

## Echinococcosis of the Liver, Lungs and Brain. Clinical Observation.

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### 1. Abstract

Echinococcosis is the chronic parasitic disease arising due to contamination of an organism by larval form of *Echinococcus granulosus* helminth. This disease represents a serious diagnostic and medical problem. This article describes clinical observation of echinococcosis with damage of liver, lung and brain. Dynamics of clinical data, morphological and histological changes of organs are given. The rarity of affection of many organs, rapid growth of brain symptoms and incorrect interpretation of a computer tomography data of the brain have led to incorrect diagnosis and erroneous medical tactics.

### 2. Introduction

Human echinococcosis is a zoonotic parasitic disease caused by the tapeworm *Echinococcus granulosus*, which is a serious medical problem due to its severe course [1-3]. The highest incidence rates in the world are registered in China, Western, Southern and South-western Europe, the Middle East, North Africa, Central and South America [4]. More than 500 new cases have been registered in Russia [5]. Human infection occurs by petting dogs, which can have echinococcal eggs (oncospheres) on their fur. When entering the stomach, the shell of the oncosphere dissolves under the influence of gastric juice, and the parasites released through the portal vein system go to the liver, where most often echinococcal cysts are formed. Individual parasites pass the liver barrier and enter the pulmonary capillary bed through the right heart, resulting in pulmonary cysts. In rare cases, the parasite crosses the pulmonary barrier and enters the large circulatory system, affecting many human organs, including the brain [1,3,6,7]. An echinococcal embryo slowly develops into a fluid-filled cyst in the form of a bubble. The wall of an echinococcal cyst consists of two membranes - an outer chitinous membrane and an inner

germ. A fibrous capsule is formed around the developing cyst, in which calcium salts are often deposited. The average growth rate of parasitic blisters is 1-3 cm per year [1], and the asymptomatic period can last from 5 to 20 years or more [3]. Echinococcal cysts grow expansively, pushing and squeezing tissues of the affected and surrounding organs, causing parenchymal atrophy. The clinical picture of echinococcosis is determined by the localization of parasitic cysts. Highly informative diagnostic methods allow early diagnosis of hepatic echinococcosis and effective treatment [8]. However, echinococcosis is still a serious diagnostic and treatment problem [9].

As an example of difficulties of diagnostics and treatment of echinococcosis we present our own observation.

### 3. Clinical Observation

Patient V., age 40, a rural resident, has considered herself sick since February 2019, when an X-ray examination revealed a rounded mass in the right lung. On June 11, 2019, a spiral computer tomography was performed: focal destructive changes in both lungs, small bilateral pleural effusion, diffuse focal liver involvement, hepatomegaly, and enlarged retroperitoneal lymph nodes were detected. On June 16, 2019, she was consulted by an infectious disease specialist. Echinococcosis was suspected: antibody titer of 1/400 was determined by enzyme immunoassay. On June 30, 2019, she was admitted to the central district hospital on emergency basis with complaints of headache, weakness, and an increase in a body temperature to 40°C. On June 30, 2019, a spiral CT scan of the head revealed for the first time a focal cystic-solid mass of the right temporal lobe of the brain up to 40 mm in diameter. On July 6, 2019, she was admitted to the neurosurgical department of the City Clinical Hospital. Magnetic Resonance Imaging (MRI) of the head with contrast was performed. A

multinodular neoplasm of cystic-solid structure of large volume with involvement of the right temporal and frontal lobes of the brain to the deep parasternal structures was detected. The tumor shows signs of an infiltrative-nodular process, invading the vessels of the sylvian crevice and subcortical structures. A conclusion was made that the tumor could not be removed due to the absence of process boundaries. On July 15, 2019, due to the increase of general cerebral symptoms, the patient underwent surgery on vital signs: trepanation of the skull on the right side and removal of the tumor in the temporal and frontal lobes with invasion into the dura mater along the tumor perimeter. Histological examination of the operative material revealed necrotic tissues that did not allow us to identify the tumor. Up to July 28, 2019, the patient's condition remained severe: generalized cerebral syndrome and hyperthermia up to 40°C were increasing. On July 28, 2019, due to the formation of internal symmetric hydrocephalus, ventriculopuncture of the anterior horn of the lateral ventricle of the left brain was performed. On August 6, 2019, an MRI series recorded the formation of an intracerebral hematoma along the drainage pathway in the left frontal lobe and signs of increasing internal hydrocephalus. On the following days, the condition remained severe, although MRI data determined the reversal of the hematoma of the left frontal lobe. On August 24, 2019, the patient's death was detected in the presence of increasing general cerebral phenomena.

Clinical diagnosis: Tumor of the frontal and temporal lobes on the right side. Cerebral edema. Occlusive hydrocephalus. Meningoencephalitis, ventriculitis. Ventricular drainage surgery. Focal lung involvement (of unspecified genesis). Perifocal liver damage (of unclear etiology).

### 3.1. Autopsy Results

The greatest changes are found in the brain, lungs and liver.

There are two trepanation holes in the skull bones. On the right of the parietal bone there is a hole covered by a 7 cm diameter bone plate, and in the left frontal bone there is a 1 cm diameter hole. The soft dura mater thickened, cloudy, in the basal parts - with yellow filmy plaque. The brain consistency is extremely flabby. In place of the temporal and frontal lobes of the right hemisphere there is a homogeneous mass, soaked with blood. On the left frontal lobe there is a cavity 4 cm in diameter with yellow content, the tissue around the cavity is of mushy consistency. On the lower surface of the cerebellum, there is a ligature furrow from wedging into the greater occipital foramen.

Lungs: in the upper left and lower right lobes there are several dense white foci with clear contours, irregularly shaped, 1 and 3 cm in size. Large foci contain cavities with yellow jelly-like content. Outside the foci, lung tissue is full of blood.

The liver is significantly enlarged in size and protrudes from under the costal arch by 6 cm. Its consistency is flabby, the organ is yellow-brown on the surface and on the cut. In both lobes there are several large white foci with clear contours of different shapes ranging

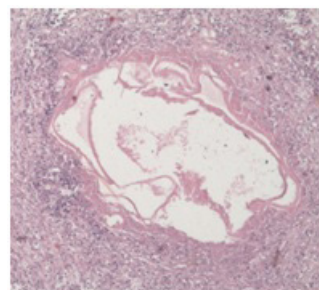
in size from 2 to 5 cm. However, the largest focus is in the left lobe and occupies half of its size.

Other organs showed signs of circulatory disorders and dystrophy.

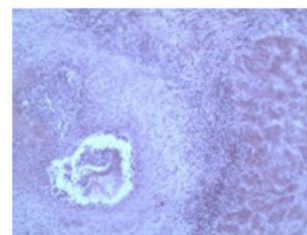
Histological examination in the brain, lungs and liver revealed multiple cavities containing parasitic cysts with a chitinous shell (Figure 1-3).

The tissue around the cavities containing chitin-sheathed parasitic cysts is necrotic, the formation of a productive inflammation zone is noted. Giant multinucleated cells are found among the infiltrate cells.

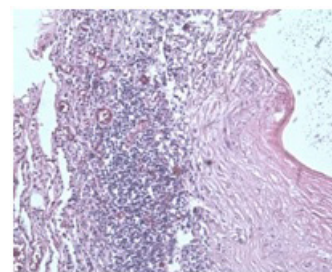
Pathological diagnosis: Generalized echinococcosis with involvement of the liver, lungs and brain. Purulent meningoencephalitis. Edema and swelling of the brain.



**Figure 1:** Histological examination of the brain: parasitic cyst with a well-defined chitinous sheath. Hematoxylin and eosin colouring;  $\times 200$



**Figure 2:** Histological examination of the liver: productive inflammation around the parasitic cyst. Hematoxylin and eosin colouring;  $\times 200$



**Figure 3:** Histological examination of the lung: productive inflammation around the parasitic cyst. Hematoxylin and eosin colouring;  $\times 200$

### 4. Discussion

The presented clinical case demonstrates an atypical course of echinococcosis with involvement of several internal organs in the absence of a characteristic focal symptomatology, which indicates the difficulty of the disease diagnosing [9]. Even though the incidence of echinococcosis in the Russian Federation is increasing [5], the damage of many organs is very rare, which may have been the beginning of errors in diagnosis and treatment measures.

Analysis of medical records showed that the conclusion of the infection specialist about the presence of echinococcosis was not sufficiently substantiated. Morphological diagnostics in the form of liver puncture biopsy was not suggested due to the increasing severity of the patient's condition. Changes of the brain with detection of a volumetric mass in the brain came to the fore. As cerebral echinococcosis is extremely rare, neurosurgeons could not assume cerebral echinococcosis, and the increase of general cerebral symptomatology led to the decision to remove the tumor mass in the right cerebral hemisphere for life indications. In the fragments of the removed brain tissue sent to the histological laboratory, due to the presence of only necrotic tissue, the pathologist could not determine the essence of the pathological process. Therefore, all further actions of neurosurgeons were conditioned by their opinion that the patient had a brain tumor. Due to increasing hydrocephalus, neurosurgeons performed ventriculopuncture of the left lateral ventricle. However, this procedure was complicated by intracerebral hematoma and aseptic inflammation.

## 5. Conclusions

Thus, at all stages of the patient's treatment no attention was paid to the opinion of the infectious disease specialist, who suspected the presence of echinococcosis in the patient. At later terms, despite using modern radiological methods, visualization of the disease picture appeared to be impossible. Therefore, specific anthelmintic therapy could not be administered either. This observation shows that neurosurgeons in their practice can meet not only with tumor, but also with parasitic damages of the brain.

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