Introduction

Enterocephalus vermicularis, also known as pinworm, commonly infests the human gastrointestinal tract. However, extra-intestinal manifestations are rare; as per literature search, we have only found a handful cases of hepatic pinworm infestation [1–4]. Here, we present a case of hepatic pinworm infestation misdiagnosed and treated as a colonic adenocarcinoma metastasis.

Case report

A 57-year-old woman presented with acute abdominal pain. An abdominal computed tomography (CT) with intravenous contrast revealed a stenosing tumor in the boundary between the descending and sigmoid colon. Further, the CT described “a small low-intensity lesion in the right lateral liver segment” (Fig. 1), but a subsequent liver ultrasound with intravenous contrast did not confirm the lesion. The chest CT ruled out thoracic metastasis. Hence a laparoscopic resection of the colonic tumor was performed. The histopathology confirmed an adenocarcinoma, stage T3N0V0, with normal KRAS, BRAF, NRAS mutation status.

A follow-up magnetic resonance imaging (MRI) of the liver confirmed an 8 mm subcapsular lesion in segment VIII, which was interpreted as a metastasis. Subsequently, at the multidisciplinary team conference, the patient was recommended for chemotheraphy (FOLFIRI and Cetuximab). After four series of chemotherapy, a control CT revealed persistence of the liver lesion. The patient received radiofrequency (RF) ablation, followed by additional chemotheraphy (FOLFIRI). Unfortunately, a control CT one month after the RF ablation showed that the lesion was unchanged and was thought to have been missed during the ablation procedure. Open resection of liver segment VIII was performed, and the histopathology surprisingly revealed an Enterobius vermicularis worm (Fig. 2 and Fig. 3). The oncological treatment was terminated, and the patient returned to the standard non-metastatic colon cancer follow-up regimen. The level of carcinoembryonic antigen (CEA) in blood samples was elevated prior to colon resection, measuring 11 µg/L (<5 µg/L) and normalised after colon resection. The level of eosinophil leucocytes in blood samples did not show any specific pattern.

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Discussion

*Enterobius vermicularis* infestation occurs by ingestion of its egg, which hatch in the stomach and upper small intestine [5]. The larvae then migrate to the caecum and distal segments of the intestine, and during the night, female worms migrate further to the perianal skin where they lay eggs, which are then transmitted through the faecal-oral route [5]. Findings of extraintestinal *E. vermicularis* infestations are rare, but multiple locations have been reported, e.g. in the kidneys, liver and lungs [5].

How this nematode migrates from the intestine to the liver is poorly understood. It is believed that *E. vermicularis* is unable to penetrate intact, healthy tissue [1] and therefore migration may be facilitated by non-intact intestinal mucosa e.g. colorectal cancer, which was present in four of the...
previously published cases of hepatic pinworm infestation [2,3]. It has been suggested that after penetrating the intestinal wall, the pinworm migrate through the abdominal cavity to the liver by direct penetration [1,2]. An alternative route to the abdominal cavity in human females could be via the urogenital tract [1]. In our case and several of the previously presented cases, the pinworm was found in proximity to the liver surface, perhaps supporting the theory that the pinworm migrated via the abdominal cavity [2].

The other plausibility is that the pinworm reaches the liver hematogenously via the mesenteric and hepatic circulation [1]. This theory is supported by the previously published case where a pinworm was found in a peripheral branch of the portal vein [1,4]. In the previously published cases, the pinworm was found in the right liver lobe (one case did not specify the exact location in the liver) and the most recently reported cases also specified the location to segments VII and VIII [1–3]. Colorectal adenocarcinoma predominantly metastasizes hematogenously to the right hepatic lobe [6]. Hence, we suggest that the pinworm disseminated to the liver via a hematogenous pathway like that of colorectal adenocarcinomas.

The presence of liver metastasis is generally diagnosed by imaging procedures as CT and/or MRI. However, our case does raise the question whether standard imaging is specific enough in diagnosing superficially located lesions and whether these be biopsied? In a case report by Arkoulis et al., biopsies of the suspected metastatic liver lesion failed to diagnose the pinworm infestation and only yielded necrotic material suggestive of malignancy [1]. Further, Furné et al. argued that biopsy should be avoided due to the high risk of needle track deposits [3]. The level of eosinophils in blood samples does not seem to help distinguishing the pinworm infestation from malignancy. However, the level of CEA in blood samples were in our case only elevated prior to the colonic resection, and normalized thereafter, perhaps suggesting the benign etiology of the liver lesion.

In conclusion, a hepatic infestation of Enterobius vermicularis is rare, and the nematode’s migration route from the intestine to the liver is not completely understood. The liver infestation is difficult to distinguish from malignancy on radiology. The take-home message from previous and present cases is that superficially located, radiologically low-intensity lesions in the right liver lobe should be interpreted carefully. Further, the level of CEA in blood samples could be used as an adjunct to distinguish adenocarcinoma metastasis from the pinworm infestation. To prevent unwarranted therapies, similar cases should be approached with caution and reported to the scientific community, so that more data could be collected to characterize this rare manifestation of a commonly found parasite.

Consent

Written informed consent was obtained from the patient. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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CRediT authorship contribution statement

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Declaration of Competing Interest

The authors report no conflicts of interest.

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Fig. 3. Photomicrograph showing the liver lesion with the Enterobius vermicularis worm surrounded by peripheral necrosis and rimmed by lymphocytes (H&E x 5).
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