

Case Report of Leishmaniasis in Four Cats

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Abbreviations: FIV, Feline immunodeficiency virus; IFAT, Immunofluorescent antibody test; SID, *Semel in die*; SC, Subcutaneous; PO, *per os*; rHuIFN α -2 α , Recombinant human α -2 α interferon; BUN, Blood urea nitrogen; CFR, Chronic renal failure; PCR, Polymerase chain reaction

INTRODUCTION

The cat is an unusual host of *Leishmania* spp. and only a few cases of leishmaniasis have been reported for this species, mostly in areas where the microorganism and several species of phlebotomine sandflies are endemic (Pennisi, 2002). About twenty clinical cases have been reported in the literature, sometimes described only briefly with regard to both the clinical course and the therapy employed. Because of this, we wish to describe the clinical findings of four cases of feline leishmaniasis observed between December 1997 and May 2001.

MATERIALS AND METHODS

Four domestic cats were involved (three short-haired, one long-haired); two males (cases 2 and 3) and two females (cases 1 and 4). The cats were six (case 3), 10 (case 4) and 14 (case 1) years of age, in case 2 the age was unknown but the subject was an adult cat. All cats came from the Messina district and they were free-roaming. Diagnosis was achieved by microscopic (smears from cutaneous ulcers and cysts, and from lymph node needle-aspiration) and serological investigations (IFAT) with anti-*Leishmania* antibody titres ranging from 640 (cases 1, 2, and 4) to 1280 (case 3). Further confirmation came from PCR and isolation of *Leishmania* spp. in cases 2, 3 and 4. The cats were tested for FIV and FeLV (Duospeed, BVT, La Seyne sur Mer, France), *Toxoplasma gondii* (IFAT), *Bartonella henselae* (IFAT) and given blood tests (complete blood cell count, biochemistry profile, serum protein electrophoresis, urinalysis). Two cats did not undergo specific treatment (cases 1 and 3) because the owner

was not compliant with the drug regimen. Cases 2 and 4 were treated by oral administration. Case 2 was given three different oral treatments without any success: fluconazole (5 mg/kg SID for 2 months), metronidazole (25 mg/kg) and spiramycin (150,000 UI/kg) SID for 35 days and itraconazole (50 mg SID) for 2 months.

Seven months later the owner decided to suspend all treatment drugs. Case 4 was given allopurinol (20 mg/kg SID) for 15 months. Case 4 was a FIV⁺ cat also suffering from pancytopenia. On this occasion erythropoietin (50 UI/kg/48 h SC) and ferrous sulphate were administered (50 mg SID PO) for ten weeks and rHuIFN α -2 α (30 UI SID topically on the oral mucosa) for 5 months.

The clinical course of three cases was recorded until the death of the subjects. Cases 2 and 3 were euthanised; case 4 is still alive.

RESULTS

At the time of diagnosis the following clinical signs were observed: depression and anorexia (cases 1 and 4), severe weight loss (cases 1 and 4), pale mucous membranes (cases 1 and 4), dehydration (case 1), solitary (case 3) or systemic lymph node enlargement (cases 2 and 4), presence of a small crusty ulcer (case 1), cutaneous bloody cyst (cases 1 and 3), alopecia (case 4), dyspnea (case 1) and hepatomegaly (case 4).

Ophthalmologic examination highlighted signs of a previous uveitis (cases 1 and 2), inactive chorioretinitis (case 3) and acute uveitis (case 4).

Hematological abnormalities were: non-regenerative anaemia (cases 1 and 4), leukopenia (cases 1 and 4), thrombocytopenia (cases 1 and 4), increased BUN (case 1) and increased creatinine (case 1). All cats showed hyperproteinemia and hyperglobulinemia with monoclonal hypergammaglobulinemia.

Cases 1, 3 and 4 were FIV⁺; case 2 was positive for Coronavirus (titre 25). Cases 1 (titre 100), 2 (titre 400) and 4 (titre 6400) were IgG positive for *Toxoplasma*, while cases 2 (titre 256) and 3 (titre 256) were IgG positive for *B. henselae*.

Case 1 (FIV⁺) was also affected with CRF complicated by non-regenerative anaemia, bronchopneumonia and pyothorax and died 35 days after diagnosis. In cases 2 (unsuccessful treatment) and 3 (no treatment), development of the disease led to the progressive development of CRF with severe non-regenerative anaemia. Euthanasia was performed 22 months (case 2) and 5 years (case 3) after diagnosis. In case 2 CRF was evident 5 months after diagnosis with consequent cachexia and severe anaemia. At the time of euthanasia lymph node enlargement was no longer evident, the specific antibody titre was 320 and serum protein electrophoresis had changed in the preceding month with reduction of hypergammaglobulinemia and development of hyperalbuminemia. Case 3 (no therapy), which developed urinary signs of renal failure three years later, was healthy for about two more years, when the onset of a proliferative stomatitis led to anorexia; at the same time there was the onset of seizures and an irregular bradycardia (108 beats/minute) associated with a 5th degree heart murmur.

The owner opposed any further investigation and asked for euthanasia. The cutaneous lesions, lymph node enlargement, serum protein electrophoresis and antibody titre did not change over the course of the disease, and when the cat was put down the anti-*Leishmania* titre was 640, with positive lymph node needle-aspiration (PCR and microscopy).

Case 4 (treated with allopurinol, erythropoietin, ferrous sulphate and rHuIFN α -2 α) showed a rapid improvement with recovery in appetite and vitality within the first two weeks, while a dramatic improvement of the severe haematological data was seen after three weeks. Five months later a weight gain (3 kg) was observed, along with the regrowth of hair, the liver and lymph nodes enlargements disappeared, and the hypergammaglobulinemia and anti-*Leishmania* antibody titre were reduced. The drug regimen was modified and the cat was given allopurinol for ten further months. At the end of the treatment (15 months in all) *Leishmania* serology and PCR were negative, while neutropenia and hypergammaglobulinemia were still present. Two months later the cat exhibited anaemia, leucopenia, hypergammaglobulinemia and positive antibody (titre 80) once again. In the following months the uveitis recurred, anaemia worsened and the IFA titre rose to 1280. Parasites were isolated once again from the submandibular lymph node. At this time allopurinol (20 mg/kg SID) was recommenced, and the treatment remains ongoing.

DISCUSSION

For the first time feline leishmaniasis has been reported in FIV⁺ cats (three cases out of four) and treated with oral drugs, which generally meet with greater compliance from the owners, especially for long-term therapy. Clinical signs of feline leishmaniasis are quite similar to those observed for dogs: lymph node enlargement, cutaneous ulcers, alopecia, weight loss, pale mucous membranes, hypergammaglobulinemia and CRF. On the contrary, cutaneous bloody cysts (with evidence of amastigotes inside) have not been reported for canine leishmaniasis. The ocular lesions cannot be considered specific because of the concurrent FIV infection (cases 1, 3 and 4) and a high anti-*Toxoplasma* titre (case 4). Despite the fact that the literature reports the efficacy of fluconazole (Gangneux *et al.*, 1999), itraconazole (Gangneux *et al.*, 1999) and spiramycin + metronidazole (Gangneux *et al.*, 1999; Pennisi *et al.*, 2001), these drugs did not work for the FIV⁻ cat (case 2) which developed CRF. The same happened in case 3 which, in spite of the FIV infection and the lack of therapy, lived for five more years after diagnosis.

Allopurinol was given to cats for the first time and it was well tolerated in case 4 which had a symptomatic (stage IV) FIV infection. The allopurinol treatment was clinically efficient but, as reported for dogs (Baneth, 2002), did not succeed in eradicating the infection.

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