DIAGNOSTICS OF LIVER HYDATID DISEASE

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ABSTRACT

E. granulosus is the species that prevails in most countries around the world and especially in the Mediterranean region. It is one of the most severe infestations in humans. The biological diagnosis is based on serological tests. Eosinophilia is considered variable because it does occur in cases of a hydatid cyst disease but its absence does not exclude the possibility of a hydatid cyst existence. Imaging diagnostics are important for the classification of the hydatid cysts. Ultrasound is a noninvasive, widely available method with high sensitivity to the diagnosis of hepatic echinococcosis and of low price, therefore it is a method of choice. CT is the method of doubt for a suppuration of a hydatid cyst. An MRI with high contrast resolution of T1 and T2 images demonstrated better pericyst, daughter cysts and matrix. We have reviewed the current trends in the diagnosis of liver cystic echinococcosis.

Keywords: *hydatid cyst, liver echinococcosis, ELISA reaction, hepatic echinococcosis, diagnostic, E. granulosus*

INTRODUCTION

The hydatid cyst disease is a cosmopolitan parasitosis (1). *E. granulosus* is the species that prevails in most countries around the world and especially in the Mediterranean region (1,2). It is one of the most severe infestations in humans. Compared to other zoonosis, the hydatid cyst disease, caused by *E. granulosus*, most often leads to prolonged disablement, frequent recurrences and is associated with permanent disability and high mortality rates, which makes it a serious medico-social and economic problem for our country. Data from the literature suggest that the liver is the most frequently affected organ.

(3). The standard diagnostic approach for the hydatid cyst disease of the liver includes a combination of imaging techniques and laboratory and serological analysis (3,4).

LABORATORY METHODS

Diagnosis can be confirmed by a series of biological tests that are based on the reaction of the host against the parasite. Eosinophilia is considered variable because it does occur in cases of a hydatid cyst disease but its absence does not exclude the possibility of a hydatid cyst existence. It is considered that a significant eosinophilia occurs in over 50% of all cases (1,2,3,21). Routine laboratory findings are not specific and therefore can show normal or abnormal results (3,5,6,22). ELISA reaction, immunofluorescent reaction, passive haemagglutination reaction, latex agglutination reaction, immunoelectrophoresis reaction, double diffusion in gel reaction. Complement adhesion reaction has a bad sensitivity and specificity. Indirect haemagglutination reaction is shown to have good sensitivity but there is also a big percentage of false positive results. Immunoelectrophoresis and ELISA according to different authors show

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the best results with sensitivity up to 90% for hydatid cysts located in the liver (3-6).

The immunologic diagnostic techniques include primary screening and confirmation tests. Non-sensitive and non-specific tests such as the intradermal test of Cassoni, complement adhesion test, indirect haemagglutination test and latex- agglutination test have been replaced by ELISA, indirect immunofluorescent test for antibodies (IFAT), immunoelectrophoresis (IEP) and immunoblot (IB) in the routine laboratory practice (5,6). Screening tests with ELISA use crude antigens and are associated with a high incidence of false negative and false positive results. However, findings of specific antigens and immune complexes with ELISA according to different authors have a 95% sensitivity, but the specificity is relatively low - 61.7% (6,13, 20,21).

Biological diagnosis is based on serological tests.

Sbihi et al. reported that purification procedures can have a strong influence on the diagnostic value of antigens with identical electrophoretic behaviour. Purified fractions enriched in antigens 5 and B and glycoproteins from hydatid fluid increased sensitivity to 95% and specificity - to 100% (7,9). According to other authors in studies with the use of purified fractions - ten to twenty percent of the patients with liver cysts do not form echinococcus-specific serum antibodies (IgG) and thus give false negative results (8,9,22). There is an association between calcifying massive hydatid cysts of the liver and negative serological tests. In a study with the help of indirect haemagglutination it was found that false negative results occur in patients with cysts of sizes smaller than 9 cm, intact cysts, cysts with extra-hepatic locations and unilocular single cysts (7,17,19).

Furthermore, 10% to 15% of false positive results are obtained because of cross-reactions with other helminth infections (cysticercosis), as well as non-infectious diseases (cancer, autoimmune diseases, pregnancy) (7). Immunological diagnostic methods showed positive results in 75%-90% of patients, therefore proving insufficient as a single test for the exact diagnosis. To lower the false-negative and false-positive results a combined diagnostic approach (imaging and lab) could be applied (8,9,15,17,19).

IMAGING METHODS

Ultrasonography

Ultrasound is a noninvasive, widely available method with high sensitivity to the diagnosis of hepatic echinococcosis and of low price, therefore it is a method of choice (16,2). Many authors have suggested ultrasound models and classification of hepatic echinococcosis. Ultrasound is useful for determining the internal structure, size, number and location of cysts, the presence of complications with a sensitivity of 90% -98% according to the available literature (10,20).

The method is useful for planning appropriate treatment and evaluation of the therapy. Several comparative studies have shown that ultrasound is more accurate in the detection of cysts than immunodiagnostic tests since the latter show relatively high rate of false negative and false positive results. (10). In one study, in 97% of the patients ultrasound allows not only to diagnose, but also to perform accurate assessment of possible variations of the biliary tract and any present complications (10,12,15,20).

Computed tomography

Computed tomography (CT) provides information equivalent to that of a conventional or intraoperative ultrasonography but shows a more detailed location and depth of the available hydatid cyst. With CT one can also determine the presence of exogenous daughter cysts and to determine the consistency of the cyst. This diagnostic method is essential in planning appropriate surgical treatment especially in laparoscopic surgery. CT is used in cases in which ultrasound is difficult, e.g. due to obesity, intestinal gas, a deformed abdominal wall, previous surgery or medical complications. CT is highly sensitive and a specific method of exploration of a hepatic hydatid cyst (11). Intravenous contrast is not routinely used unless there is suspicion of probable supuration in the communication with the biliary tree. (10) Improved resolution with contrast enhancement is important in the diagnosis of the hepatic hydatid cyst density between the cyst and the normal liver parenchyma. Cystic fluid usually shows hypoechogenicity (3-30 HU) (12). CT easily detects a calcification of the cystic wall or the internal septa. In CT without contrast the hydatid cyst is visualised with a

hyperechogenic wall, even without calcification (20). There is a better visualisation of the differentiation of the cuticular membrane of the fibrous capsule pericyst (11,12). Daughter cysts appear as round structures located peripherally within the mother cyst. They usually contain liquid with lower echogenicity than the cyst fluid in the maternal one (10). According to Mortelet KJ and associates, large calcifications are found in 50% of the cases, and daughter cysts occur in approximately 75% (11). CT is the method of doubt for suppuration of the hydatid cyst (11,12,20).

According to Agayev CT has 100% accuracy in the diagnosis of liver hydatid disease (11). According to Suwan Z. CT was superior to ultrasound in the visualisation of gas cysts, calcifications, and more precisely in determining the position of hydatid cysts. (10). Numerous studies confirm the higher sensitivity of CT compared to that of ultrasound in the diagnosis of hydatid disease (12).

According to various authors in the literature, false-negative results, when administering CT, are observed at a higher rate in patients with fatty degeneration of the liver parenchyma. Having similar density, echinococcus cyst and fat, even hamper the research and administration of intravenous contrast. CT is a more reliable method to detect small cysts when compared to ultrasound (10).

MRI

MRI gives better structural details of the echinococcus cyst, however its use is not economically viable. According to various authors there is no significant superiority of the method in the diagnosis of hepatic echinococcosis and therefore it is not applied everywhere. The administration of gadolinium gives a high rate of detection of echinococcus cysts demonstrated in T1 and T2 images (12). MRI with high contrast resolution of T1 and T2 images demonstrated better pericyst, daughter cysts and matrix (13). On T1 and T2 images a pericyst is seen as the same ring due to its fibrous structure and the presence of calcifications. Hydatid matrix is presented as the same structure on T1 images and significantly the same structure on T2 images. Daughter cysts were reported as structures similar to the matrix of the breast cyst on T1 and T2 images (12,14,18).

Sagittal and coronary slices of magnetic resonance imaging demonstrated a well-invaded echinococcus cyst through the diaphragm. The main advantage of MRI over CT and ultrasound is in severe cases of complicated hydatid disease with a suspected rupture of the cyst into the biliary tree (14). MRI findings of a rupture of the echinococcus cyst are divided into direct (a break in the cuticle and a leakage of cyst fluid) and indirect (increased echogenicity, presence of gas in the cyst, a change in the intensity image) (12,13,14,23).

CONCLUSION

Cystic echinococcosis is a zoonotic disease caused by an infection with *Echinococcus granulosus*. The immunological diagnostic methods show variable results, therefore proving insufficient as a single test for the exact diagnosis. To reduce the false-negative and false-positive results, a standard diagnostic approach to hepatic hydatid disease involves a combination of imaging techniques and laboratory and serological analysis.

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