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SURGICAL TREATMENT OF CARDIAC ECHINOCOCCOSIS: REPORT OF TEN CASES

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ABSTRACT

From 1977 to July 1994, 10 patients underwent operation for cardiac cysts in the Department of Cardiovascular Surgery of Türkiye Yüksek Ihtisas Hospital. The ages of the patients ranged from 10 to 39 years (mean 25.2 ± 8.82). Nine patients had cardiac and pericardial cysts, and the first patient of this series had two pericardial cysts. One patient died in the early postoperative period due to rupture of the interventricular septum. Hospital mortality was 10% (1/10). Late follow-up data were obtained for 8 of the 9 hospital survivors, and no recurrence was found.

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INTRODUCTION

Cardiac hydatid disease is a rare but life-threatening entity[1–3]; however, diagnosis is relatively easy, once suspected. Conventional and specific cardiac investigations are not pathognomonic for the disease, and serology and antibody screening may be negative in most cases[4]. Cardiac imaging plays an important role in the diagnosis[5–7]; diagnosis and location of the cysts are best accomplished with noninvasive methods such as two-dimensional (2-D) transthoracic and transesophageal echocardiography (TEE), computed tomography (CT), and nuclear magnetic resonance (NMR)[4,8–12]. Surgical treatment is almost always indicated because of the serious and frequently fatal complications of cardiac echinococcosis[12–18].

MATERIALS AND METHODS

From 1977 to July 1994, 10 patients underwent operation for cardiac hydatid cysts at this institution. Four patients were male. The ages of the patients ranged from 10 to 39 years (mean 25.2 ± 8.82). Clinical data are shown in Table 1. Three cases were asymptomatic. Physical examination was normal in 5 patients. Eight of the 10 patients underwent two-dimensional (2-D) echocardiography. Four patients were evaluated with computed tomography (CT), and 2 with nuclear magnetic resonance (NMR) (Figure 1). At the beginning of the experience, 1 patient had only a telecardiogram (Figure 2). The results of the diagnostic tests are shown in Table 2. Ten patients had 9 cardiac and 18 pericardial cysts. Three patients also had simultaneous lung and liver hydatid cyst disease.

OPERATIVE TECHNIQUE

A posterolateral thoracotomy was performed on the first patient of this series, who had two pericardial cysts; the two cysts were resected with the adjacent pericardium. A median sternotomy was performed in 9 patients. Standard cardiopulmonary bypass (CPB) techniques, moderate hypothermia, cardioplegic arrest, and topical cooling were used in 8 patients. Initial cardioplegia was antegrade cold crystalloid (St. Thomas II solution); repetitive cardioplegia was cold blood in the last 3 patients. After cardioplegic arrest, the cysts were reached via left ventriculotomy. The fluid content of the cysts was aspirated initially and then the cyst cavity was opened. Multiple daughter cysts were removed and the cavity was irrigated with hypertonic saline solution or polyvinylpyrrolidine iodine. If the cyst wall was strong enough and located on the left ventricular free wall, the cyst cavity was left open. Although the clinical policy was to close the left ventriculotomy prima-

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rily, a polytetraflourethylene (PTFE) patch had to be used in case 4 to close the left ventriculotomy because of a large defect. When the cyst was located in the interventricular septum, circular sutures were inserted inside the cyst cavity for capitonnage. In case 10, the cyst was located between the aortic root and the right atrial appendix; deformation and calcification of the noncoronary cusp due to penetration of the cyst to the aortic wall caused severe aortic insufficiency. After routine CPB, the calcified cyst and aortic leaflets were resected. The aortic root was enlarged with a Dacron® patch, and the aortic valve was replaced with a 25-mm St. Jude Medical prosthesis.

In case 9, a median sternotomy without cardiopulmonary bypass was performed. Fifteen hydatid cysts, located on the right atrium, right ventricle, vena cava inferior, and diaphragm, were resected after cystotomy and removal of the germinative membranes.

Surgical data are summarized in Table 3.

RESULTS

Nine patients survived operation. One patient died due to rupture of the interventricular septum 6 hours after operation; hospital mortality was 10% (1/10). Eight of the 9

TABLE 1. CLINICAL AND ELECTROCARDIOGRAPHIC DATA

Case	General Data	History	Examination	EKG
1	33 years, female, endemic area, family history, previous operation for pulmonary hydatidosis	Asymptomatic	Normal	NSR
2	27 years, female, endemic area, family history	Dyspnea, chest pain	Normal	Nonspecific ST-T changes
3	24 years, female, previous operation for liver hydatitosis	Dyspnea, palpitation	Normal	NSR
4	26 years, male, shepherd	Dyspnea, chest pain	2/6 systolic murmur in the aortic area	D1 T(-), V2-V6 T(-)
5	19 years, male, farmer	Hemoptysis	Diminishing of heart sounds, venous pulsation	NSR
6	35 years, female, family history	Chest pain, hemoptysis	3/6 SM aortic 2/6 SM apical	D1-D2 T(-) V4-V6 T(-)
7	10 years, male	Asymptomatic	3/6 SM aortic 2/6 SM apical	D2, D3, aVF T(-)
8	39 years, female	Chest pain, exertional dyspnea	Normal	D3, aVL T(-) V5, V6 T(-)
9	17 years, female	Asymptomatic	Normal	NSR
10	22 years, female	Exertional dyspnea, chest pain, NYHA IV	BP 110/0 mmHg, HR 79, 4/6 DM in the 3rd left interspace	Sinus LV diastolic strain

NSR = normal sinus rhythm, SM = systolic murmur, DM = diastolic murmur, NYHA = New York Heart Association

TABLE 2. DIAGNOSTIC DATA

Case	CT	MR	Echocardiography	Coronary Angiography
1	2 pulmonary cysts	Not done	Not done	
2	Not done	Not done	Cystic mass lateral to the LV	Not done
3	Not done	Not done	Cystic mass at the posterior LV wall	Not done
4	Not done	7 x 9-cm cystic mass	Not done	Not done
5	Not done	Not done	Pericardial effusion, apical mass	Not done
6	Not done	Not done	Apical and left ventricular mass	Normal coronary arteries, distortion of the LAD artery
7	Interventricular and pulmonary cyst	Not done	Cystic mass at the IVS, minimal MI and TI	Normal coronary arteries
8	Not done	6 x 7-cm cardiac and 10 x 12-cm liver hydatidosis	Cystic mass at the posterior wall of the LV	Not done
9	2 pericardial lobulated cysts	Not done	Large pericardial cyst	Not done
10	5-cm calcified mass	Not done	AI, 7 x 5-cm cystic mass in the anterior mediastinum	Not done

LAD = left anterior descending artery, MI = mitral insufficiency, TI = tricuspid insufficiency, AI = aortic insufficiency, LV = left ventricle, CT = computed tomography, MR = magnetic resonance

hospital survivors were followed from 3 months to 12 years; the patient operated in 1977 was lost to follow-up. All surviving patients were symptom-free and showed no cardiac recurrence. Two of the surviving patients underwent a second operation for lung and liver involvement; one was reoperated for liver hydatidosis 1 year after the first operation, and the other was reoperated for a pulmonary hydatid cyst 3 years after the cardiac cyst operation. Only 1 patient has been under mebendazole treatment after surgery.

DISCUSSION

Cardiac echinococcosis is rare in patients with hydatid disease, but its diagnosis should be suspected in patients from endemic regions[2,6,18]. The occurrence rate of cardiac hydatid cyst varies between 0.2% and 2% of all hydatid cyst patients[16]. Contaminated water and close contact with infected animals are the routes of infection. However, the absence of manifest clinical signs in the initial course of the disease makes diagnosis difficult. If the patient has a history of other organ involvement, the diagnosis becomes much easier[4].

After contact with infected dogs or contaminated food, the ingested ova releases a hexacant embryo, which penetrates the intestinal mucosa and reaches the liver first. The natural course of hydatid disease begins when the embryo reaches

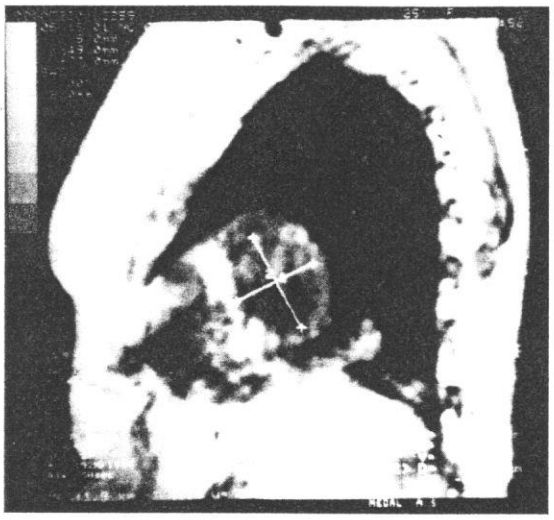

Figure 1. Nuclear magnetic resonance imaging shows the exact location of the cardiac hydatid cyst. Posteroanterior view.

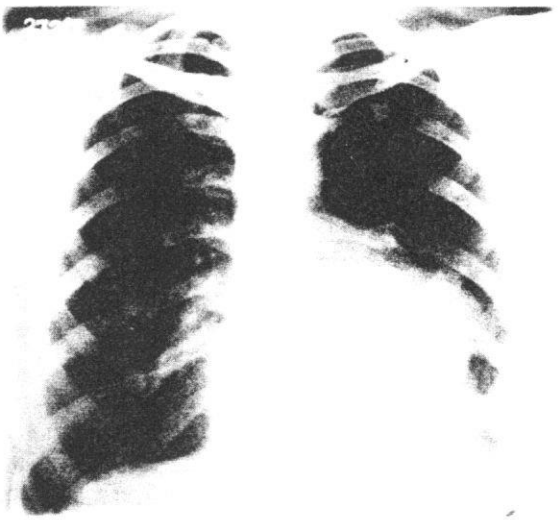

Figure 2. A posteroanterior thorax X-ray shows bulging of the left side of the cardiac silhouette due to the cardiac hydatid cyst.

TABLE 3. SURGICAL DATA

Case	Location of the Cyst	Surgical Procedure
1	6 x 6-cm and 3 x 2-cm pericardial	Posterolateral thoracotomy, cystectomy
2	i—5 x 5 x 3-cm apical	i—left ventriculotomy, cystotomy, left open
	ii—3 x 5 x 7-cm pericardial	ii—cystectomy
3	8 x 10-cm posterobasal wall of the LV	Cystotomy, left open
4	3 x 5-cm lateral wall of the LV	Left ventriculotomy, cystectomy, closure of the ventriculotomy with a PTFE patch
5	i—3 x 3 x 4-cm pericardial	i—median sternotomy, cystectomy
	ii—4 x 5 x 5-cm lateral wall of the LV	ii—left ventriculotomy, cystectomy, left open
6	i—4 x 3 x 3-cm apical + IVS	i—left ventriculotomy, capitonnage, primary closure of the ventriculotomy
	ii—10 x 6 x 3-cm lateral wall of the LV	ii—left open
7	8 x 8-cm IVS	Left ventriculotomy, capitonnage, primary closure of the cyst cavity and left ventriculotomy
8	3 x 5 x 5-cm lateral wall of the LV	Cystectomy
9	15 hydatid cysts located on diaphragma adjacent to the RA, RV, and VCS	Cystectomy
10	AI, 5 x 5-cm cystic mass between the aortic root and RA	Cystectomy, aortic root enlargement, AVR with a 25-mm St. Jude Medical prosthesis

LV = left ventricle, IVS = interventricular septum, RA = right atrium, RV = right ventricle, VCS = vena cava superior, PTFE = polytetraflourethylene, AI = aortic insufficiency

the myocardium via coronary circulation. Coming through the venous return, it arrives at the right atrium. It may enter the left side of the heart and the coronary arteries by way of either a patent foramen ovale or pulmonary circulation[18]. The myocardial reaction to a hydatid cyst creates the adventitial pericyst layer that surrounds the intact laminated membrane, and this tissue forms an inseparable portion of the myocardium. The growth potential of the hydatid cyst is sometimes then restrained because of cardiac construction. Finally the cyst degenerates and may calcify. The pericystic growth of the viable cyst may determine the consequences, which include rupture into the heart chambers, rupture into the pericardial cavity, compression of the myocardial vessels with resultant myocardial ischemia, cardiac conductance disturbances, or obstruction of the left and right ventricular outflow tracts.

The clinical picture of cardiac hydatid cyst disease depends on its location, age, size, and number of cysts. Echocardiography is a reliable technique in the diagnosis of intracardiac masses; with 2-D echocardiography one can visualize one or more hydatid cysts, locating them precisely in the myocardium or pericardium, seeing them in relation to the normal elements of the heart, and sometimes being able to detect a complication (for example, fissuring or rupture)[8–11]. CT and NMR are adjunctive techniques that facilitate diagnosis and allow detection of a hydatid cyst on various organ images[3,7]. Angiocardiography also depicts the anatomic size and site of a cyst. If a cyst was close to a valve, pressure gradients obtained by catheterization could also be a determining factor[16].

Septal location of a cyst is very rare; involvement of the interventricular septum occurs in only 9% of cases[4]. Septal location was seen in 2 patients in our series and caused paroxysmal supraventricular tachycardia. Tachycardia attacks ceased abruptly after surgical treatment.

All patients, even those who are completely asymptomatic, should be treated surgically[12,14]; surgical therapy is essential for cardiac hydatidosis[5,13,15,17,18]. Cardiopulmonary bypass and elective cardiac arrest by cardioplegia should be used for easy excision of the cyst and to minimize the threat of spillage during aspiration of the hydatid fluid. Capitonnage is proposed for septal, interventricular, and apical cysts, performed by inserting circular sutures inside the cyst cavity for obliteration. Patients having a thin ventricular wall associated with a cardiac hydatid cyst carry additional risks. One of our patients died of rupture of the interventricular septum; this patient had left ventriculotomy and capitonnage. If the cyst is large, it is highly probable that the myocardium will not allow approximation of ventriculotomy and has a higher risk of rupture, as was seen in one of our patients.

Delineated examination of patients with a hydatid cyst is essential, especially for liver and lung involvement. Preoperatively, we investigated multiple-organ involvement, and 2 patients had to be operated on for lung and liver hydatidosis. A common feature of these patients was that they came from contaminated areas.

The cyst may be located in the right ventricular outflow tract, the interventricular septum, the apex of the right or left ventricle, the free wall of the right or left ventricle, the pericardial cavity, or a combination of two or more regions. Location between the aortic root and right atrium, penetration to the aortic wall, and development of severe aortic insufficiency due to cusp degeneration, as in one of our cases, is a very rare complication of cardiac echinococcosis. This patient was in New York Heart Association class IV. A cystic and lobulated mass in the anterior mediastinum was diagnosed by CT and confirmed by echocardiography. In this patient, aortic valve replacement, aortic root enlargement, and total excision of the calcified cyst were performed in the same operation.

The preferred technique for hydatid cysts located on the left ventricular free wall is inactivation of the daughter vesicles, drainage, and marsupialization. Pericardial cysts may be totally resected without CPB. If there are multiple cysts, either separated or combined, total resection without CPB is advised.

In conclusion, early surgery is necessary for prevention of complications, because no effective medical therapy has yet been described. Operative mortality is low and postoperative therapy is usually satisfactory and uncomplicated.

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