectomy is performed.

The most frequent postoperative complications are atelectasis, pneumothorax and pneumonia. The percentage of postoperative complications after treatment of complicated hydatid cysts is greater compared to that of non-complicated cysts. In our study some postoperative complications are observed only after surgery of complicated cysts – empyema and hydropneumothorax.

Conclusions:

- 1. Relative decrease in the rate of pulmonary echinococcosis in pediatric patients in recent years is observed but increase in the rate of complicated hydatid disease.*
- 2. Great part of the children 49.65% are with complicated hydatid disease which demands an accurate evaluation of the general condition, pulmonary status and the use of great variety of diagnostic and therapeutic techniques.*
- 3. Complicated hydatid disease in children is a serious problem in surgical practice, implying the use of diverse diagnostic and surgical methods, with more in number and more serious postoperative complications, demanding a complex therapy.*
- 4. There is no specific localization of the hydatid lung cysts correlating with degree and extend of the complication.*
- 5. The differentiated choice of different surgical methods and techniques in every single case according to the localization, size and number of the hydatid cysts as well as the developed complications, is a prerequisite for better early and late postoperative results.*
- 6. More prolonged postoperative period and unfavorable consequences are observed in the cases with late diagnosed complicated hydatid lung disease.*

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