

## ADVANTAGES OF VIDEOTHORACOSCOPIC ECHINOCOCCYCTOMY OF LUNGS IN CHILDREN

The paper describes results of videothoroscopic echinococcectomy of lungs in 45 children aged from 1 to 15 years. Pulmonary echinococcectomy of lungs in 37 (82.2%) cases was accomplished only through thoracic access. In 8 (17.8%) children it was implemented using video-assisted thoracoscopic echinococcectomy - combination of thoracic access and mini-thoracotomy length less than 5cm. No complications were fixed. Children were discharged in satisfactory state on 6th-7th day after operation.

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### Introduction

Echinococcosis is an international medico-biological problem of national economical significance. A great number of publications on echinococcosis over past decades demonstrate that the interest to this problem does not decrease (Kir et al., 1995; Dhaliwal et al., 1998; Karimov et al., 2000; Kulakeev et al., 2001). It is difficult to perceive pediatric surgery without endoscopic operations that are widely used in different areas of pediatric surgery including immature babies (Razumovsky et al., 2010).

Fast development of pulmonary surgery has changed surgical tactic concerning certain methods of surgical intervention in pulmonary echinococcosis. Diagnostic and therapeutic thoracoscopy is used in clinical practice almost since last century; indications to thoracoscopy were rather restricted during prolonged years. Thoracoscopy was primarily aimed at diagnosis, and therapeutic measurements were limited by coagulation of bulls, sympathetic ganglia, incision of commissures, and sanitation of pleural cavity. However, in the past years operative thoracoscopy experiences its second birth due to creation of television equipment and instruments to accomplish endoscopic operations well valued and implemented in laparoscopy; indications to using of surgical thoracoscopy are steadily expanding (Gallinger et al., 1995; Porkhanov, 1996; Sigal, 1999; Kulakeev et al., 2001; Shulutko et al., 2006).

The study intends to consider efficacy of endovideosurgical technology in treatment of of patients with solitary and multiple echinococcus cysts of the lungs.

### Material and methods

The study has observed outcomes of thoracoscopy operations in 45 children with pulmonary echinococcosis aged from 1 to 15 in the Republican Scientific Practical Center of low invasive and endovisual surgery within a period 2005-2010.

Most children with pulmonary echinococcosis were aged from 8 to 15 (60%). There were 26 (57.8%) boys, and 19 (42.2%) girls (Table 1). The right lung was affected by echinococcosis more often 27 (60%) than the left one 18 (40%).

The most cases were found with single cysts (36 children or 80%), 9 (20%) children had multiple cysts. Bilateral affection by echinococcosis was noted in 7 (15.6%) children. In 13 (28.9%) patients echinococcosis was combined with hepatic injury. There were observed giant cysts - 14 cases (31.1%), average cysts - 23 (51.1%), small cysts - 8 (17.8%).

TABLE 1. DISTRIBUTION OF PATIENTS BY THEIR SEX AND AGE

Age	Boys	Girls	Total
Up to 3years	2 (7.7%)	1 (5.3%)	3 (6.6%)
4-7 years	7 (27%)	7 (36.8%)	14 (31.1%)
8-10 years	9 (34.6%)	6 (31.6%)	15 (33.3%)
11-15 years	8 (30.8%)	5 (26.3%)	12 (26.7%)
All	26 (57.8%)	19 (42.2%)	45 (100%)

Central position of the cysts was more often fixed in pulmonary tissue 37 (82.2%), it was mainly remarkable for major and average cysts. Small cysts were the cysts localizing in a depth more than 2 cm from parenchymal surface of the lung and protruding from parenchyma no more than 1/3. To peripheral cysts were referred small cysts covered by pulmonary tissue with the thickness less than 2 cm or which fibrous capsule was seen on surface of the lung as well as cysts protruding from parenchyma of the lung more than 1/3.

All patients in preoperative period underwent complex investigation procedures, such as complete blood count, clinical urine examination, biochemical blood analysis, serologic reactions for echinococcosis (IFA), ultrasound investigation of abdominal cavity, and roentgenography of thoracal organs. When there were difficulties in delivering diagnosis or defining cysts localization, the computer tomography was performed

Ultrasound examination of thorax in children suspected for pulmonary echinococcosis was conducted on apparatus "Aloka SSD - 1100" (Japan) having sensors with frequency 3.5; 5 and 7.5 MHz.

## Results and discussion

Asymptomatic course of the disease was noted in 12 (26.6%) children. Some latent symptoms, not established previously by attending doctors, were noted in 9 (20%) patients: they comprised periodically arising transitory pains in thorax, worsening of appetite, cough, indisposition, perspiring.

Main complaints of patients during the second stage of disease development in 24 cases (53.3%) were pains in thorax of different intensity on a side of injury; these pains were reinforcing in outdoor games and physical loading. 21 (46.6%) patients had persistent dry cough which was resistant to drug therapy. One-third of children experienced allergic symptoms. It should be noted that patients often experienced loss of appetite, general weakness, fatigue, sweating.

Different complications were diagnosed in 13 of 45 children (28.9%), of them cyst breaking into bronchus most often was observed. Festering of chitinous membrane without perforation was registered in 9 (20%) patients, breakthrough in the pleural cavity - in 4 (8.9%) patients.

Clinical manifestation of echinococcosis breakthrough in bronchus was accompanied with raise in body temperature to 38-39°C, attack of strong cough with discharge of a large amount of transparent or turbid fluid with scraps of chitinous membrane.

Suppuration of cyst was characteristic by signs of acute inflammatory process. Children had raise of body temperature to 38-39°C, dry cough, pains in a injured thoracal side aggravating under a deep breath, common weakness, absence of appetite.

Breakthrough of echinococcus cyst of the lung in the pleural cavity developed acutely and was manifested by development of pleuropulmonary shock. The process was accompanied with a sharp pain in thorax, anxiety, repeated vomiting, labored respiration and shortness of breath, weakness, deferred response. Allergic manifestations shortly became associated to the mentioned symptoms.

Roentgenologic examination of the thorax served as main method in primary diagnosis of echinococcosis of the lungs. Echinococcosis cyst in case of uncomplicated echinococcosis performed as either rounded or oval homogeneous, more or less intense shade with robust edges on the background of the lung tissue.

If a breakthrough of echinococcus cyst into bronchus occurred, the roentgenogram displayed a level of fluid and gas bladder above it, or waviness and convexity of fluid level was observed. The latter case was caused by roll-off of chitinous membrane of parasite – so called symptom of “floating chitinous membrane”, or symptom of “sickle-shaped clarification”.

These changes resembled the destructive pneumonia and its complications, and this caused some difficulties in the diagnosis of pulmonary echinococcosis. Breaking of echinococcus cyst in pleural cavity roentgenologically resembled a picture of pleuritis. It should be noted that every method of roentgenologic examination was estimated not only from point of view of its diagnostic value but also from its radiation loading on an examinee that forced to search for investigation methods harmless for child.

The most simple and noninvasive method of diagnosis of echinococcosis of the lungs is ultrasound examination. Echography of thorax to diagnose pulmonary echinococcosis was carried out in 35 children.

Changes in the laboratory indices in echinococcosis were non-specific. Increase in number of eosinophiles in peripheral blood was noted in 46% of children, leucocytosis was revealed in 31.6%, accelerated ESR - in 53.3% patients.

Length of preoperative preparation was different and depended upon common behavior of child, character and duration of complications available. Preoperative preparation for children with uncomplicated pulmonary echinococcosis was accomplished according to common surgical rules during 3-4 days including desensibilization therapy.

All the children with complicated forms of pulmonary echinococcosis were admitted into clinic by emergency call in a critical health condition. Severity of condition was caused by an acute respiration failure of obstructive and restrictive type, hypovolemia, endotoxiosis and fluid deficit; such condition indicated a necessity of preoperative preparation.

### **Videothoroscopic echinococcectomy of the lungs**

At this moment videothoroscopic echinococcectomy was performed 45 times in the lung (7 patients received the operation in both sides). From the very beginning, the utmost importance was given to the selection of patients: size and number of cysts, character of injury of pulmonary tissue, history of surgical interventions on a side of injury were taken into consideration. The following causes were considered as undesirable to accomplishment of videothoroscopic echinococcectomy of the lung: availability of multiple cysts with diameter more than 4 cm located in various lung lobes; complex forms of cysts with diameter more than 15 cm; suppurated echinococcus cysts with pronounced perifocal inflammation; either recurrent echinococcus cysts or an availability of thoracotomy (caused by other reason) on a side of injury.

Unilateral lesion of the lung by echinococcus was noted in 29 children, the bilateral one - in 8 children. Solitary cysts were discovered in 26 observations, multiple cysts - in 19. Cysts were located in the right in 21 cases (upper lobe - 6, middle lobe - 4, lower lobe - 11); in the left - in 14 cases (upper lobe - 4, lower lobe - 10). Echinococcus cysts in their

diameter had a size from 2 up to 5 cm - in 8 (17.8%) children, from 6 up to 10 cm - in 23 (51.1%), from 11 up to 15 cm - in 14 (31.1%).

All surgical interventions were performed using two methods: thoracoscopy echinococcectomy of the lung - by using of only trocar accesses (37 cases) and video-assisting thoracoscopic echinococcectomy of the lung - combination of trocar accesses and mini-thoracotomy less than 5 cm long (8 cases).

Videothoracoscopic echinococcectomy was conducted by one lung ventilation with intubation of the right or left primary bronchus. Position of a patient on surgical operating table was on healthy body side. Four trocars were used. After installing the first with diameter 5 mm (for telescope), CO<sub>2</sub> was insufflated into pleural cavity under pressure 6-8 mm mercury column; subsequently other three trocars were introduced.

Disposition of trocars was the following: the first trocar with diameter 5 or 10 mm was in the 7th intercostal space along line axillaris media - for endoscope; the second trocar with diameter 5mm - in the 5th and 6th intercostals space along line axillaries anterior - for instruments; the third trocar with diameter 5 mm - in the 6th intercostal space along line axillaries posterior - for instruments; the fourth trocar with diameter 11 mm - in the 7th intercostal space along line axillaries posterior - for aspirator of great diameter (10 mm).

Revision of pleural cavity and the lung was the first step in videothoracoscopic echinococcectomy. Diaphragm and anterior and posterior surfaces of the lungs were examined to reveal commissures process and additive echinococcus cysts. Adhesions in pleural cavity were separated by unipolar coagulation and scissors that provided possibility of careful examination of pulmonary surface. The next step was an accomplishment of puncture of echinococcus cyst through thoracal wall by thick needle connected to aspirator; and content of cyst was sanitized. 80% solution of glycerin was injected into cyst cavity; then fibrous capsule was dissected and chitinous membrane of parasite was aspirated by aspirator with diameter 10 mm. The formed cavity of fibrous capsule was re-treated with glycerin solution. Within the healthy pulmonary tissue, the fibrous capsule was circularly excised by unipolar coagulation and scissors; residual cavity was closed by purse-string sutures. To determine a presence of bronchial fistulas the fluid was introduced through intubation tube into residual cavity, fistulas detected were closed by suture PDS II 3/0 or coagulated by bipolar coagulator; after aerostasis cavity was drained by drainage tube with lateral apertures, operation was completed by drainage of pleural cavity.

Combination of trocar accesses and mini-thoracotomy with length less than 5 cm due to giant cyst with multiple large caliber bronchial fistulas was accomplished in 8 (17.5%) children. No complications during intervention were noted. Outcomes of low-invasive interventions in pulmonary echinococcosis were quite satisfactory. Complications in postoperative period were observed in 3 (8.1%) patients: residual cavity - in 2 (5.4%), exudative pleuritis - in 1 (2.7%). As a rule, all the patients were discharged from hospital on day 6-7 after surgical intervention. No relapses following low invasive echinococcectomy of the lung under correct taking of antiparasitic preparations (albendazol) in postoperative period were observed.

## Conclusion

Comparative analysis with “open” operations in echinococcosis exhibited that endovideosurgical interventions allow significant reducing traumatic injury of surgical intervention, optimizing medicament expenditures, shortening stay in hospital, providing good cosmetic effect. Experience described above shows that endovideosurgical technology in treatment of pulmonary echinococcosis may and should become an alternative to conventional operations.

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