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Bacterial meningoencephalitis secondary to disseminated strongyloidiasis in a pacient with COVID-19

Filofteia Cojanu Banicioiu[1], Claudia Chirila[1], Andreea Toderan[1], Simin-Aysel Florescu[1,2], Corneliu Petru Popescu[1,2]

[1]"Dr. Victor Babes" Clinical Hospital for Infectious and Tropical Diseases, Bucharest, Romania
[2]"Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

ABSTRACT

Introduction. Strongyloidiasis in a parasitic disease determined by the intestinal nematode *Strongyloides stercoralis.* In most cases, this disease is asymptomatic, but the immunocompromised patients can develop severe forms like hyper-infestation and disseminated strongyloidiasis. The severe forms of the disease are associated with bacteremias with gastrointestinal microorganisms which can determine infectious complication anywhere in the body. Bacterial meningitis is the most common complication of this kind.

Case presentation. We present you the case of a 78-year-old patient who initially presented in another hospital for suddenly installed aphasia. He was clinically and paraclinically evaluated and the suspected diagnosis was acute meningoencephalitis, so he was transferred to our hospital. This is a case about a patient with an immunocompromised status determined by the recent infection with SARS-CoV-2 who was hospitalized and received prolonged corticosteroid therapy. The clinical examination performed at admission shows a patient with mediocre general status, partially cooperative, partially time-spatial oriented and to one's own person, discreet neck stiffness, anxious-depressive mood, with acute respiratory failure. A coproparasitological examination is performed which revealed the presence of filariform larvae of *Strongyloides stercoralis* in the stool. Also, a parasitic PCR test from a stool sample is positive for *Strongyloides stercoralis.* These clinical and paraclinical findings corroborated with those found in the cerebrospinal fluid examination establish the diagnosis: acute bacterial meningoencephalitis secondary to disseminated strongyloidiasis. During the disease's evolution, he is confirmed with a new infection with SARS-CoV-2. He received antiviral treatment, antiparasitic treatment, antibiotic treatment and symptomatic treatment. The evolution of the disease is favorable.

Conclusions. The immunocompromised status of the patient determined the evolution of the infestation with *Strongyloides stercoralis* to a severe form, complicated with acute bacterial meningoencephalitis. The difficulty in establishing the diagnosis of strongyloidiasis is represented by the fact that Romania is a non-endemic country for the infection with this parasite.

Keywords: strongyloides, COVID-19, meningoencephalitis

INTRODUCTION

Strongyloides stercoralis is an intestinal nematode responsible for the disease called strongyloidiasis. This worm is unique among intestinal nematodes by having two lifecycles: one outside the host, in the soil (rhabdithiform larvae) and the other one, a parasitic lifecycle, in the host (filariform larvae). The parasitic lifecycle allows it to multiply without reinfestation from outside, so the host can be infested for many years in the absence of the treatment. It is endemic in tropical and subtropical regions of the world, but it can be found sometimes in temperate regions also. The main reservoir is humans, but dogs and cats can also represent natural reservoirs

Corresponding author:
Corneliu Petru Popescu
E-mail: cornel160@yahoo.com

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for this nematode. The skin exposure to contaminated soil with feces containing *Strongyloides stercoralis* can lead to infection. In most cases the infection is asymptomatic throughout the host's life. Patients with immunosuppressed status can develop severe forms of the diseases such as hyperinfestation or disseminated strongyloidiasis which can lead to death. In the case of hyperinfestation, the respiratory and gastrointestinal tract are affected, the two systems involved in the parasitic lifecycle of *Strongyloides stercoralis*, while in disseminated strongyloidiasis from the larvae can be found in any organ of the host. These severe forms of infestation with *Strongyloides stercoralis* can be associated with bacteremia with microorganisms located in gastrointestinal tract. This phenomenon is facilitated by the passage of the larvae through the intestinal wall. Bacterial meningitis is the most common of these complications [1-6].

Risk factors associated with disseminated strongyloidiasis are: prolonged corticosteroid therapy, HIV and HTLV infection, malignancies, COVID-19, organ transplants, old age [1,5,7].

CASE REPORT

Presenting concerns

We present you the case of a 78-year-old patient hospitalized between 15.04.-27.04.2022 in "Dr. Victor Babes" Infectious and Tropical Diseases Clinical Hospital from Bucharest. He was transferred to our hospital from the National Institute of Neurology and Neurovascular Diseases where he presented for suddenly installed aphasia and was hospitalized between 12.04-15.04.2022. He is known with chronic obstructive pulmonary disease in treatment with Symbicort, bilateral bronchiectasis, hearing loss and chronic smoking. He has recently recovered from severe bronchopneumonia with SARS-CoV-2 (hospitalized in February 2022 for 14 days, and with corticosteroid therapy and oxygen therapy at home for 3 weeks). He lives in an urban area, in a house with a yard and has 3 unvaccinated and unwormed dogs. At the National Institute of Neurology and Neurovascular Diseases, the laboratory investigations showed high inflammatory syndrome, leukocytosis with neutrophilia. The chest CT scan showed changes with frosted glass appearance located in the bilateral posterior subpleural level, small focus of apical condensation of the level of upper right lobe and emphysema specific changes. The brain CT showed cortical atrophy and hypodensities of periventricular white matter and the brain MRI showed diffusion restriction in the occipital horns of the lateral ventricles with uncertain infectiousness versus hemorrhagic imaging appearance. A lumbar puncture was performed with cerebrospinal fluid sampling which was clear, colorless with 127 elements/mm^3, 50% polymorphonuclear cells, positive Pandy reaction, albuminorachia = 0.4g/l, proteinorachia = 0.618g/l, glycorachia = 41.7 mg/dl, chlororrhagia = 112.4mmol/l. During hospitalization in National Institute of Neurology and Neurovascular Diseases he was treated with Moxifloxacin (Avelox) 400 mg/day I.V. for 4 days, anticoagulant in prophylactic dose, antipyretics and hydro-electrolytic rebalancing infusions and bronchodilator. The patient is transferred to our hospital with the suspected diagnosis of acute meningoencephalitis.

Clinical findings

At the admission in our hospital the patient had a mediocre general condition, pale skin and mucous membranes, adipose tissues represented in excess at the abdominal level, hypotonic, hypokinetic muscular system, vesicular murmur present bilaterally, diminished in the lower left lung field, crackling rales present basally bilaterally, $SatO_2$ = 89-90% in ambient air, partially conscious patient, partially time-spatial oriented and to one's own person, discreet neck stiffness, anxious-depressive mood.

Diagnostic focus, therapeutic focus and assessment

The laboratory investigations showed eosinophilia (1300/µl), mild normochromic normocytic anemia (Hb = 10,7g/dl), biological inflammatory syndrome (C-reactive protein = 4.18 mg/dl, fibrinogen = 585mg/dl), hyponatremia (Na = 131mmol/l), also negative HIV antibodies and negative rapid antigenic test for SARS-CoV-2. The lumbar puncture showed clear cerebrospinal fluid, colorless, PCR panel multiplex meningitis/encephalitis negative. At this point, the diagnosis of acute meningoencephalitis and acute pneumonia is formulated and the patient is treated with empiric antibiotic Ceftriaxone I.V. b.i.d., cerebral depletives and hydro-electrolytic rebalancing infusions and Symbicort according to his personal treatment plan.

On 23.04.2022, the patient has a febrile episode of 40°Celsius, so a blood culture is drawn and also a Genexpert test for influenza A and B, respiratory syncytial virus and SARS-COV-2 is performed. The patient is confirmed with COVID-19 and is transferred to the COVID ward of our hospital. Clinically, the patient presents lingual erosive lesions, maculoerythemateous exanthema with few elements at the level of the right ear, chest and upper limbs, vesicular murmur present bilaterally, crackling rales present in the right lower lung field, $SatO_2$ = 98% in ambiental air, time-spatial oriented and to one's own person, emotionally unstable and cries easily. Blood results revealed leukocytosis (12300/µl) with neutrophilia (8500/µl) and monocytosis (1100/µl), persistent eosinophilia, elevated C-reactive protein

(8,9mg/dl), hyponatremia (130mmoli/l), mild normochromic normocytic anemia (Hb = 11,5mg/dl). An antiviral is added to the patient's treatment according to COVID 19 protocol (Remdesivir I.V. for 5 days), antihistamines, borax glycerin for lingual aplications.

On 27.04.2022 a stool sample for parasitic examination is taken and the laboratory doctor confirms the presence of fillariform larvae of *Strongyloides stercoralis.* The lumbar puncture is repeated and the cerebrospinal fluid prelevated is clear, normotensive, 77 elements/mmc, frequent polymorphic mononuclear cells, very rare polymorphonuclear cells, rare erytrocytes, negative Pandy reaction, albuminorachia = 0.390 g/l, proteinorachia = 0.632 g/l, glycorachia = 0.44 g/l, negative bacterial cultures. Antibodies IgG *Borellia burgdorferi* from LCR are negative from the first cerebrospinal fluid prelevation. Blood investigations reveal normal blood count, persistent eosinophilia, mild anemia, biological inflammatory syndrome in decline (fibrinogen = 422 mg/dl, C-reactive protein = 3.63 mg/dl), RPR and TPHA, serologies for *Rickettsia conorii* and *Borellia burgdorferi* were negative.

The patient had psycho-emotional instability with easy crying throughout the hospitalization and he requested the discharge several times, so on 27.04 he is discharged by his request against medical advice. On the day of discharge, he is time-spatial oriented and to one's own person, no signs of meningeal irritation. He receives treatment indications with Albendazole 400 mg po b.i.d for 7 days, until medical reevaluation.

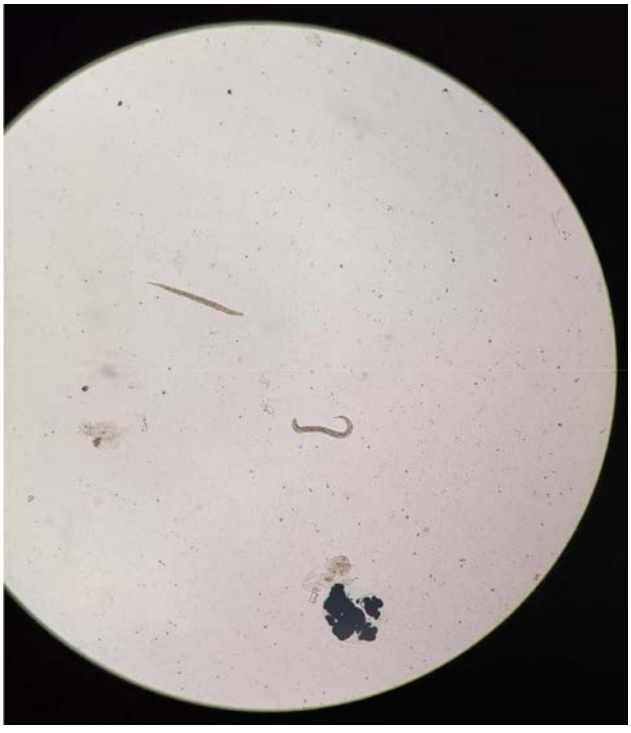

FIGURE 1. Strongyloides stercoralis

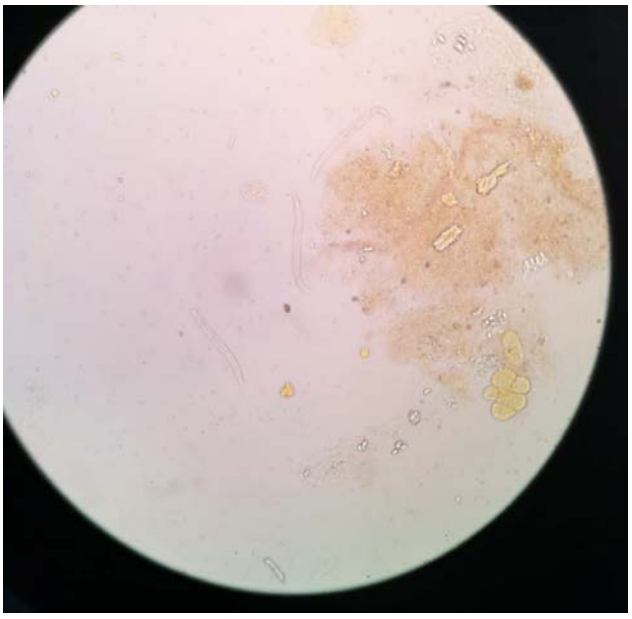

FIGURE 2. Strongyloides stercoralis

After 7 days he returns to our hospital with fever and swallowing difficulties started 2 days previously and he is admitted again.

Clinically, he presents with discreetly pale skin, white lingual deposits, slight tremor in the right hand, cries easily, he is time-spatial oriented and to one's own person, and he has no other pathological changes. The blood investigations reveal mild leucocytosis (10900/µl) with mild neutrophilia (7700/µl) and monocytosis (1100/µl) and no eosinophilia, hyponatremia (124mmol/l) and elevated C-reactive protein (12,7mg/dl) and increased fibrinogen (598mg/dl). The lumbar puncture reveals clear cerebrospinal fluid, normotensive, 1200 elements/mmc, 80% polymorphonuclear cells, 19% mononuclear cells, 1% eosinophills, rare erytrocytes, Pandy reaction ++++, albuminorraghia = 1.193 g/l, proteinorraghia = 1.958 g/l, glycorrahagia = 0.43 g/l, chlororraghia = 6.8 g/l, PCR multiplex meningitis/encephalitis negative, negative bacterial cultures.

The stool microscopic parasitic examination is negative (repeated in 3 different days), but the parasitic PCR (polymerase chain reaction) test from a stool sample is positive for *Strongyloides stercoralis.*

At this point, the diagnosis is bacterial meningoencephalitis secondary to disseminated strongyloidiasis.

This time, the patient was treated with broad spectrum antibiotherapy (Meropenem 6g/day I.V. for 14 days, Vancomycin 3 g/day I.V. for 11 days changed for logistic reasons with Lynezolid I.V. 600 mg b.i.d for 2 days) and continued to receive Albendazole 400 mg po b.i.d. for 14 days. He also received antipyretics, anxyolitics and did psychotherapy.

After 15 days the pacient was discharged in good general condition, with no swallowing difficulties,

time-spatial oriented and to one's own person, no meningeal irritation signs, emotionally stable. Also, the lumbar puncture repeated on 16.05.2022, 2 days before the discharge, showed clear cerebrospinal fluid with almost normal parameters, 16 elements/mmc, rare mononuclear cells, negative Pandy reaction, albuminorraghia = 0.329 g/l, proteinorraghia = 0.517 g/l, glycorrahagia = 0.55 g/l, chlororraghia = 7.5 g/l. The blood tests showed normal blood count, decreased biological inflammatory syndrome, electrolytes with normal values and the control parasitic PCR from the stool was negative.

Follow up and monitoring

At discharge, it was recommended to monitor health status through the family doctor, according to the national protocol.

DISCUSSIONS

Disseminated strongyloidiasis has, in general, an unfavorable prognosis, with high death rate (up to 80%). This is mainly related to the non-specific clinical presentation in an immunocompromised patient, which often leads to wrong diagnosis, especially in nonendemic areas. At the same time, this nematode has a particular characteristic, that of persisting and replicating in the host without producing symptoms or only producing them at a minimal level, and thus it is difficult to establish the moment of infestation [1,2]. The global prevalence of infection with *Strongyloides stercoralis* is unknown, but it is estimated that in 2017 there were between 30-100 million people infected with Strongyloides. The largest number of infested people is in Southeast Asia, the Caribbean area, tropical Brazil, Panama, Cuba, and temperate areas of Spain.

It is important to prevent infestation by walking with shoes on in areas possibly contaminated with feces or sewage. At the same time, pets such as cats and dogs must be properly dewormed internally because they can be vectors for this nematode. In the last 2 years in which the COVID-19 pandemic occurred, an association of *Strongyloides stercoralis* infection with SARS-CoV-2 infection was observed [5-7].

CONCLUSIONS

Disseminated strongyloidiasis or hyperinfestation are favored by immunosuppression, and our patient had several favorable factors: recent history of COVID-19, prolonged corticosteroid therapy, reinfection with SARS-CoV-2 and advanced age.

The difficulty of the diagnosis was due to the initial presentation as a meningo-encephalitis in another hospital and the fact that Romania is a country with low endemicity for infection with *Strongyloides stercoralis.* Persistent eosinophilia raised the suspicion of a parasitic infestation, although only part of patients infected with *Strongyloides stercoralis* show eosinophilia.

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