

OPTIMAL CHOICE OF DIAGNOSTIC TACTICS AND MINIMALLY INVASIVE SURGICAL TREATMENT OF LIVER ECHINOCOCCOSIS

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Abstract: Some of them are known to cause human echinococcosis, and there are reasonable doubts about others. Diagnosis is confirmed by epidemiological history, clinical presentation, radiological imaging, and serological tests. Various pathological forms can become life-threatening, and in these cases, treatment is extremely difficult. The main goal of treatment is the complete cure of the disease in order to avoid further complications and relapses. Liver surgery using various techniques gives the best results with acceptable morbidity and mortality rates. In Uzbekistan, this disease is endemic with high incidence and prevalence. The surgical department of the 1st clinic of the Samarkand State Medical Institute has extensive experience in the treatment of echinococcal liver disease. This article focuses on the epidemiology, etiopathogenesis, diagnosis and surgical treatment of liver echinococcosis.

Keywords: liver echinococcosis, epidemiology, etiopathogenesis, diagnosis, surgical treatment.

ОПТИМАЛЬНЫЙ ВЫБОР ДИАГНОСТИЧЕСКОЙ ТАКТИКИ И МАЛОИНВАЗИВНОГО ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ ЭХИНОКОККОЗА ПЕЧЕНИ

Аннотация: Известно, что некоторые из них вызывают эхинококкоз человека, а относительно других есть обоснованные сомнения. Диагноз подтверждается эпидемиологическим анамнезом, клинической картиной, рентгенологическим исследованием и серологическими тестами. Различные патологические формы могут стать опасными для жизни, и в этих случаях лечение крайне затруднено. Основной целью лечения является полное излечение заболевания во избежание дальнейших осложнений и рецидивов. Хирургия печени с использованием различных методик дает наилучшие результаты при приемлемых показателях заболеваемости и смертности. В Узбекистане это заболевание является эндемичным с высокой заболеваемостью и распространенностью. Хирургическое отделение 1-й клиники Самаркандского государственного медицинского института имеет большой опыт лечения эхинококкового заболевания печени. В данной статье основное внимание уделяется эпидемиологии, этиопатогенезу, диагностике и хирургическому лечению эхинококкоза печени.

Ключевые слова: эхинококкоз печени, эпидемиология, этиопатогенез, диагностика, хирургическое лечение.

INTRODUCTION

Human echinococcosis, also called echinococcosis, is a zoonosis that has been known since ancient times. References to echinococcosis in both humans and animals appear in ancient documents such as the Ebers Papyrus and the Babylonian Talmud [1, 2]. Around the mid-19th century, a major breakthrough occurred when the etiology and life cycles of various species of *Echinococcus* were determined, although many related questions remain to be resolved [3]. Echinococcal disease is caused by nine recognized species of tapeworms of the genus *Echinococcus* (E.). Seven of these cause various forms of human echinococcosis, and the

remaining two are under investigation for possible human involvement. Some life cycles of these tapeworms involve domestic animals, such as dogs as definitive hosts and sheep as intermediate hosts. Humans are occasional intermediate hosts. Other species of these parasites have wild life cycles, infecting almost exclusively wild animals and rarely humans. In addition, more complex cycles occur when wild and domestic animals interact. Geographically, variations in these cycles are known [4].

Cystic echinococcosis, the most common form of echinococcosis, is an endemic zoonosis caused by the larval stage (metacestodes) of the tapeworm *E. granulosus*. In terms of geographic distribution, the disease is present in many countries worldwide [5]. Diagnosis is confirmed by epidemiological history, medical history, clinical presentation, imaging, and serologic tests.

Surgical treatment uses a variety of techniques aimed at achieving the best outcome for the patient. Partial cystectomy, pericystectomy and liver resection are performed either by open or laparoscopic surgical approach, with or without neoadjuvant or adjuvant medical therapy. There are also various procedures for parasite evacuation using percutaneous or endoscopic approach. In selected cases, antiparasitic drug therapy is used as the only method of treating this disease [6].

The prognosis for these patients will depend on the choice of the most adequate therapy according to several factors, mainly related to the physical condition of the patient, the larval stage of the parasite and its localization [7]. Complex cases should be treated in specialized centers by well-trained and experienced hepatobiliary surgeons. This zoonosis has not yet been completely eradicated, and unless the affected countries implement an epidemiological control policy, a lot of resources will have to be allocated to the treatment of this disease. Cystic echinococcosis of the liver is endemic, especially in Central Asia [8]. For this reason, the main topic of this article will be focused on issues related to this form of hydatidosis.

Diagnosis. Currently, the epidemiological background must always be taken into account when making a diagnosis. Definitive diagnosis is achieved by imaging and, in some cases, with the additional contribution of serology. In the near future, earlier stages of parasitosis will be diagnosed using advances in immunological tests [9, 14, 19].

Clinical features. The clinical picture of liver echinococcosis remains asymptomatic for a long period of time after infection due to the slow growth of the echinococcal cyst in the liver (1–5 mm per year). Small and medium-sized cysts of central liver localization are usually asymptomatic, or the patient may note mild pain in the epigastrium and right hypochondrium along with a feeling of discomfort in the abdomen. In addition, the previous immune status of the patient and the anatomical localization of the cyst could determine the late manifestation of the first symptoms [16]. When cysts grow and reach significant sizes, the biliary tree and hepatic vasculature are primarily affected, resulting from biliary obstruction, portal hypertension and Budd-Chiari syndrome. The magnitude of this effect will determine the varying degrees of jaundice and portal hypertension, which can range from a slight increase in bilirubinemia and the appearance of venous collaterals in the abdominal wall to very severe jaundice, ascites and bleeding from the upper gastrointestinal tract [17].

Imaging. In 1981, Gharbi published an ultrasound classification of liver echinococcosis, describing five categories regarding the morphological features of the cysts according to their stage of evolution [18]. In 2002, based on this classification, the World Health Organization Informal Working Group on Echinococcosis (WHO-IWGE) formulated a new classification adding two more categories to help in choosing the best treatment and follow-up of patients [19-21]. Modern imaging offers several tools for the diagnosis of this disease. Typically, imaging diagnostics begins

with the use of ultrasound (US), and then other imaging methods such as contrast-enhanced ultrasound (CEUS), computed tomography (CT), magnetic resonance imaging (MRI), magnetic resonance cholangiography (MRCP), endoscopic retrograde cholangiography (ERCP) and conventional radiography can be used for a more accurate diagnosis of the most complex forms of parasitosis.

Ultrasound. Sonography is widely used due to its low cost and high image clarity, which allows determining the pathological characteristics of echinococcal cysts of the liver and other localizations in the abdominal cavity. It is also useful for differential diagnosis of echinococcal cysts with other liver tumors. The use of mobile devices allows having a portable tool for screening populations in an endemic area with a high risk of infection [7, 12, 13]. Due to the difficulty in differentiating some forms of alveolar echinococcosis from other types of liver tumors, ultrasound is increasingly used in certain regions where this pathology is endemic [24].

Computed tomography. Sometimes ultrasound is of little help in diagnosing hepatic hydatidosis due to various reasons, such as obesity, the presence of abundant intestinal gas, recurrent echinococcus, or residual cavities after previous surgery. In this case, CT is used, taking advantage of its higher sensitivity and specificity. Non-contrast CT allows for better radiographic diagnosis of various forms of cyst calcification [13]. Contrast-enhanced CT helps to choose the best surgical technique according to the various manifestations or complications associated with the disease, for example, allowing a more accurate assessment of the involvement of the vascular system and biliary tree. CT also helps to diagnose cystic migration into the chest and biliary tree [15, 16]. Another advantage of using contrast-enhanced CT is to achieve better differential diagnosis with other focal liver lesions [3, 7 17].

Magnetic resonance imaging. MRI is useful for diagnosing cases of cholangiohydatidosis. Compared with ultrasound and CT, T2-weighted MRI sequences better define the internal structure of the cyst. It is generally indicated in patients who have difficulties with ultrasound, such as excess gas in the intestine, previous surgeries, disseminated hydatidosis, and obesity. In addition, MRI is recommended in the presence of contraindications to CT due to comorbidities. MRI is used to determine the presence of a cystobiliary fistula and the presence of hydatid material in the biliary tree. It also visualizes the cystobiliary fistula both in the bronchial and biliary tract [8, 19].

Endoscopic retrograde cholangiography. Rupture of echinococcal cyst into intrahepatic bile duct may cause some complications which may become serious mainly due to development of cholangitis and septicemia. In these cases, ERCP makes the diagnosis and performs removal of echinococcal material in order to improve the general condition of the patient before performing definitive surgical treatment [23].

Serology. Currently, diagnosis and follow-up of patients with cystic echinococcosis is achieved mainly by imaging. Serology using detection of IgG-specific antigens is used for the same purpose. However, low sensitivity and specificity have been reported. In addition, false-positive results occur during follow-up due to the persistence of antibodies over time. There are many studies (recombinant proteins, isotopic antibodies, subisotopic IgG, synthetic peptides) aimed at developing new antibodies using molecular techniques to improve the diagnosis of this parasitosis [21, 22].

Surgical treatment. The main goal of treatment of liver echinococcosis is to eradicate the parasite and prevent recurrence. There is a consensus that surgery is the best option to achieve this goal. Currently, various surgical techniques are possible with acceptable morbidity and mortality

rates, depending on the pathological condition of the cysts. In more complex cases, surgery may be supplemented by other treatments, such as minimally invasive procedures and chemotherapy. Surgical treatment has indications and contraindications depending on the patient's condition and the form of the disease [6]. Previously, only conservative methods were used to treat liver echinococcosis. Among them, marsupialization consisted of opening and removing the parasite, followed by removing the residual cavity towards the abdominal wall, waiting for closure by secondary intention. Cystoenteroanastomosis was also performed, anastomosing the residual cavity of the liver with the duodenum or a defunctionalized loop of the jejunum. Currently, these conservative methods are not indicated due to the high risk of complications such as recurrence, liver abscesses, intestinal obstruction, biliary fistulas, biliomas, biliary peritonitis, cholangitis, septicemia. However, there are surgical centers that report good results in the treatment of large cysts by laparoscopic cystojejunostomy [49].

Different surgical centers perform different resective surgical procedures. When determining the indications, it is necessary to take into account the age, general condition of the patient, the pathological condition of the cysts and their localization in other organs, as well as the presence of important concomitant diseases that are difficult to control. Despite the fact that this is a benign pathology, its evolution can sometimes be very complex, requiring multiple operations and leading to an unfavorable prognosis. Surgical resections are performed open or laparoscopically. The most commonly used methods from the least to the most complex are listed below.

Pericystectomy. Open or laparoscopic pericystectomy is based on the concept of complete removal of the parasites. This technique involves resection of the cyst with a plane through the liver parenchyma adjacent to the adventitia, thus avoiding recurrence due to the presence of daughter cysts in the adventitia or in the surrounding liver parenchyma [22]. In complicated cysts, pericystectomy is not recommended due to the risk of further bleeding or injury to the bile ducts. Previous radiological studies are crucial to determine the relationship of these structures with the cysts. Nowadays, laparoscopic pericystectomy helps to prevent the above-mentioned risks due to an increased field of view, more effective instruments for liver transection, and wide access. Well-trained surgeons in laparoscopic liver surgery have a better chance of successfully performing this technique [23].

Liver resection. Liver resection is sometimes necessary, for example, in the presence of recurrent echinococcosis in the same previously operated lobe or in residual cavities that have a risk of subsequent infection with the development of liver abscesses and cholangitis. When the infection is controlled by antibiotic therapy or percutaneous drainage, resection of the compromised lobe, which is usually more atrophic, is recommended. Therefore, this operation will be more labor-intensive. However, compensatory hypertrophy of the unaffected lobe determines a lower risk of postoperative liver failure. In order to completely eradicate the parasite and prevent recurrence, several surgical centers increasingly perform liver resection, both open and laparoscopic, with acceptable morbidity and very low mortality. Liver resection is more indicated in alveolar echinococcosis due to its higher recurrence rate and infiltrative nature, similar to malignancies. There are recent reports of liver transplantation as well as ex vivo resection operations with autotransplantation in this type of echinococcosis [14]. In summary, liver resection, which was little used in the past, now appears to be a viable alternative in selected cases, performed in specialized reference centers.

The morbidity of resection surgery depends on the complexity of the hydatidosis and the extent of the operation performed. The most difficult to treat are biliary fistulas, bleeding and infections. For example, in patients with cyst fistulas towards the bile ducts and chest, it is advisable to work in stages, for example, first treating cholangitis and then, when the patient's condition is stabilized, draining the pleural empyema. After restoration of the general condition, resection surgery is indicated. As for the morbidity and mortality rates, what has been reported so far shows a large discrepancy in figures. The staff of the Department of Surgical Diseases No. 1 of the Samarkand State Medical University conducted a study of risk factors determining postoperative morbidity in a significant number of foreign publications. The results indicate a rather low level of evidence [24]. The objective is to perform a prospective series to reach a consensus on the indications for surgical treatment of this complex disease.

Percutaneous treatment. This therapy is carried out by puncture, aspiration, administration of scolicalid agents and re-aspiration of fluid and echinococcal membranes (PAIR). In some cases, the procedure is performed under ultrasound control. This procedure was developed by a Tunisian group in 1986. WHO recommends this procedure because it is less invasive than surgery, provides good evacuation of the parasite, reduces the hospitalization time and is cheaper. The following recommendations contain indications and contraindications for this procedure [16]. It is necessary to have anesthetic support to treat a possible anaphylactic crisis due to leakage of hydatid fluid during PAIR [10, 17].

Chemotherapy. Numerous publications report the use of drugs that are able to penetrate and destroy liver echinococcal cysts. These drugs are administered alone or in combination with surgery and less invasive treatments such as PAIR. Currently, albendazole has shown efficacy in reducing the size or even killing the parasite. For this reason, it is used to prevent recurrence after surgery. It is also used as the only therapy in patients who refuse surgery or are inoperable due to disseminated echinococcosis or other comorbidities [7, 8, 9, 10, 16].

CONCLUSION

Hepatic hydatidosis remains a disease that spreads without epidemiological control in many parts of the world. Continuous biological adaptation of the parasite to existence in the intermediate host has also been demonstrated, which explains the great difficulties in eradicating this zoonosis. The constant and even increasing incidence of this disease determines very high medical costs for the treatment of patients, sometimes with a complex pathological picture. Efforts are being made to find new alternatives for the diagnosis of early stages of parasitosis. The development of new vaccines for the immunization of the intermediate host would determine the best control of echinococcus in humans. Surgical advances allow more and more radical surgical procedures to be performed with acceptable morbidity and mortality rates. However, minimally invasive operations are associated with significantly higher costs. Logic suggests that the best way is to minimize the number of new patients through successful epidemiological control.

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