



# Hydatid disease of the ribs: a diagnostic challenge with an endless differential diagnosis – a case report

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## Abstract

Hydatid disease is a parasitic infection in humans caused by *Echinococcus granulosus* and can lead to tissue cyst formation anywhere in the body. The most common sites for the development of parasitic cysts are the liver (75%) and lungs (15%). Skeletal involvement in echinococcal infection is relatively rare, occurring in only 1%–4% of cases. Few reports in the available medical literature describe rib hydatidosis, which clinically mimics benign or malignant cystic tumors.

We present the case of a 73-year-old female patient who underwent multiple surgeries for pulmonary and hepatic echinococcosis. She was treated with albendazole (800 mg daily) and underwent computed tomography, which revealed cystic formations in the chest wall, including lysis of a thoracic vertebra and adjacent rib arches, interpreted in the differential diagnosis as pulmonary carcinoma or pleural mesothelioma. Surgery facilitated both diagnosis and treatment. Six months postoperatively, no recurrence in the chest wall was observed.

Hydatid cysts occurring in the chest wall are rare and should be included in the differential diagnosis of chest wall formations, particularly in endemic areas and in patients with a history of hydatid disease.

## Keywords

hydatid disease, *Echinococcus granulosus*, chest wall formation, rib hydatidosis

## Introduction

Hydatid disease is a parasitic condition in humans that can result in the formation of tissue cysts anywhere in the body. In 2022, 27 countries within the European Union/European Economic Area (EU/EEA) reported a total of 731 cases of echinococcosis (Fig. 1). Cystic echinococcosis poses a significant public health challenge in Balkan countries. Bulgaria is among the most endemic countries in Europe. As of 2022, Bulgaria ranked first in incidence among EU

countries, with 89 cases and an incidence rate of 1.30 per 1,000,000 people. All confirmed cases in Bulgaria were caused by *Echinococcus granulosus*.<sup>[1]</sup>

Hydatid disease primarily affects the liver (75%) and lungs (15%), occurring in only 10% of cases in other parts of the body. Skeletal involvement due to primary hydatid disease is rare, representing 0.5%–4% of cases, and its occurrence in the ribs is exceptionally unusual. In cases of hydatidosis of the chest wall, the clinical presentation may mimic benign or malignant cystic tumors, metastases, con-

genital cysts, abscesses, pseudocysts, empyema, hematomas, and other lesions<sup>[2]</sup>, making diagnosis easily missable unless specifically considered.

We report a case of a hydatid cyst in the ribs, which was misdiagnosed preoperatively as either peripheral lung carcinoma or pleural mesothelioma despite the history of prior echinococcosis. The gold standard for therapy is radical removal of the cyst and affected ribs. Better outcomes are achieved by combining surgical procedures with mebendazole or albendazole for preoperative and postoperative prophylaxis.<sup>[3,4]</sup>

## Case report

A 73-year-old female patient was referred to our clinic with a history of gradually increasing pain in the paravertebral region of the lower chest for approximately two years, radiating to the abdomen. The patient resides in a rural area of the Eastern Rhodopes. Years ago, she underwent multiple surgical interventions due to echinococcal dissemination in the liver and lungs, including the perforation of a hepatic cyst into the pleural cavity, which was complicated by a right-sided empyema. She was treated for an extended period of time with 800 mg of albendazole per day.

Physical examination revealed retraction of the right hemithorax. Laboratory tests showed mild anemia (118 g/L; reference range 120–160), neutrophilia (76.9%; reference range 50–70), lymphopenia (13.2%; reference range 20–40),

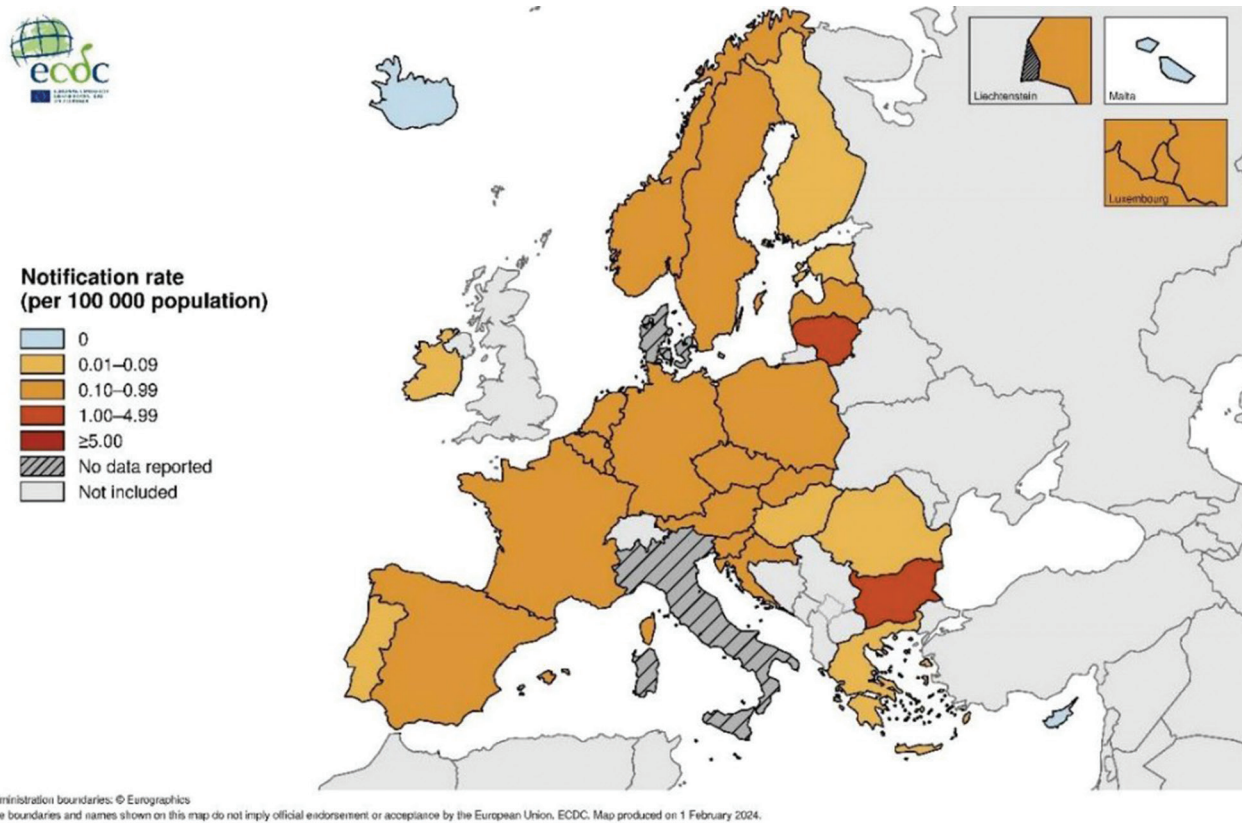
eosinophilia ( $0.57 \times 10^9/L$ ; reference range 0.02–5), and an ESR of 48 mm/h (reference range 0–15).

Chest radiography demonstrated an osteolytic lesion of the 5th and 6th ribs on the right side. Computed tomography revealed retraction of the right hemithorax and a dorsally located paravertebral oval lesion with central cystic density measuring 5.4×4 cm. The lesion caused lysis of the T4 and T5 vertebral bodies, with pronounced destructive changes in the lateral arches of these vertebrae and the right costovertebral joints. Similar changes involved and lysed the 5th and 6th rib arches on the right side along the posterior axillary line over a length of approximately 7 cm. Cranially, a paravertebral lesion with similar characteristics measured 5.1×3 cm. Anteriorly at the same level, a subpleural, predominantly soft-tissue lesion with a density of 39 HU containing calcifications measured 2.3×1 cm. Another ventral lesion measured 1.7 cm. A soft-tissue formation was observed paracardially on the right side above the diaphragm with a density of 30–37 HU, calcifications in its structure, and dimensions of 2.7×3.4 cm. Several similar lesions were noted along the pleura but were smaller in size.

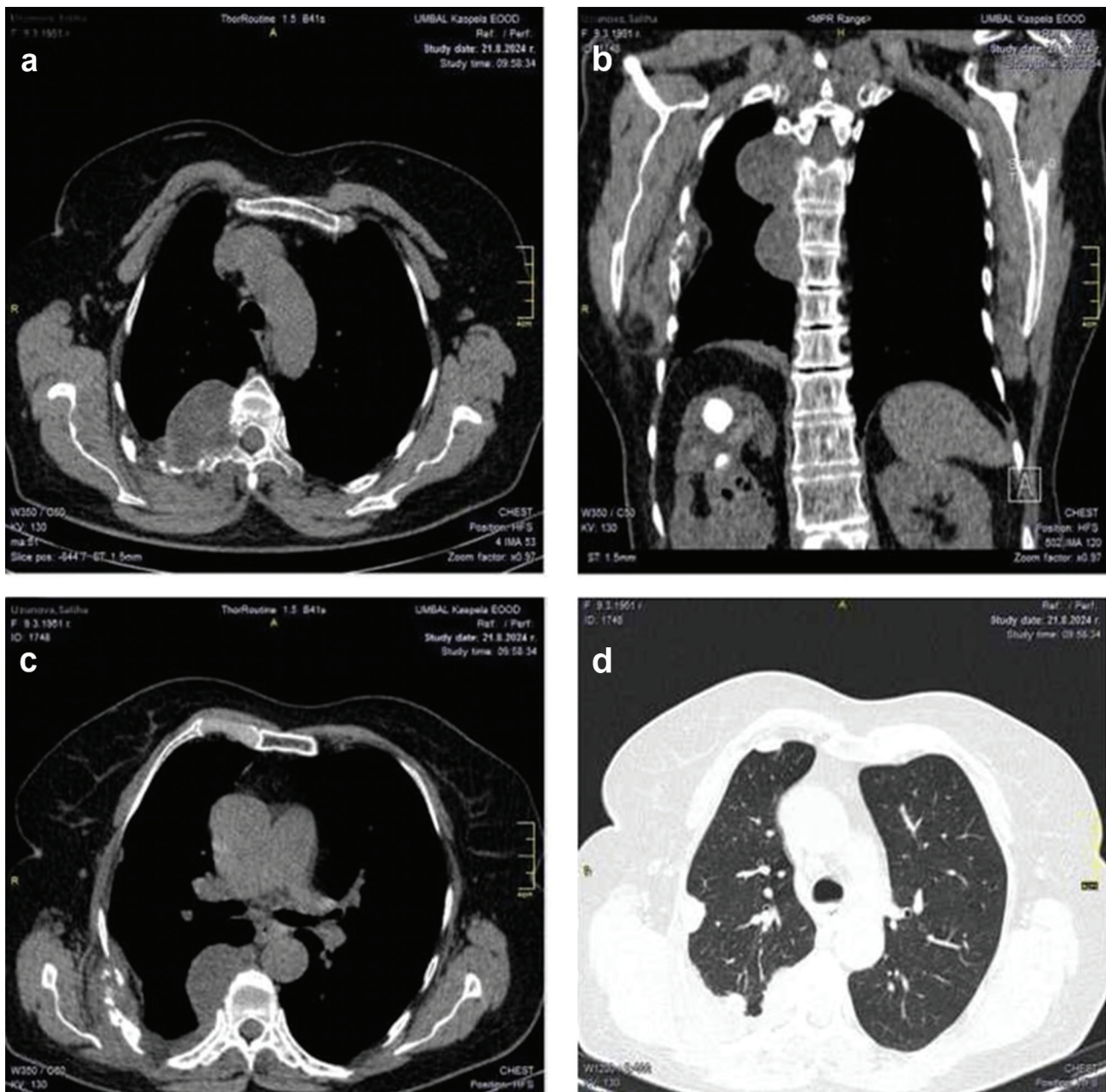
The described changes in the right hemithorax suggest the following differential diagnoses:

1. Pulmonary carcinoma
2. Pleural mesothelioma (Fig. 2).

A thoracotomy was performed using a posterolateral approach with excision of the old scar. Partial resection of the destroyed 5th rib was carried out. Daughter cysts were identified upon opening a formation measuring 5 cm (Fig. 3). Another cystic formation, located paravertebrally and mea-



**Figure 1.** Number of confirmed echinococcosis cases per 100 000 population by country, EU/EEA, 2022<sup>[1]</sup>



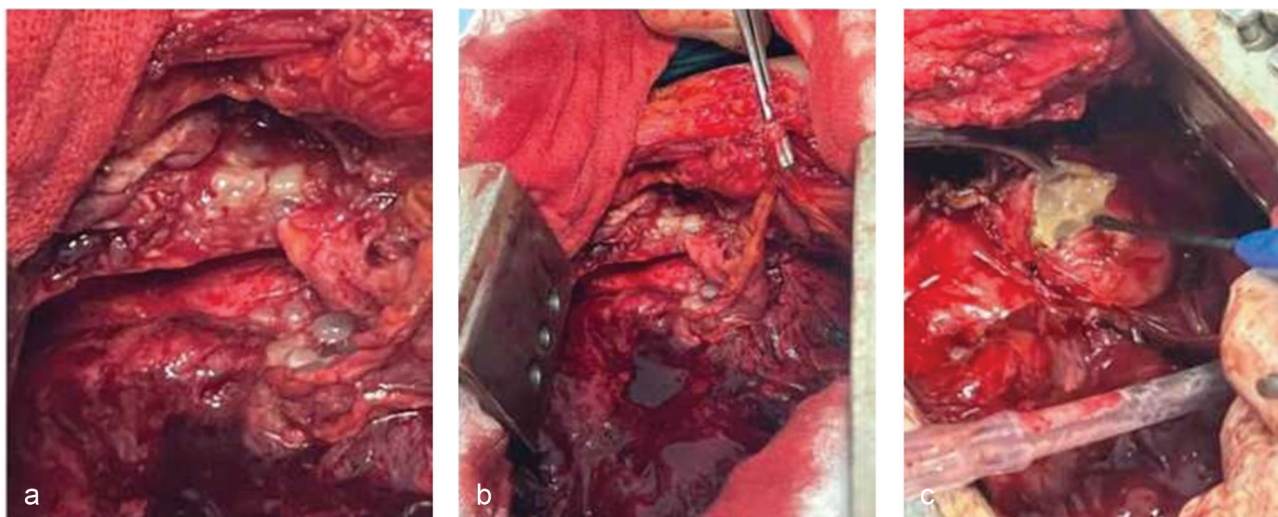
**Figure 2.** a. Axial CT scan showing retraction of the right hemithorax and a paravertebral lesion with lysis of a thoracic vertebra; b. Coronal CT scan revealing paravertebral formations and lysis of rib arches caused by a peripheral lesion; c. Axial CT scan showing a lesion in the arches of the 5th and 6th ribs; d. Axial CT scan showing visible formations on the right, suspected to be pleural mesothelioma.

suring 6 cm, was causing lysis of a thoracic vertebra, which was curetted to healthy tissue. A cyst was found above the rib surface in the subcutaneous tissue and within the 6th rib itself, which was partially resected. Several small cysts were located on the visceral pleura.

Histological findings confirmed the diagnosis of echinococcal invasion. There were no complications in the postoperative period, and the patient was discharged on the 4th day after surgery in a state of full recovery. Albendazole (800 mg daily) was administered for three months postoperatively. The patient was still in good health at the 6-month follow-up, showing no signs of a chest wall recurrence.

## Discussion

Hydatid disease is a globally widespread condition causing health issues in endemic zones such as the Mediterranean region of Asia, Australia, South America, the Middle East, and Southern Europe. It is most prevalent in areas with sheep and cattle farming, which form the first step in the transmission chain of this infection. Humans can become infected either through direct contact, most commonly with dogs (the definitive hosts), or by ingesting food and water contaminated with eggs present in dog feces.<sup>[5]</sup> Once



**Figure 3.** a, b. Daughter echinococcal cysts located above the rib surface, on the visceral pleura, and within the 6th rib; c. Open echinococcal cyst with a visible germinal capsule and daughter echinococcal cysts.

ingested, the eggs release larvae, which penetrate the mucosa of the jejunum and travel through venous and lymphatic channels to various parts of the body, where they transform into small cysts.

Hydatid disease primarily affects the liver (75%) and lungs (15%), with only 10% of cases involving other parts of the body. Primary skeletal involvement in hydatid disease is rare, occurring in 0.5%–4% of patients, and is typically found in highly vascularized areas of the bones.<sup>[6]</sup> The vertebrae, epiphyses of long bones, ilium, skull, ribs, and soft tissue extensions are the most commonly affected sites.<sup>[6]</sup>

Hydatid cysts in the ribs are significant because they cause destruction of the bone matrix and spread to the surrounding soft tissues and adjacent skeletal structures.<sup>[7]</sup> In patients with a history of surgery for pulmonary hydatid cysts, formations in the chest wall should be considered as disease dissemination to the chest wall. Pulmonary cysts can rupture spontaneously or during surgery, leading to contamination of neighboring organs.<sup>[8]</sup> This can result in the development of pleural or chest wall hydatid cysts, as observed in our patient. Similarly, cystic lesions in the chest wall, particularly in patients with concurrent lesions in the lungs or liver, should be interpreted as a sign of hydatid cyst involvement in the chest wall.<sup>[9]</sup>

In this case, the hydatid cysts were not primary lesions. The disease progression is typically slow. These patients are usually asymptomatic, but as the cyst enlarges, chest pain may develop, as in our patient. Over time, this can cause severe neurological damage. Imaging techniques such as CT scans reveal rib arch lesions, thoracic vertebral erosions, and density lesions above the skeletal system in the subcostal musculature. Differential diagnoses for such radiographic findings may include giant cell tumor, osteolytic metastases, plasmacytoma, aneurysmal bone cyst, mesothelioma, peripheral lung carcinoma with satellite metastases, and cystic neurofibromas.

Serological testing is a valuable diagnostic tool for hydatid

disease but may yield false positives or negatives.<sup>[10]</sup> Therefore, serology cannot serve as the most reliable early diagnostic method. It is generally used to confirm findings from imaging studies and hypotheses.<sup>[11]</sup> Various serological tests are employed to detect specific serum antibodies and circulating antigens, including hemagglutination tests, immunoelectrophoresis (IEP), and ELISA for echinococcal IgG. ELISA has a sensitivity of 95% and a specificity of 94%.<sup>[12]</sup>

In our patient, serological testing was not performed. A definitive diagnosis was not possible based on preoperative clinical examination, biochemical and imaging studies, or two fine-needle aspiration cytology (FNAC) procedures. Surgery provided both diagnostic and therapeutic outcomes. The gold standard for treatment is the radical resection of the cyst and the affected rib(s). In our patient, we removed all cysts and affected portions of the 5th and 6th ribs. Better outcomes are expected with a combination of surgery and albendazole (10 mg/kg) for pre- and postoperative prophylaxis, with high doses administered over a prolonged period to reduce recurrence rates.<sup>[12]</sup>

In this case, postoperative prophylaxis involved albendazole at 800 mg/day for three months. Asymptomatic patients must be followed long-term, with periodic serological tests and imaging studies to ensure no disease recurrence.

## Conclusion

Hydatid cysts can affect all organs and tissues in the human body, including all chest structures, such as the ribs. In patients with a history of surgery for hydatid disease, imaging-detected formations should be interpreted as recurrences, particularly in those living in endemic areas. For patients in these regions with cystic masses in the chest wall, hydatid cysts should be considered a primary diagnosis. However, imaging methods such as CT scans may present a wide range of differential diagnoses, with a definitive

diagnosis only established during surgery.

In the presented patient, surgical treatment combined with medication administered during the postoperative period resulted in successful early and late outcomes.

## Ethical approval

Not applicable

## Ethical statements

The authors declared that no clinical trials were used in the present study.

The authors declared that no experiments on humans or human tissues were performed for the present study.

The authors declared that no informed consent was obtained from the humans, donors or donors' representatives participating in the study.

The authors declared that no experiments on animals were performed for the present study.

The authors declared that no commercially available immortalized human and animal cell lines were used in the present study.

## Conflict of interest

The authors have declared that no competing interests exist.

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## Use of AI

No use of AI was reported.

## Data availability

All data used are referenced or included in the article.

## Author contributions

All authors have contributed equally.

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