



Surgical approach of pulmonary hydatidosis in childhood

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SUMMARY

To review the results of different surgical treatment in hydatid disease of the lung in paediatric patients.

A total of 102 children with pulmonary hydatid cysts were treated at the our clinic in the period from 1990 to 2001. There were 59 boys and 43 girls and their age ranged from 4 to 16 years (mean 10.2).

Chest radiography, computed tomography and abdominal ultrasonography were the most commonly used diagnostic techniques. The cysts were located in the right lung in 68 patients (66.6%), in the left lung in 30 patients (29.4%), in both lungs in four patients (3.9%). Concomitant liver cyst hydatid was also detected in 12 patients that were located at right lung, and two patients with bilateral lung involvement. All cases were managed surgically. Of 14 cases with concomitant liver and intrathoracic hydatid cysts, right thoracophrenotomy

was performed in 12, median sternotomy in one, and phrenotomy in other. Partial cystectomy and capitonnage were the most commonly used surgical methods. Post-operative complication was seen in 10 (9.8%) patients. Infection at the incision site occurred in four patients and air leakage in three. Complications of capitonnage were seen in three patients. One patient (1%) died at fourth post-operative day due to sepsis.

Parenchyma protective operations should be performed especially in children living in endemic areas because of the possibility of recurrence of the disease in the future. Single stage operations in suitable cases decrease the cost of treatment and make surgical therapy suitable in both children and young adults, by reducing the hospital in-patient time and morbidity.

Keywords: Hydatid cyst; lung; liver; surgery; pediatric

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INTRODUCTION

Hydatid disease is an important public health problem in Turkey, with an annual incidence of 12 cases per 100,000 inhabitants (1). In the rural areas, shepherding and cattle raising, along with dogs, are common. Dogs and other canines are the primary hosts of the adult *Echinococcus* tapeworms, which produces eggs that are passed in the stool. Eggs are ingested by intermediate hosts such as cows and sheep. Humans become accidental hosts by ingesting tapeworm eggs (1,2). The lungs are the most common organ infected by the larval form of *Echinococcus granulosus* in children, and is reported in 20–30% in adults and 64% in children (1–4). Cysts may grow faster in less-resistant organs such as lungs, and this may explain the high incidence of disease in these organs in childhood (4,5).

In this study, we report our results of surgical treatment of pulmonary and concomitant liver hydatid cyst diseases in children.

MATERIALS AND METHODS

Between January 1990 and January 2001, 319 patients with pulmonary hydatid cysts were treated at the thoracic surgery department of Atatürk University Medical Faculty. A total of 102 patients (31.9%) were in the paediatric age group. We analysed the medical records of the patient according to age, symptoms and signs at presentation and radiographic findings. A second analysis was performed of surgical planning of surgery, surgical approach and the progress after surgery (hospital stay and prognosis). At presentation chest radiography was performed in all patients. Computed tomography and abdominal ultrasonography provided most diagnostic information about the nature and the location of the lesion. Casoni skin test, Weinberg complement fixation test and eosinophil counts were not used routinely, because of their relatively low diagnostic value compared with radiodiagnostic techniques.

Cystotomy, partial pericystectomy and capitonnage were the most commonly used surgical methods. After routine

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Table 1 Symptoms of pulmonary hydatidosis (102 cases)

Symptoms	Number	Percentage
Cough	57	56
Pain	41	40
Dyspnea	21	21
Fever	19	19
Hemoptysis	9	9
Hydatoptysis	8	8
Pleural complications	4	4

exploration, the surgical area was isolated with compresses soaked in povidone-iodine and attention, given to prevent spillage of the cystic content into the thorax. The cyst was decompressed by aspiration with a 14-gauge needle connected to a high-pressure suction. An incision was made in the pericyst, and the cyst contents were evacuated. The components of the pericyst that protruded outside the lung parenchyma were excised. The remaining cyst cavity was carefully irrigated with povidone-iodine as a scolocidal agent. Bronchial communications were closed with fine absorbable sutures. In the capitonnage procedure, the walls of the pericyst cavity were brought together with a series of purse-string or mattress sutures starting from deepest point and working outward.

After the extraction of the inner cyst membrane, wedge resection was performed in patients with small and peripheral cysts.

RESULTS

There were 59 (57.8%) boys and 43 (42.1%) girls. Their age ranged from 4 to 16 years, with a mean of 10.2 years. The

most common symptoms were cough and chest pain, which were present in 57 and 41 of cases, respectively. The symptoms at clinical presentation are summarised in Table 1. All patients were examined with chest radiography (Figures 1 and 2A). Computed tomography (CT), ultrasonography and laboratory tests (indirect haemagglutination) were the additional diagnostic techniques (Figures 2B and 3). Table 2 shows the diagnostic methods that were used in making the diagnosis. The cyst located in the right lung in 68, and in the left in 30. Cysts were bilateral in four patients. Unilateral multifoci were detected in 23 (22.5%). Concomitant liver involvement was observed in 14 patients with bilateral lung involvement in two.

All of the patients underwent surgery, and a total of 105 operations were performed. A standard thoracotomy was used on the affected side in 98 (96%). Median sternotomy was used in four (3.9%). Evacuation cystotomy, partial pericystectomy (unroofing) and capitonnage of the residual pericyst cavity were performed in 81 (79.4%) patients. In four of the patients, additional decortication was required because of pleural thickening. Evacuation cystotomy, total pericystectomy and capitonnage were performed in seven (6.8%) patients. 14 lung resections were performed (13.7%). 'Clamp and cut' wedge resections were performed in two, segmentectomy in two, bilobectomy in two and lobectomy in eight cases. Capitonnage was performed as a secondary operation in three cases, who had prolonged air leakage. If concomitant hepatic cysts were present on the diaphragmatic surface of the liver, they were treated with a transdiaphragmatic approach in the same operation. Concomitant liver cyst hydatids were detected in 12 of patients who had right lung cysts and two patients with bilateral lung involvement. Of 14 cases with

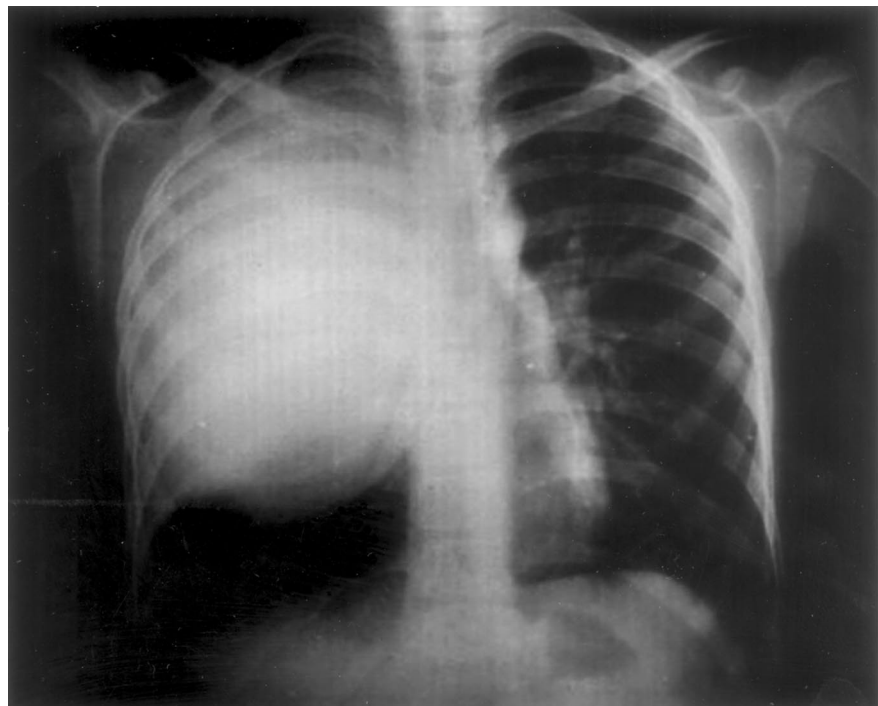


Figure 1 Chest radiograph showing a giant lung hydatid cyst

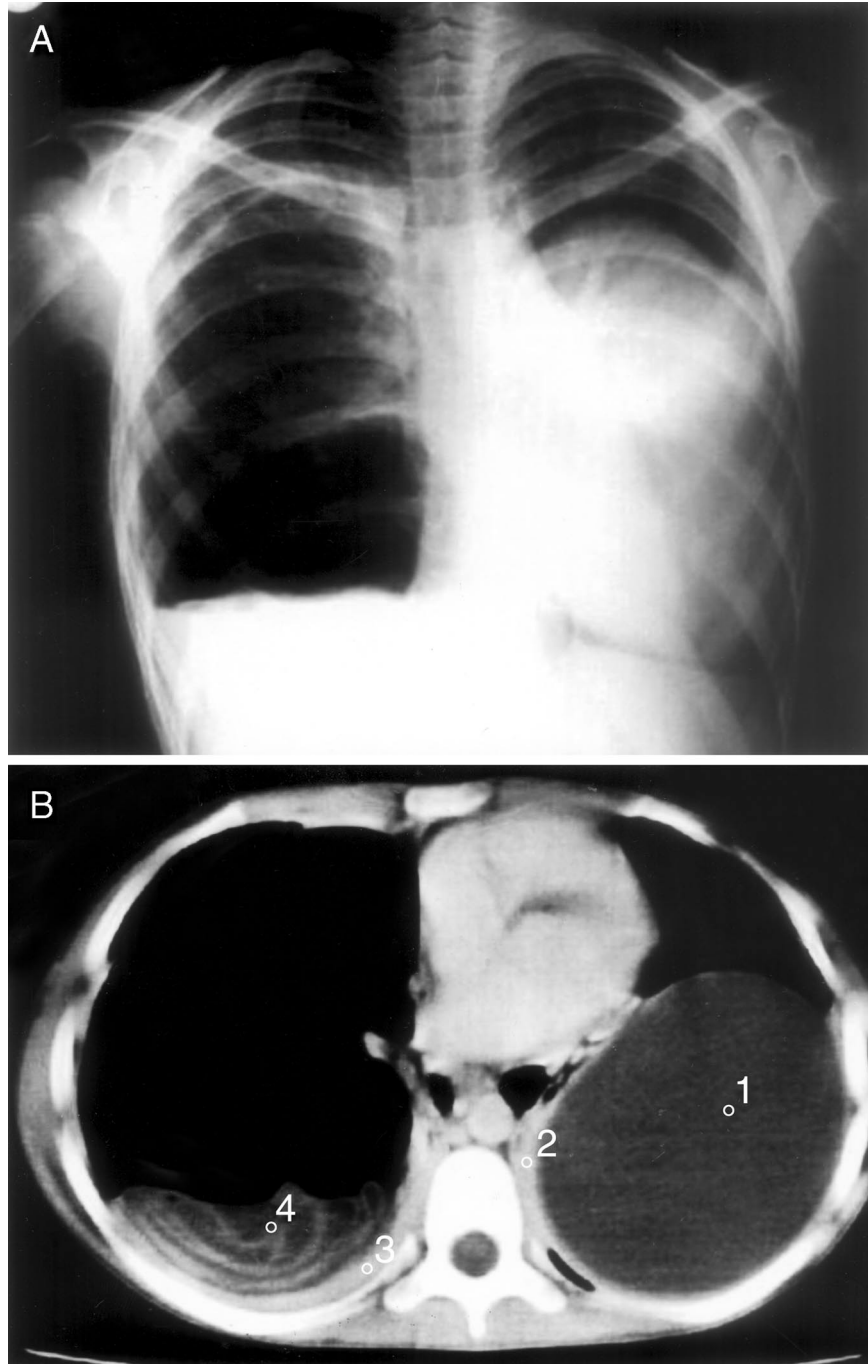


Figure 2 Ruptured right and intact left lung hydatid cysts in the chest radiograph (A) and thorax CT scan (B)

concomitant liver and intrathoracic hydatid cysts, right thoracophrenotomy was performed in 12, and median sternotomy and phrenotomy in one. In one patient with concomitant liver cyst, percutaneous drainage with ultrasound guidance was performed in the general surgery clinic, approximately 1 month after the chest operation.

Post-operative complications were seen in 10 patients (9.8%). Wound infections were detected in four and air leakage in three patients. Capitonage complications were seen in three patients. One patient (1%) died due to respiratory failure on the fourth post-operative day. The post-operative course in the remaining patients was uneventful. The mean

hospitalisation time was 9.3 days. The patients were followed for a period of 1 year to 5 years, and no recurrence was detected.

DISCUSSION

Pulmonary hydatid cyst is little more common in young males than females (2,5). In our study, 102 of 319 patients, in whom surgical therapy was performed, were under the age of 16 (31.9%). Hydatid disease in childhood is a major health problem in endemic areas. Age is an important factor that can affect the surgical therapy. The compressible nature of the lung tissue permits the cyst to reach a large size before



Figure 3 Left hydatid cyst in the thorax CT scan

symptoms appear in children (5,6). The percentage of patient requiring lung resection for cysts larger than 10 cm in diameter is not uncommon (5). Surgical procedure should be performed as soon as possible in children because of the risks of growth retardation and chest wall deformity (5,6). Liver cyst hydatid is common in older patient, whereas the lungs are commonly affected in childhood (3,4).

The most common symptoms of lung hydatid disease are cough, chest pain and blood-streaked sputum (6). In our study, although cough and chest pain are the most frequent symptoms, haemoptysis was encountered in only nine (8.8%) patients. The pathognomonic finding of expectoration of cystic fluid and membranes was seen in eight cases.

The diagnosis of lung hydatid cysts can be made by radiological techniques. Casoni, Weinberg, indirect haemagglutination tests are laboratory methods, which can also be useful in the diagnosis of cyst hydatid. However, the Casoni test, used frequently in the past, is no longer the method of choice because of poor specificity and a small risk of anaphylaxis (1,7,8). Serologic methods, on the other hand, were found in the 80–100% sensitive and 88–96% specific in the diagnosis of liver hydatid. However, it is not as sensitive in the diagnosis of lung cysts (50–56%) (1). Imaging techniques remain more

sensitive than serodiagnosis, and a characteristic scan in the presence of negative serologic results should still suggest the diagnosis of echinococcosis (1,6). In our series, Casoni's intradermal test and Weinberg complement fixation test were not routinely used because of their high rates of false positive results, and imaging techniques are preferred for diagnosis in endemic areas.

The therapy of the lung hydatid cysts is generally based on surgical treatment. The causative parasite is removed from the tissue of the affected organ. Cavity and bronchial communications are closed via capitonnage. The excised tissue is non-functional fibrous tissue in the partial pericystectomy procedure. Re-expansion of the surrounding lung tissue is aided by obliteration of the fibrous pericyst with capitonnage (9).

Single stage surgical treatment suggested for the bilateral lung hydatid cysts with concomitant liver involvement with satisfactory results (10,11). Median sternotomy or thoracotomy with a transdiaphragmatic approach should be evaluated pre-operatively in those patients. We based our pre-operative evaluation on the CT findings, which we assessed the diameter and the location of the cyst. The decision of median sternotomy or a bilateral thoracotomy approach depended on the CT findings. Posterior location, perforation and suppuration, adhesions to the aorta, trachea and oesophagus were important factors for this approach.

Concomitant lung and liver cysts were reported 6–20% in previous studies (2,5,11–14). In these cases, the need for the thoracic approach was dictated by two considerations: liver cysts are easily accessible through the diaphragm and co-existing intrathoracic complications can be managed at the same time (13,14). There are some cases of concomitant lung and liver involvements that used the median sternotomy

Table 2 Diagnostic methods used in our study group

Technique	Number	Percentage
PA and lateral CxR	102	100
Abdominal ultrasonography	87	85.2
Indirect hemagglutination	69	67.6
CT	44	43.1
Thoracotomy	2	1.9

and laparotomy approaches in the same session (10). Bilateral approach with median sternotomy was applied to one of our patients, in our study. In that patient, the liver cyst was treated surgically by laparotomy.

The resection rate in lung cysts has been reported as 6–21% in different series (3,5,15). We performed wedge resection for small cysts that located at the edges of the lobes. Large cysts located centrally were treated by lobectomy. The resection rate in our patients is 13.7%.

Medical therapy of lung hydatid disease became the treatment of choice with the advent of benzimidazol compounds. However, perforation of hydatid cysts in lung tissue can cause serious complications, and this should be taken into consideration when medical therapy is being planned (16). We used medical therapy for 1–3 months period to prevent possible spread during operation and to prevent the development of new cysts. Medical therapy alone can take approximately 1 year (17,18). The other important point is to perform regular liver function tests. The side effects of growth retardation during childhood and the dependence of the patient on the hospital are the important disadvantages of the medical therapy. In our study group, the mean hospital stay time is 9.3 days, and the children returned back to their normal activity at the end of the treatment.

In conclusion, surgery is an effective treatment for pulmonary hydatid disease in children. It is also suitable for the treatment of concomitant liver cysts at the same operation. Resection of lung for hydatid disease should be reserved for cases with severe parenchyma destruction.

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