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Diagnosis and surgical treatment of complicated liver echinococcosis

Komplike karaciğer kist hidatiklerinin tanı ve cerrahi tedavisi

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Background/aims: *Complicated liver echinococcosis considerably worsens the prognosis of the disease. In this study the treatment of patients with complicated disease was analyzed.* ***Methods:*** *The records of 136 patients who had undergone surgery in our clinic during the last decade were evaluated.* ***Results:*** *Among all complications, the most common were lesions of the bile ducts (88 patients) and suppuration of the cysts (77 patients). Twenty-nine cases had a combination of two complications. Surgery was based on the nature of complications, number and sizes of hydatid cysts and patients general condition. The surgical treatment of choice was echinococcectomy, with possible liquidation of the fibrous capsule cavity. In cases with complications such as suppuration, remaining bile fistulas, large cyst cavities or extrahepatic location, external drainage is obligatory. Post-operative complications occurred in 43 patients (31.6 %), 22.4 % of them being specific in nature. Postoperative mortality was 2.2 % (three patients).* ***Conclusion:*** *Timely diagnosis, appropriate investigation and well planned surgical techniques may improve the outcome of complicated liver echinococcosis.*

Key words: Liver echinococcosis; hydatid cyst; echinococcectomy; bile ducts.

INTRODUCTION

Echinococcosis is a severe parasitic disease which affects both animals and humans, with multiform complications and frequent relapse. It has a considerable economic impact on the communities in which it occurs due to multiple complications leading to disability, a chronic complicated course and even death.

Unfortunately, an increase in the rate of surgical treatments for this disease has not led to improvements in outcome; indeed, the high rate of intra- and post-operative complications is often due to diagnostic, decision-making and technical errors.

Although the disease may occur in all age groups, 50-55 % of cases are found in the 20-40 year age group. Movchun et al. (1) reported that 53.7 % of patients were aged 40-49 years, with the average age of severe disability being 43.6 years and average life expectancy of 54.5 years.

Echinococcosis affects the liver rather than other organs in 50–70 % of cases (2-6).While surgery is recognized as the only satisfactory method of treatment for liver echinococcosis (LE), many controversial results have been reported (2,5,7) but total excision of the cyst alone or with part of the liver appears to be the most effective (6,8-11).This method is not always feasible, however,since it depends on the size and site of the cyst. Moreover, intraoperative blood loss and postoperative bile leakage from the resected area may occur (3,12,13). A conservative approach of evacuation of the cyst contents may lead to problems of a residual cavity with the subsequent complications of biliary fistula, cavity contamination and drainage of purulent material (2,5,12).

Various procedures have been developed to overcome these complications such as external or internal drainage following evacuations and capitonnage with or without omentoplasty (1,2,14,15).

In this study, surgical treatment methods of complicated LE were evaluated according to the nature of complications and the character, location and sizes of cysts cavities.

MATERIALS AND METHODS

The surgical treatment of 136 patients with complicated LE who underwent surgery in our clinic between 1988 and 1998 were analyzed. Patients with the complicated form of disease comprised 52.3 % of the total number of patients (260) who underwent surgery for LE during this period. The

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Table 1. Distribution of patients by age and sex.

Sex	*Age*						
	< 15	15-20	21-40	41-60	61-75	total	%
male	3	3	27	15	8	56	41.2
female	2	5	38	26	9	80	58.8
total	5	8	65	41	17	136	100
%	3.7	5.9	47.8	30.1	12.5	100	

distribution of patients according to sex and age is shown in Table 1. As seen from the table, most patients (123, 90.4%) were at the most able bodied age (21-60 years), which demonstrates the social implication of the problem. The disease was observed in town dwellers more often then in country dwellers. We consider this to be connected with the high level of preventive medicine and medical care in cities on the one hand, and considerable migration from country to city on the other hand.

Complicated LE was diagnosed on the basis of clinical, laboratory and instrumental evaluation. Laboratory results were mostly inconclusive although significant findings included elevated erythrocyte sedimentation rate (ESR) (41.9 %), leukocytosis (19.1 %), anemia (21.3 %) and esinophilia (5.1 %). The leading diagnostic tools for detecting the number, size and location of cysts are ultrasonography (USG) and computerized tomography (CT), which have 90-100% accuracy. In this study, USG was used in all 136 patients preoperatively and in 97% of cases allowed not only diagnosis but also correct evaluation of complications and observation and pathologic changes in the bile ducts. CT was found to have 100 % accuracy in the diagnosis of LE. In the 12 patients on whom it was used, it was possible to detect the size, number and compactness of all hydatid cysts and the condition of the intra- and extrahepatic bile ducts in eight of them ERCP was used in two patients with jaundice and was informative in both cases.

All 136 patients underwent surgery, with preoperative treatment according to individual needs and based on examination results. Generally, prophylaxis of hepato-renal failure, purulent-septic complications and cholemic hemorrhage was undertaken.

For prophylaxis of purulent complications, the broad spectrum antibiotic of choice was more recently ceftriaxon, administered at a dosage of 1 gm iv immediately prior to surgery and continued at a dosage of 2.0 gm iv, 12 hourly, for three to four days postoperatively.

Choice of operative access was based on number, size and location of cysts, nature of complications and previous surgery but in 90.4 % of patients an oblique subcostal incision was used, which is the most common universally as it allows revision of the right lobe of liver in full value, and can be easily extended and combined with toracophrenothomy in case of need (2.3 %). Superior median laparatomy was used in nine patients (6.6 %), mainly in cysts of the left lobe. In one case (0.7%), a right pararectal incision was made due to multiple postoperative scars on the abdominal wall.

Surgery should be conservative in sparing of organs but radical in ablation of parasitic cysts. In practice, the classification of Milonov (1974) was used, taking into account the main aspects of parasite ablation, antiparasitic treatment, attitude to fibrous capsule (retain, partial or total ablation) and residual cavity (liquidation, partial closure, drainage).

Cyst removal usually involved the use of an apparatus invented in our clinic to ablate both cyst contents and chitine capsule. The principle of its action (Figure 1) is the separate suction of the liquid part of the cyst through a long needle fixed with a rubber tube into the lateral hole of a glass tube, which was connected to a domestic vacuum cleaner. As the glass tube is 2-3 cm in diameter, the thick contents of the suppurated cyst and chitine capsule remain there and due to the large stream of air, suction occurs easily and quickly without contamination of surrounding tissue and without damage to liver tissue. The glass tube may be substituted with a silicone tube of appropriate diameter.

Disinfection of the fibrous cavity capsule was usu-

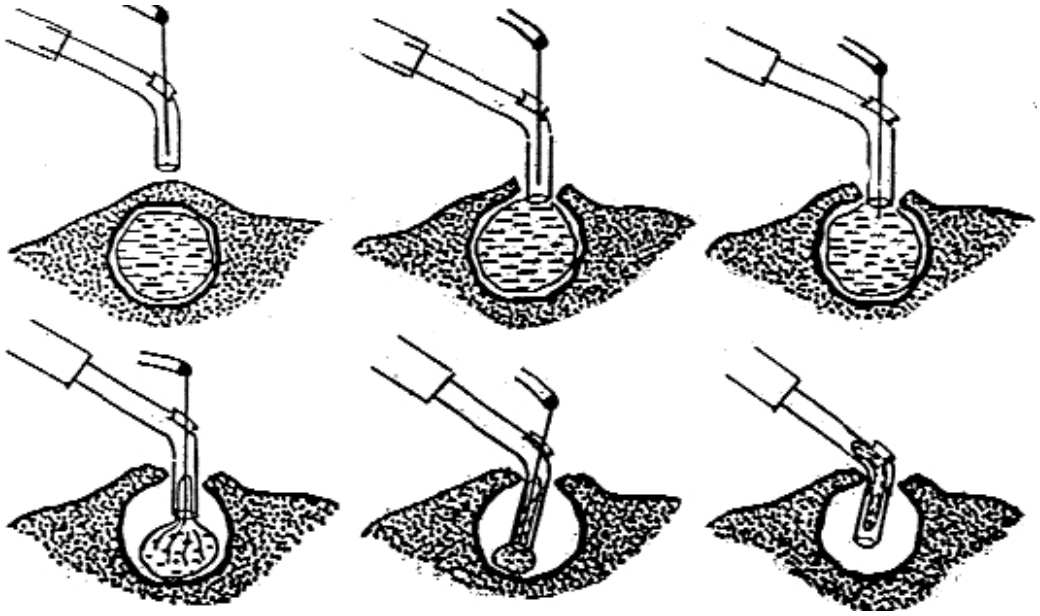

Figure 1. The scheme of apparatus for removal of echinococcal cyst

ally undertaken using 0.5 % chlorhexidine and 3-5 % alcohol solution of iodine.

RESULTS

The most frequent complication of LE was cyst perforation (88 patients), with 86 of these patients (33.1 % of total LE patients) having cyst perforation into the bile ducts and two (0.7 %) having perforation into the peritoneal cavity. The second most common complication was suppuration of the cyst (77 patients, 29.6 %). Thirty eight patients (14.6 %) had more than one complication, the most common being suppuration with perforation into the bile ducts. Moreover, eight of the patients with bile duct complications also had different presentations of mechanical jaundice with associated cholangitis in six of them.

Most hydatid cysts of the liver were located in the right lobe (103 patients, 75.3 %) but in 17 patients (12.5 %) they were found in the left lobe and in 16 cases (11.8 %) in both lobes.

Monocular liver cysts were detected in 72% of patients and were mostly 50-800 ml in volume but sometimes up to 1500 ml. Multiple cysts (28 %) were generally smaller than single lesions. Four patients had an extended form of echinococcosis where the liver and other abdominal cavity organs were affected. It should be noted that 58 % of complicated echinococcal cysts were located in the subdiaphragmatic region.

The types of operation are shown in Table 2. In 64 patients (47 %) the most acceptable procedure of echinococcectomy with total liquidation of the residual cavity of the fibrous capsule was

Table 2. Type of operation.

	Total	*%*
1.Echinococcectomy without excision of fibrous capsule	101	74.3
* with liquidation of residual cavity	49	
* with external drainage	52	
2.Echinococcectomy with partial excision of fibrous capsule	23	16.9
* with liquidation of residual cavity	15	
* with external drainage	8	
3. Echinococcectomy with total excision of fibrous capsule	8	5.9
4. Atypical resection of left lobe of liver	4	2.9
Total	136	100

Table 3. Nature of postoperative complications.

No	*Complications*	*Number of cases*	*% of total number of patients*
1.	Suppuration of residual cavity	3	2
2.	External purulent fistula	4	3
3.	Hemorrhage in residual cavity	1	0.7
4.	Subdiaphragmatic and subhepatic abscesses	4	3
5.	Peritonitis	3	2
	Non-specific complications		
6.	Suppuration of wound	11	8
7.	Pneumonia	9	6.6
8.	Pleuritis	22	16.2
9.	Hepato-renal failure	1	0.7
10.	Gastro-intenstinal hemorrhage	1	0.7
11.	Cardio-vascular failure	2	1.4
12.	Ileus	4	3

achieved. Invagination of the surplus fibrous capsule, capitonnage or tamponade with a fragment of omentum was frequently used to liquidate the residual cavity. In cases of suppurated echinococcal cysts, cystobiliary fistulas and partially collapsed deep intrahepatic cavities (60 patients, 44.1 %), drainage of the residual cavity was performed.

In rare instances, the following methods were used: echinococcectomy with total excision of the fibrous capsule (pericystectomy) in eight (5.9 %) patients, and with resection of the left liver lobe in four (2.9 %) patients. In 21 patients (15.4 %) echinococcectomy was combined with cholecystectomy, which was indicated in cases of calculouse cholecystitis, interposition of echinococcal cyst and gallbladder and the necessity for common bile duct (CBD) drainage through the stump of the cystic duct.

Seventy seven (89.5%) out of 86 patients with bile duct involvment had an intrahepatic from of the lesion.Surgery for these forms of complicated LE included closure of one of several internal fistulas combined with total or partial liquidation of the residual cavity (30 patients, 39%) and drainage of the cyst cavity after partial closure (47 patients, 61%)

Surgical treatment of the extrahepatic form of bile duct disease (nine patients, 10.5%) included bile duct procedures. Severity of the patients condition depended on whether the CBD was occluded by the parasitic material. In addition to echinococcectomy and liquidation of the residual cavity, choledochotomy, removal of the parasitic material from the bile duct, cleansing of the bile duct with antiseptic solution and external drainage of the bile ducts was performed.

Fourty three out of 136 (31.6 %) patients developed 67 different complications following surgery (Table 3) and 15 (22.4 %) of these were specifically related to the type of surgical intervention. Also, 35 patients with cystobiliary fistulas which had either not closed due to complications (such as cyst suppuration or deep/badly closed cavity) or had not been noticed during or after surgery, experienced chronic bile leakage through the drainage tube. This ceased over a period of two weeks to five months.

Ten patients required surgical treatment of complications. Repeat laparotomy was performed on three patients due to formation and suppuration of a residual cavity, on four patients due to subdiaphragmal or subhepatic abscess, on two due to peritonitis and on one patient due to erosive hemorrhage from the residual cavity of the cyst.

Table 4. Type of complication in the patient pool of 260 patients complicated liver echinococcosis occurred in a total of 136 patients.

Complication	*n*	*percent*
Cyst perferation	88/260	34%
To bile duct	86/260	33.1%
To peritoneal cavity	2/260	0.7%
Suppuration	77/260	29.6%
Suppuration+perforation	38/260	14.6%

A fatal outcome was recorded in three (2.2 %) cases, the causes of death being acute hepatorenal insufficiency (one case), peritonitis (one case) and acute respiratory insufficiency as a result of pneumonia and exudative pleurisy (one case).

DISCUSSION

The clinical course of LE can be divided into two to four stages. We consider the three stage classification of Melnikov (1935) to be the most simple and useful in practice: stage I: asymptomatic, from time of invasion to beginning of clinical manifestation, stage II: first symptom appearance to development of echinococcosis complication/s, stage III: cyst complications.

Some authors have reported that complicated LE are diagnosed preoperatively in 30.3-34.7 % of patients (5,6,12,16), thus one third of patients are admitted at the stage of complication development.

Suppuration is the most frequent complication of EC (12,17,18). In the present study, cyst suppuration was less common than perforation into bile ducts (29.6 % and 33.1 % respectively). The first signs and symptoms of the disease (pyrexia, chills, sepsis and increased pain) may occur with the development of acute cyst infection. There may be suppuration into the intra- and extrahepatic bile ducts (49 patients in this study) which increases the severity of the pathology and affects treatment results.

Rupture of hydatid cyst into the bile ducts and formation of cystobiliary fistulas occur in 4.5 %55 % of patients with LE (2,5,10,13,19). According to Harris (20), 90 % of all cysts eventually affect the bile ducts. The present authors concur with the views of Movchun (1) and Utepkaliev (13) who mark out intrahepatic (formation of internal fistula between cyst cavity and bile ducts) and extrahepatic (real rupture of parasite's elements into bile ducts) forms of disease.

In this study, only nine (10.5 %) of 86 patients with affected bile ducts had the extra-hepatic form while 77 (89.5 %) patients had the intrahepatic form.

In spite of alternative treatment methods, the majority of authors state the only reliable method to be surgery (1,5,6,15,18). The surgical method is determined by the number and location of cysts, their connection to adjacent structures and the presence of complications. Surgery usually involves five main stages: 1) operative access 2) delimitation of operative area 3) puncture and opening of cysts with removal of contents 4) antiparasitic treatment and 5)liquidation of the residual cavity by an appropriate method.

Liquidation of the residual cavity of the fibrous capsule is necessary for perevention of possible suppuration, formation of chronic purulent and biliary fistulas and future formation of nonparasitic liver cyst at the site of the excised EC (1,12).

Liquidation by Delbet's capitonnage is rarely used as it may damage internal liver structures, especially in large deep rooted cysts with a rigid fibrous capsule. We consider the most safe and effective method to be that of invagination of the fibrous capsule margins into the residual cavity from the outside to inside with several layers of sutures or tamponade of the residual cavity (in case of small sizes or considerable narrowing after capitonnage) with an omentum flap.

In a large size residual cavity, with a central location and location of the cyst in projection of frank vessels, partial closure, with or without omentoplasty was used. This allows irrigation of the cavity with antibiotics during the postoperative period; removal of the tube should only be undertaken under USG guidance after liquidation of the content and in the absence of a residual cavity.

The less radical procedure of echinococcectomy with external drainage but without narrowing or liquidation of the residual cavity was used in 29 patients in this study. Indications for the use of this method include cyst suppuration, unusual location (eg subdiaphragmal, intrahepatic) poor condition of the patient and need for rapid completion of operation.

Echinococcectomy, with total excision of the fibrous capsule, (pericystectomy) was performed in five patients while in 23 patients (16.9 %), partial pericystectomy was performed due to the danger of affecting frank vessels and bile ducts near the wall of the fibrous capsule.

Regional resection of the liver was performed in 2.2 % of patients with regional location of cyst and cyst pedicle.

Surgical treatment of extrahepatic disease includes closure of one or several internal fistulas combined with total or partial liquidation of the residual cavity (39 % of our patients), thereby avoiding future formation of an external bile fistu-

la, decreasing the probability of bile leakage into the peritoneal cavity and decreasing the postoperative recovery period.

In a deep residual cavity with additional cavities located in segments I, VII and VIII of the liver, it may not be possible to find and close the fistula's orifice due to difficulties in sufficient revision of cyst walls. In such cases, many authors recommend drainage of the cyst cavity following partial closure (61 % of our patients). Surgical treatment of extrahepatic disease should include bile duct procedures and the majority of surgeons believe that both the hydatid liver cyst should be liquidated and bile duct obturation performed.

Bile duct procedures include choledochotomy, removal of parasitic material, irrigation and drainage of the bile ducts (6,12,13,19,20). Some authors recommend external drainage of the bile ducts (5,12,17), while others prefer biliodigestive anastomosis (2,14).

In conclusion, surgical treatment of complicated liver echinococcosis may be improved with early diagnosis, the use of modern instrumental methods of investigation, well-planned surgical techniques and appropriate procedures based on correct evaluation of disease complication.

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