SURGICAL TREATMENT OF PULMONARY HYDATID CYSTS IN CHILDREN

Salih Topçu, MD
İsmail Cüneyt Kurul, MD
İrfan Taştepe, MD
Durmuş Bozkurt, MD
Erkmen Gülhan, MD
Güven Çetin, MD

Objective: Hydatid disease is a parasitosis and endemic in many sheep-raising areas; it is still an important health problem in Turkey. We report our experience with childhood hydatid cyst and discuss the concepts of treatment.

Methods: The clinical courses of 128 children with thoracic and liver hydatid cyst operated on from 1994 to 2000 were reviewed. The group consisted of 71 boys and 57 girls aged from 8 months to 16 years. Intact cysts were found in 144 patients and ruptured cysts in 68.

Results: In the postoperative course we have encountered 20 perioperative complications in 16 patients. The most common complication was residual pleural space and delayed air leakage, which occurred in 9 patients. There was no early death.

Conclusion: Surgery is the treatment of choice for most patients with pulmonary hydatid disease. The aim of surgery is evacuation of the cyst, removal of the endocyst, and management of the residual cavity. Conservative surgical methods that preserve lung parenchyma should be preferred. (J Thorac Cardiovasc Surg 2000;120:1097-101)

Hydatid disease is a parasitosis caused by *Taenia echinococcus*. It is endemic in many sheep-raising regions, notably the Mediterranean countries, South America, the Middle East, New Zealand, and Australia.^{1,2} It is still an important public health problem in Turkey. The incidence of the disease is said to be 2/100,000.¹ In this article we present our experience and discuss the concepts of treatment.

Patients and methods

The records of 128 children who had surgical treatment at Atatürk Center for Chest Disease and Thoracic Surgery between 1994 and 2000 were reviewed. During the same period a total of 567 patients with hydatid disease were treated surgically in our center. Nineteen of the 128 patients had bilateral cysts and 4 of them had bilateral pulmonary and hepatic cysts. Fifteen of 128 patients had additional subphrenically located liver cysts.

Results

The group consisted of 71 boys and 57 girls. Their ages ranged from 8 months to 16 years with a median age of 10.1 years. A total of 212 cysts were present in 128 patients. One hundred four cysts were located in the right lung and 93 in the left. The lower lobes were affected more than upper lobes, 130 versus 67. Seventy-five cysts were found in the right lower lobe and 55 in the left lower lobe. In 26 patients there were multiple cysts in more than one lobe of the same lung.

Of these 212 cysts, 144 were intact and 68 were perforated on admission. Twenty-one of 68 cysts were complicated with parenchymatous lesions or pleural complications. Four patients were referred to our center with empyema. We drained the empyema first and then operated after the patient's general condition improved.

All patients were treated surgically; no medical treatment was tried before surgery. Seven of 19 patients with bilateral pulmonary hydatid disease were managed by median sternotomy and 12 of them were operated on sequentially. Fifteen patients with additional subphrenically located liver cysts were operated on by phrenotomy through right thoracotomy. Sixteen patients had cysts in the lower part of the liver, 12 in the right side and 4 in the left. All were referred to pediatric surgery for laparotomy. The following operative procedures were performed: cystotomy-capitonnage, 183; cystectomy, 23; wedge resection, 4; and lobectomy, 2.

From the Department of Thoracic Surgery, Atatürk Center for Chest Disease and Thoracic Surgery, Ankara, Turkey.

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Address for reprints: İsmail Cüneyt Kurul, Oyak Sitesi Blok 1/12, 06610 Çankaya, Ankara, Turkey (E-mail: ckurul@hotmail.com).

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Fig 1. Bilateral multiple hydatid cysts of the lung.

Fig 2. "Water-lily sign" in a case of ruptured hydatid cyst.

Surgical technique. After classic thoracotomy by a posterolateral incision, the lung was freed from all adhesions to the chest wall. Then the thoracotomy wound and the lung, apart from the area containing the cyst, were covered with sponges moistened with saline solution and diluted with 10% povidone-iodine solution to prevent inadvertent implantation of solices or daughter cysts.

As the lung was kept inflated, a large needle connected to the suction tip was inserted into the cyst. Before needle aspiration, no antiscolicidal agent was injected into the cystic cavity. When the cyst was aspirated and its fluid evacuated as completely as possible, the most prominent part of the cyst was opened (cystotomy) and the cyst membrane was removed with ring forceps. Then the cavity was irrigated with saline solution and cleaned with sponges moistened with diluted povidone-iodine solution and the bronchial openings were sutured. The residual cavity starting from the deepest level, a space of 1.5 to 2 cm being left between each layer, was obliterated by absorbable purse-string sutures (polygalactin 910; Vicryl) (capitonnage).

In the postoperative course we encountered 20 complications in 16 patients. The most common com-

plication was residual pleural space and delayed air leakage, which occurred in 9 patients. Atelectasis occurred in 6 patients and wound infection occurred in 5 patients.

In the postoperative period, albendazole was used for perforated cysts in a dosage of 10 mg/kg. Treatment was given as 3 sequential 28-day courses, with 14-day intervals between courses. In 1 patient a hydatid cyst relapsed after operation at the fifth month and lobectomy was performed. There was no perioperative death.

Discussion

Hydatidosis is a parasitic disease caused by the larval growth of the tapeworm *Echinococcus granulosus*. The dog-sheep cycle is the paradigm for the life cycle of the parasite. Man becomes involved in this cycle when he is associated with infected dogs or by consuming contaminated vegetables.²

The liver is the most common and the lung is the second most common area affected in adults. However, children are more likely to have pulmonary than hepatic echinococcus cysts.³ Pulmonary hydatid cysts can be located in any pulmonary lobe. The right lower lobe is the most frequently affected area of the lung.² In our

study the right lung was affected in 52.7% of patients, the right lower lobe in 38.1%, and the left in 47.2%.

Usually the rate of growth of the cyst in the lung is progressive and more constant than in other organs because the pulmonary tissue is elastic and shows little resistance to the expansion in size.²

The most valuable diagnostic procedure was the plain chest radiograph. On radiographs the cysts appear as round, homogeneous, well-defined opacities^{2,3} (Fig 1). The alteration from a spherical to an oval shape may only be observed during deep inhalation, called the Escudero-Nenerow sign. A floating membrane called the “water-lily sign” is seen with an air-fluid level in perforated cysts (Figs 2 and 3). Yet computed tomographic imaging can show both intact and ruptured cysts. Although there are some arguments about the necessity of computed tomography in hydatid disease, we believe that in selected cases tomography is necessary, especially for patients who have cysts behind the heart or perforated, infected cysts.

Operation is the treatment of choice for pulmonary hydatid cysts. Various surgical procedures have been described in the literature, namely, excision of entire cyst by enucleation (Barrett technique), excision of pericyst (Perez Fontana), cystotomy, capitonnage, wedge resection, segmentectomy and lobectomy.^{1,2,4}

The choice of surgical technique depends on the conditions encountered during surgery. Enucleation, introduced by Barrett, is generally performed on peripherally located small cysts, but extirpation is difficult to accomplish without rupturing the cyst.^{2,4}

Seven of the patients with bilateral hydatid disease were operated on through a median sternotomy. As Çetin and colleagues⁵ reported, we did not prefer median sternotomy in patients with empyema or with perforated cysts in whom resection is required and in patients with concomitant liver cysts, because of the risk of mediastinitis in patients with empyema or perforated cysts and because of the risk of hepatobiliary fistula in patients with an additional liver cyst (Fig 4).

Resection techniques are used only if parenchymal lesions appear irreversible.^{1,2} Removal of the cyst with capitonnage of the residual cavity with absorbable sutures is the usual method of choice in our clinic even in the presence of bronchiectasis. We believe that pulmonary resection should not be routinely performed for hydatid cyst of the lung even in the complicated cysts, especially for children and young adults, because the affected lung parenchyma in children has a great capacity for healing.^{1,2} Hydatid cyst of the lung should be operated on as soon as it is diagnosed. Best rates of surgical success, with minimal postoperative morbidity,

Fig 3. Computed tomographic scan of chest of the same patient showing a large hydatid cyst.

are achieved when patients are in stable condition at the time of the operation.

In recent reports, video-assisted thoracic surgery has been seen among the surgical procedures.⁶ We believe long-term follow-up of these cases should be taken into consideration before acceptance of this procedure.

In the treatment of hydatid disease, drugs have been used but the results have been variable. Some recommend medical treatment and some do not. We do not recommend medical treatment in the preoperative period. Chemotherapy alone is not reliable in controlling this disease.^{1,4,7} In addition to its side effects, complications occur mostly because of perforations of the cysts during medical treatment with albendazole or mebendazole. Chemotherapy is indicated only to prevent secondary recurrence in patients with pulmonary hydatid cysts after spontaneous or iatrogenic rupture of cysts and spillage of contents after operation. We routinely prescribe albendazole only after operation for perforated cysts in 3 sequential 28-day courses with 14-day intervals to prevent the disease from recurring from the release of hydatid daughter cysts into the pleural space.

Some recommended percutaneous drainage of radiologically typical hydatid cyst to confirm the diagnosis and evacuate elements of the cyst.⁸ The laminated membrane or endocyst is made of noncellular chitin and is very friable and tears very readily when perforated by a needle. The smallest break in the membrane may result in total rupture of the cyst, and spillage of its contents, hydatid fluid with scolices and daughter cysts, could cause severe anaphylactic reaction or later development of new cysts in the contaminated tissues. In our opinion, transthoracic needle aspiration of a sus-

Fig 4. Treatment algorithm for pulmonary hydatid disease.

pected cyst must never be attempted. Patients who have undergone medical treatment or transthoracic needle aspiration have the risk of superinfections in the following days because of the connections between bronchial tree and pericystic cavity.^{4,7}

In conclusion, surgery should remain the primary treatment for pulmonary hydatid disease.

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