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Andrea M. Lauffer M.D.

Marshall University, lauffer1@marshall.edu

Patricia Lutz M.D.

Marshall University, lutz3@marshall.edu

Susan L. Flesher M.D.

Marshall University, nine@marshall.edu

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Andrea Lauffer, MD

Medicine/Pediatrics Resident
Marshall University Joan C. Edwards School
of Medicine

Patricia Lutz, MD

Marshall University Joan C. Edwards School
of Medicine

Susan L. Flesher, MD

Marshall University Joan C. Edwards School
of Medicine

Abbreviations:

CDC – Centers for Disease Control
ELISA – Enzyme linked
immunosorbent assay

Corresponding Author: Susan L. Flesher, MD,
Department of Pediatrics, Marshall University Joan C.
Edwards School of Medicine, Huntington, WV. Email:
nine@marshall.edu or sunine@aol.com.

Abstract

We report a case of exposure to raccoon feces found to be contaminated with baylisascaris procyonis. The exposure was recognized early enough by the family to allow prophylaxis with albendazole. Because of the potential fatal or neurologically catastrophic effects of this disease immediate treatment is indicated. This is started in advance of environmental studies that are done to determine if the feces is indeed contaminated.

Introduction

In our pediatric afterhours care center we encountered a case of a child and his father having been exposed to raccoon feces in a tree stand. Baylisascaris procyonis infection is caused by a nematode found in raccoons. Human infection is rare but can result in ocular, visceral or neural larva migrans and is often fatal. There is a very real possibility of children in our area being exposed to raccoons, yet the disease is rare enough that many physicians may not be familiar with appropriate early management. The purpose

of this case report is to discuss the importance of prophylactic treatment for baylisascaris in cases of high risk exposure.

Case Presentation

An eleven year old male and his father were exposed to raccoon feces in a tree stand while they were hunting in a rural area in West Virginia. Upon their arrival to the tree stand, feces was observed in the stand. Our patient and his father proceeded to clean the tree stand with their bare hands. Afterward, they consumed sandwiches they had packed prior to the trip. No hand sanitizing or disinfection of their hands occurred after the manual removal of the raccoon feces prior to the consumption of the sandwiches.

A few days following the hunting excursion while discussing the events that had occurred with a friend, the patient's father had become aware of baylisascaris and was concerned about their unsanitary meal consumption. He contacted the WV Bureau for Public Health and sent samples of the stool which he had placed in a garbage bag when cleaning the stand. He also sought medical advice from the patient's established pediatrician. Incidentally, the son was developing symptoms of an upper respiratory infection. When the father discussed his concerns with the pediatrician about their exposure to raccoon feces as well as the child's incidental concurrent upper respiratory symptoms, they were immediately directed to our afterhours care center for further evaluation.

Upon arrival to our facility, the child presented with a complaint of nasal drainage, chest congestion, and concerns about exposure to raccoon feces. Review of systems was negative except for nasal drainage and cough. The patient was noted

to be on Focalin XR for attention deficit disorder without hyperactivity. Otherwise he was a healthy child with no significant past medical history. Social history included minor issues in school related to the attention deficit disorder. On physical exam he had normal vital signs with a temperature of 97.7 F and blood pressure of 124/70 mm Hg. He was well appearing, well hydrated and active. His exam was only significant for clear nasal drainage. Lungs were clear to auscultation, there was no lymphadenopathy, no hepatosplenomegaly, and the neurological examination was normal.

The pediatrician evaluating the patient contacted the West Virginia Bureau for Public Health to discuss this case and they faxed recommendations from the Centers for Disease Control (CDC). Additionally the pediatrician spoke with pediatric infectious diseases. Enzyme linked immunosorbent assay (ELISA) testing for baylisascaris was obtained for both the child and his father. The results were not available for 7-14 days and there is only a three day window for prophylactic treatment. Albendazole 25 mg/kg/day with fatty meals for twenty days was prescribed for both father and son per CDC recommendations. No maximum dose is listed by the CDC.

The raccoon feces the father had sent was found to be positive, although we did not have this information at the time we started treatment. The ELISA testing that was obtained at presentation was negative for both the patient and his father. However, repeat testing done two weeks later was positive for the son. Both father and son remained asymptomatic and never developed the disease. No further treatment was needed.

Discussion

Raccoons are the host animal of baylisascaris. According to the CDC, infected raccoons have been found mostly in the Midwest, Northeast, Middle Atlantic, and West Coast¹ Raccoon infection has been seen less often in the southeast but has been reported in Tennessee, Georgia and Florida and a 2012 study showed 12% of raccoons tested in North Carolina to be infected.²

Raccoons habitually defecate in communal spaces called latrines in areas such as unsealed attics, decks, tree stumps or rooftops. The tree stand in our case was apparently used by raccoons as a latrine. Eggs are highly resistant to most conditions and can survive for years. Because the eggs are so hardy, this increased the risk that the raccoon stool our patient was exposed to was infectious.

The CDC also reports that fewer than 25 cases of Baylisascaris disease have been documented in the United States. These cases have been reported in California, Illinois, Louisiana, Massachusetts, Michigan, Minnesota, Missouri, New York, Oregon, and Pennsylvania. The CDC further notes that as of 2012, there were 16 published human neurological cases in the United States and six of these persons died.¹

Human disease starts with the ingestion of eggs which hatch in the digestive tract and crawl through the gut wall. Passage of the larvae into major organ systems manifests as visceral larva migrans. Invasion into the meninges leads to human eosinophilic meningoencephalitis which is also known as neural larva migrans. The incubation period varies from one to four weeks. Symptoms may or may not be present and can include nausea, fatigue, hepatosplenomegaly, and neurologic changes such as disorientation, lack of coordination, loss of muscle control and coma.

Baylisascaris neural larva migrans is often associated with devastating

neurologic outcomes or death.³⁻⁵ Older literature before 2007 shows no neurologically intact survivors.⁶ A recent case was reported to have a good outcome in a 14 month old in Boston with treatment with albendazole and steroids.⁷ There has also been a report of a 4 year old in Louisiana,⁷ and a Canadian toddler⁹ who had positive outcomes.

In animal models the administration of albendazole shortly after ingestion of eggs has been shown to prevent clinical disease.⁶ Treatment of infected mice was successful only if it was started before Baylisascaris procyonis larvae had entered the brain. This was shown to occur as early as three days after ingestion.⁶ Therefore prophylactic treatment should be started immediately and can be stopped if the environment is available to be tested and is found not to be contaminated. According to a review article reflecting several hundred million patients, albendazole has an impressive safety record with few side effects.¹⁰ The most common side effects noted are gastrointestinal disturbances, headache, mild to moderately elevated liver enzymes, rashes, and reversible alopecia.

Conclusion

Given the potential severity of infection after ingestion of baylisascaris eggs, administration of a prophylactic course of albendazole should be strongly considered. Albendazole is relatively safe and has few side effects.

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