Urinary Tract Infection by *Strongyloides stercoralis*: A Case Report

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**ABSTRACT:** The objective of this study was to report a case of a hydropneumothorax patient with *Strongyloides stercoralis* infection, with discharge of rhabditoid larvae exclusively in urine. In 2013, a 72-yr-old male patient, hypertensive, obese, and diagnosed with hydropneumothorax secondary to renal calculi, reported lumbar pain, polyuria, poliaciuria, and dysuria, as well as frequent urinary tract infections. The microscopic analysis of urine sediment showed the presence of *S. stercoralis* rhabditoid larvae. However, parasitological examinations by Baermann–Moraes, agar plate culture, and spontaneous sedimentation performed with 3 fecal samples on alternate days had negative results. The patient was treated with albendazole and to date has shown negative results in both parasitological and urine tests. This report deals with the unusual finding of *S. stercoralis* in a urine sample of an immunocompetent individual and absence of disseminated infection, but with hydropneumothorax. Patients with nephropathies from *S. stercoralis*-endemic areas should be monitored periodically, as early detection may prevent the worsening of symptoms and renal failure.

Strongyloidiasis, an intestinal parasitic disease caused by nematodes of the genus *Strongyloides* and which is one of the main infections caused by geohelminths (Bethony et al., 2006; Elliot et al., 2007; Krolewiecki et al., 2013; Requena-Méndez et al., 2013; Nutman, 2016), affects approximately 30 to 100 million people worldwide, mainly in tropical and subtropical regions. According to the rate of prevalence, the infection by *Strongyloides stercoralis* can be classified as sporadic (<1%), endemic (1–5%), and hyperendemic (>5%) (Pires and Dreyer, 1993). The hyperendemic areas are located mainly in the tropics, especially in the developing countries of Asia, sub-Saharan Africa, and South America (notably Brazil and Colombia) (Fardet et al., 2007; Devi et al., 2011; Schär et al., 2013). In Brazilian regions, between 1990 and 2009, the occurrence of *S. stercoralis* infection was approximately 5.5%. This rate of infection places Brazil in the hyperendemic category (Paula and Costa-Cruz, 2011). In the city of Salvador, Bahia, the prevalence ranges from 4.6 to 6.6% (Santos et al., 2007; Inês et al., 2011).

The parasitic infection usually takes place when filariform larvae penetrate through the skin and migrate via the bloodstream to the lungs. After ascending the respiratory tract to the oropharynx, larvae are swallowed and reach the duodenal mucosal crypts to grow into parthenogenetic females. Thereafter, rhabditoid larvae hatch from the eggs and are excreted in feces. However, some larvae may transform into the filariform infective stage, penetrating the intestinal mucosa and causing autoinfection (Genta, 1992; Lemos et al., 2003; Vonghachack et al., 2015). The autoinfection process is responsible for the chronic maintenance of strongyloidiasis, which may remain asymptomatic and undiagnosed in most infected hosts for decades (Sudrê et al., 2006).

The clinical diagnosis of strongyloidiasis is hampered by the lack of specific symptoms. Acute manifestations, when presented, include serpiginous erythema in the skin site of larvae penetration, coughing (which mimics asthma, due to larva migration through the lungs), abdominal pain, and diarrhea (Luna et al., 2007). In the severe form of the disease, hyperinfection and dissemination to multiple organs may occur, especially in immunocompromised individuals (Maia et al., 2006; Jongwutiwes et al., 2014). In these cases, the passage of the larvae through the tissues can cause several complications such as malabsorption, gastrointestinal hemorrhage, paralytic ileus, severe pneumonia, meningitis, atrial fibrillation, hemoptysis, pneumothorax, and gram-negative infections (Keiser and Nutman, 2004; Tavares et al., 2011; Makker et al., 2015). In rare cases larvae were also observed in organs such as the liver (larvae in portal spaces), heart (larvae in the pericardial fluid), and brain (larvae in the CSF), as well as in urine, accompanied by hematuria and proteinuria (Maia et al., 2006; Miyazaki et al., 2010; Wang et al., 2013).

The most commonly used parasitological method for *Strongyloides* diagnosis is the Baermann–Moraes (BM) method, although the agar plate culture (APC) is considered 2–3 times more sensitive than BM (Marques et al., 2010; Inês et al., 2011; Mejia and Nutman, 2012). One limitation of parasitological methods is that, in most cases, the parasite load is low and intermittent, affecting these methods’ effectiveness and making it necessary to analyze several samples on alternate days (Liu and Weller, 1993; Mello et al., 2014). In addition, other factors can influence the sensitivity of parasitological methods, such as sample cooling, fecal amount analyzed, and handling (Zaha et al., 2000; Inês et al., 2011).

Hydropneumothorax (HN) is a clinical condition that occurs when the kidney swells because of the failure of normal drainage of urine from the kidney to the bladder. Common causes include obstructing stones and ureteropelvic junction obstruction caused by intrinsic narrowing of the ureters or an overlying vessel. The obstruction will lead to increased pressure within the structures of the kidney because of the inability to pass urine from the kidney to the bladder and usually affects only 1 kidney (Nguyen et al., 2010). This article aims to describe a case report of a patient with *S. stercoralis* identified in urine with a medical diagnosis of systemic arterial hypertension and HN.

A 72-yr-old male patient, hypertensive and obese (body mass index 32.87), was diagnosed in 2011 with HN secondary to renal calculi, after presenting with lumbar pain, dysuria, polyuria, poliaciuria (5 urinations at night), and frequent urinary tract infections. The urinalysis tested positive for hemoglobin and nitrite; on microscopic examination it showed the presence...
epithelial cells, red blood cells, and both numerous pyocytes and bacteria. The values of urea and creatinine in serum were 54 mg/dl (UV enzymatic method, reference value: 15 to 45 mg/dl) and 1.77 mg/dl (picrate alkaline method, reference value: 0.40 to 1.30 mg/dl), respectively.

An exacerbation of symptoms was observed in 2013, with medical indication of nephrectomy of right kidney, which was contraindicated by a cardiologist, due to an uncontrolled arterial hypertension. At this time, the patient presented to the Laboratory of Clinical Analysis of the Federal University of Bahia for routine laboratory examinations. The urea and serum creatinine presented values of 44 mg/dl and 1.40 mg/dl, respectively. Urine examination revealed a turbid appearance, the presence of proteins, traces of urobilin, and positive nitrite. The microscopic analysis of urine sediment showed rare epithelial cells, numerous red blood cells and bacteria per microscopic field, and the presence of approximately 1.4 larvae/ml of *S. stercoralis*. A second sample examination the next day confirmed the presence of parasites in urine (Fig. 1). However, parasitological examinations by BM, APC, and spontaneous sedimentation, performed with 3 fecal samples on alternate days, had negative results.

The 2 urine samples collected by the patient for uroculture were contaminated. Because of the difficulty of collecting a clean-catch urine sample, the urinary bacteria identification as well the antibiogram was not possible. The patient was treated for urinary infection with ciprofloxacin, 500 mg every 12 hr, for 5 days and for strongyloidiasis with albendazole, 400 mg/day for 3 consecutive days, with repetition of the same therapeutic regimen after 15 days. After the treatment, fecal parasitological examinations were performed as before, with all negative results, as well as the urinalysis microscopy. One month later, urine and feces were reexamined, with no detection of *S. stercoralis* larvae. However, clumps of leukocyte sediment, numerous bacteria, and rare epithelial cells were observed in the urine.

The patient did not present prior immunocompromised reports and did not use immunosuppressants. He reported having access to basic sanitation, good hygiene practices, satisfactory housing conditions, and a potable water supply.

On 2 subsequent occasions, July 2014 and January 2015, the urine tests were negative for nitrite, numerous pyocytes, rare red blood cells, rare epithelial cells, and numerous bacteria and an absence of *S. stercoralis* larvae. Serum urea and creatinine were 36 mg/dl and 1.70 mg/dl, respectively. In May 2016, the patient was again invited to undergo new parasitological and urine tests with 3 samples on alternate days, and the result was negative for *S. stercoralis* in all fecal and urine samples.

Although *S. stercoralis* infection is frequently asymptomatic, it can present in a severe form, culminating in death in some hosts (Newberry et al., 2005). Several conditions are determinant for the evolution of infection, such as immunosuppressive state, autoimmune diseases, viral infections, malnutrition, chronic alcoholism, aging, diabetes mellitus, and other morbidities (Lemos et al., 2003; Benincasa et al., 2007; Souza et al., 2014).

The present report describes a case of a patient with HN infected by *S. stercoralis*, with the elimination of the parasite through the urine. HN is an abnormality of the urinary tract, characterized by the abnormal enlargement or edema of the kidney, due to dilatation of the renal calices and renal pelvis, which disrupts the normal mechanisms of hydrokinetic defense, predisposing to infections. It is often associated with obstruction of the ureter or with chronic nephropathies, which prevent normal drainage of urine from the urinary bladder, causing an increase in hydrostatic pressure (Decramer et al., 2007; Nguyen et al., 2010).
and which may result in severe impairment of renal function (Ronald and Pattullo, 1991). The obstructed kidney becomes more predisposed to traumatic ruptures, to the formation of new stones, recurrent pain, as well as bleeding and frequent infections (Elder et al., 1995; Rodríguez-Suárez et al., 2014). In HN patients, a reduction of tubular blood flow, accompanied by hypoxia and oxygen free-radical release, can also be observed. This can generate an interstitial inflammatory response characterized by infiltration of macrophages, renal tubular dilatation, and apoptosis, resulting in tubular atrophy and interstitial fibrosis with a loss of functional nephrons (Chevalier, 2006).

After diagnosing nematode larvae in urine, the patient was requested to bring a fecal sample on the next day that was processed by BM and APC, with negative results. The patient started treatment immediately with albendazole. Nevertheless, we suppose that there was a S. stercoralis intestinal infection, with low and intermittent larva output that was not diagnosed at this time. Thereafter, the anthelminthic treatment must have deeply reduced or eliminated the parasite, as negative urine results were observed soon after starting treatment.

Strongyloides and Rhabditis are similar from the morphological point of view, and can potentially cause ectopic infections (Campos, 1985). The S. stercoralis L1 measures approximately 250 μm in length and has a rhabditoid-type esophagus, with body, and an isthmus distinct and clear. The L2 is around 400 μm in length, and different from that observed in the L1, has a more elongated esophagus, and a more apparent genital primordium. Conversely, the larvae of the Rhabditis genus have a relatively long buccal vestibule, and a typical esophagus consisting of body, middle esophageal bulb, isthmus, and posterior bulb (Teschner et al., 2014). Considering the number and morphology of larvae found in urine, we believe to have seen S. stercoralis L2 evolutive form. The intermittent output of larvae in feces and the rapid onset of treatment may have produced parasitologically negative results and impaired the confirmation of intestinal tract infection.

There are few reports of strongyloidiasis with the presence of larvae in the urinary tract (Lemos et al., 2003; Maia et al., 2006; Wang et al., 2013). Yu et al. (1995) reported a case of a patient with disseminated strongyloidiasis with chronic obstructive pulmonary disease, diagnosed with rhabditoid larvae in feces, sputum, and urine, and embryonated eggs in sputum. Miyazaki et al. (2010) identified a patient with disseminated strongyloidiasis with nephrotic syndrome and rhabditoid larvae in urine and filarioids in feces and sputum. Pocaterra et al. (2016) described a case of a kidney-transplanted patient with S. stercoralis hyperinfection, diagnosed in urine and feces. According to the review of Wang et al. (2013), the diagnosis of strongyloidiasis through urine is possible, especially in those with nephropathies and compromised immune systems. In their review of 106 cases, the rates of parasitic positivity in feces, sputum, and urine were 75, 24, and 8%, respectively.

Other case reports have confirmed the presence of filarial larvae of S. stercoralis in organs such as the colon, liver, lungs, and kidneys, as well as parthenogenetic female forms in the lungs and trachea. Moreover, there are reports of the identification of rhabditoid larvae of S. stercoralis in urine (Lemos et al., 2003; Schroeder and Banaei, 2013). This is most likely due to the presence of parthenogenetic females in the kidneys (Steiner et al., 2002; Pocaterra et al., 2016). Nevertheless, in most cases parasite larvae were also found in feces.

Interestingly, the presence of only the rhabditiform stage in urine, in the case reported here, presumes that filarial larvae circulating in the blood may develop into adult forms (parthenogenetic females) inside the urinary tract, which could be favored by the HN pathology. This infection may have led to the production of rhabditiform larvae and excretion in the urine, despite the lack of detection of S. stercoralis in feces.

After treatment, the patient remained free of infection, with an absence of larvae in both feces and urine. Our data emphasize the need of follow-up parasitological examination of patients with renal disorders and from S. stercoralis-endemic areas, to avoid renal symptoms worsening due to inflammation caused by the presence of worms and larvae in the kidney.

LITERATURE CITED


