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Rare disease

Dipylidium caninum infection

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Summary

Dipylidium caninum is a cestode that requires from the participation of an arthropod in its life cycle. This parasitosis occurs in dogs and cats, and occasionally in human beings. Human cases of *D caninum* infection have been reported in Europe, Philippines, China, Japan, Latin America and the United States; mostly children, one third of them being infants under 6 months old. The diagnosis of this disease is done by the parasitological study of the feces, observing the characteristics of the gravid proglottids. The treatment is performed by administering broad-spectrum anthelmintics. The authors report a case of a rare infection in a Mexican child.

BACKGROUND

Dipylidium caninum is taxonomically located in the *Dilepidiidae* family, order *Cyclophyllidea*, subclass *Eucestoda*. It is a cestode that requires from the participation of an arthropod in its life cycle; this parasite is transmitted through the ingestion of the intermediate parasitised host, which carries the larval forms. This parasitosis occurs in dogs and cats, and occasionally in human beings, in the latter case it is usually identified in children 1 to 5 years old.[1–4] *D caninum* has been known also as *Taenia canina* or *T cucumerina*, and the disease as dog taeniasis.[5]

CASE PRESENTATION

We report the case of a female infant, 18 months old, from Sinaloa, Mexico. The girl did not show initially any identifiable clinical manifestations; but the mother reports that she found on two different occasions, in the girl's feces, unknown structures that caught her attention and caused her concern. For this reason, she made an appointment with her family physician, who prescribed a single 400 mg albendazole dose without any study of the aforementioned structures. In the days after treatment, the girl evacuated more of these structures; given this situation the patient and her mother approached our institution, providing eight samples of these structures preserved in ethanol. In physical examination, there was not any sign of disease. The patient underwent clinical and laboratory studies, including a complete blood count (CBC), blood chemistry, liver function tests, urinalysis and a chest x-ray study, there were no abnormal results (no eosinophilia), no other laboratory test were made. The eight structures preserved in ethanol were studied macroscopically, although it was not possible to carry out proper microscopic studies due to the dehydration state of the samples; and so the morphological diagnosis of a cestode helminth was reached, with genus and species still to be determined at this point.

A 24 h stool test was requested, finding two adult cestodes of approximately 50 cm in length. Proglottids and scoleces were fixed in ethanol – formaldehyde – acetic acid and observed under the stereomicroscope and light microscope. Several tape-like structures, which corresponded to

Figure 1 Organisms of *Dipylidium caninum.*

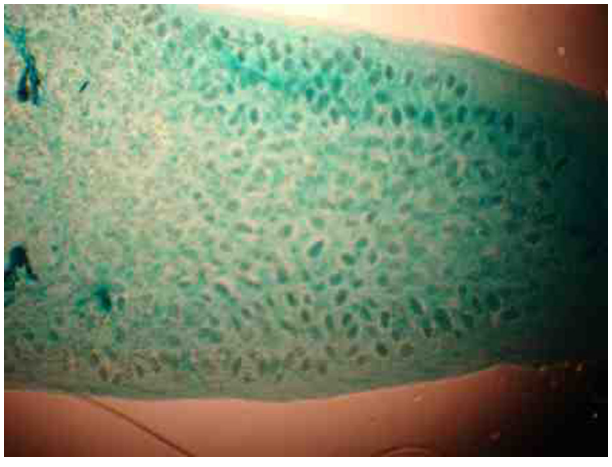

Figure 2 Gravid proglottids of *D caninum.*

Figure 3 Scolex of *D caninum.*

Figure 4 Gravid proglottids of *D caninum* where we can see the genital pore.

cestode proglottids, were studied macroscopically. Several anatomical structures were identified: a scolex bearing four suckers, each showing several hook crowns; proglottids with two genital pores, one on each side; and eggs (30 µm in size on average) within an ovigerous capsule. With all these microscopic and macroscopic morphological data, the parasite species was established as *D caninum* (figures 1–3).

Once the parasitological diagnosis was integrated it was determined that the girl suffered from an asymptomatic intestinal dipylidiasis. A soft diet was prescribed for 2 days; praziquantel was administered at 25 mg per kg of weight dosage; after 1 h a mild laxative was administered. From the start of the treatment, the child's feces were collected for 5 days; a stool screening was carried out and the collected proglottids were processed and stained; the identification of *D caninum* proglottids was corroborated (figures 4–6).

The patient showed no discomfort during treatment. Stool control studies were performed at 14, 21 and 28 days after starting treatment; the techniques employed were stool screening, Faust technique and Ritchie sedimentation method. All control studies were negative and the patient was discharged.

DIFFERENTIAL DIAGNOSIS

Teniasis, Himenolepiasis.

DISCUSSION

Dipylidiasis is a parasitic zoonosis caused by *D caninum*, a common cestode parasite of dogs and cats and other wild canid and felid species, which are the definitive hosts in the helminth's life cycle, as *D caninum* adults develop in the intestine. Human beings can accidentally acquire the parasitosis by ingesting infected intermediate hosts, such as the dog flea (*Ctenocephalides canis*), the cat flea (*C felis*) and occasionally the human flea (*Pulex irritans*), as well as the chewing louse of dogs (*Trichodectes canis*).[1 2]

This disease is associated with close contact with pets; children are parasitised by ingesting dog or cat fleas infected with *D caninum*.[2 6 7] This parasitic disease is a zoonosis of worldwide distribution; infection has been reported in all continents. The infection frequency in dogs and cats ranges from 1% to 60%, depending on the geographic area.[2 6] The necropsy of stray dogs in Merida, Yucatan (Mexico) showed that animals older than 6 months present a 34% infection frequency,[7] and in Queretaro (Mexico) the infection frequency was of 54%.[8]

Human cases of *D caninum* infection have been reported in Europe, Philippines, China, Japan, Latin America and the United States; mostly children, one third of them being infants under 6 months old. There are reports from South America (Chile) of infected children aged 2 months to 4 years old.[2] Most of the times, like in the case presented in this report, the infection is asymptomatic. The adult helminth develops in 3 to 4 weeks after infection and the parasite load is directly related to the number of cysticercoid larvae present in the fleas and the number of ingested insects. The parasite load in humans is generally low and the cestode does not multiply because it is not its definitive host.[9]

Over the days the parasite can generate appetite alterations, occasional diarrhoea or vague and non-specific manifestations such as restlessness, agitation, epigastric pain, constipation; and in older children anal itching and pain. These symptoms are not often recognised, so most of the time the infection is asymptomatic. The proglottids can be evacuated in the feces and found in the diaper.[2 9 10]

The diagnosis of this disease is done by the parasitological study of the feces, observing the characteristics of the gravid proglottids; and eosinophilia can present itself in the CBC. A differential diagnosis must be made in order to rule out other helminth species.[10 11] The treatment is performed by administering broad-spectrum anthelmintics, like praziquantel[12] or niclosamide.[13]

Cestodes like *T solium*, *T saginata* and *H nana* present a scolex with an armed rostellum and suckers, in the proglottids the sexual pores open laterally; *D caninum* has been classified within the Dilepididae family[1 5] because the adult parasite possess an armed rostellum with unarmed suckers, its uterus is divided in ovigerous capsules and the genitalia are simple in structure, also it is characterised by the fact that gravid proglottids present two pores. Linnaeus in 1758 named the species caninum because he found out that the parasite affects mainly dogs.[5] During *D caninum* development there are three parasitic stages: egg located in

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Figure 5 Close up of a gravid proglottid of *D caninum.*

Figure 6 Close up of a genital pore of *D caninum.*

the feces of the vertebrate definitive host (dogs and cats), cysticercoid or larval stage in fleas and the adult stage in the definitive host.[11]

The eggs (25–40 µm) leave the host in the feces and are deposited in the soil, where they can be ingested by the larval stages of flea species such as *C canis*, *C felis* or *P irritans*; or lice (*T canis*). When the fleas develop from larvae to the adult stage, the oncospheres are released from the *D caninum* eggs and develop into the cysticercoid or larval stage. The cysticercoids measure 1 mm and present a scolex within a vesicle with fluid. The fleas and lice bearing cysticercoids are ingested and the adults develop inside the hosts intestines.[1 13 14]

CONCLUSIONS

This case is important because infection is rare in humans, in Mexico there is no epidemiological information about this parasitosis. Apparently the patient had no history of contact with animals, however, it is unlikely since contact with fleas from dogs or cats is required, which do not survive in the environment for a long time, therefore contact with this type of animals must have existed; it is likely that the girl was taken to visit relatives or acquaintances which do own dogs or cats and it was at this moment that the contact was established and the ingestion of infected arthropods took place. The parasitological diagnosis was established according to the identification of morphological characteristics of the cestode.

Dogs and cats in many latitudes breed freely without any control, defecate outdoors in any area, are not groomed, are not subjected to any deworming regime at all and usually they are found in unhygienic places in search for food. These circumstances favour the fact that this zoonosis might reach important levels, as can be seen in the Queretaro and Merida studies.[7 8]

Preventing dipylidiosis in pets and humans requires from flea and lice control, which can be achieved by cleaning areas, animals and humans; avoiding the outdoor defecation of definitive hosts; deworming pets and preventing children from playing with stray animals.

Learning points

- This is a rare-emergent pathology.
- It is rare to find the organism in good shape to study.
- There are a few photos about this parasite.

Competing interests None.

Patient consent Obtained.

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