

Angiostrongylus costaricensis: Systematic Review of Case Reports

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Abstract

Introduction: Abdominal angiostrongyliasis is an infrequently diagnosed disease because it is little known and is usually well tolerated. **Methods:** We carried out a systematic review with PubMed as a search engine for the MedLine database, and we analysed the clinical, epidemiological and analytical parameters of this disease. **Results:** In total, reports of 27 case have been found, together with a series of 116 patients, which were later augmented up to 194 patients. In the results, we have observed a predominance of male patients, and Costa Rica, Brazil and the United States as the main countries of origin. Typical symptoms include abdominal pain on the right iliac fossa, with leukocytosis and eosinophilia. **Discussion:** There are some serological diagnostic methods, although lack of standardization leads to most of the diagnoses being reached via pathology. Surgery is the usual treatment approach. Although there are medical options, this is a controversial subject because of the low number of cases published in the literature, which implies an absence of solid studies.

Keywords

Angiostrongylus costaricensis; Abdominal Angiostrongyliasis; Acute Abdomen; Eosinophilia

1. Introduction

Abdominal angiostrongyliasis is a condition that was described by Morera and Céspedes in Costa Rica [1]. The parasite that causes this disease is a nematode from the superfamily *Metastrongyloidea*, which is classified by

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morphological criteria into the *Angiostrongylidae* family and the *Angiostrongylus* genus. There are 14 described species of the *Angiostrongylus* genus, with different morphological characteristics. Two of them are human pathogens: *Angiostrongylus costaricensis*, which causes abdominal symptoms, and *Angiostrongylus cantonensis*, which is responsible for a form of eosinophilic meningoencephalitis [1] [2]. The definitive hosts are different species of rodents, and the main one is *Sigmodon hispidus*. There are other species involved such as *Rattus rattus*, *Zygodontomys microtinus*, *Orizomys fulvesceus* and *Orizomys caliginosus* [3]; but, occasionally, even dogs can be potential reservoirs [4]. Intermediate hosts are slugs from the Veronicellidae family, such as *Sarasinula plebeia*. Besides veronicellid slugs, several other molluscs may play a role as host. Also they can be snails such as *Achatina fulica* [5]-[8]. Adult parasites reside in the mesenteric arteries of rodents, where females lay their eggs [9]. The man is an accidental host that becomes infected via the ingestion of molluscs, snails or vegetables that contain their secretions [10]-[13]. Lack of host-parasite adaptation leads to the cycle not being completed [14].

In humans, both the eggs and the larvae induce an intense inflammatory response in the ileocecal mucosa, which generates a granulomatous reaction with eosinophilia and, afterwards, an intestinal stenosis. Macroscopic features comprised two types: a predominant thickening of the intestinal wall (pseudo-neoplastic pattern) and a congestive necrotic lesion (ischemic-congestive pattern). Microscopically, three fundamental histopathological findings were detected: A massive infiltration of eosinophils in all layers of the intestinal wall, a granulomatous reaction and eosinophilic vasculitis affecting arteries, veins, lymphatics and capillaries [15]. Cases of extraintestinal involvement are very rare, and they are mainly located in the liver and the testicles. Some authors suggest that antihelminthic chemotherapy stimulates the migration of the worm and increases the chances of an extraintestinal disease [16].

There are few data regarding the incidence of this condition. In Brazil, a seroprevalence of 28% has been described [17]. The clinical manifestations of this disease are included in a wide range, from asymptomatic cases to severe cases in which emergency surgery needs to be performed [18].

In view of the increase of immigration during the last years, we think that it is important to be aware of the characteristics of this disease in order to establish a proper diagnostic suspicion. There are very few references to this subject in the literature, and because of this we have carried out a systematic review of cases as our research method.

2. Materials and Methods

We carried out a systematic review of clinical cases and case series using Pubmed and Medline in English, French, Portuguese and Spanish as databases from 1966 until April 2012. For our search, we used the terms “*Angiostrongylus costaricensis*” and “*humans*”. The inclusion criteria were human cases in which the causal agent was diagnosed by the detection of anti-*Angiostrongylus* antibodies via serological methods, or after an histopathological study.

3. Results

From all the bibliographic references, we found 27 case descriptions and 1 case series (first published with 116 patients in 1980 and completed in 1987 with a total number of 194 patients). None of them were excluded from our study (Table 1). From these cases, 61.1% of the patients were men. 89.6% of the patients were from Costa Rica, 2.7% were from Brazil, 1.8% were from the United States, 0.9% were from Spain and Guadeloupe and 0.5% were from Venezuela, France, Dominican Republic, Honduras, Panama, Zaire and Martinique. In 0.9% of the cases, the place of origin of the patients was not specified. General symptoms were the most frequent such as malaise, myalgia what were present in all cases. Other symptoms described were abdominal pain in 84.1% of the cases, vomiting (50%), diarrhoea (27.5%), and constipation (14.2%) (Table 2). Findings on physical exam, the most important one, were hepatomegaly and palpable mass. No data on abdominal tenderness were described. In the analysis, the average level of leukocytes was 18,000/ μ L (7600 - 30,000), and the absolute eosinophil count showed an average value of 4978/ μ L (0 - 24,000) in 92.5% of the patients.

Most of the cases did not include information with regard to hemoglobin levels, although thanks to the 8 cases which did include this information we can conclude that 20.3% presented anaemia, with no further data regarding this fact.

Table 1. Demographic data of patients with *A. costaricensis*.

Variable	Results
Age (years) ± SD	25.5 ± 21.3
Sex (n,%)	
Male	135 (61.1%)
Female	86(39.9%)
Country (n,%)	
Costa Rica	198 (89.6%)
Brazil	6 (2.7%)
US	4 (1.8%)
Spain	2 (0.9%)
Guadeloupe	2 (0.9%)
Venezuela	1 (0.5%)
France	1 (0.5%)
Dominican Republic	1 (0.5%)
Honduras	1 (0.5%)
Panama	1 (0.5%)
Zaire	1 (0.5%)
Martinique	1 (0.5%)
ND	2 (0.9%)

SD: standard deviation; ND: No data.

Table 2. Clinical data of patients with *A. costaricensis*.

Variable	Results
General symptoms (n,%)	
Myalgias	4 (100%)
Malaise	5 (100%)
Weight loss	5 (83.3%)
Anorexia	104 (53.6%)
Digestive symptoms (n, %)	
Abdominal pain	181 (84.1%)
Vomiting	102 (50%)
Diarrhoea	55 (27.5%)
Constipation	28 (14.2%)
Organomegaly (n,%)	
Hepatomegaly	103 (50.1%)
Palpable mass	5 (2.5%)
Hemogram (n,%)	
Eosinophilia	198 (92.5%)
Anemia	41 (20.3%)

The diagnosis was done exclusively by pathology in 80.7% of the cases. In the other 19.3% of the cases, the anatomical pathology tests were accompanied by different serological techniques with crude antigens of adult parasites, which were not validated or comparable among themselves.

4. Discussion

Infection with *Angiostrongylus costaricensis* is a forgotten disease due to multiple causes: 1) Its existence is little-known; 2) Seroprevalence is higher than the number of cases, which means that more infections are subclinical and do not require medical attention; 3) Under-diagnosis makes it difficult to establish the real incidence of this condition. We must take into account that, due to the social changes that have been taking place in the last decades (the increase in international flights and the migration trends), the epidemiological pattern of this disease has changed. For this reason, cases may appear outside from its original area, in places such as Europe or Africa.

If we look at the place of origin, most of the cases described took place in Costa Rica, Brazil and the United

States. For this reason, the diagnostic suspicion in Latin America is higher than in Europe, but lower than what would be desirable. Due to the biology of the parasite and its peculiar localization inside arteries, and the relative small number of bibliographic references (only isolated cases were found in the literature and a pediatric case series [15] [16] [18]-[33]), the management of this disease is very difficult. The small number of case reports could also mean that the morbidity and prevalence of infection is not as widespread as one may anticipate.

One of the areas that require more research is the parasitic cycle in the final host, which was first described by Morera in 1973 and then reviewed by Mota and Lenzi in 2005. One of the factors that is still unclear is the reason why larvae in stage 3 show a preference for mesenteric lymphatic vessels (where they evolve to L4), or what is the influence of intestinal hormones when the male and female meet [34] [35].

Currently, diagnosis within the clinical practice is obtained via pathology. We do not have any validated serological technique for the non-surgical diagnosis of angiostrongyliasis, and the inter-test variability is not known, which means that even in cases with a high pre-test probability, a surgical intervention cannot be avoided. The false negative results can be a problem of diagnostic test, or because many infected individuals have low antibody levels even at acute stage of the infection. This implies that, in view of its variable clinical presentation, the less severe cases remain undetected and undiagnosed, and only those who require surgery are included in the literature, with the corresponding histopathological study of the surgical specimen. For this reason, the role of medical treatment cannot be assessed. Whether it is effective or it should not be applied, thus preventing the erratic migration of the parasite, is unknown.

5. Conclusion

For this reason, we can conclude that abdominal angiostrongyliasis is an unknown entity in our environment. We must establish suspicion in presence of localized abdominal pain on the right iliac fossa accompanied by leukocytosis and eosinophilia in a person that comes from an endemic area. This means that, in view of a worm-produced eosinophilic enteritis, apart from *Anisakis* and *Strongyloides*, we must think about *Angiostrongylus costaricensis*. More studies are needed in order to clarify some aspects of the biological cycle, the serological diagnosis and the medical treatment of this disease.

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