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Vena Cava Inferior Thrombosis in the Course of Advanced Alveolar Echinococcosis

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Short title: Alveolar echinococcosis with hepatic cirrhosis and VCI thrombosis

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A 34-year-old man was hospitalized in the Clinic of Tropical and Parasitic Diseases, Poznań University of Medical Sciences, Poland, due to compensated liver cirrhosis in the course of inoperable alveolar echinococcosis (AE). Upon the patient's admission in September 2018, we found an enlarged liver, palm-tree sign on the skin of the abdominal cavity, and a single spider angioma on the back. Laboratory tests revealed elevated levels of gamma-glutamyltransferase, alkaline phosphatase, and unconjugated bilirubin. Additionally, we found microcytic anemia, iron deficiency, low ferritin level, a prolonged prothrombin time, and increased d-dimer levels. The imaging studies found a large (78x59 mm) focal lesion originally occupying the liver segment IV/VIII, with invasion of the diaphragm and right lung segment VII/VIII (Figure 1). The patient was qualified to the P4N1M1 group [2] according to the PNM (P = parasitic mass, N = involvement of neighboring organs, M = metastasis) classification, class A according to the Child-Pugh Score and obtained 9 points in the Model for End Stage Liver Disease Score. Patient was disqualified from surgical intervention and potential liver transplantation

The AE was diagnosed in 2011 on the basis of epidemiological data (red foxes observed in household) imaging investigations and an Em2-ELISA/Western blot which confirmed *Echinococcus multilocularis* infection [1]. On admission alanine and aspartate transferases, bilirubin level and activated partial thromboplastin time were normal. Abdominal ultrasonography revealed single 4 mm gallstone and 92 mm length lesions with calcifications in liver segment VIII were described. Nodular remodeling of liver was not observed, hepatitis B and C virus infection were excluded. In 2016, an angio CT revealed the development of collateral circulation (lumbar and paraspinal veins to the azygos vein and hemiazygos vein) and vena cava inferior (VCI) subphrenic constriction. The VCI thrombosis may have formed as a result of the main venous trunks' infiltration by the parasitic masses. This situation is

rarely described in the course of AE. The patient was treated with albendazole, started in 2011, according to current World Health Organization standards, but due to the irregular uptake of the drug, some thrombotic complications have occurred [1]. In additional to the albendazole, the patient received rivaroxaban. The subsequent imaging studies (February 2018) showed a progression of liver parasitic masses and the presence of satellite foci. We also observed a lack of VCI contrasting in the intrahepatic segment (Figure 1), a persistent adjunct of thrombosis, as a result of the irregular drug uptake. Acenocoumarol treatment was then implemented under INR control. In May 2018, the patient was diagnosed with third-degree esophageal varices, ligated during gastroduodenoscopy. This was followed by an episode of bleeding from the upper gastrointestinal tract. Anticoagulation treatment was discontinued. Due to the advanced state of the parasitic process, liver cirrhosis, and thrombotic lesions of the main abdominal trunks, the prognosis for survival is dim.

The number of diagnosed cases of AE in Poland has increased significantly [3]. AE leads to changes in the liver that often do not display clinical symptoms for a long time, imitating the development of a malignant neoplasm [4]. The described case indicates that cirrhosis in AE occurs not only because of the direct action of the parasite but also of its indirect influence on the VCI, thus potentially revealing a new mechanism of liver damage.

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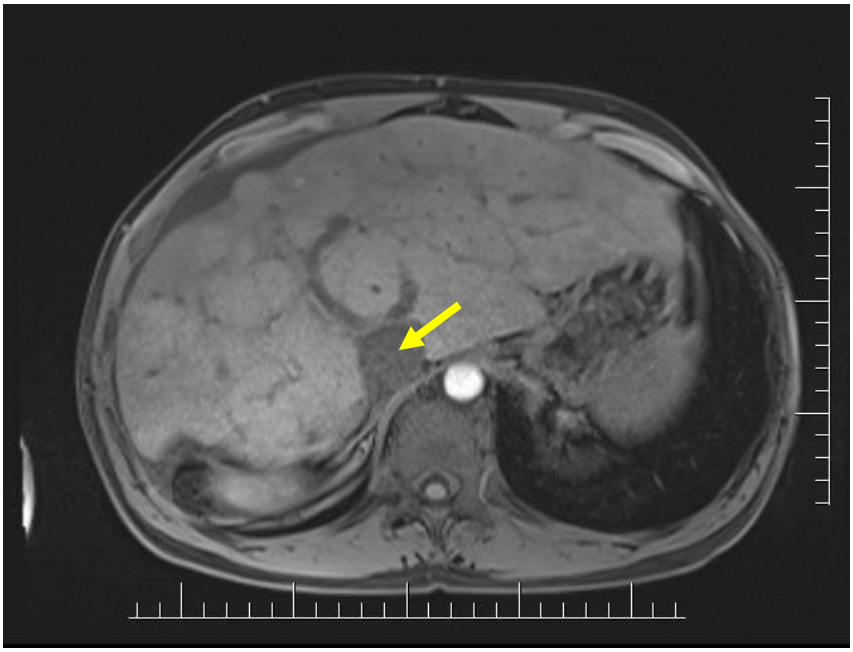
Figure 1

A)



B)

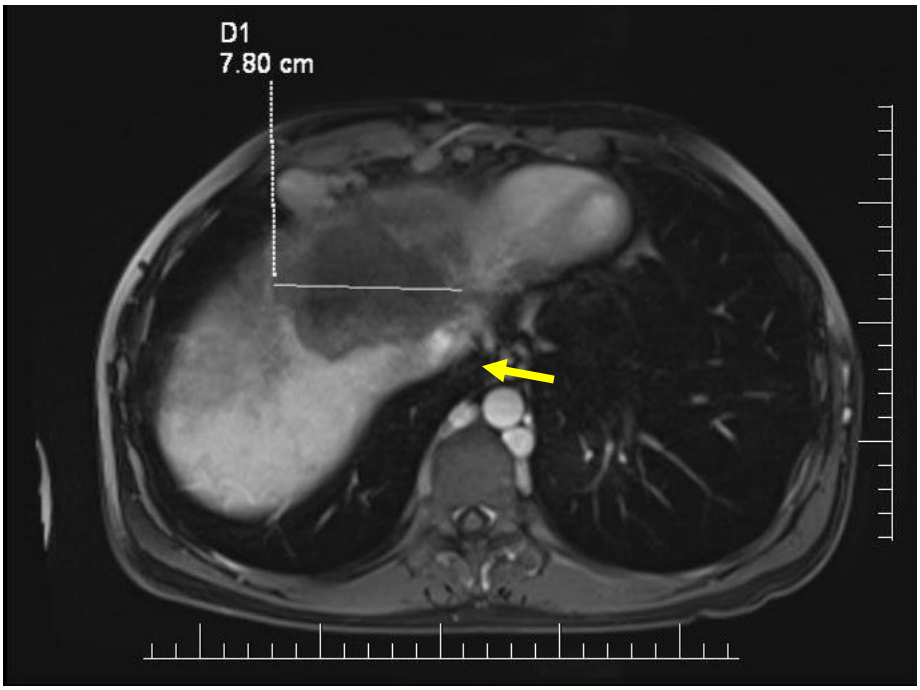


Figure 1. Extensive cirrhotic lesions (A) and parasitic mass (B) in the liver. (A) The liver cirrhosis is visible around the whole organ. At this scan level, the vena cava inferior diameter is not affected. (B) In segment VIII of the liver, as well as around the vena cava inferior, the solid parasitic mass infiltrates the diaphragm, which results in a decrease of the vena cava inferior's diameter. The vena cava inferior is marked with an arrow. Magnification: 2.0x (A) and 1.0x (B).