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**СРАВНИТЕЛЬНАЯ ПАТОМОРФОЛОГИЯ «ЗАБЫТЫХ БОЛЕЗНЕЙ»:
ЭХИНОКОККОЗ И АЛЬВЕОЛЯРНЫЙ ЭХИНОКОККОЗ В БЕЛАРУСИ И
ЕВРОПЕ**

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**COMPARATIVE PATHOMORPHOLOGY OF “NEGLECTED DISEASES”:
ECHINOCOCCOSIS AND ALVEOLAR ECHINOCOCCOSIS IN BELARUS AND
EUROPE**

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Резюме. Эхинококкоз (СЕ) и альвеолярный эхинококкоз (АЕ) относятся к «забытым болезням» по классификации ВОЗ. Проведён сравнительный гистопатологический анализ 70 пациентов из Республики Беларусь. Установлено преобладание женщин (73%), средний возраст – 44 года. Доля АЕ в Беларуси (37%) выше, чем в Европе (32%), а поражение лёгких встречается в 2 раза чаще (23% против 14%). Выявлены ключевые патоморфологические различия между СЕ и АЕ, имеющие дифференциально-диагностическое значение.

Ключевые слова: эхинококкоз, альвеолярный эхинококкоз, патоморфология, гидатидная киста.

Resume. Echinococcosis (CE) and alveolar echinococcosis (AE) are classified as «neglected diseases» by WHO. A comparative histopathological analysis of 70 patients from the Republic of Belarus was performed. A predominance of women (73%) was established, the average age was 44 years. The proportion of AE in Belarus (37%) is higher than in Europe (32%), and lung involvement occurs 2 times more often (23% vs 14%). Key pathomorphological differences between CE and AE with differential diagnostic significance were identified.

Keywords: echinococcosis, alveolar echinococcosis, pathomorphology, hydatid cyst.

Relevance. Echinococcosis (CE) and alveolar echinococcosis (AE) are «neglected diseases» according to the WHO classification, endemic to developing countries [1]. However, cases of these parasitic diseases continue to be recorded even in prosperous European countries and in the Republic of Belarus with a temperate continental climate. Worldwide, 10,500–18,000 cases of AE are registered annually, 92% of which occur in China. CE is more common and affects young people, while AE affects older individuals. The high medical significance of the problem is due to: difficulties in the differential diagnosis of AE (it mimics a malignant tumor), aggressive infiltrative growth of AE leading to mortality of up to 90% without treatment, as well as the absence of comparative pathomorphological studies between Belarus and Europe [2,3].

Aim: to perform a comparative histopathological analysis of different types of echinococcosis in a sample of patients from climatically and economically different countries.

Objectives:

1. To assess the age and gender structure of patients with CE and AE in the Belarusian sample.
2. To analyze the localization of parasitic involvement (liver, lungs, other organs).
3. To perform a morphological analysis of the cyst wall, the nature of growth and the type of inflammatory infiltration.
4. To compare the Belarusian data with published European data.
5. To identify key pathomorphological differences between CE and AE.

Materials and methods. Biopsy data and ready-made histological specimens of 70 patients with diagnosed AE and CE were analyzed at the Minsk City Pathological Anatomy Bureau between January 1, 2015 and January 1, 2026. Morphological and statistical methods were used. Patients were divided into groups depending on the form of the disease (CE/AE), age (15–18 years, 18–44 years, 45–59 years, 60–74 years, 75–90 years), gender (male/female), localization (liver, lungs, other organs), degree of inflammatory infiltration (0 – none, 1 – mild, 2 – moderate, 3 – severe). Statistical data processing was performed using Microsoft Excel 2023.

Results and their discussion. In the study sample of 70 patients, a predominance of women was noted – 51 cases (73%), while men accounted for 19 cases (27%). The ratio of women to men was approximately 2.7:1. The average age of patients was 44 years (range – from 15 to 83 years). The largest number of patients was found in the age group of 18–44 years – 37 people (53%). In the group of 45–59 years, 24 patients (34%) were registered. Thus, young and middle-aged patients (18–59 years) accounted for 87% of the entire sample. In the group of 60–74 years, 7 patients (10%) were noted. The extreme age groups (15–18 years and 75–90 years) were the least represented – 1 patient each (1% each). Thus, CE and AE in the Belarusian sample most often affect persons of working age with a pronounced predominance of women.

A comparative analysis with European data revealed that Belarus has a higher proportion of alveolar echinococcosis (AE) – 37% versus 32% in Europe. At the same time, AE in Belarus affects younger patients (average age 42 years versus 51 years in Europe), while the cystic form (CE) is detected in older patients (46 years versus 34 years). The Belarusian sample is significantly dominated by women (73% versus 60% in Europe), and the lungs are affected almost twice as often (23% versus 14%), which may indicate hematogenous dissemination and a more aggressive course of the disease. The epidemiological and pathomorphological situation of echinococcosis in the Republic of Belarus appears more unfavorable compared to European countries [4].

A pathomorphological comparison of CE and AE revealed the following differences. In CE, the cyst wall is thick, layered with a chitinous membrane, growth is expansive (pushing tissues aside), which makes it possible to relatively clearly delineate the parasite; the host response develops granulomatous inflammation with giant cells, daughter cysts are often formed, and calcification is rare and peripheral in nature. In contrast, in AE, the cyst wall is thin and fragmented, growth is infiltrative (invasive) – similar to a malignant tumor, the host response is weak with a predominance of fibrosis and necrosis, daughter cysts are absent (only microvesicles are detected), and calcification is frequent and localized in the center of the lesion. Thus, AE morphologically mimics a malignant neoplasm, which

explains the difficulties of its early diagnosis, a more aggressive course and an unfavorable prognosis compared to CE. (Fig. 1, 2)

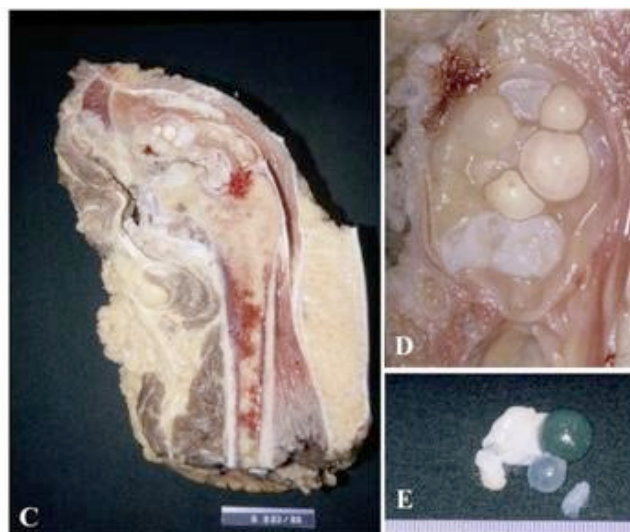


Fig. 1 – Focus of AE with small vesicles and surrounding necrosis

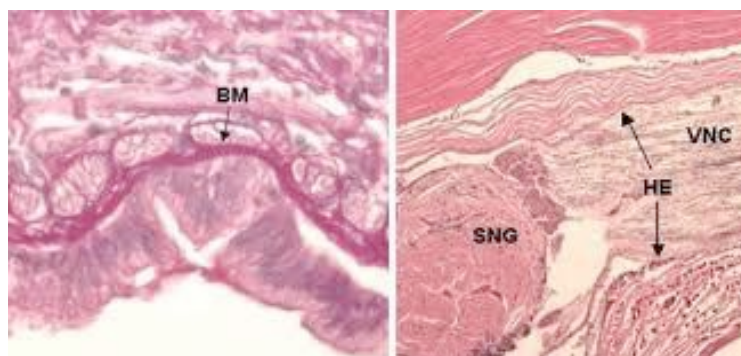


Fig. 2 – PAS staining: fragmented laminated membrane in AE

Analysis of the degree and types of inflammatory infiltration showed that severe (grade 3) and moderate (grade 2) infiltration were detected in 44% of cases (31% and 13%, respectively), whereas absence of infiltration (grade 0) was observed in 33% of cases, and mild infiltration (grade 1) – in 23% of cases. Microscopic examination revealed that the most common type of infiltrate was lymphocytic. At the same time, the presence of eosinophils is characteristic of CE, whereas giant multinucleated foreign body-type giant cells and lymphoplasmacytic infiltration are typical for AE. Thus, the nature of the host cellular response is an important differential diagnostic sign: eosinophilia indicates CE, while giant cell and lymphoplasmacytic reaction indicates AE, which is consistent with the more aggressive course of the latter. (Fig. 1)

Analysis of cyst types showed that multilocular variants predominate in both forms of echinococcosis: in CE, multilocular cysts occur in 59% of cases (26 out of 44), while in AE – in 73% of cases (19 out of 26). Unilocular cysts are registered in both forms, but more often in CE (18 cases, 41%) compared to AE (7 cases, 27%). The multilocular nature of growth in AE has key clinical significance, since it is precisely this that determines the infiltrative (invasive) growth of the parasite similar to a malignant tumor, which leads to

invasion into adjacent organs and vessels, complicates radical surgical removal and worsens the prognosis of the disease. (Fig. 3)



Fig. 3 – Gross specimen (macroscopic section) of a hydatid (echinococcal) cyst in CE

Conclusions:

1. In the Belarusian sample (N=70), women predominate (73%), the average age of patients was 44 years, the largest group is 18–44 years (53%). Patients of working age (18–59 years) account for 87% of the sample.
2. The proportion of alveolar echinococcosis (AE) in Belarus is 37%, which is higher than in Europe (32%). AE in Belarus affects younger patients (average age 42 years versus 51 years in Europe), whereas CE is detected in older patients (46 years versus 34 years).
3. Extraphepatic involvement in Belarus occurs in 33% of cases, with lung involvement accounting for 23% (in Europe – 14%), which is almost 2 times higher and may indicate hematogenous dissemination and a more aggressive course of the disease.
4. Key pathomorphological differences between CE and AE: CE is characterized by a thick layered chitinous wall, expansive growth, granulomatous inflammation with giant cells, and the presence of daughter cysts; AE is characterized by a thin fragmented wall, infiltrative (invasive) growth similar to a malignant tumor, fibrosis and necrosis, absence of daughter cysts, and central calcification.
5. The nature of the cellular response is an important differential diagnostic sign: eosinophilia is characteristic of CE, whereas giant cell and lymphoplasmacytic infiltration is characteristic of AE.
6. Multilocular cysts predominate in both forms, but in AE their proportion is higher (73% versus 59% in CE), which determines infiltrative growth and the difficulty of radical surgical removal.
7. The epidemiological and pathomorphological situation of echinococcosis in the Republic of Belarus appears more unfavorable compared to European countries, which requires further monitoring and the development of preventive measures.

Literature

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