MODERN STATUS OF THE HEART ECHINOCOCCOSIS (literature review)

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Echinococcosis of the heart is a severe zooanthroponotic disease, which is characterized by a long chronic course, severe organ and systemic pathology, leading to disability and often to the death of the patient. From the moment of infection to the establishment of a diagnosis, there is a latent period lasting from 5 to 20 years. [14-22;51-55] .

Echinococcosis of the heart continues to be a serious social and medical problem in many countries of the world, especially in epidemiologically disadvantaged regions [6-8;10-12;31-39] .

The Central Asian Republics are one of the regions where the incidence rate reaches high figures, amounting to approximately 9 people per 100,000 population. Up to 1500 newly diagnosed patients with echinococcosis of one or another localization are operated annually in Uzbekistan [1,2] , while the especially high incidence of echinococcosis among people of the youngest, most able-bodied age turns into one of the important problems. It is necessary to note the obvious fact that there has been kova tendency to increase the number of patients in the developed countries of Europe and the USA. This, apparently, is due to an increase in the number of emigrants suffering from echinococcal disease.

[6-10;31-39] . For example, in the United States, about 100 new cases of echinococcosis are registered annually. In Russia, 800 initially diagnosed patients are registered annually; moreover, there has been a clear upward trend in the incidence [2,5] . Therefore, it is not surprising that, despite certain successes in the medical and surgical treatment of echinococcosis, it still remains a serious medical and social problem [1 2 -1 6 ; 31-39] . It is well known that echinococcosis most often affects the liver and lungs, which are considered to be the main target organs

[22-23 ; 44-48] . However, in recent years, thanks to the capabilities of computed tomography and echocardiography (EchoCG), cases of identifying patients with rare localizations of echinococcal cysts, which include cardiac echinococcosis, have become more frequent.

According to the literature, the frequency of heart damage by echinococcosis is from 0.5 to 3 % among all echinococcosis [3-6 ; 11-14 ; 32-37] . Human echinococcal disease still remains an urgent problem of medical parasitology and surgery, especially in endemic areas of the Mediterranean coast, Africa, South America, Australia, New Zealand and, especially, Central Asia [8-10; 14-16; 37-39]. The attention of researchers, especially surgeons, was paid mainly to the diagnosis and surgical treatment of patients with echinococcosis of the liver and lungs as the organs most often affected by the parasite [22-25;51-56;58-60] . Indeed, most often (50-75%) the liver is damaged, which is the first "filter" for portal blood and, consequently, for echinococcus embryos located in it [12-16;41-47]. The development of parasitic cysts in more than one organ is usually called "combined" forms of echinococcosis. With the introduction of modern radiation research methods into clinical practice, it has become possible to more often detect patients with cardiac echinococcosis [14-19;32-38] . As you know, the causative agent of parasitic damage to the heart is the larval stage of the helminth belonging to the species Echinococcus granulosis The life cycle of echinococcus occurs with a change of two hosts (Figure 1.1).

The definitive (final) hosts, in whose body the sexually mature stage of echinococcus parasitizes, are: domestic dog, wolf, jackal, fox, lynx and other carnivores. Intermediate hosts in which the larval (bubbly) stage of echinococcus develops are: sheep, cattle, horse, buffalo , camel, pig, goat, deer, monkey and some rodents, as well as humans. Dogs become infected by eating the entrails of animals with echinococcal cysts. The germinal elements contained in the cyst (protoscolexes and acephalocysts) attach to the wall of the dog's colon and grow into adults. Mature segments containing 400-800 oncospheres come off the trousers ; infected dog feces pollute the grass, the ground; eggs enter the intestines of sheep, pigs , camels or

humans, on the hair of dogs. A person can become infected by petting a dog or eating contaminated vegetables. The role of meat products in the growth of morbidity should be recognized as minimal, since both humans and farm animals are intermediate hosts, and heat treatment of meat almost always leads to the death of the parasite.

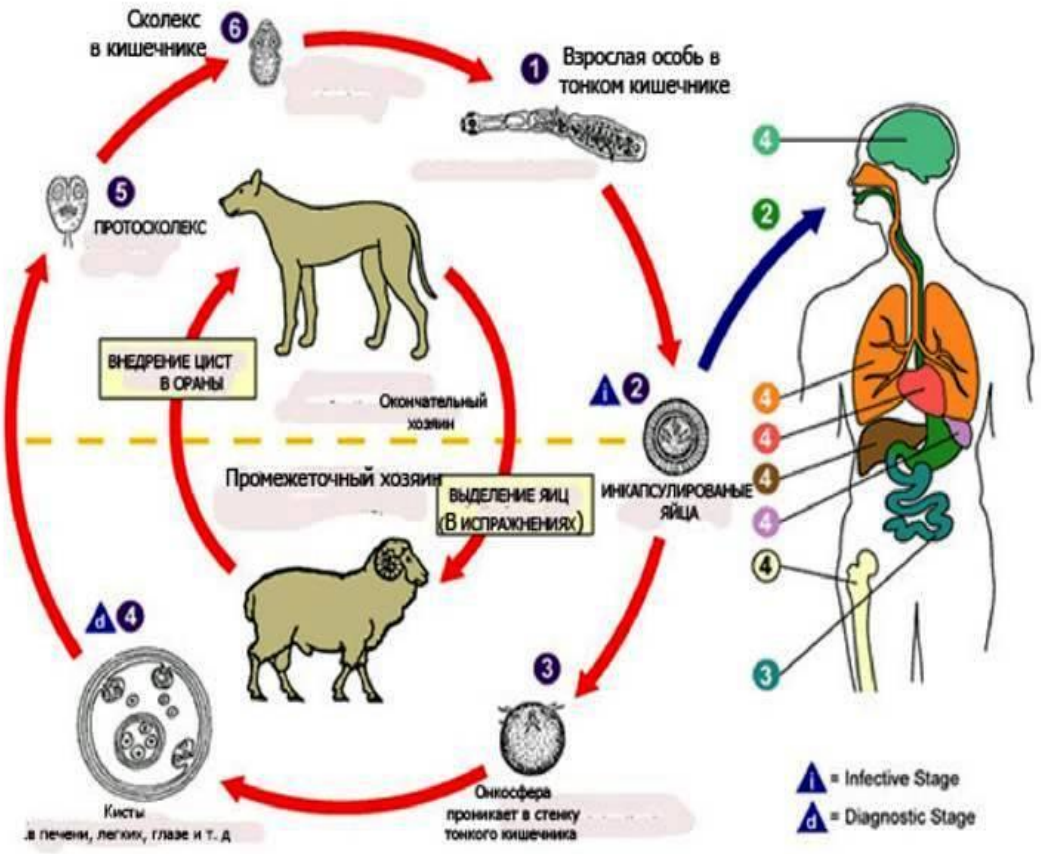

Fig.1.1. Scheme of the life cycle of echinococcus

The eggs of the parasite (oncosphere) are covered with a membrane that dissolves under the action of gastric juice. The released parasites pierce the intestinal mucosa and enter the liver through the portal vein system, where they develop into a mature cyst. Most parasites linger in the liver, so 54 to 84% of cysts form in the liver. Separate eggs pass through the liver and, bypassing the heart, are retained in the pulmonary capillary bed, which leads to the formation of pulmonary cysts (15-20%). When the parasite enters the systemic circulation, cysts are formed in the spleen, brain and heart. A maternal cyst develops from the germinal echinococcus, which is a bubble filled with fluid. The wall of the cyst consists of two membranes: the outer cuticular (chitinous) and the inner germinal (embryonic). From the outside,

the cyst is surrounded by a dense connective tissue fibrous capsule, which is formed as a result of protective reactions of the intermediate host in response to the metabolic products of the parasite and performs a kind of skeletal and protective functions, protecting the parasite from mechanical damage and from the host's immune attack. The larval stage of echinococcus is a fluid-filled bubble that can reach sizes from a millet grain to the head of a newborn baby or more. The wall of the bladder consists of an outer, cuticular membrane and an inner, germinal (germinal) layer . The bladder cavity is filled with liquid, in which scolexes, daughter and granddaughter vesicles often float freely. The chitinous membrane has a layered structure. With the growth of the bubble, the thickness of the chitinous shell also increases. The number of scolexes in one bladder can be from several tens to hundreds . Echinococcal fluid is transparent, colorless, its specific gravity is 1007-1015, the reaction is neutral or slightly acidic. The liquid contains amino acids, proteins, proteolytic and glycolytic enzymes, sodium chloride, calcium, acids, lecithin , cholesterol, ammonium salts. Echinococcal fluid has toxic and allergic properties. The sexually mature form of echinococcus is a small cestode 2.7-5.4 mm long, consists of 3-4 segments. The scolex is armed with a double crown of 30-40 hooks and has 4 muscular suckers. The egg is oval, has a shell. Each egg contains a six-hooked embryo - an oncosphere . The main route of penetration of the oncosphere into the human body is the gastrointestinal tract. Once in the digestive tract of the host, the oncosphere is released from its shell and penetrates into the thickness of the mucous membrane of the stomach or intestines, from where it enters either venous or lymphatic vessels. Most often, it enters the portal vein through the superior mesenteric vein and can settle in the liver. Part of the embryos that have passed the hepatic barrier through the inferior vena cava, the right atrium, the right ventricle and the pulmonary circulation enter the lungs, where the oncospheres can linger in the pulmonary capillaries. It can be assumed that some of the oncospheres penetrate the arteriovenous anastomoses of the liver and lungs and, having passed into the left parts of the heart and aorta, enter the systemic circulation. Single oncospheres can be introduced into any organ and any tissue, where they gradually

turn into echinococcal blisters [2-5;10-18] . Moreover, there are indications that infection with echinococcus can occur not only through the digestive tract, but also through the aerogenic route, through the wound surface, the conjunctiva of the eyes and salivary ducts. As the cysts grow, their constant pressure on the surrounding tissues and organs causes functional disorders and pathological changes in the body of the intermediate host. Gradually, intoxication also increases due to toxoalbumins , located in the echinococcal fluid and diffusing through the lymphatic ducts into the pericystic space.

The main reasons that lead to infection with this parasite are: contact with infected animals (pigs, sheep, cows, dogs, horses and other animals); eating contaminated animal meat; contact with contaminated soil, animal hair (parasite eggs are excreted with feces); making clothes from the fur of infected animals; collection of berries or herbs infected with parasite eggs; drinking water from contaminated reservoirs; eating unwashed fruits and vegetables.

Secondary echinococcosis develops without a change of host, i.e. self-infection occurs. Secondary echinococcosis is observed much less frequently than primary. The spread of the parasite in the host organism occurs in the following ways: 1) hematogenous; 2) along the serous membranes; 3) through the mucous membrane; 4) lymphogenous . Four types of echinococcosis are distinguished depending on the distribution routes. The first - implantation - recurrence of echinococcus after implantation of bladder elements during surgery or puncture. The second - after the breakthrough of the cyst into the abdominal or pleural cavity, followed by seeding. The third - metastatic - when elements of an echinococcal cyst spread in the form of emboli . It is more often observed with perforation of the echinococcal bladder of the heart. The fourth is secondary echinococcal cysts that form on the mucous membranes.

The death of the echinococcal bladder is one of the important points in the clinic of the disease. At the same time, the liquid becomes cloudy, absorbed, and part of it turns into a putty-like mass, the germinal layer is destroyed, the shells are impregnated with lime salts. A small cyst may disappear completely, leaving only a

scar in its place. The death of the echinococcal parasite can be caused by the lack of proper conditions for its development, hemorrhage into the cyst or suppuration, injury and perforation of the cyst, physiological aging of the cyst.

High incidence of echinococcosis in regions with predominant development animal husbandry is associated with a low level of socio-economic development and sanitary culture of the population. In economically developed countries, the increase in the incidence occurs mainly due to immigrants and the development of tourism. In these regions, as well as in non-endemic foci, doctors are often not ready for timely diagnosis and adequate treatment of patients with echinococcosis.

In the last two decades, due to the introduction of the most modern highly informative research methods into clinical practice, cases of identifying patients with rare localizations of echinococcal cysts, in particular, cardiac echinococcosis, have become more frequent [11-21; 42-51] . According to the literature, echinococcosis of rare localizations (bones, brain, muscles) is 12.2% of cases. With these, rare, localizations of echinococcosis, the oncosphere of the parasite reaches certain organs through the systemic circulation.

According to the average data [17-19; 26-29; 52-59] , among all examined or operated patients with echinococcosis of various localizations, 0.2 - 1.3% of cases had concomitant damage to the heart or pericardium.

Despite the relative rarity of cardiac echinococcosis, interest in this localization of parasitic cysts has rightly increased in recent years, since the possibility of radical surgical treatment of these patients under cardiopulmonary bypass has appeared.

Echinococcosis of the heart, according to various authors, accounts for 0.5-3% of all echinococcosis diseases [7-12;30-37;41-48]. Mostly people of the most able-bodied age, that is, in the range from 20 to 40 years, get sick; patients in this age range account for 70-75% of all patients with heart echinococcosis. At the same time, if the localization of parasitic cysts in the liver and lungs is more often observed in women, then heart echinococcosis more often affects men. Many authors attribute this ratio to the fact that the incidence of echinococcosis is influenced by social aspects, the nature of the profession, migration processes and

contact with animals [9-14;20-23;52-57]. The combined forms of echinococcosis indicate the possibility of a one-time or prolonged massive invasion by oncospheres . As a rule, there are cysts of the heart with a predominant lesion of the ventricles. In this case, the left ventricle is affected 2-3 times more often than the right one [24-29; 31-39; 43-48] , accounting for 55-15% of all cases of cardiac echinococcosis. The atria are affected equally often - in 5-7% of cases [41,48] . Isolated lesions of the interventricular septum are extremely rare [9-14; 19-25] . In most cases, left ventricular cysts are located subepicardially , right ventricular cysts - subendocardially . This explains the breakthrough of LV cysts into the pericardial cavity, and the cysts of the pancreas - into the cavity of the heart, which is one of the fatal complications of heart echinococcosis - 2/3 of the dead die from rupture of the cyst. Intracardial localization of cysts directly in the chambers of the heart is rare [10–19; 31–39] . Echinococcal cysts of the heart are more common, in 82.2% [32–41; 8% of cases - multiple. The number of cysts can be in the tens and even hundreds, and the more cysts, the smaller their size. In these cases, the heart muscle seems to be stuffed with echinococcal cysts [34,39] . Pericardial damage is more often combined either with echinococcosis of the lungs, or with damage to the atria and ventricles. According to the literature, an isolated pericardial lesion is extremely rare. Echinococcal cysts grow slowly, increasing by an average of 1-3 cm per year, so they remain asymptomatic and undiagnosed for a long time. According to the literature, echinococcal cysts located in the ventricles of the heart die early, rarely reaching significant sizes. These authors associate this fact with continuous contraction of the myocardium. Therefore, this mechanism leads to the fact that the intramurally located echinococcal cyst does not have a rounded shape, which is usual for target organs, but is deformed, with several diverticulum-like protrusions , formation. Parasitization of an echinococcal cyst in the tissues of the heart always leads to an increase in this organ. The heart affected by echinococcosis increases in size, can push back and squeeze the mediastinal organs and even the lungs. Under the influence of the parasite in the process of its growth, changes in tissues occur and clinical signs of the disease appear. Growing larvocysts put pressure on

myocardial muscle fibrils - their ischemia develops, which can mimic coronary heart disease [8-12;23-29]. When the cyst of the parasite is localized in the interventricular septum, the conduction of the bundle of His is disturbed. Sclerosis and dystrophy of his legs are also possible, that is, there are anatomical prerequisites for the development of complete atrioventricular heart block with or without Morgagni - Edems -Stokes attacks

[14-17;20-33]. Growing larvocysts , protruding into the cavity of the heart, can mechanically disrupt the outflow of blood. In the presence of large parasites, the flow of blood into the atrium from the caval or pulmonary veins is hindered, and the covering of the atrioventricular openings is not excluded , or vice versa, creating a situation that contributes to the occurrence of tricuspid valve insufficiency [10-13; 24-30] . Larvocysts , especially those that perforate into the left half of the heart, lead to embolism of the coronary vessels, primarily the left coronary artery. Perforation is observed in the presence of large larvocysts , when they protrude significantly into the lumen of the ventricles, where they usually open. Due to the fact that cardiac larvocysts almost always contain child bladders, embolisms often occur during the rupture of the maternal bladder, blockage of the pulmonary artery [45;52] or its branches by echinococcal bladders and their membranes may occur. In addition to mechanical blockage , which is caused by daughter blisters and their membranes, the intake of infected, toxic, allergenic echinococcal fluid with the development of an anaphylactic reaction is also essential [31;37] . Intracardiac localization of cysts directly in the chambers of the heart is rare [9;17] . Localization of a cyst in one or another part of the heart determines the clinic of the disease, predetermines the prognosis, the nature of the operation and the outcome of the disease. As you know, the ventricles of the heart have different wall thicknesses and different systolic pressures in the chambers; in addition, a certain distinct pattern of localization of intramural cysts was revealed - in the pancreas they “lie” subendocardially , and in the left ventricle - subepicardially . This explains the more frequent breakthrough of left ventricular cysts into the pericardial cavity (EckleT . 2012; HagguiA . 2012), and right ventricular cysts - directly into the heart cavity.

Cyst perforation is observed with a frequency of up to 30% of cases, almost 2/3 of the dead die from cyst rupture (ZiadiA . 2014; JinP . 2012). The clinical picture of cardiac echinococcosis is nonspecific, diverse. There are practically no pathognomonic subjective clinical signs of echinococcosis. Most often, patients note pain in the heart, shortness of breath, cough , palpitations, fever; paroxysmal tachycardia with extrasystole may occur. The breakthrough of the cyst dramatically changes the clinical picture of the disease, which entirely depends on the direction of the breakthrough (cardiac tamponade, embolism of the vessels of the large or small circulation). A complication in the form of agglomeration or suppuration of the cyst causes an even greater variety of symptomatology [6-12; 31-34] . The clinical course of echinococcosis in some cases is asymptomatic . However, despite the advances in modern medicine, the diagnosis of cardiac echinococcosis is still a difficult task. In this regard, the analysis of the significance, role and capabilities of modern methods for diagnosing cardiac echinococcosis is of both scientific and practical interest . Clinical and laboratory methods for blood tests in cardiac echinococcosis provide an opportunity to obtain additional information. First of all, this refers to an increase in the number of eosinophils, which, according to various authors, occurs in 18-83% of cases. In this case, eosinophilia is a sign of a living parasite; with calcification or death of the cyst, this symptom is absent; after echinococcectomy eosinophilia completely disappears. Also, there may be an increase in ESR and blood leukocytosis [41-48;50-54] .

Electrocardiography - with echinococcosis of the heart, although it is not considered a reliable research method, it provides important information. According to [21-28;30-33] , ECG reveals nonspecific changes in ST segments, signs of incomplete and complete blockade, and ventricular hypertrophy.

X-ray method of research is an invaluable method for diagnosing combined echinococcosis of the heart and lungs. For this purpose, multi-axis fluoroscopy, radiography in frontal and lateral projections are used. Small cysts are detected using a layered X-ray examination - tomography. A characteristic radiological sign of echinococcosis of the heart is the determination of a rounded shape against the

background of the heart, a formation of uniform intensity with clear even contours, areas of increased density - these signs are described in scientific papers. On X-ray kymograms, there is a transmission pulsation along the contour of the formation. In most cases, an increase in the shadow of the heart with an unusual deformation of its contours is detected [26–29; 33–39] . The absence of pathognomonic clinical symptoms, the lack of expression of clinical signs and laboratory changes, and the inconsistency of serological reactions dictate the need for the use of instrumental diagnostic methods.

According to the classification developed by WHO experts, parasitic heart cysts are divided into 4 types. 1-type - simple cysts without internal architecture; type 2 - cysts with an internal matrix and daughter cysts; 3-type calcified parasite cysts; 4-type - festering cyst.

Computed tomography makes it possible to detect very subtle structural changes without resorting to invasive studies [10-17;33-39] . On computed tomography , parasitic cysts appear as rounded formations with clear, even contours. Calcification of the cyst greatly facilitates differentiation. Internal structures indicate the presence of daughter cysts. CT provides valuable information about the location, size, and involvement of the tissue surrounding the echinococcal cyst, however, according to [6;10] , it does not allow differentiating an injured or infected cyst from an abscess.

With combined forms of echinococcosis, complex radiation diagnostics using X-ray examination, ultrasound and CT can increase the information content of diagnosis up to 97%. At the same time, the data of such a complex of studies make it possible to plan the nature, sequence and stages of surgical intervention on the heart and other target organs [7-12;33-38].

Echocardiography is a non-invasive , reliable, sensitive and, therefore, affordable method for diagnosing cardiac echinococcosis [25-31;48-52] . So, transthoracic , even better. transesophageal , echocardiography allows you to accurately see a volumetric, round-shaped cavity formation with clear contours, determine its size, localization; thanks only to echocardiography, it is possible to

differentiate a cyst from neoplasms, its connection with the intracavitary structures of the heart, determine the degree of mobility of the cyst and the density of its contents [10-19;52-60] . All of the above allows most clinicians to quite rightly consider echocardiography as the method of choice in the diagnosis of cardiac echinococcosis [22-27; 30-42] . Previously, it was believed that ventriculo-coronary angiography is justified if, with established cardiac echinococcosis, the ECG shows changes in the type of myocardial ischemia. However, today, given the modern possibilities of echocardiography, it is legalized [9-12;45-49] that there is no need to perform ventriculography in case of cardiac echinococcosis , because the latter itself carries an additional danger to the patient. During invasive examination methods, there is a risk of puncture of subendocardial located cysts.

The first successful operation for cardiac echinococcosis dates back to 1921 (P. Marten et al). In the CIS countries, the first successful echinococcectomy from the heart was performed by M.T. Kudrin in 1955 under local anesthesia. The priority of the first successful echinococcectomy from the interventricular septum belongs to [51;59] . The first operation of echinococcectomy from the heart with LV plasty under EC was performed by A.A. Kolesnikov in 1963. In our country, the first successful echinococcectomy from the heart under EC conditions was carried out by Professor D.S. Gulyamov in 1994.

According to [35-59;52-57], cardiac echinococcosis requires urgent surgical intervention. In recent years, approaches to the treatment of patients with echinococcosis have changed somewhat. Along with traditional operations, minimally invasive (percutaneous , thoraco- and laparoscopic) interventions have become possible, some authors have recognized the effectiveness and possibility of conservative treatment [31;39] . However, according to most authors, in case of heart echinococcosis, small, sparing interventions are not applicable, conservative treatment is impossible, the only method is surgical treatment [8;12] .

When analyzing the literature, it was revealed that every sixth patient dies from bleeding during surgical treatment, especially if the latter is not performed under EC conditions. Therefore, some authors, fearing the occurrence of a number of

complications (bleeding, myocardial rupture, etc.), consider it expedient to perform EE from the heart under conditions of EC and CP [6]. We also consider it expedient and justified to perform EE under conditions of EC and CP on an “immobilized” heart. As can be seen from the above, in the choice of intraoperative tactics, in relation to the use of EC, many unresolved issues remain to this day. The practical significance of the problem under consideration is determined by the particular difficulty of measures for the prevention of cardiac echinococcosis, the complexity of its early diagnosis, the need and the possibility of using only a surgical method of treatment. According to the literature, there was a distinct trend towards the location of the hydatids closer to the apex of the left ventricle , in the thickness of the myocardium. They consider the early death of the parasite to be an important feature of cardiac echinococcosis, which, apparently, is a consequence of the structure of the heart muscle and its constant contraction . Regarding the number of operations to remove hydatid cysts from the heart, it should be noted that the experience of a single group of authors, as a rule, is not great and usually does not exceed 5-7 observations [32] report five successful echinococcectomy from the heart; V.A. Ivanov et al ., (1999) out of 5 patients examined by them with echinococcosis of the heart, only two underwent surgical treatment; M.A. Aliyev et al . (1997) performed three successful echinococcectomy , 2 of them without the use of cardiopulmonary bypass. The largest number of echinococcectomy operations from the heart under cardiopulmonary bypass are [33-37;43-51] , these teams of authors operated on more than 10 patients with various forms of localization of cardiac echinococcosis.

Treatment of cardiac echinococcosis is carried out according to all the rules of purulent-septic surgery, since ES refers to intracardiac infections (Shevchenko Yu.L.). According to the literature, surgical treatment is the method of choice for cardiac echinococcosis [6-8;10-12;14-16]. These operations required the development of new optimal surgical tactics, since the ideal echinococcectomy , which involves the complete removal of a cyst with a fibrous capsule, is unacceptable in heart surgery.

When choosing a surgical approach, a number of authors prefer operations on the "working" heart through the thoracotomy approach, especially in pericardial echinococcosis [2].

Table #1

Rate of in-hospital mortality and recurrence of cardiac echinococcosis

And the second	**Number of patients**	**Number of operations**	**Lethality rate**	**Relapse rate**
T			5.5%	
E	7	7	28%	
Vakeli Murat(2007) **China**	15	15	6.6%	26.6%
J	5	5	20%	
O	25	25	4%	4%
KardarasF(2010) **Greece**	10	6	thirty%	
Molavipour A(2010) **Iran**	Eleven	eleven	18.1%	
S		15		
RSNPMCH(2018) **Tashkent**	83	83	6.8%	2.7%

Operation on a “working” heart to remove an echinococcal cyst is associated with a number of complications, such as dissemination of the contents of the cyst, the possibility of accidentally taking nearby coronary vessels into the suture during the cardiac cycle, perforation of the cyst during treatment of the parasite bed, the risk of aeroembolism, and non - radical removal with a high risk of disease recurrence. As can be seen from Table No. 1.1 until 2000, no more than 30 observations of those examined and operated on for heart echinococcosis are

described in the literature. After 2000, the detection of patients and the number of those operated on for heart echinococcosis increased significantly. This indicates, firstly, an improvement in the quality of diagnostic studies, and secondly, the emergence of the possibility of radical treatment of this category of patients.

1. Indications for surgery for cardiac echinococcosis are discussed, however, there is no doubt that the detection of a live echinococcal cyst is an absolute indication for surgery [2-5;12-16;30-38] . With respect to partially calcified cysts, some authors are inclined to the need for surgery. According to V.A. Ivanov et al . (1999) for cysts less than 5 cm in diameter that do not cause clinical manifestations, surgical treatment is not indicated. For echinococcectomy from the heart, the ideal approach, without a doubt, is a longitudinal, median sternotomy , which provides the surgeon with good access to all parts of the heart and convenience for connecting a heart- lung machine . 2007), the cyst extirpation operation had to be supplemented with complex reconstruction: ventricular septal plasty with autopericardium , annuloplasty tricuspid valve due to its insufficiency, as well as implantation of the pacemaker due to complete AV blockade due to compression of the conduction pathways . Discussing the very technique of removing a cyst from the heart, SS Kabbani et al. intact cysts is the method of choice, because this method completely prevents the possibility of dissemination. Enucleation, the authors believe, can be performed without any consequences, especially if echinococcal cysts are located subepicardially , closer to the tops of the ventricles. However, in order to avoid rupture of the cyst, it is first recommended to puncture the cyst, then introduce agents that cause the death of larvae, and then remove the cyst wall and its contents. The issue of eliminating the residual cavity after echinococcectomy from the heart remains uncertain. So, Zh.K. Mitrev et al. (2005) after removal of the cyst, the bed of the parasite is eliminated by applying multi-row circular-corrugated sutures, starting from the bottom of the formed funnel-shaped defect in the thickness of the myocardium of the ventricles. Other authors [21-25;47-51] , who have sufficient experience in the surgical treatment of cardiac echinococcosis, act in approximately the same way. The problem of the

residual cavity after EE from the heart, especially with the so-called "large" cysts, is still debatable . Some authors fill the parasite cavity with a piece of autopericardium or move a strand of the greater omentum from the abdominal cavity into the cyst cavity [1-2.]. With “large” intramural LV cysts, after EE, a large cavity with thin walls remains and the risk of rupture and development of an aneurysm is very high. Aminov R.S. (2007) suggests omentocardiopexy to eliminate the residual cavity. To do this, through the incision in the diaphragm, a strand of the greater omentum on the vascular pedicle is passed into the chest cavity and tamponated, fixed with sutures to the fibrous membrane of the heart cysts. The author points to improvements in coronary blood flow. In addition, according to the authors, it prevents the development of aneurysm in the area of echinococcectomy. In the literature, unfortunately, there is no single point of view regarding the tactics of surgical treatment of combined echinococcosis of the heart and other organs, in particular the liver and lungs . With combined echinococcosis of the heart and one of the other target organs, the main and decisive task is to determine the scope and sequence of the operation. Many authors believe that the first operation should be on an organ with a more severe lesion or if there is a threat of complications from one of the cysts on this organ. So, in many sources it is reported about the successive-staged removal of echinococcal cysts, first from the liver, after a short period of time - from the heart [2-5;17-23] . Also, SSKabbani et al. (2007) in 8 of their observations with extracardiac localization of cysts , the first stage of echinococcectomy was performed from the heart, after 3-6 months - from the liver or lungs. A small group of authors [1-2;10-17;30-34] in practice performed successful surgical interventions for combined simultaneous-sequential removal of echinococcal cysts from the heart and another target organ. According to Shevchenko Yu.V. (2016) the question of the sequence of echinococcectomy remains debatable , given the small number of publications regarding single-stage echinococcectomy from the heart and another target organ, this issue requires further study. Perhaps the sequence of stages of surgical intervention depends on the severity of the lesion and the patient's condition.

A method of simultaneous surgical treatment of echinococcosis of the heart and lungs is known in the literature (Travin N.O. 2007). The authors substantiate the simultaneity of the intervention in combined echinococcosis of the heart and lungs by the fact that echinococcosis cysts are located in the same anatomical cavity, i.e. chest cavity. This method does not allow surgical intervention in case of combined echinococcosis of the heart and abdominal organs, i.e. at an arrangement of an echinococcal cyst in different anatomical cavities.

However , R. Parvisietal . (2013) proposes to perform a simultaneous operation for combined echinococcosis of the heart and liver. At the same time, he used a subcostal approach to remove an echinococcal cyst from the liver and a longitudinal sternotomy to access the heart. The disadvantage of this method is the high morbidity of the subcostal approach, that is, almost all muscle groups of the anterior abdominal wall are intersected, the high incidence of postoperative hernias and deformities of the anterior abdominal wall.

Some authors [9;15] for preliminary sterilization of the cyst cavity before its removal use various solutions: 2% formalin, 0.5% silver nitrate, 30% sodium chloride solution, 1% iodine, 85-87% aqueous glycerol solution. Until recently, many surgeons have widely used 2% formalin to treat the fibrous cap. But its toxic effect on the liver of patients limited its use; moreover, there are reports of the preservation of the viability of scolexes in a 2% formalin solution when exposed for two hours. The most reliable and suitable for practical use were 30% sodium chloride solution and 80-100% glycerin solution. A solution of glycerol causes 100% death of parasites after 1-10 minutes and acts on protoscolexes and acephalocysts , responsible for the recurrence of the disease. Glycerin is active even at a significant dilution, which guarantees its greater reliability. These germicides are justified in the antiparasitic treatment of cysts during operations.

Despite the fact that historians of medicine attribute the first attempts at surgical treatment of parasitic cysts to Hippocrates, so far there is no consensus among experts on the choice of the optimal strategy for the medical treatment of cardiac echinococcosis. There are reports of positive results of conservative

treatment with albendazole . Other authors limit the scope of non-surgical chemotherapy only to patients with unresectable options or who refuse surgery. Still others perform intervention on the heart after a course of chemotherapy, and also recommend that therapy be carried out after surgery [23-26;47]. The fourth consider the treatment with albendazole before surgery to be deadly and absolutely contraindicated due to the softening of the parasite wall during treatment and the multiply increasing risk of cyst rupture [3-6;36] . Finally, fifths note the low effectiveness of chemotherapy even after the removal of hydatids . We use chemotherapy only in the postoperative period to prevent recurrence of the disease.

In the aspect of conservative therapy of cardiac echinococcosis, there is a significant difference from the treatment of other target organs. In particular, in the preoperative period, the use of antiparasitic drugs is not recommended [2-7;22-30] , since the above therapy causes the death of the parasite and destruction of the cyst walls, which can lead to perforation of the cyst into the cavity of the pericardium or heart with all the ensuing consequences. In contrast, [23-28;30-38] indicate that anthelmintic drugs cause a decrease in the size and number of echinococcal cysts, but do not lead to complete recovery; the listed authors recommend antiparasitic treatment both before the operation and within 6 months after it. The same long-term anthelmintic therapy using albendazole or mebendazole (10-15 mg / kg / day for 3-5 courses of 28-30 days with a break between courses of 10 days) is recommended by R. Rein et al. (1996). The most serious attention should be paid to the implementation of a complex of anti-relapse measures, including repeated courses of drug-specific therapy in the postoperative period, in case of cardiac echinococcosis. A rational combination of surgical and medical measures to influence the disease will certainly improve the results of treatment of this complex category of patients.

Hospital mortality after surgical treatment of cardiac echinococcosis in the literature is not covered enough, because, in the vast majority of cases, we are talking about single operations. So, in the series [3-6;28-39] operational lethality was reduced to zero. At the same time, Yu.L. Shevchenko and his colleagues (2006)

bitterly emphasize that out of 7 non-operated patients , 5 (71%) died in the coming years, and in the series of SS Kabbani et al ., (2007) out of 19 operated 4 (21%) died in the next year after the intervention due to acute cerebrovascular accident (rupture of an echinococcal cyst of the brain) or multiple organ failure (cysts in the kidneys and liver). In most observations, we are talking about single operations. So, in 45 cases, according to T ha meur H. _ etal . (2001) lethality was observed in 5.5%, recurrence of the disease - 4.4%; according to *Elhattaoui M.*, et al . (2006) lethality was observed in 28% of cases; according to *JerbiS* . et al (2008) - in 20% of cases. Orhan G. et al . (2008) notes mortality and recurrence in 4% of cases.

The recurrence rate of isolated cardiac echinococcosis after various types of surgical treatment is 2–22% [18,33,58]. With combined damage to the heart and target organs, the frequency of relapses increases to 10-36 %. Relapses are detected within 1 to 20 years after surgery. In accordance with the reasons that led to the recurrence, there are implantation, metastatic, residual and reinvasive echinococcal cysts. There is no doubt that the remaining viable elements of echinococcal cysts are the cause of most relapses. The reasons for the development of relapses are the ingress of parasitic fluid into the pericardial cavity during puncture of the cyst or during its rupture, drainage of the echinococcal cyst, technical errors during the operation, which led to the entry of elements of the removed cyst into the surgical field, independent migration of scolexes at some distance from the primary cyst. The sensitivity and resolution of modern research methods is not unlimited, and this leads to the fact that some of the small cysts remain undetected before and during surgery. These cysts cause recurrence. It cannot be ruled out that a significant part of relapses is the result of re-infection, since after the operation, patients return to their previous living conditions, and immunity is not developed after the disease. A number of authors note the absence of relapses in the follow-up period of 17-72 months [22;46]. In 20% of patients with echinococcosis who received conservative treatment, various complications were noted. The most frequently noted are increased pain in the area of cysts, allergic reactions, fever, increased cough, leukopenia, hypo - dysproteinemia , increased ESR. The occurrence of

complications is associated with inflammation and damage to the parasite capsule, increased antigenic effects of the parasite on the body. With the development of complications, it is recommended to interrupt treatment, prescribe antibacterial, detoxification and desensitizing therapy, and after the patient's condition improves, continue taking anthelmintic drugs [41]. Table 1 below shows the percentage of lethality and recurrence according to the literature. The data of our study on postoperative mortality and disease recurrence correspond to the literature data.

Thus, summarizing the above brief review of the literature, it can be stated that the following issues of surgical treatment of cardiac echinococcosis remain definitively unresolved or debatable:

1. The optimal variant of the "conditions for ensuring" echinococcectomy from the heart has not been determined.

2.The optimal options for surgical tactics in isolated and combined echinococcosis of the heart and target organs have not been determined;

3.The possibilities of simultaneous surgery for combined echinococcosis of the heart and target organs have not been determined;

4.The issues of elimination of the residual cavity after echinococcectomy are not covered ;

5.Morphological bases of perforation of echinococcosis of the heart have not been studied.

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