



Unusual Fatal Case of Disseminated Strongyloidiasis in Chimpanzee (*Pan troglodytes*)

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Keywords

Immunocompetent; *Strongyloides stercoralis*; Hyperinfection; Non-Alcoholic Steatohepatitis

Case Presentation

The 5 years old male primate was sick two months ago. His diet consists of mangoes, papayas, oranges, cereals in industrial preparation for children, soda water. Clinically, he presented with anorexia, gastrointestinal disturbances in the form of vomiting and diarrhea. There was moderate dyspnea. He then benefited from two successive antibiotic therapies, the first of which consists of a Sulfonamide-Trimethoprim combination for seven days and the second of a synergistic combination of Amoxicillin and Clavulanic acid for a week. At the end of the three days of partial remission of the primate, he received therapy based on metronidazole.

Although the patient's condition improved, it was not satisfactory because the diarrhea and vomiting persisted. Then, he received a gastric dressing based on diosmectite and a reconstituting intestinal microbiota. On the day's death, dyspnea aggravated and the emergency care based on dexamethasone treatment failed to save the patient life. Immediately following the death of this chimpanzee, the Abidjan (Côte d'Ivoire) zoo administration referred the primate to us in order to investigate the case.

Autopsy Findings

Externally, the subject was in a good condition but moderately dehydrated. Internally, there were interstitial mild hemorrhagic multifocal and moderate emphysematous pneumonia; diffuse congestive and catarrhal colitis with telangiectasia (Figure 1), diffuse severe catarrhal enteritis; diffuse moderate to severe hepatic steatosis, mild to moderate and focal congestive myocarditis.

Parasitological Examinations

The fecal material of the subject was positive to *Strongyloides stercoralis* parasite with a parasitic load of 200 eggs per gram. Besides, the dead chimpanzee was positive to *Ancylostoma duodenale* parasite with a parasitic load of 150 eggs per gram of feces.

After these findings, half part of liver, lung, kidney, heart, spleen, small and large intestine have been fully dissected to check for *Strongyloides stercoralis* parasites (Figure 2). There were more than 7 parasites (3 adult females and 4 larvae) in the large intestine, 6 (2 adult females, 4 larvae) in the small intestine, 7 (2 adult females and 4 larvae) in the lung, 5 (2 adult females and 3 larvae) in the liver, and nothing in the heart, kidney or the spleen. After having shaved the skin, there was no lesion that could justify further examination of this organ.

Histopathological Examination

Lung

Severe interstitial eosinophilic, multifocal hemorrhagic and moderate emphysematous pneumonia, due to *Strongyloides stercoralis* (Figure 3A, 3B). Notwithstanding the negative result to Mycobacteria infection (TB or Non-TB infection) using not only histopathological examination, the lung specimen was also negative to Acid fast Bacilli testing. There was thrombus (Figure 3A), and small larval granuloma in the lung.

Liver

Non-Alcoholic Steatohepatitis with mild portal and perisinusoidal fibrosis, stage F1 (according

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Figure 1: Large intestine, severe diffuse catarrhal colitis, with telangiectasia.

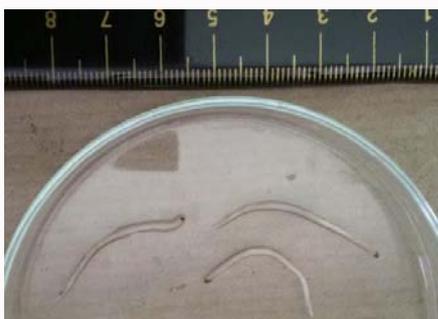


Figure 2: *Strongyloides stercoralis* parasites recovered from intestines, lung, and liver.

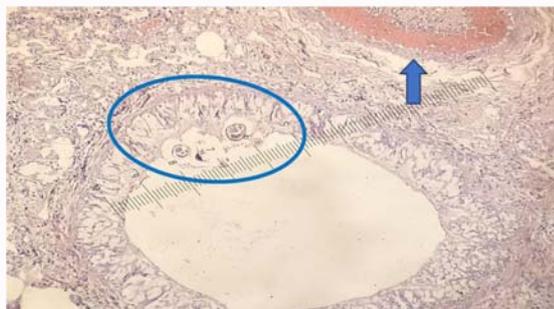


Figure 3A: Interstitial eosinophilic pneumonia, notice here numerous *Strongyloides stercoralis* (circle) larvae extruding from bronchial epithelium and at Top and right, a thrombus (arrow).

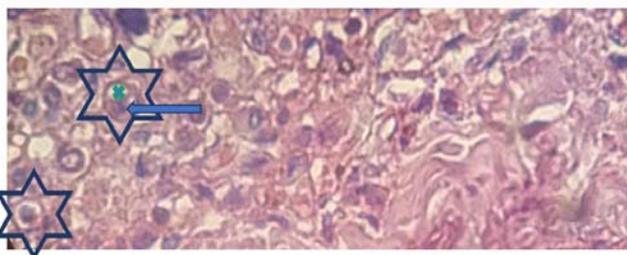


Figure 3B: Chronic interstitial eosinophilic pneumonia with connective tissue reorganization. Cross section of numerous *Strongyloides stercoralis* parasite (star), ovary (arrow), uterus (green cross).

to METAVIR scoring system from F0: No fibrosis, F1: Portal fibrosis without septa, F2: Portal fibrosis and few septa, F3: numerous septa without cirrhosis, F4: cirrhosis), Note micro and macrovesicular steatohepatitis with little inflammation in which there were few lymphocytes (Figure 4), and activated Kupffer cells. Then, there is

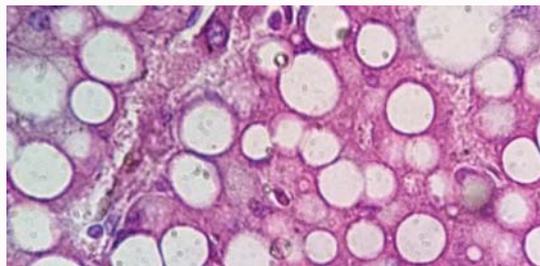


Figure 4: Liver, Severe macro and microvesicular steatohepatitis. Note here, few mononuclear inflammatory cells and mild Mallory-Denk body.

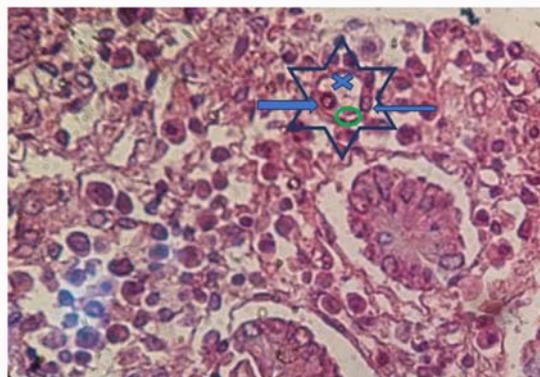


Figure 5: Submucosa the large intestine, note in cross section the adult parasite *Strongyloides stercoralis* (star), its ovaries (two arrows), its uterus (cross), and its intestines (circle).

mild Mallory-Denk body.

Heart

Focal and mild eosinophilic myositis. There were no parasites.

Spleen

No lesion, and there were no parasites.

Kidney

No lesion, and there were no parasites.

Mediastinal and mesenteric lymph nodes

Reactive, in particular no follicular hypoplasia evidenced. There were no parasites.

Small intestine and large intestine

Diffuse severe catarrhal and necrotizing enterocolitis. Note *Strongyloides stercoralis* parasites in the sub mucosa (Figure 5). There was severe granulomatous lymphangitis that explains lymphangiectasia in gross lesions.

Additional Imaging Examination

The MRI examination of the Central nervous system did not show any inflammation or parasite migration evidence.

Pathological Discussion

Host immunosuppression is the main documented risk factor of Strongyloidiasis hyperinfection and dissemination. This immunosuppression is chiefly caused by long term and high dose of glucocorticoid treatment [1]. A few described conditions include inappropriate use of immunosuppressive drugs [2]. In the current case, none of these etiologies could be valid. It is comprehensive

that immunosuppression condition if it is proven, could explain dissemination. Nonetheless, in the current case, there was no evidence of immunosuppression due to absence of hypoplasia of lymph nodes. Yet, we recognize that the blood values have not been estimated during ante mortem in order to appreciate lasting leukopenia. It is a pathological process that initially affects the digestive function with a significant subsequent impact on the lungs (for the record, the chimpanzee grabbed his chest shortly before death), liver and whose main etiology is *Strongyloides stercoralis* hyperinfection followed by its dissemination. The constitutions of thrombi in the lungs have not yet been described in this pathology. This fact could be explained by hemorrhagic lesions in lung that imply necrotizing vasculitis. But these thrombi that can cause thromboembolism are a serious factor. However, diffuse alveolar hemorrhage due to *Strongyloides stercoralis* hyperinfection has been substantiated in a recent human clinical hospitalized case [3]. The skin dermis was highly parasitized. In our case, the responsibility of *Ancylostoma duodenale* in the dissemination of strongyloidiasis remains unknown. This is an unexplained and particular disseminated strongyloidiasis: There was neither evidenced immunosuppression nor lasting glucocorticoid treatment. Another lesson of this rare case is that human alimentary practices could be a major risk factor for Non-Alcoholic Fatty Liver Diseases (NAFLD) in captive Non-Human Primates (NHP).

Many chemicals that cause Non-Alcoholic Steatohepatitis (NASH) as well in human and animal model such as Paraquat, Atrazine, Simazine, and Arsenic [4] are still used as herbicide or

crop chemicals. In many under developing countries, agriculture foods such as fruits that are sold before the end of withdrawal time-a delay that has to be observed after a crop chemical treatment in order to permit elimination of residues. Thus, the consumers including captive NHP become exposed for a long time.

In consequence, as far as NASH is becoming a public health concern in terms of its potential complications (cirrhosis, hepatocellular carcinoma, for instances), its physiopathological relation with strongyloidiasis dissemination deserves to be addressed.

Final Diagnosis

Disseminated strongyloidiasis with Non-Alcoholic Steatohepatitis stage F1 of chimpanzee.

References

1. Fardet L, Génereau T, Poirot JL, Guidet B, Kettaneh A, Cabane J. Severe strongyloidiasis in corticosteroid-treated patients: Case series and literature review. *J Infect.* 2007;54(1):18-27.
2. Buonfrate D, Requena-Mendez A, Angheben A, Muñoz J, Gobbi F, Van Den Ende J, et al. Severe strongyloidiasis: A systematic review of case reports. *BMC Infect Dis.* 2013;13:78.
3. McDonald HH, Milton M. *Strongyloides stercoralis* hyperinfection: Images in clinical medicine. *N Engl J Med.* 2017;376:24.
4. Wahlang B, Beier JI, Heather B, Clair HB, Bellis-Jones HJ, Falkner KC, et al. Toxicant-associated Steatohepatitis. *Toxicol Pathol.* 2013;41(2):343-60.