



Case Report

The Appendix: A Reservoir for Giardiasis Intestinalis

Patrice Bouree^{1*}, Francine Bisaro², Alireza Ensaf³

¹Tropical Diseases Department, Fournier Institute, Paris France

²Medical Center, Civil Aviation Department, Paris

³Health Center, St. Georges, French Guyana

Abstract

Giardia intestinalis is a highly common parasite in humans. It is cosmopolitan and can remain asymptomatic. Most commonly, *Giardia* infection causes intestinal disorders such as diarrhea and abdominal pain. Severe infection can produce a malabsorption syndrome. Refractory giardiasis is due to some reservoirs such as the diverticulum or gallbladder. The authors present an uncommon case of chronic giardiasis due to the appendix as the reservoir. The parasitological examination of the gall-bladder was normal, while the appendix revealed a great number of *Giardia*. The patient was cured after the appendectomy.

Keywords: Appendicitis, *Giardia intestinalis*, Refractory giardiasis

Received: September 8, 2022, Accepted: September 18, 2022, ePublished: September 29, 2022

Introduction

Giardia intestinalis is a worldwide gastrointestinal protozoan (1). The gallbladder is widely reported to be the reservoir for intestinal giardiasis. This case study reports an uncommon case where the appendix was found to act as a reservoir.

Case Presentation

A 54 years old man with a history of hypogammaglobulinemia presented seven years ago because of an episode of resistant diarrhoea. The faecal specimen examination revealed cysts and vegetative forms of *G. intestinalis* which were successfully treated with metronidazole. In the face of the recurrent episodes of diarrhoea during the next two years, *G. intestinalis* was redetected in the faeces, and treated again with metronidazole with temporary results. Simultaneously endoscopic duodenal biopsies demonstrated the presence of *Giardia* in the duodenal mucosa. Thus, the diagnosis of "chronic" giardiasis was confirmed. The idea of an abdominal reservoir was strongly entertained according to the theory of passage of parasites from their store in the gallbladder to the duodenum. Therefore, the following attacks of diarrhoea were treated by antiparasitic therapy and chologogues, but this treatment remained unsuccessful. A cholecystectomy took place three years ago. At this time, it was decided to perform an additional appendectomy in order to completely eliminate all possible digestive reservoirs. The parasitological examination of the gall bladder, bile, and faeces was normal, while that of the appendix represented great numbers of *Giardia*

(Figure 1). The diarrhoea disappeared postoperatively, and the patient is now symptom-free with a follow-up of several years.

Discussion

Giardia intestinalis is one of the most common parasitic infections and is cosmopolitan, mostly in developing countries, where about 200 million people have symptomatic giardiasis, with 500 000 new cases reported each year. It has been first observed in 1681 by Van Loewenhoek, and the first detailed description was made by Lambl in 185). In 1888, Blanchard suggested the name *Lamblia intestinalis*, then Stiles changed to *Giardia duodenalis* in 1902. In 1915, Kofoid proposed the name of *G. lamblia* and, in 1990, several authors encouraged the name of *G. intestinalis* (1).

This parasite affects humans, as well as a range of domestic and wild mammals (2). It is a common cause of waterborne outbreaks of diarrhoeal disease in humans, mostly in developing countries and among disadvantaged groups (3). *Giardia* has a simple direct life cycle. Trophozoites attach to the microvillous surface of the duodenum and jejunum (Figure 2), and then a rapid multiplication occurs by binary fission and encystation. The cysts passed in faeces with sometimes trophozoites in cases of acute diarrhoea. These cysts are relatively resistant and may remain infective for at least 2 months under appropriate climatic conditions (4). Transmission is by faecal-oral contamination by the ingestion of cysts.

Most cases of *Giardia* infection are asymptomatic. However, sometimes *G. intestinalis* infection causes



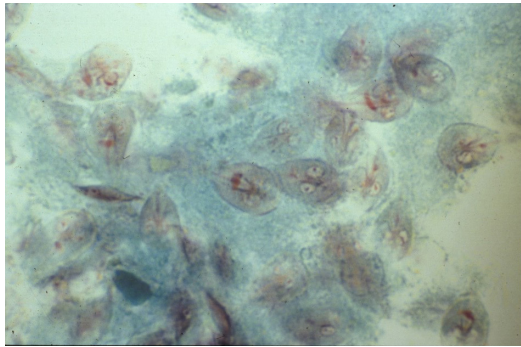


Figure 1. Many Trophozoites of *Giardia intestinalis*



Figure 2. Microvillous Surface of Duodenum With *Giardia intestinalis*

severe intestinal disorders (5), mostly abdominal pain (6,7), diarrhoea yellowish, greasy and foul-smelling stools, and related symptoms due to malabsorption such as steatorrhea with a loss of weight (8), abdominal distension, nausea, vomiting, flatulence, and irritable bowel syndrome (9). However, there is neither blood nor mucus. Without treatment, these symptoms last for several weeks or months. Cholecystitis, jaundice, and colic can occur in case of infection of the bile duct and the gallbladder (10). In children, chronic giardiasis is a factor in retarded physical and mental development (11).

The diagnosis is made by the identification of the cysts in the stool examination, duodenal secretions, or jejunal biopsies. The discharge of parasites is often intermittent making laboratory confirmation difficult. Serum immunoglobulin M (IgM), IgG, and IgA antibody responses to *Giardia* occurred in 60%-100% of patients. The immunodiagnostic method for the rapid detection of *Giardia* antigen is specific but economically, it is expensive and not always available (12,13).

Although standard treatments such as metronidazole, tinidazole, and albendazole (14) are usually curative, some immuno-suppressed and healthy patients suffer a refractory giardiasis that is resistant to treatment (15) due to inefficacy of the drugs, diverticulum, and achlorhydria deficiency in the enzymatic or immunological system (16). Quinacrine can be useful in the case of resistant *Giardia* (17), but a specific process must be respected to obtain the product. Household contacts and sexual partners should be examined, and the ones harbouring the parasite must be treated even if asymptomatic. Our

patient had hypogammaglobulinemia with a deficiency in IgA which is responsible for local intestinal mucosal immunity, thus allowing the *Giardia* infestation to be more aggressive, and is an increased risk of chronic clinical giardiasis. In the case of hepatobiliary *Giardia*, bile is found to act as its reservoir, and a cholecystectomy usually releases the symptoms. This fact has invited practitioners to perform cholecystectomy even in cases of resistant intestinal giardiasis without biliary manifestations, as in a recent case report of a human immunodeficiency virus patient who presented intestinal and biliary giardiasis (10).

A cholecystectomy remarkably released the symptoms despite the absence of *Giardia* in the bile. In our patient, the hypothesis of a digestive reservoir was confirmed, thus the cholecystectomy was decided in accordance with all classical protocols such as treatment with imidazole derivative. The decision to perform an appendectomy was “complementary” and was proven to be the right therapeutic choice, indicating that, in particular, it was the appendix that acted as a reservoir for *Giardia* in this case. Many articles described the relationship between parasites and the appendix, but very few studies are available concerning *Giardia*, including 0.12% on 5000 appendices (18) and 1.9% on 414 appendicitis cases in Czechoslovakia (19). The findings of our case confirmed that the appendix can host *Giardia* like it does with other parasites. This fact can clarify some questions concerning the natural evolution of intestinal *Giardia* and proposes a simple surgical treatment for it.

As food and water contaminated with faeces containing the cysts are the modes of transmission, the rule of prevention is to drink only bottled water and avoid raw vegetables and non-peeled fruits (20-22).

Conclusion

Considering the parasitological results and the disappearance of symptoms after an appendectomy, in this case, the appendix was the reservoir for this *Giardia* infestation. This conclusion, when applied to other resistant cases of *Giardia*, in which the analysis of the removed gallbladder is negative, strongly indicates the existence of another intestinal reservoir, primarily the appendix. Accordingly, the possibility of an appendiceal reservoir should be always considered when dealing with a case of chronic giardiasis, and systematic appendectomy and cholecystectomy should be recommended in patients with chronic *Giardia* infestation with a suspected digestive reservoir.

Authors' Contribution

Conceptualization: Patrice Bouree.

Data curation: Patrice Bouree.

Formal analysis: Patrice Bouree.

Funding acquisition: Patrice Bouree.

Investigation: Patrice Bouree, Francine Bisaro.

Methodology: Patrice Bouree.

Project administration: Patrice Bouree.

Resources: Patrice Bouree, Francine Bisaro.

Supervision: Patrice Bouree.

Visualization: Patrice Bouree, Alireza Ensaf.

Writing—original draft: Patrice Bouree, Alireza Ensaf.

Competing Interests

The authors declare that they have no competing interests.

Informed Consent

Written informed consent was obtained from the patient for publication of this report.

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