

Possibilities of Modern Radiation Methods in the Diagnosis of Liver Echinococcosis and Its Complications

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Abstract All 118 patients suffering from liver echinococcosis and its complications underwent comprehensive diagnostics. In each of the 118 cases, the presence of liver echinococcosis and its complications was confirmed using combined ultrasound and computed tomography (CT) methods. The diagnostic algorithms that have been developed make it possible to choose different surgical tactics, taking into account the location, size and connection of echinococcal cysts with the vascular and secretory structures of the liver, the stage of the parasite's life cycle and the type of complications that have developed. Differentiated surgical tactics depending on the type of echinococcal cysts, their location, number and presence of complications allows the priority use of low-traumatic methods as the final method of treatment or as a stage of preliminary sanitation of a purulent focus in case of endogenous intoxication due to suppuration of cysts and breakthrough into the bile ducts.

Keywords Liver echinococcosis, Consequences, Diagnosis, Minimally invasive methods, Radiation methods

1. Relevance

Radiation methods such as ultrasound, computed tomography (CT) and magnetic resonance imaging (MRI) are the main diagnostic methods for liver echinococcosis (EP) [4]. Their use makes it possible to more accurately visualize the cyst, determine its interaction with vascular structures and bile ducts, as well as determine the size, which helps to choose the most appropriate access for surgery [1,3,9]. These methods have the advantage that they allow the disease to be detected at an early stage, when clinical manifestations are minimal [2,5], which allows operations to be performed with less risk to the patient. Some researchers believe that intraoperative ultrasound is necessary to identify hidden cysts and prevent the development of residual echinococcosis [6,7].

Compared to ultrasound (ultrasound), computed tomography (CT) offers a more sensitive image and a panoramic image. Thanks to this method, it is possible to carry out detailed differential and topical diagnostics, determine the location, volume and number of the cyst, as well as evaluate its interaction with blood vessels and bile ducts. Thanks to these data, the doctor can choose the most appropriate method, access and volume of surgery, as well as anticipate possible risks of intraoperative complications.

Magnetic resonance imaging (MRI) studies in echinococcosis are considered comparable in their diagnostic effectiveness to computed tomography (CT), while MRI does not use ionizing

radiation [10]. Radiation diagnostic methods such as ultrasound, computed tomography (CT) and magnetic resonance imaging (MRI) can determine the location, size, number and stage of development of the parasite, as well as its interaction with surrounding structures. This contributes to the correct choice of access and method of surgical intervention [8].

It is important to note that in addition to diagnosing echinococcosis itself, it is important to identify its complications, such as infection and suppuration of the cyst, its breakouts, the presence of cystobiliary fistulas, as well as determining the type and degree of liver damage. The purpose of the study. Modern methods of radiation examination improve the diagnosis of liver echinococcosis and its complications.

2. Material and Methods

The study was conducted at the Faculty of Surgical Pathology No. 1 of the University of Samarkand. Analytical processing of diagnostic and surgical results was performed on 118 patients with liver echinococcosis and its complications.

The study period covers the years 2018 - 2023. All 118 patients admitted to the hospital underwent ultrasound examination, which was an effective method of diagnosing liver echinococcosis and its complications. Comprehensive ultrasound diagnostics (ultrasound) made it possible to determine the size, location and nature of the contents of cysts, the thickness of the walls of cysts, the structure of the liver, echogenicity and their connection with large intrahepatic vessels and ducts. The data obtained helped to decide on the best access and type of surgery.

Ultrasound signs of echinococcal cysts appear as rounded formations containing liquid, with obvious negative echogenicity. The brushes have clear borders, a thickened wall, a double contour and calcification of the fibrous capsule. In addition, daughter blisters are often found inside the cyst; this usually helps to distinguish them from cysts of a different nature.

An echinococcal cyst of the liver has a compacted and thick wall around its contour. As a result of the presence of fibrous and chitinous capsule shells, two-circuit is usually observed.

According to the BO3 classification, CL type echinococcal bones are characterized by low echogenicity and a clear, even (rarely moderately uneven) contour. (Fig. 1). The echinococcal cyst does not have an echogenic suspension or other inclusions, and it does not have a noticeable hyperechoic contour. The symptom of "fish scales" was detected in 61% of cases and is one of the characteristic signs of EP and its complications. The formation of a thickened fibrous capsule and the presence of several daughter cysts are signs of long-term echinococcal cysts. On ultrasound, daughter cysts appear as heterogeneous rounded inclusions that are in close contact with each other, and the maternal cyst often has destroyed contents. (Fig. 2).



Figure 1. Sonogram. Echinococcal cyst of the liver (4 cm) type CL



Figure 2. Sonogram. Multiple echinococcal liver cysts type CE2

Echinococcosis type CE3 cysts are distinguished by the presence of several daughter cysts and an anechoic substance with a detached inner shell. In patients with echinococcal

cysts of type CE4, an ultrasound examination revealed heterogeneous hypoechoic contents of cysts, which may indicate degenerative changes in parasitic formation. There were no daughter cysts, indicating that the parasite had died.

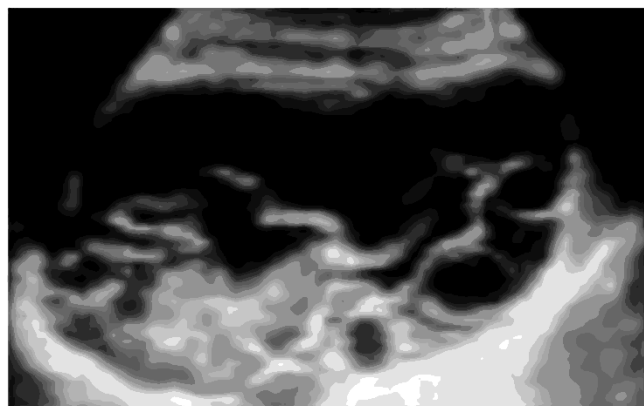


Figure 3. Sonogram. Echinococcal cyst type CE3

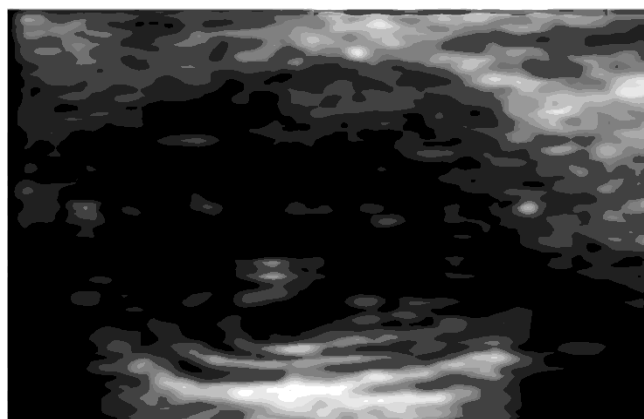


Figure 4. Sonogram. Echinococcal cyst type CE4

Echinococcal bones of type CE5 are distinguished by a thick calcified capsule forming an arch with conical echo shadows.

With the help of a comprehensive ultrasound examination, complications associated with echinococcal cysts were successfully detected. For example, in 97% of cases, purulent lesions of echinococcal cysts were detected.

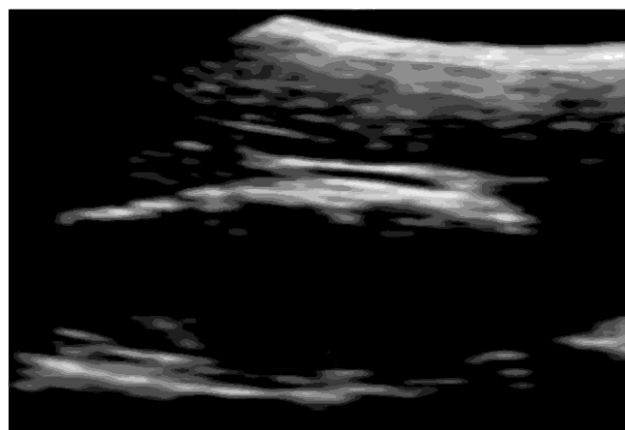


Figure 5. Sonogram. Echonegative cysts type CE5



Figure 6. Sonogram. Suppurated echinococcal cyst of the liver with a thinned capsule and daughter vesicles type CE2.

Ultrasound images showed changes in the contours of the cyst due to a decrease in its tension, as well as detachment of the chitinous membrane during the breakthrough of echinococcal cysts in the bile ducts.

Recurrence of echinococcal disease was successfully detected by ultrasound examination in 12.3% of cases. The detection of a double contour of formation and visualization of an echogenic fine suspension that settled rapidly were signs of the presence of a parasitic cyst. In 5.2% of cases of recurrent cyst, an ultrasound pattern of type CE1 was detected.



Figure 7. Sonogram. The breakthrough of an echinococcal cyst into the bile ducts



Figure 8. Sonogram. Recurrent echinococcal cyst type 1

32 patients (27.1%) underwent computed tomography (CT) for the comprehensive diagnosis of echinococcal liver disease (EP) and its complications.

During computed tomography (CT), various signs of echinococcal liver disease (EP) and complications that may arise as a result of this disease were found.

Computed tomography revealed numerous features of echinococcal liver cysts (EP) and subsequent complications. The density of the cyst contents ranged from 8 to 43 Hounsfield units and increased with the course of the disease. In most cases, the density of the contents of the main cyst was higher than that of the daughter cysts. Parasitic cysts in patients with EP were presented as cavities of various sizes on a CT scan. Usually, the cystic formation had a rounded or oval shape with a homogeneous structure and differentiated walls. In the presence of multiple echinococcal cysts, the cuticular layer of the hydatid cyst was easily detected. (Fig. 9).

Computed tomography (CT) allows differential diagnosis of echinococcal bones from formations of a different nature and to identify specific changes characteristic of complicated forms of the disease. (fig. 10).



Figure 9. CT scan of an echinococcal cyst of the left lobe of the liver with a picture of its death and corresponding changes



Figure 10. CT scan of recurrent echinococcosis of the liver. Calcified fibrous capsule

Only one error was associated with the incorrect location of echinococcal cysts. In 117 out of 118 patients (99.1%), the diagnosis of liver echinococcosis and complications was

confirmed. In each of the 118 cases, simultaneous use of both ultrasound and computed tomography (CT) confirmed the presence of liver echinococcosis (EP) and its complications. This provided 100% confirmation of the diagnosis. The strategy of surgical treatment was determined based on the results of instrumental and radiological diagnostics.

3. Conclusions

The use of combined methods of radiation diagnostics, such as ultrasound and computed tomography, provides effective detection of liver echinococcosis and its complicated forms. The developed diagnostic strategies make it possible to determine individual surgical tactics, taking into account the location and size of echinococcal cysts, their relationship with the vascular and biliary structures of the liver, the stage of development of the parasite and the nature of the complications that have arisen.

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