

Strongyloidiasis associated with duodenal dysplastic changes: a case report

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Strongyloides stercoralis is an intestinal nematode that infects the mankind worldwide, particularly in low socioeconomic status areas. It has a unique autoinfection phenomenon, which enables it to reproduce permanently even after cessation of exposure. *Strongyloidiasis* is an easily missed disease and is fatal usually when the immunity is suppressed due to disseminated infection and consequent multiorgan damage. The authors present a case of *strongyloidiasis* associated with duodenal mucosal dysplasia beyond the usual reactive changes. *S. stercoralis* is a treatable infection and should be cared for properly. Pathologists have a major role in its detection. Mucosal changes are not usually reactive and should not be overlooked.

Keywords:

duodenal dysplasia, *Strongyloides stercoralis*, strongyloidiasis

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Introduction

Strongyloidiasis is a parasitic infestation caused by the intestinal nematode *Strongyloides stercoralis*. It has a worldwide prevalence except in the Antarctica with predominance in the warm and humid climates of tropical and subtropical regions [1].

About 100 million people worldwide are estimated to be affected [2]. In Namibia; community prevalence reaches 99.3% [3].

Strongyloidiasis is common among farmers in the rural population and low socioeconomic status areas with slums as the predisposing factors include walking barefoot in soil which is contaminated with human feces and sewage water [4,5].

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The life cycle of the parasite starts by penetration of the skin by infective filariform larvae and through the lymphatics it reaches the blood and then to the lungs to be swallowed towards the intestine. After embedding in the mucosa, it undergoes self-fertilization and lays the eggs.

The eggs hatch out rhabditiform larvae which pass out through the feces to continue the free-living cycle in the environment. The rhabditiform larvae may immediately transform into a filariform larvae causing internal autoinfection through penetration of the intestinal mucosa or perineal skin. Other way of autoinfection is the external one in which the rhabditiform larvae develop into filariform larvae at

the perianal regions (outside the intestine) and then penetrate the skin [6,7].

In immunocompetent patients, the parasite usually results in a chronic intestinal infection, remaining undetected for decades [8,9]. *S. stercoralis* can sustain autoinfection may be up to 64 years [10].

However, *S. stercoralis* may cause the stercoralis hyperinfection syndrome (SHS) in immunocompromised patients. SHS is an increase in the number of larvae in the feces along with manifestations confined to the gastrointestinal and respiratory system syndrome [8].

Disseminated infection is migration of *S. stercoralis* beyond the gastrointestinal tract and the respiratory system to other organs including the skin, liver, and central nervous system, and other organs, and is often complicated by Gram-negative sepsis [11], disseminated intravascular coagulation, bacterial/aseptic meningitis, and renal failure [12].

Pathologists have a major role in the detection of *S. stercoralis* mainly through duodenal or jejunal cytological or histological biopsies. Also in complicated cases, diagnosis may be made through cerebrospinal fluid, ascetic fluid, vomitus, and others [13–16].

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Pathologists also have to evaluate the associated mucosal changes.

Case report

A 78-year-old Egyptian female patient from El-Buhayra province was admitted to Ahmad Maher Teaching Hospital for dysphagia, and persistent vomiting and diarrhea associated with weight loss, not associated with fever or constipation. She was known to be asthmatic on corticosteroid treatment.

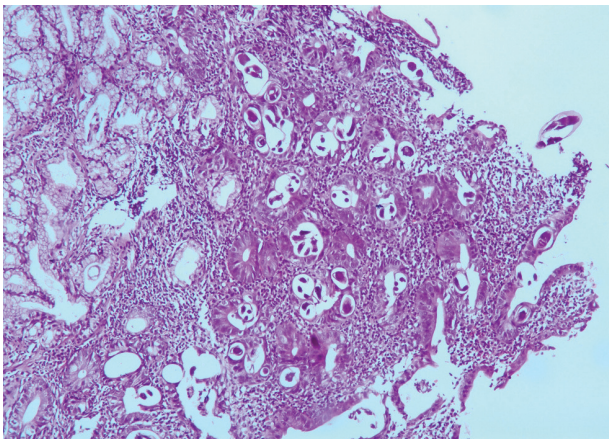
ECG revealed atrial fibrillation. Laboratory results were decreased levels of Na, K, and albumin (120 mmol/l, 3.3 mmol/l, and 1.5 g/dl, respectively). Liver enzymes and glucose levels were slightly elevated (44.2 UI/l, 41.6 UI/l, and 153.7 mg/dl, respectively). Creatinine and urea were within the

normal range. The patient's complete blood count showed mild anemia (hemoglobin (11.3 g/dl) and normal white blood cells count ($7.8 \times 10^9/l$),. However, MID% was slightly elevated (15.2%).

Upper gastrointestinal endoscope was done, and it revealed moniliasis and duodenal bulb erosions; biopsy from the second part of duodenum was taken for histopathological examination.

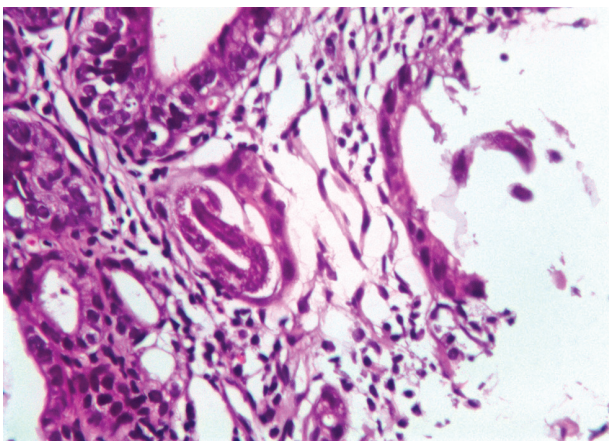
Histopathological examination showed numerous various basophilic figures within the crypts (Fig. 1). Some shows longitudinal sections of *strongyloides* with tube-like intestine (Fig. 2). Other shows a worm-cut section with uterus, ovary, and intestine (Fig. 3). Also seen are eggs with morula and different stages (Fig. 4). Epithelium revealed erosions and villous atrophy of duodenal mucosa. Crypts were distorted with a focal cribriform pattern and lined by pleomorphic stratified columnar epithelium with mucin loss and partial loss of

Figure 1



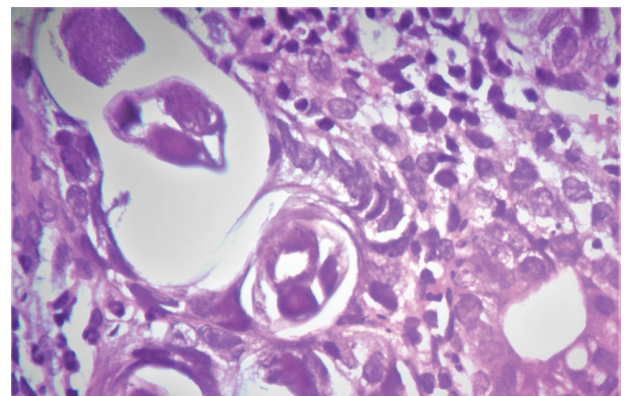
Numerous various basophilic figures within the crypts representing various developmental stages of *Strongyloides Stercoralis*. Hematoxylin and eosin.

Figure 2



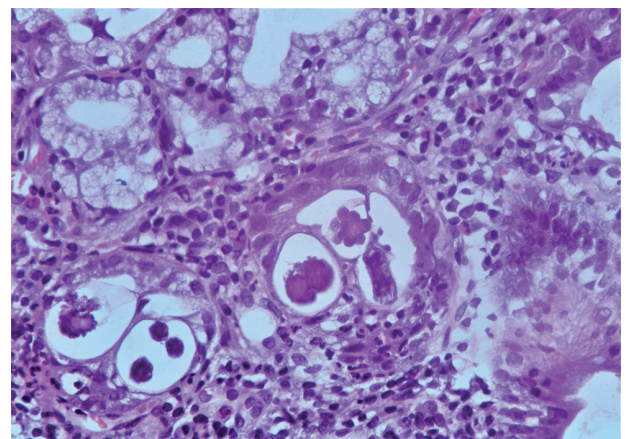
Longitudinal section of strongyloides worm with tube-like intestine. Hematoxylin and eosin.

Figure 3



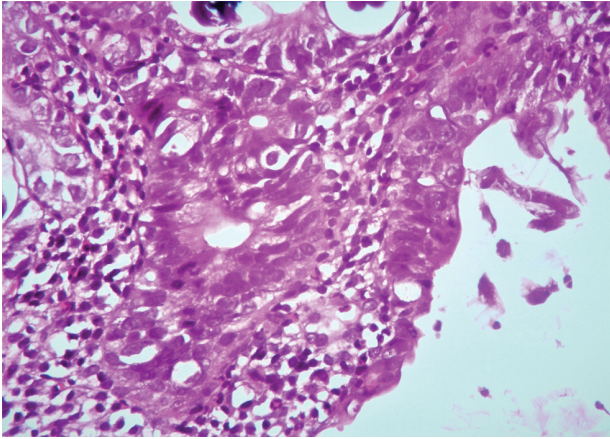
Worm-cut section shows the uterus, ovary, and the intestine. Hematoxylin and eosin.

Figure 4



Eggs in different developmental stages. Hematoxylin and eosin.

Figure 5



Crypt distortion and starting cribriform, lining is hyperchromatic pleomorphic with loss of mucin. Surface shows stratification. Hematoxylin and eosin.

polarity. Nuclei were large hyperchromatic and were focally vesicular with prominent nucleoli (Fig. 5). Lamina propria was moderately infiltrated by eosinophils and lymphocytes forming follicles.

The patient died 5 days after admission as a result of aspiration pneumonia due to persistent vomiting, before receiving the specific treatment for the parasite.

Discussion

In Egypt, the prevalence of *strongyloidiasis* is estimated as 2.5 and 11.1% in community-based and hospital-based surveys, respectively [3]. Our patient lived in risky rural areas, mostly where poor sanitation and soil contamination with human feces are common [4,5].

Hyperinfection syndrome and disseminated infection occur when the immune system is compromised by corticosteroid therapy [17,18], malignancies, and human immunodeficiency virus. Other risk factors include metabolic disorders, organ transplantation collagen/vascular diseases alcoholism, chronic renal disease malnutrition, and old age [19–25].

Our patient had strong risk factors for SHS and disseminated infection as she was 78 years old, malnourished (albumin: 1.5 g/dl), and she was also on corticosteroids for asthma.

One of the most important risk factors and signs of complicated *strongyloidiasis* is the absence of peripheral eosinophilia [17,26–28] as it has cytotoxic effect on the larval stages of parasitic helminths [29]. White blood cells in our patient was $7.8 \times 10^9/l$, granulocytic count

was $3.5 \times 10^9/l$, and granulocyte percentage was 43.8% (within the normal range).

Mortality rate in complicated SHS and disseminated infection is from 87% up to 100% [8].

Many factors usually cause missed or delayed diagnosis: low clinical awareness or suspicion of the disease as it is one of the most neglected tropical diseases [30]. The vague or nonspecific gastrointestinal and pulmonary manifestation of the infection include abdominal pain, diarrhea, vomiting, bowel obstruction, paralytic ileus, protein losing enteropathy, and pneumonia [11]. The low sensitivity of the usual single stool analysis is about 30%, so multiple samples should be analyzed [31,32]. Also, the serological tests do not specify the stage of the infection if it is recent, remote, current, or resolved and may elicit false-negative results [33], and the duodenal endoscopic findings in case of *strongyloidiasis* may include edema, erythema, swollen folds, granule, polyp, hemorrhage, megaduodenum, stenosis, deformity, erosions, or ulcers [11], but these findings are not pathognomonic as it may also appear unremarkable when the immunity is compromised [34].

The diagnosis is made by jejunal or duodenal biopsy in 90% [20]. So pathologists have to know developmental stages and morphological features of helminths to avoid misdiagnosis [35].

The diagnostic features of *S. stercoralis* in gastric or duodenal biopsy include intense basophilic staining of rhabditoid and filariform larvae, eggs, and adult worms in various planes present in the same specimen within the crypts. Eggs show thin transparent cuticle containing morula, tadpole, or rhabditoid embryo. Adult female worms may show the uterus, ovary, intestine, and thin muscular layer [36].

Histopathological examination of intestinal biopsy in the case of *S. stercoralis* reveals mucosal changes like crypt distortion, ulceration, villous atrophy, and lamina propria infiltration with plasma cells and eosinophils [35,37,38]. Our case showed marked crypt distortion, villous atrophy, and focal erosions in addition to cribriform formation without remarkable ulceration. Lamina propria showed moderate eosinophilic infiltration together with mononuclear inflammatory cells.

It is necessary to prove or exclude whether the associated changes are reactive or neoplastic, because the chronic infections with viruses, bacteria, and

parasites contribute to 18% of all cancers [39]. Three helminthic infections are classified as carcinogenic to humans: *Schistosoma haematobium* is associated with urinary bladder cancer; and *Clonorchis sinensis* and *Opisthorchis viverrini* are associated with cholangiocarcinoma [40].

In vitro studies have shown that substances secreted or excreted by many nematode species may stimulate proliferation of tumor cell lines [41]. Also, in the past *S. stercoralis* has been associated and seen on gastric adenocarcinoma, atrophic gastritis, and its larvae have been isolated from the bile of patients with biliary tract carcinoma [36,42,43].

The degree of the mentioned reactive mucosal atypical pathologic changes appears to be related to the intensity of the infection [36], especially when associated with vesicular nuclei, surface maturation, and myxoinflammatory stroma [44]; our case also showed some borderline nonconclusive criteria like pleomorphism, pseudostratification, overlapping nuclei, and loss of polarity, which are not conclusive or could be categorized as indefinite for dysplasia [44].

But it additionally exhibited findings which are highly suggestive of dysplasia including stratified pleomorphic columnar epithelium without surface maturation – in the areas away from erosions – focal hyperchromatic nuclei with high nuclear-to-cytoplasmic ratio [44]. We also have architectural complexity and focal cribriform as a sign of high-grade dysplasia [45]. Other dysplastic changes that were not encountered are irregular nuclear contour and abnormal mitosis [44].

Again, histological diagnosis can be easily made with little awareness and training. We also initiate a term Strongyloma to increase the pathologists' attention to this disease dilemma.

Conclusion

S. stercoralis is a treatable infection and should be cared for because of the fatal consequences of the complicated disease.

Pathologists have a major role in its detection via histopathological examination of the intestinal biopsy.

Mucosal changes are not usually reactive; however, it may show dysplasia or even frank malignancy.

Further studies in these rural areas are required for the estimation of incidence and probable endemicity.

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Conflicts of interest

There are no conflicts of interest.

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