Abdominal angiostrongyliasis in a spider monkey *(Ateles geoffroyi)*

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KEY WORDS

Angiostronylus costaricensis, monkey, human beings

SUMMARY

A 2.5 years old male spider monkey was referred to a private animal hospital with history of an acute rectal prolapse. Due to the poor prognosis following clinical evaluation, it was euthanized. A complete postmortem examination revealed a caecocolic intussusception. A focal white nodule of the right hepatic medial lobe was also observed. On histological examination the caecal mucosa and submucosa showed a parasitic granulomatous inflammation, a picture like hepatic larva migrans syndrome was also observed in the liver.

INTRODUCTION

Angiostrongylus costaricensis is a filiform nematode which parasitizes the mesenteric arteries of caecal regions of different rodent species mainly in Central America.[6,9]

In Costa Rica the final hosts of this parasite are the cotton-rat *Sigmodon hispidus* and the domestic rat (*Rattus rattus*).[6,5,10] Besides human beings, natural infection has been described in several rodents species[10], coati (*Nasua narica*)[4], marmoset (*Sanguinus mystax*)[9] and domestic dog (*Canis familiaris*).[1]

The adult worm of *A. costaricensis* lives in the lumen of the mesenteric arteries. First stage larvae (L1) pass in the rodent faeces and are ingested by slugs (*Vaginulus plebeius*), in the mollusc in about 18 days develop the second and third stage larvae (L2, L3). When the L3 is introduced into the stomach of the rat it moves rapidly into the intestine towards the ileocecal region, where most of larvae penetrate the intestinal wall.[3,6]

Humans beings and animals are an accidental hosts, and are infected when they ingest either the third-stage larvae (L3) present in unwashed vegetables contaminated with mucus secreted by the obligatory intermediate host, the slug or by eating the slugs. The slugs are locally known as "babosas" and are frequently found in Costa Rica, mainly during the rainy season[7], in the gardens and other domestic humid places.

Case report

An 8 kg, 2.5 years old male spider monkey (*Ateles geoffroyi*) from a local zoo was referred to a private animal hospital with a history of an acute rectal prolapse. Physical examination revealed a 10% dehydration, the animal was treated with lactated ringers iv. Anesthesia was induced with a combination of ketamine (80 mg) and diazepam (8 mg), im. followed by halothane in oxygen via mask. The prolapsed mass was identified as the caecum which showed a marked thickening of the wall, with haemorrhagic oedema and inflammation. Due to the extensive damage of the caecum and the very unfavorable prognosis, it was decided to euthanize the monkey. Euthanasia was done with pentobarbital overdose.

On postmortem examination the caecum was inside the colon (caecocolic intussusception). The caecal mucosa was oedematous. Round worms at least 5 mm long were found in the faeces. They were identified as *Oxyuris sp.* family *Oxyuridae*. Multiple small dark color nodules 1-2 mm in diameter were also present in the mucosal wall. There was hyperemia of the ileum serous membrane and mesenterium. White nodules of irregular contour were present on the edge of the right medial lobe of the liver. The right pulmonary cardiac lobe revealed an increased consistency and a deep red color.

Tissue samples collected during necropsy were fixed in 10% buffered formalin. The specimens

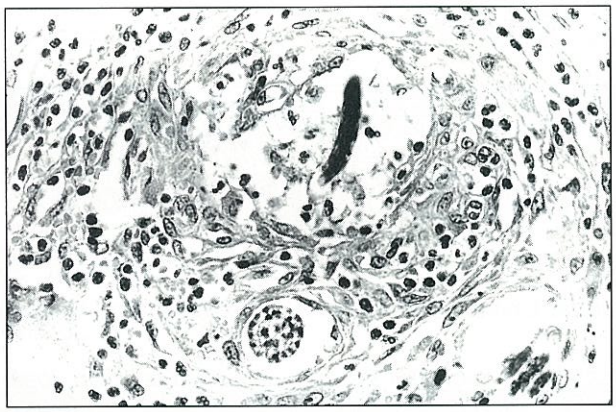

Figure 1. A longitudinal larva section and embryonated egg of A. costaricensis *surrounded by granulomatous inflammation in the submucosa of the cecum. H & E, x 400.*

Figure 2. Transverse sections of two adults female A. costaricensis *inside hepatic artery. H & E, x 100.*

were processed routinely, embedded in paraffin, sectioned at 4 µm, and stained with hematoxylin-eosin (HE), Periodic Acid Schiff (PAS) and Van Gieson.

Microscopically the caecal mucosa showed massive necrosis and haemorrhage. Several sections of larvae were found inside the mucosa which showed a predominant neutrophilic inflammatory reaction. The muscular layers also showed multiple sections of larvae surrounded by a granulomatous inflammation, predominantly with mononuclear cells, giants cells and few eosinophils (Fg. 1). Fragments of parasites were also observed in the submucosal aggregated lymphatic tissue of the region with granulomatous inflammation. Larvae were also observed inside blood vessels close to the affected areas. Thrombosis was present in the intestinal submucosal vasculature. The caecal lymph nodes had a marked germinal hyperplasia with follicular histiocytic differentiation. Other areas of the small and large intestine were normal. The liver showed areas with severe parenchymal granulomatous inflammation with predominantly mononuclear and Langhans type giant cells; numerous scattered infecund eggs were observed, in the center of these areas of inflammation. Inside some hepatic arteries transversal sections of adult female parasites were also found. In both females a section of intestine and ovaries are present (Fig. 2).

Mononuclear perivascular reaction was observed in the submucosa of the stomach. The renal glomeruli had increased cellularity and hyperemia. The lungs showed alveolar edema and perivascular mononuclear reaction.

Based on the anatomic localization, microscopic aspect of the lesions observed in the intestinal wall, the morphologic characteristics of the adult worms and eggs found in the liver and the migration of adult female to the liver, the parasite was identified as *A. costaricensis.*

Latex agglutination tests were done from sera of 8 male adult monkeys kept at the same zoo. All sera were negative for *A. costaricensis* antigens. In addition, coprological examinations were carried out from samples of the same 8 monkeys, and other 2 adult females and one young male. All coprological examinations were negative for *A. costaricensis* eggs.

DISCUSSION

From the described species of *Angiostrongylus*, only *A. vasorum* is known to affect carnivores from the family *Canidae* which are the final hosts[2]. *A. vasorum* infections have been reported in domestic dogs (*Canis familiaris*), foxes (*Vulpes vulpes)* and an African desert fox (*Fenncus zerda*).[2] Other *Angiostrongylus* species, such as *A. chabaudi* infect wild felines. Other *Angiostrongylus spp* are found in rodents.[1] In human beings two *Angiostrongylus* species have been described as a cause of disease; *A. cantonensis*, affecting central nervous system with a typical eosinophilic meningitis and *A. costaricensis* which causes occlusion of mesenteric arteries and subsequent necrosis of intestinal wall.[6] *A. costaricensis* has been reported as a cause of disease also in domestic dogs[1] and as an accidental finding in marmosets.[9] This is the first case of disease in monkeys caused by this parasite. Most likely, the route of infection in the present case was similar to the one described in man, i.e. ingestion of vegetables or fruits contaminated with mucus secreted by slugs or by ingestion of the slugs.

Except for the scanty eosinophilic reaction observed in the present case, all other aspects and lesions were very similar to these described in human beings and dogs.[1,6,7] Furthermore, like in humans beings[8] this monkey developed an ectopic localization of adult worm in portal artery and embryonated eggs in the liver parenchymal, human pathology which is known as visceral larva migrans like syndrome.[8]

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