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Surgical treatment of pulmonary hydatid disease: a comparison of children and adults

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Abstract

Background: Hydatid cyst still remains an important health problem in our country as in many Mediterranean countries. The disease may affect children, and its treatment may be challenging in this age group. Surgery is the primary way of treatment. In the current study, the features unique to childhood pulmonary hydatid disease are emphasized.

Methods: Between 1992 and 2003, 301 patients were operated on because of pulmonary hydatid cyst in our hospital; 44 of them were 14 years or younger. They were categorized as pediatric patients. We retrospectively evaluated the clinical data of the patients.

Results: The mean age of the patients was 10.6 ± 3.7 years (5-14 years) in children and 32.2 ± 14 years (16-75 years) in adults. The rate of intact cyst was 71% in children and 57% in adults ($P = .07$). The mean diameter of the cyst was 8.5 ± 3.1 cm (3-15 cm) and 6.6 ± 3 cm (2-16 cm) in children and adults, respectively ($P < .001$). The rate of parenchyme-saving procedures was 84.1% in children, whereas 94.9% in adults. Lobectomy was performed in 16% of children, whereas it was performed in 1.5% of adults ($P < .001$). Morbidity rates were 13.6% in children and 11.6% in adults. No children but 1 adult died. Long-term follow-up revealed the recurrence rates as 4.5% in children and 4.3% in adults.

Conclusions: Surgery, the primary method of treatment of hydatid cyst, is safe. Parenchyma-saving procedures such as cystotomy and capitonnage should be performed as much as possible. Nevertheless, hydatid cyst can reach relatively larger dimensions in children than in adults, which causes parenchyme destruction eventually leading to lung resection.

Echinococcus granulosus (dog tapeworm) is found in most sheep- and cattle-rearing regions throughout the world, including Africa, Latin America, Central Asia, Australia, and Europe, particularly in the Mediterranean area. The natural intermediate hosts (eg, sheep, cattle, and swine) and accidental intermediate hosts (man) become infected by oral ingestion of *E. granulosus* eggs on food or in water or by direct contact with infected dogs [1-4].

The primary infection with *E. granulosus* is believed to occur during childhood. Because the cysts grow slowly, clinical symptoms do not usually arise until several years after infection. Thus, cystic *Echinococcus* is a rather rare disease of children in general, especially in countries with a low prevalence [1-4]. The primary treatment of it is

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surgery, and parenchyme-saving surgical methods are preferred [4-6].

The present study was performed to describe several features of the patients with pulmonary hydatid cysts and to compare the preoperative, therapeutic, and postoperative characteristics of pediatric and adult patients.

1. Patients and methods

We reviewed the clinical records of 301 patients who underwent operative treatment of pulmonary hydatid cyst disease between 1992 and 2003 and assessed the results of surgical treatment. Patients at or younger than 15 years old were accepted as pediatric. Clinical data of these and adult patients were reviewed retrospectively focusing on demographic characteristics, diameter of cysts, type of the operation, complications, and long-term results. The data obtained from the children were compared with those from the adults.

In all our patients, posteroanterior and lateral chest radiography, computed tomography of the chest and upper abdomen, biochemical and hematologic studies, and electrocardiography were performed. Fiberoptic bronchoscopy was done in 2 patients because a mass lesion rather than a hydatid cyst was suspected preoperatively.

We performed indirect hemagglutination test and specific antiechinococcus immunoglobulin E G tests.

2. Operative techniques

We routinely used posterolateral thoracotomy. A posterolateral thoracotomy in the fifth or sixth intercostal space was accomplished with the patient under general anesthesia and in the lateral decubitus position. In bilateral hydatid disease, the side with a larger cyst or with greater number of cysts was treated first. In bilateral uncomplicated hydatid cysts, second thoracotomy was performed 3 to 4 weeks after the first operation. In patients with an intact cyst and a ruptured one together, the former was treated first. We recommend the operation of the ruptured side first if it causes serious symptoms such as hemoptysis. In patients with lung and hepatic cysts, hepatic cysts were operated on after lung surgery.

After the cyst was identified, it was surrounded by 1% (vol/vol) povidone-iodine–impregnated gauze to prevent seeding of possible daughter cysts. We prefer enucleation of all intact cysts without needle aspiration. But we generally do not prefer enucleation or direct cystotomy for giant cysts. Uncomplicated giant cysts were mainly removed after needle aspiration. With needle aspiration, hydatid fluid was aspirated first from the uppermost part of the cysts with a 20-gauge needle to decrease the intracystic pressure. At enucleation, pericystic tissue was dissected until a germinative membrane was confronted. A great care was taken for the germinative membrane not to be perforated. A cross-shaped incision of the pericystic tissue was done. By stretching its corners, dissection of it from the germinative membrane was achieved. Bathing the environment with isotonic saline facilitates the procedures. After reaching between germinative membrane and pericyst, incision in the pericystic tissue was enlarged safely. The intact cyst was removed from the orifice by the aid of pulmonary inflation. Cystotomy was applied when the cyst was already perforated or enucleation cannot be performed in an intact cyst. Then a suction apparatus was introduced into the cyst, and the fluid was completely aspirated. In all patients, the needle and suction apparatus insertion site was enlarged by cutting the pericystic layer (host tissue) with scissors or an electrocautery so that the germinative membrane was easily taken out and the bronchial openings encountered. After removal of remnants of germinative membranes of complicated cysts, the residual cavity was carefully cleaned and reexamined for dissemination from daughter vesicles. In all patients, the pericystic cavities were irrigated with 1% povidone-iodine solution. Bronchial openings were found using saline and closed with 3-0 polyglactin 910 (Vicryl; Ethicon, Edinburg, Scotland) or polypropylene (Prolene; Ethicon). No pericystotomy was performed. However, in complicated cysts with a calcified or thickened pericystic layer, management of bronchial openings was done more carefully with closer and deeper sutures.

A capitonnage is generally applied. It cannot be performed when cyst is located in the diaphragmatic surface or in the fissure, or when cavity is not large enough for capitonnage. For capitonnage, the cavity was closed by purse sutures beginning from the base to the orifice. On capitonnage, absorbable materials, most frequently with 3-0 polyglactin 910 (Vicryl; Ethicon), was used.

Table 1 Several characteristics of pulmonary hydatid cysts in children and adults

Demographic characteristics	Children	Adult	*P*
Age	10.6 ± 3.7 (5-14)	32.2 ± 14 (16-75)	
Male/female	33/11	146/111	.02
Lower lobe location (%)	58	68	
Mean diameter of cysts	8.5 ± 3.1 (3-15) cm	6.6 ± 3 (2-16)cm	<.001
Intact (%)	71	57	.07
Perforated (%)	29	43	.07
Multiple (%)	25	27.6	.6
Bilateral (%)	4.5	8.9	.3
Other organs (%)	20.4	12.8	.17
Duration of chest drains (d)	3.2 ± 1.6	4.8 ± 4.4	.02
Morbidity (%)	13.6	11.6	.7
Mortality (%)	0	0.4	
Recurrence (%)	4.54	4.28	