Abdominal Pain and Bacterial Meningitis in a Previously Healthy Young Adult

(See page 1458 for the Photo Quiz)

Diagnosis: human T cell lymphotropic virus type 1 (HTLV-1) infection with associated Strongyloides stercoralis hyperinfection and bacterial (i.e., vancomycin-resistant Enterococcus faecium) meningitis.

HTLV-1 is a single-stranded RNA retrovirus endemic to focal areas of the world (Japan, Israel, Iran, and Melanesia), as well as larger geographic regions (West Africa, South America, and the Caribbean) [1]. Transmission is thought to be primarily cell associated, occurring peripartum, intravenously, or sexually [1]. Our patient likely acquired HTLV-1 via mother-to-child transmission at birth or during breast-feeding while still an infant in Sierra Leone.

The flowe cell (also known as a flo et or cleaved cell) is characteristic of HTLV-1 infection. HTLV-1 infects CD4+ cells and induces clonal proliferation [2]. Several studies suggest that the nuclear abnormalities of flowe cells are a consequence of viral expression of the oncoprotein Tax [3, 4]. Tax causes cell-cycle dysregulation by targeting key regulators of the cell cycle and interfering with tumor-suppressor proteins [4]. This interference may then contribute to the induction of genomic instability and defective cell division that results in the formation of multinucleated giant cells with the characteristic cerebriform or convoluted nuclear structure [3, 5].

Flower cells can be found in asymptomatic carriers of HTLV-1 [6, 7], but they are also the characteristic morphologic feature of both acute and chronic adult T cell leukemia and/or lymphoma, which is a severe complication of HTLV-1 infection. Flower cells can also be seen in mycosis fungoides (Sézary cells) [8, 9]; other malignant disorders, including acute T cell lymphoblastic leukemia; and chronic B cell lymphoproliferative diseases [10].

HTLV-1 infection is associated with immunodeficiency and a predisposition to opportunistic infections, such as Pneumocystis carinii pneumonia, Cryptococcus neoformans meningitis, disseminated fungal infections, and S. stercoralis hyperinfection [11, 12]. The relationship between HTLV-1 and strongyloidiasis has been well documented in Japan [13] and Peru [14]. HTLV-1 decreases the Th2 immune response that is necessary for control of strongyloidiasis [15]. This decreased immune response to infection with S. stercoralis leads to more-severe strongyloidiasis, as well as decreased efficacy of anthelmintic treatment [12, 16].

The strongyloidiasis hyperinfection syndrome is characterized by disseminated infection and an association with enteric bacteremia and meningitis [12, 17–19]. Strongyloidiasis hyperinfection syndrome has been classically described in association with corticosteroid therapy but is also associated with other immunosuppressive agents, organ transplantation, hematological malignancies, malnutrition, and HTLV-1 infection [20]. The pathogenesis of bacterial meningitis is postulated to occur in 1 of 2 ways: carriage of enteric bacteria by S. stercoralis larvae from the gastrointestinal tract to the meninges [14] or translocation of enteric bacteria after perforating abdominal infection due to S. stercoralis, with resultant bacteremia and seeding of the meninges. Given the clinical course of our patient, the latter mechanism is the likely means by which he developed vancomycin-resistant E. faecium meningitis.

Our patient initially had S. stercoralis larvae identified on examination of stool for ova and parasites (figure 1) and was treated with ivermectin. Because of concern for possible acute
T cell leukemia and/or lymphoma in the presence of antibodies for HTLV-1, he received a course of fludarabine and high-dose dexamethasone. After a bone marrow biopsy and further hematological review, there was no evidence of hematological malignancy and no further indication for chemotherapy. The patient had a prolonged hospital course, including treatment for recurrent vancomycin-resistant *E. faecium* meningitis 4 and catheter-related candidemia. He was treated again for disseminated strongyloidiasis, with improvement evident in his abdominal CT scan; however, the patient had persistent neurological deficit and never regained full consciousness. He expired 4 months after initial presentation.

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