Strongyloides hyperinfection syndrome presenting as enterococcal meningitis in a low-endemicity area

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Strongyloides stercoralis is an intestinal nematode with an unusual life cycle, consisting of free-living and parasitic components.1 During the latter, a unique autoinfection cycle takes place, when rhabditiform larvae in the intestine metamorphose to filariform, which penetrate the bowel wall or perianal skin, enter the circulation via lymphatics, thus completing their life cycle without leaving the host. In the immunosuppressed host, autoinfection is accelerated and filariform larvae reach different organs. This leads to hyperinfection syndrome (HS), when migration is limited to respiratory and gastrointestinal tracts or to disseminated infection when involvement of other organs occurs.2 During HS, systemic infections with enteric bacteria occur frequently and contribute to the significant morbidity and mortality associated with this condition.3

Herein, we present a case of an immunosuppressed patient with community-acquired Enterococcal meningitis in whom Strongyloides hyperinfection syndrome (HS) had been overlooked.

A 62-year-old farmer was admitted to our department because of fever, severe headache and confusion for the last 48 hours. His medical history was notable for long-term use of high-dose methylprednisolone (65 mg/day) for retroperitoneal fibrosis. On admission, the patient was lethargic with nuchal rigidity. Initial investigations showed peripheral blood neutrophilia (WBC: 15,300 k/µl, polymorphonuclear: 91.6%, eosinophils: 0.5%) with remarkable elevation of CRP (190 mg/dl). Diagnosis of bacterial meningitis was established by CSF examination, which revealed 4,000 leukocytes/µl with remarkable elevation of CRP (190 mg/dl). Diagnosis of bacterial meningitis was established by CSF examination, which revealed 4,000 leukocytes/µl with remarkable elevation of CRP (190 mg/dl). Diagnosis of bacterial meningitis was established by CSF examination, which revealed 4,000 leukocytes/µl with remarkable elevation of CRP (190 mg/dl). Diagnosis of bacterial meningitis was established by CSF examination, which revealed 4,000 leukocytes/µl with remarkable elevation of CRP (190 mg/dl).

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A transesophageal echocardiogram was not revealing. Marked improvement was noted until day 10 when the patient complained for persistent vomiting. Upper GI-endoscopy revealed diffuse inflammatory lesions at the duodenal bulb. Histological examination of biopsies revealed the presence of parasites with the characteristics of Strongyloides stercoralis (Fig. 1A). In addition, multiple eggs containing rhabditiform larvae were noted on microscopical examination of duodenal aspirates and mobile rhabditiform larvae were seen in a fresh stool sample (Fig. 1B and C). Finally, filariform larvae were detected in bronchoalveolar lavage (Fig. 2), establishing the diagnosis of HS. The patient was treated with 400 mg albenazole BID, while corticosteroids were tapered. Sequential stool examinations detected rhabditiform larvae up to 10 weeks following initiation of treatment. The total duration of treatment was 12 weeks. No relapse has been noted during 20 months follow up, and repeated stool

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Figure 1. Detection of S. stercoralis in the gastrointestinal tract. (A) rhabditiform larvae in duodenal biopsy specimen (H & E; 100) (B) eggs with rhabditiform larvae of S. stercoralis in duodenal fluid aspirate (C) rhabditiform larvae in a fresh stool specimen.
adherence to the external surfaces of larvae or by the alimentary tract of parasites and subsequent secretion upon entering systemic circulation. In a recent series of 38 cases of serious bacterial infections associated with strongyloidiasis, 55% had meningitis and 73% had bacteremia. The most prevalent causes were enteric gram-negative bacteria. Enterococci only rarely have been associated with HS. Enterococcal meningitis accounts for only 0.3–4% of all cases of bacterial meningitis. It usually occurs in nosocomial setting as a result of neurosurgical procedures or haematogeneous dissemination secondary to another focus of enterococcal infection. Very seldom, enterococci are involved in community-acquired meningitis.

Another unique characteristic of HS is the high prevalence of systemic infections with intestinal bacteria. It has been recommended that immunocompromised patients presenting with unexplained meningitis, bloodstream infections (especially if recurrent) or pneumonia from enteric bacteria should be promptly evaluated for HS. Severe intestinal inflammation, as was demonstrated in our patient by endoscopical and pathological examination of the duodenum, leads to defects in mucosal integrity, which facilitate the systemic spread of gut bacteria. Alternatively, filariform larvae may carry intestinal bacteria to the bloodstream, either through adherence to the external surfaces of larvae or by the alimentary tract of parasites and subsequent secretion upon entering systemic circulation. In a recent series of 38 cases of serious bacterial infections associated with strongyloidiasis, 55% had meningitis and 73% had bacteremia. The most prevalent causes were enteric gram-negative bacteria. Enterococci only rarely have been associated with HS.

It should be also pointed out the persistence of larvae in the stools for as long as 10 weeks after initiation of treatment with albendazole. This might be related to high parasitic burden due to significant immunosuppression.

Figure 2. Diagnosis of HS. Filariform larvae are seen in bronchoalveolar lavage. The characteristic tail notch which is a distinctive characteristic of Strongyloides filariform is shown in the inlet picture in magnification.
studies, recurrence of strongyloidiasis occurred after apparently adequate treatment with either albendazole or ivermectin. Therefore, in immunocompromised hosts with HS serial stool examination is required and prolonged treatment may be necessary, as was demonstrated herein.

In summary, our case raises several important issues related to strongyloidiasis. First, the possibility of strongyloides HS should be considered when an unexplained community-acquired infection by organisms of enteric flora occurs in an immunocompromised patient. Second, in such cases, any GI-related symptomatology should be sought for and promptly investigated. Finally, prolonged treatment and sequential stool examinations are needed to ensure eradication of the parasite in patients with HS.

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