

# LOW INVASIVE OPERATIONS IN COMBINED PULMONARY AND HEPATIC ECHINOCOCCOSIS IN CHILDREN

Thirty children aged from 2 to 15 with diagnosis “combined pulmonary and hepatic echinococcosis” were observed in the period from 2005 to 2011. Seventeen patients were undergone staging conventional echinococcectomy with interval not less than 2-3 weeks. Simultaneous endovisual echinococcectomy of the lung and liver was performed in 13 children. Our small experience showed that endosurgical intervention allows increasing volume of surgical intervention, excepting prolonged period between stages of echinococcectomy of the lung and liver. It shortens repetition factor of operative intervention, sufficiently decreases medicaments consumption, terms of staying in hospital, especially in postoperative period ( $7.2 \pm 1.2$  b/d), terms of restoration of physical activity of patient, it gives a well cosmetic effect as well. Therefore, endovideosurgical echinococcectomy should take a priority in treatment of combined pulmonary and hepatic echinococcosis.

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## Introduction

Scientific reports about echinococcosis published in periodical medical journals within the last decades confirmed that the interest to this problem does not cease to exist, and quite the contrary, it becomes one of the actual problems both in pediatric and common surgery (Kir et al., 1995; Dhaliwal et al., 1997; Karimov et al., 2000; Kulakeev et al., 2001).

In the last decade a growth of morbidity with echinococcosis, and extension of geographic borders of disease has been fixed. Prevalent tendency is caused by sequence of factors to which, first of all, it must be attributed the increasing migration of population, worsening of sanitary-epidemiologic situation, in the first place, in regions, endemic to echinococcosis (Ilhamov, 2005).

Especially complicated in its diagnostic, therapeutic and predictive respect is combined damage of the lungs, liver and other abdominal organs with echinococcosis (Petrov et al., 2001; Aribas et al., 2002; Nazirov et al., 2002; Pyshkin et al., 2002). Question about when, on which organ, in which sequence and interval between operations it must be carried out surgical treatment of patients with combined pulmonary and hepatic echinococcosis remains unsettled and discussable up to date (Dhaliwal et al., 1997; Pishori et al., 1999; Jafarov et al., 2000; Pulatov, 2004).

On modern stage it is difficult to present pediatric surgery without endoscopic operations that by this time are widely used in different areas of pediatric surgery (Razumovsky et al., 2010).

New techniques in surgery contributed to relatively wide using of laparo- and thoracoscopic methods of elimination of echinococcus cysts from liver and lung of minor and average sizes.

Working out of new video-technical instruments extends potentialities of endo-video-surgical operations with each year.

The research explores further increase of efficacy in surgical treatment of patients with combined pulmonary and hepatic echinococcosis by using of new techniques.

**Material and methods**

Thirty children aged from 2 up to 15 with diagnosis “combined pulmonary and hepatic echinococcosis” were observed in the Republican Science Practical Center of Low invasive and Endovisual Surgery of Childhood within a period since 2005 up to 2011.

Main number of children with pulmonary echinococcosis was found in an age from 11 to 15 (43.3%). There were 20 boys (66.7%), and 10 girls (33.3%) (Table 1).

TABLE 1. DISTRIBUTION OF PATIENTS IN THEIR SEX AND AGE

| Age           | Boys       | Girls      | Total     |
|---------------|------------|------------|-----------|
| Up to 3 years | 1 (3.3%)   | 1 (3.3%)   | 2 (6.6)   |
| 4-7 years     | 4 (13.4%)  | 2 (6.6%)   | 6 (20.0%) |
| 8-10 years    | 6(20.0%)   | 3 (10.0%)  | 9 (30.0%) |
| 11-15 years   | 9 (30.0%)  | 4 (13.3%)  | 13 (43.3) |
| All           | 20 (66.7%) | 10 (33.3%) | 30 (100%) |

Combined injury of the right lung and liver registered to be in 17 (56.6%) patients, and that of the left lung and liver - in 9 (30%) patients, and injury of both lungs and liver - in 4 (13.3%) patients (Table 2). Peripheral location of cysts was more often fixed in pulmonary tissue in 19 (63.3%) patients that was mainly characteristic for major and average cysts. To minor cysts were referred cysts localized in a depth more than 2 cm from surface of pulmonary parenchyma and projecting not more than 1/3 from under parenchyma. To peripheral cysts were referred minor cysts covered by pulmonary tissue with thickness less than 2 cm or those which were presented on pulmonary surface as well as cysts projecting from under pulmonary parenchyma more than 1/3 part.

TABLE 2. TOPOGRAPHIC CORRELATION BETWEEN ECHINOCOCCUS CYSTS IN THE LUNG AND LIVER

| Organs               | Right hepatic lobe |                |              | Left hepatic lobe |                | Right and left hepatic lobes |                         | TOTAL    |                        |
|----------------------|--------------------|----------------|--------------|-------------------|----------------|------------------------------|-------------------------|----------|------------------------|
|                      | VII-VIII segment   | VI-VII segment | V-IV segment | IV-V segment      | II-III segment | III-IV segment               | V-VI and II-III segment |          | VI-VII and III segment |
| Right lung           | 4 (13.3%)          | 3 (10.0%)      | 2 (6.7%)     | 3 (10.0%)         | 2 (6.7%)       | 1 (3.3%)                     | 1 (3.3%)                | 1 (3.3%) | 17 (56.7%)             |
| Left lung            | 2 (6.7%)           | 3 (10.0%)      | 1 (3.3%)     | -                 | 1 (3.3%)       | 2 (6.7%)                     | -                       | -        | 9 (30%)                |
| Right and left lungs | -                  | 1 (3.3%)       | -            | 1 (3.3%)          | 1 (3.3%)       | -                            | 1 (3.3%)                | -        | 4 (13.3%)              |

In localization of echinococcus cysts in the liver single echinococcosis was revealed in 23 (76.7%) of 30 children, multiple (two or more cysts) - in 7 patients (23.3%). Minor cysts - 5 (16.7%), average ones - 16 (53.3%), major ones - 9 (30.0%) (Pulatov, 1999).

Reasons for visits were the following common complaints: cough with poor mucoid sputum, pain in thoracic area, in the right subcostal area, weight loss, and common weakness.

All the patients were underwent survey radiography of chest in two projections, ultrasonic scanning of thoracic, abdominal cavities and retroperitoneal area, computer tomography was performed while difficulties in diagnosis and determination of localization and volume of cyst. In preoperative period complex examination was carried out: complete blood count (CBC), urine, biochemical blood analyses, coagulogram, serologic reactions to echinococcosis (IFA).

All the children with combined echinococcosis had malnutrition (deficiency of body mass was  $20.3 \pm 2.25\%$ ), they complained of common weakness and indisposition. An expressed

physical developmental lagging was observed in 7 (23.3%) children. Dyspnea, short cough, deformation of chest were noted in 4 (13.3%) children with bilateral pulmonary and hepatic echinococcosis. The liver mass was enlarged in each second child, bulging was determined in epigastric area and (or) in the right subcostal area. Tachycardia (pulse frequency increased  $23.9 \pm 4.8\%$  a proper one) was fixed in 22 (73.3%) children, event of hypochromic anemia was noted in all the patients (erythrocytes  $3.4 \pm 0.95 \cdot 10^{12}/l$ , hemoglobin  $100 \pm 2.4$  g/l). Eosinophilia (7-14%) appeared the most stable symptom. ESR, as a rule, was increased ( $31.2 \pm 3.1$  mm/h). Updates in functional state of liver (moderate increase in transaminase activity: ALT  $1.85$  mmol/(h l), AST  $0.75$  mmol/(h·l) were observed in 8 (26.6%) children. In uncomplicated echinococcosis of the lungs in 23 (76.6%) children echinococcus cyst on radiogram was presented as oval or rounded homogen fluid shadow with correct clear contours without perifocal reaction. Crescent-shaped enlightenment in the upper pole as bubble shadow - "half-moon symptom" was found in 5 (16.6%) patients in roentgenologic examination, it was suspicion on micro-perforation of chitin membrane in pericystic area. Rounded shadow with clear borders and presence of gas bubble with horizontal level of fluid was determined by roentgenogram in penetration of cyst into bronchus in 2 (6.6%) children.

Ultrasound examination of the liver of children with suspicion on pulmonary echinococcus was conducted on apparatus "Aloka SSD - 1100" (Japan) by convex and linear transducers with frequency 3.5; 5.0 and 7.5 MHz. In all the children a rounded echo-negative thin-walled formation with well pronounced dense bilayer capsule with fluid contents was visualized.

Computer tomography was carried out in 4 (13.3%) children with combined echinococcosis of the lower lobe of the right lung and VII-VIII hepatic segments. Meanwhile segment localization of cysts, their sizes have been revealed that allowed differ unicameral from multicameral as well as non-parasitic from parasitic cysts by their density of contents.

Preoperative preparation of children with combined pulmonary and hepatic echinococcosis consisted of elimination of oxygen insufficiency, management of disintoxication therapy, hyposensibilization, correction of deviations in homeostasis parameters. To this effect were prescribed bed regime, damped oxygen inhalations, caring caloric diet, and intensive infusion therapy including antihistamine preparations, cardiac glycosides and vitamins.

## Results and discussion

All 30 children were underwent surgical intervention. Staged operative treatment by open method was conducted in 17 (56.6%) cases. Elimination of parasitic cysts, in the first place, in the lung was prevailed in combined echinococcosis. Difference between plan operations of thoracotomy and laparotomy was not less than 2-3 weeks.

We used methods according to Delbe in 11 (36.6%), A.V. Wishnevsky in 4 (13.3%) and A.T. Pulatov in 2 (6.6%) of the existing conventional methods of capitonnage in pulmonary echinococcosis. Resection of a lobe of lung was performed in 1 (3.3%) patient.

In open method of surgical treatment of hepatic echinococcosis cysts we used the following approaches: upper medial laparotomy in 9 (30%), according to S.P. Fedorov in 8 cases (26.6%). These patients were underwent semi enclosed echinococcectomy with resection of the projecting, from parenchyma fibrous capsule with drainage of residual cavity in 4 (13.3%), closed echinococcectomy with plasty of residual cavity by capitonnage in 8 (26.6%), echinococcectomy with omentoplasty of residual cavity in 5 (16.7%).

Simultaneous thoraco- and laparoscopic echinococcectomy of lung and liver we performed in 13 (43.3%) children.

Thoracoscopic echinococcectomy of the right lung was performed in 2 (6.7%) cases, laparoscopic echinococcectomy of liver from visceral segments was performed after elimination of pulmonary echinococcus cyst.

Thoracoscopic echinococectomy of the left lung was conducted in 3 (10%) children after which laparoscopic echinococectomy of the liver was carried out. One-stage bilateral thoracoscopic echinococectomy in both lungs was performed in 1 (3.3%) case, and then laparoscopic elimination of the left lobe echinococcus cyst of the liver was made. Successfully was performed thoracoscopic echinococectomy of the right lung and VIII hepatic segment (through diaphragm) in 1 (3.3%) case in bilateral damage of both lungs combined with damage of the liver. On the left owing to a deep location of cyst echinococectomy with video-assisting was carried out, i.e. by mini-thoracotomy incision (up 4.5 cm long), laparoscopic echinococectomy of the right lobe of liver was conducted in 2 weeks after elimination of cysts in both lungs. Combined injury of the right lung with subdiaphragmal hepatic segments was noted in 3 (10%) children. Simultaneous echinococectomy of lung was made in these cases, then from subdiaphragmal hepatic segments through diaphragm. Phrenicotomy, antiparasitic treatment of cystic cavity with elimination of chitin membrane were performed after puncture of echinococcus cyst. Then cavity was treated by 80% solution of glycerin warmed up 60°C with exposure 10-15 minutes. Next stage was capitonnage of residual cavity with destruction of biliary fistula by a method of coagulation or wound closure. Capitonnage of residual cavity through pleural cavity failed in one patient a residual cystic cavity was drained by polyvinyl chloride tube and it was removed out through pleural cavity.

Results of operative interventions in combined pulmonary and hepatic echinococcosis were fully satisfactory. No complications during interventions were registered.

As a rule, patients were discharged from hospital on days 6-8 ( $7.2 \pm 1.2$  b/d), after surgical intervention. Relapses after low invasive echinococectomy of lung in correct taking antiparasitic preparations (albendazol) in postoperative period were not observed.

The following complications in postoperative period observed to be in 6 (20.0%) patients: residual cavity - in 1 (3.3%), exudative pleuritis - in 1 (3.3%), bile leak through drainage that ended on day 12 - in 2 (6.6%) patients. Suppuration of postoperative wound noted to be in 1 (3.3%) patient that was underwent an open echinococectomy of liver. Suppuration of residual cavity in liver was also fixed in 1 (3.3%) patient. All the patients operated were by tradition discharged on days 13-15. Control roentgenologic and ultrasound investigations in 3 months revealed residual cavity in liver as fibrous channel in size 0.5-0.8 x 1.5-2,5cm in 1 (3.3%) patient, no postoperative complications were fixed in other patients.

## Conclusion

Our small experience showed that comparative estimation of results of conventional echinococectomy and endosurgical interventions in combined pulmonary and hepatic damage revealed that the latter possessing an even radicalism but a lower traumatic outcomes permits to increase a volume of operative intervention excepting prolonged time interval between stages of echinococectomy of lung and echinococectomy of liver.

It shortens repetition factor of operative intervention, sufficiently decreases medicaments consumption, terms of staying in hospital, especially in postoperative period ( $7.2 \pm 1.2$  b/d), terms of restoration of physical activity of patient, it gives a well cosmetic effect.

Endo-video-surgical echinococectomy is and must be priority in treatment of combined pulmonary and hepatic echinococcosis.

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