Reference number to be mentioned by correspondence : AG/CR200822

Strongyloides Stercoralis infection associated with repititive bacterial meningitis and SIADH : a case report

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Abstract

Strongyloidiasis is an infection by the intestinal parasite *Strongyloides Stercoralis*, which usually stays asymptomatic. In some situations a hyperinfection or disseminated disease can occur. We report a case of a 49-year-old Congolese man with a medical history of 5 episodes of bacterial meningitis, who presents himself with a paralytic ileus and a low serum sodium. A Strongyloides hyperinfection with a SIADH was diagnosed. After treatment with ivermectine the abdominal symptoms subsided and the serum sodium returned to normal values. In comparison to other case reports our patient had no respiratory or gastrointestinal symptoms during the episodes of bacterial meningitis. Screening for Strongyloides stercoralis is indicated in patients with unexplained SIADH, bacterial meningitis or bacterial septicaemia, who originally come from endemic countries. (Acta gastroenterol. belg., **2008**, 71, **000-000**).

Key words : Strongyloides Stercoralis, SIADH, repititive bacterial meningitis.

Introduction

Strongyloidiasis is an endemic parasitosis in the tropical and subtropical parts of the world and is caused by the intestinal nematode Strongyloides Stercoralis (1-5). Worldwide it can affect 30 to a 100 million people (1,2, 4). Humans acquire the infection when the filariform or infective larvae penetrate bare skin. This usually happens at a young age when the host's bare feet come in contact with contaminated water or soil (2). After penetrating the skin, the larvae enter the venous microcirculation through the lymphatics. Reaching the lungs, they invade the pulmonary alveoli and are carried through the bronchial tree to the pharynx where they are swallowed. Once in the small intestine, the larvae become adult females and bury themselves into the epithelium where they lay eggs. The eggs become rhabditiform non-infective larvae, which are passed in the faeces. Some of those larvae transform into infective filariform larvae, which penetrate the colonic mucosae or perineal skin. This cycle of internal autoinfection can let the parasite cause a persistent occult infection for decades (1,2,4). About half of the individuals with a chronic Strongyloidiasis have no symptoms at all. When symptomatic, symptoms include abdominal pain, nausea, vomiting, diarrhea, constipation or weight loss (2,4). These symptoms can be very vague (2). The autoinfection cycle can be accelerated by suppression of the immune system (1,2,6). Consequently a hyperinfection syndrome or disseminated strongyloidiasis may occur. A hyperinfection syndrome is defined as an increase in parasitic burden without the spread of larvae outside of the usual migration pattern (2). This results in symptoms of the respiratory and or digestive tract. A disseminated Strongyloidiasis occurs when the invasive filariform larvae spread outside their normal migration pattern to virtually every organ (2). Hence, there can be involvement of the central nervous system (7), the cardiovascular system and even the skin. The immune suppression, which causes the increase in parasitic burden, can be iatrogenic or related to another concomitant disease. Haematological malignancies, seropositivity for HIV, chronic renal failure and diabetes have been associated to strongyloidiasis. Also some therapies like corticosteroids, chemotherapy or immune suppressants are known to alter the immune competence (2).

Case report

A 49-year-old man presented himself at the emergency department with abdominal pain and vomiting. He was born in Congo and migrated to Belgium seventeen years ago. He never returned to Congo since. His sole trip outside Europe was a vacation in South Africa for two months in the year 2000. His medical history included five episodes of meningitis. The first episode occurred shortly after his arrival in Belgium in 1992. No medical records of this event could be found. The second episode of meningitis happened during his stay in South Africa eight years later of which we have no records either. The third episode occurred one year later. At that time a *Streptococcus Anginosus* could be isolated from the CSF. The fourth and fifth episode respectively took place seven months and one month before the current complaints. No causative pathogen could be found for the last two episodes of meningitis but the diagnosis of bacterial meningitis was withheld based on the neutrofile count of the leucocytes in the cytology of the CSF. Besides the

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Submission date :
Revised version :
Acceptance date :

Table 1. — **Evolution of biochemical markers for SIADH during hospitalisation ; Na^+, sodium ; K^+, potassium**

	Day 1	*Day 4*	*Day 8*	*Day 14*	*Day 19*	*Day 26*
Serum Na^+ (mEq/L)	*129*	*122*	*121*	*122*	*131*	*142*
Serum K^+ (mEq/L)	*3,8*	*3,7*	*4,0*	*3,9*	*3,9*	*3,7*
Osmolality serum (mOsm/kg H^2O)			*258*			*291*
Osmolality urine (mOsm/kg H^2O)			*622*			*938*
Urine Na^+ (mEq/L)			*30*			

recurrent meningitis, the patient was also suffering from arterial hypertension and diabetes mellitus since one year. His medication consisted of repaglinide, an oral anti-diabetic drug, and a combination therapy of amlodipine and lisinopril for the arterial hypertension. Ten days before his presentation at the emergency department he was discharged from the hospital after been treated for his 5th episode of bacterial meningitis.

He complained of a diffuse abdominal crampoid pain, which appeared approximately a week before. He got a loss of appetite, needed to vomit regularly and hadn't produced stools in 2 days. He mentioned some weight loss. No fever had been measured at home. Physical examination showed a black man in a moderate general condition with a blood pressure of 100/60 mmHg, a heart rate of 96 bpm and a temperature of 36,2°C. He had a BMI of 21 kg/m^2. Compared to the BMI during his hospitalisation one month before there was a drop of 4 kg/m^2. The heart and lung auscultation was normal. Pathologic lymph nodes were not found. The abdomen was bloated and slightly painful when palpated. There was a normal peristaltic sound. A blood sample showed a normal white blood cell count with a normal differentiation. but slightly elevated CRP. Low serum sodium and protein levels were found (Table 1). On abdominal X-ray a paralytic ileus was suspected (Fig. 1). CT-scan excluded a mechanical small bowel obstruction but visualised colitis of the colon descendens and a paralytic ileus. The day after admission the patient developed a fever that lasted only one day. Blood, urine and stool cultures were negative. Two days after admission upper GI endoscopy and colonoscopy were performed. The upper GI endoscopy showed a mild reflux oesophagitis and a diffusely inflamed duodenal bulb with a yellowish coating (Fig. 2). Several biopsies were taken. The colonoscopy showed a marked inflammation of the left colon and the right colon with many small ulcers. Biopsies were taken. The following days the patient showed a little improvement with a resolving of the paralytic ileus. Pathologic examination of the biopsies showed the presence of parasites with the characteristics of *Strongyloides Stercoralis* in the intestinal mucosa (Fig. 3). Stool cultures in search of parasites were taken and confirmed the presence of the Strongyloides (Fig. 4). A treatment with Ivermectine was started at 200 µg/kg daily dose on day 1, 15 and 16. About 48 h after the first dose of Ivermectine, the patients clinical situation

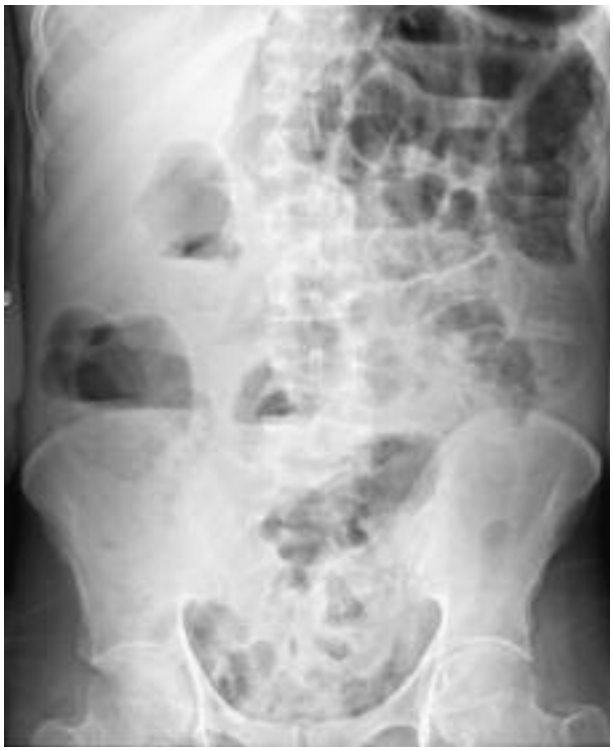

Fig. 1. — Abdominal X-ray : suspicion of a paralytic ileus

improved significantally. He was discharged from the hospital a couple of days later. Another remarkable fact during his recent hospitalisation was the gradual development of a hyponatremia that reached as lowest value a serum sodium of 120 mEq/L (Table 1). At that moment the plasma osmolality was 258 mOsm/kg water and the urine sodium excretion was higher than 20 mEq/L. We restricted the fluid intake for the patient, which stabilised the sodium value. After administration of the first dose of Ivermectine the serum sodium level normalised and stayed normal even when the fluid restriction was stopped. Two weeks after the first dose of Ivermectine, the patient was readmitted to administer the second and third dose and to revaluate his general condition. He already recuperated well with a reinstatement of his appetite and a slight weight gain. He had no abdominal pain. Control stool cultures were negative. Eight weeks after the treatment, a new upper GI endoscopy and lower colonoscopy was performed. The inflammation in the upper intestine was fully healed. In the colon some light

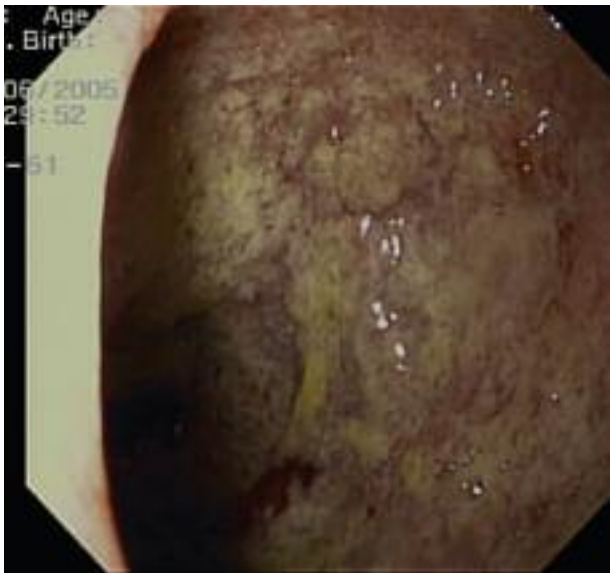

Fig. 2a. — Duodenal ulcers whit white-yellowish coating

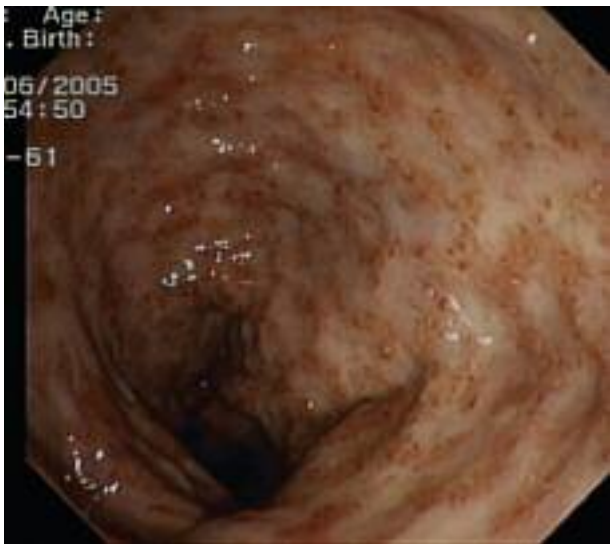

Fig. 2b. — Superficial ulcers of the colon

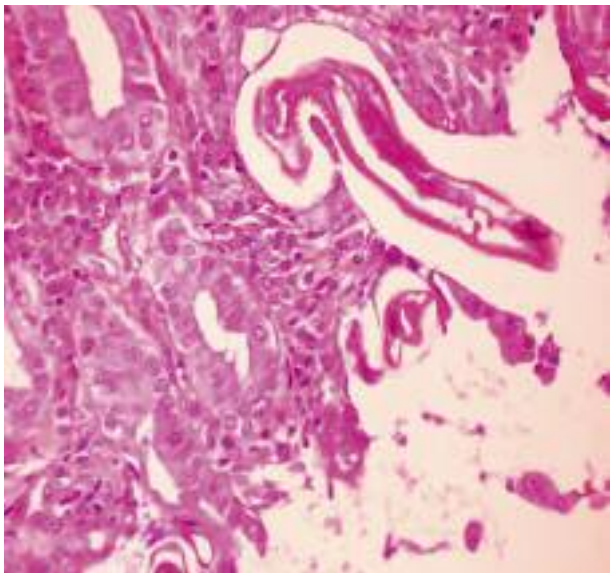

Fig. 3. — Duodenal biopsy with haematoxilline eosine staining showing *Strongyloides* larvae.

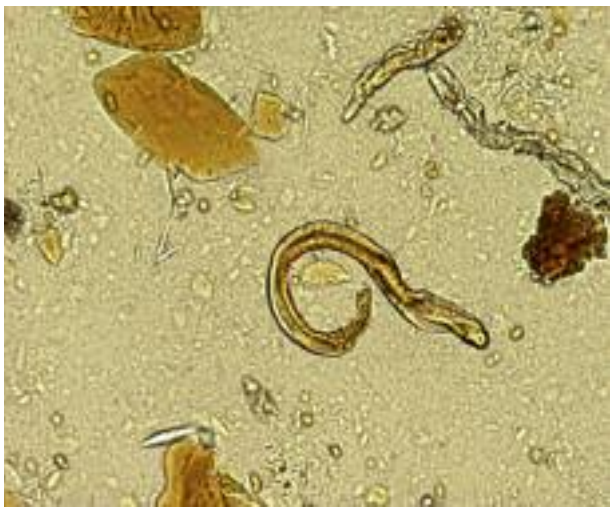

Fig. 4. — Stool culture with Strongyloides Stercoralis larvae

ulceration was still present. After six months the patient was still asymptomatic and his weight had normalised.

Discussion

In our patient a symptomatic Strongyloides stercoralis hyperinfection presented itself as a paralytic ileus and an associated syndrome of inappropriate secretion of the antidiuretic hormone (SIADH). Because systemic symptoms where present, it can be considered as a hyperinfection. As a sole evocating factor we report a 3-day therapy of corticosteroids during his last hospitalisation. Corticosteroids, known for their immunosuppressive effect, have been associated in many case reports to the development of a hyperinfection syndrome or disseminated Strongyloides (1,3-6). However, when we searched for a similarity regarding frequency, dose and length of the steroid therapy there were many differences. The administered corticosteroids varied from days to years, in low and episodic high doses before the patients showed symptoms corresponding with a Strongyloides hyperinfection. Even in some case reports there's a possibility that symptoms were already present before the corticosteroids were administered (1,6). One could assume that there is an individual threshold to trigger the hyperinfection. If so, what determines this threshold ? Is it solely the general health status of the patient, the effectiveness of his immune system or does a yet unknown factor play a role in this development ? Or is this unknown factor an independent factor that could explain the hyperinfection syndromes arising without any form of immune suppression ?

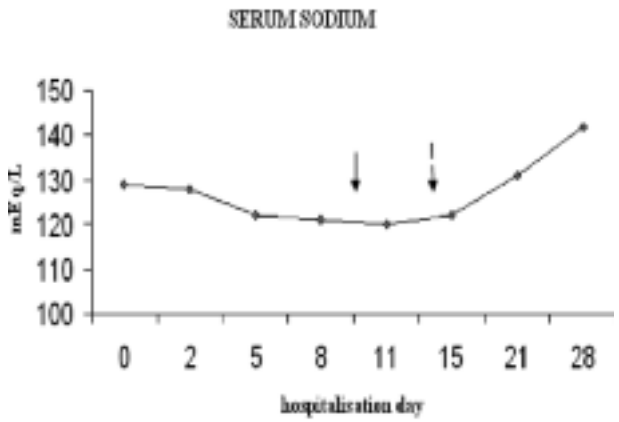

Fig. 5. — Evolution of serum sodium values during hospitalisation. Full arrow : start of fluid restriction. Striped arrow : first dose of ivermectine.

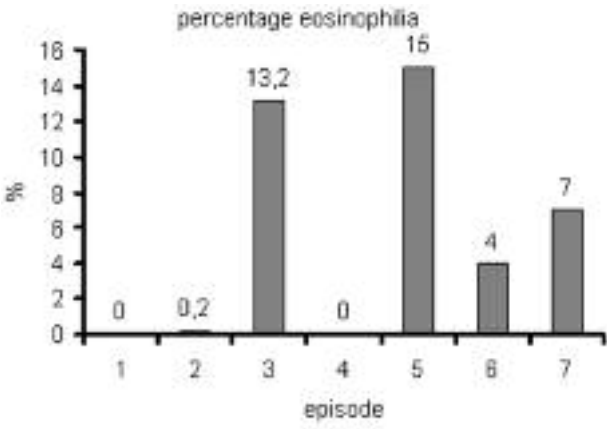

Fig. 6. — Percentage eosinophila of the patient. Peripheral eosinophilia tended to be high in asymptomatic phases and low when bacterial meningitis (BM) occured. *1 :* third episode of BM *2 :* fourth episode of BM *3 :* between 4th and 5th episode of BM *4 :* fifth episode of BM *5 :* after 5th episode of BM *6 :* admission with paralytic ileus *7* : after treatment with ivermectine.

Our patient was probably infected more than 18 years before while he was still living in Congo. All these years he suffered from an asymptomatic intestinal strongyloidiasis. But when we looked at his medical history he had 5 episodes of meningitis. Many reports have written about the link between bacterial septicaemia or meningitis and Strongyloides stercoralis infection (2,3,5-9). Though in these case-reports where bacterial septicaemia and bacterial meningitis was linked to Strongyloidiasis, all patients suffered from a hyperinfection syndrome. The hypothetical cause for this bacterial meningitis was the transmural translocation of the intestinal flora due to the damaged mucosae of the gut or the travelling of the bacteria with the infesting larvae (2,3,6). Only during the third episode of bacterial meningitis a pathogen was cultured from the CSF, a Streptococcus Anginosus. This bacteria is a commensal organism in humans and can play a role in pyogenic infections (10) but a link with Strongyloides stercoralis hasn't been described yet. When applied to our patient two questions arise. First, is there such thing as an asymptomatic hyperinfection syndrome or/and is transmural translocation of pathogens possible in a Strongyloidiasis without hyperinfection syndrome ? These questions may have an implication on the general work-up for bacterial meningitis. If one or both of them could be answered positively, one should consider upper GI endoscopy with duodenal biopsies for patients with risk factors and bacterial meningitis as a must. In almost 90% of the time parasites are found on duodenal biopsy (1,3). In contrary with stool cultures of which one need more than 7 to reach 85% sensitivity (1,2,4). Serology for the Ig G antibody has a high sensitivity too but the ELISA technique isn't available in every hospital (1,2,4). We found the peripheral eosinophilia was low while suffering from the bacterial meningitis. In more than half of the patients with an asymptomatic Strongyloidiasis, one can find a rise in the peripheral eosinophilia (11) but when hyperinfection occurs the peripheral eosinophilia tends to be low (12,13). This finding suggests that a hyperinfection was present at the time of the bacterial meningitis and supports the hypothesis that a hyperinfection exists without gastrointestinal or respiratory symptoms. After treating our patient with the antiparasitic drug, the peripheral eosinophilia stayed within normal range (Fig. 6). Arguments in favour for the strongyloidiasis as a cause for the recurrent meningitis are the eosinophilia, the lack of other etiologies and the shorter intervals between the episodes of meningitis followed by the Strongyloides hyperinfection syndrome. Another syndrome that occurred during hospitalisation of our patient was a syndrome of inappropriate ADH secretion or SIADH. Few case-reports were found where it was linked with a strongyloidiasis (1,14-16). Some authors explained the occurrence of the SIADH as a consequence of the pulmonary infiltrates during a hyperinfection syndrome. In our patient however, pulmonary infiltrates never occurred. After putting our patient on water intake restriction the hyponatremia stabilized. It was only after administering the antiparasitic drug that the hyponatremia resolved (Fig. 5). This founds the hypothesis that SIADH is directly linked with the Strongyloides infection and not with the pulmonary complications.

Conclusion

Strongyloidiasis used to be a disease which the western world didn't encounter often. Due to the easier ways of travel and migration, the Strongyloides stercoralis becomes a pathogen which can occur in unexpected

situations. Screening for Strongyloides should be performed in patients who come from or travelled to endemic regions, before starting any immunosuppressive therapy. Collection of several stool samples or upper GI endoscopy with duodenal biopsies should be part of the examination for unexplained bacterial meningitis or septicaemia. The presence of a SIADH combined with abdominal or respiratory symptoms can suggest a Strongyloidiasis.

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