

A Case of *Aelurostrongylus abstrusus* Infection in a Cat in İstanbul, Turkey and its Treatment with Moxidectin and Levamisole

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Abstract: Larvae of *Aelurostrongylus abstrusus* were identified in the feces of a 2-year-old female cat suffering from dyspnea and incoordination for 18 months. The larvae had a terminal S-shaped projection and a subterminal dorsal spine. The larvae measured 363-378x15 µm (aver. 370x15 µm). Firstly, moxidectin (0.4 mg/kg) was given subcutaneously to 3 healthy stray cats over 1 year old to check adverse effects on cats. No adverse reaction was observed. Then a subcutaneous injection of moxidectin (0.4 mg/kg) was given to the infected cat for treatment on day 0 and this was repeated on day 51. Seventy-nine days after the 2nd application of moxidectin (on day 130), levamisole (8 mg/kg) was given orally to the cat. The treatment of moxidectin resulted in only a decrease in larval output, whereas levamisole ceased it within 5 days. The clinical signs of the cat improved within 5 weeks of the first application of moxidectin. Neither moxidectin nor levamisole caused adverse effects. This is the first case report on *Aelurostrongylus abstrusus* infection in a cat in Turkey.

Key Words: *Aelurostrongylus abstrusus*, Cat, Moxidectin, Levamisole, Treatment, İstanbul, Turkey

İstanbul'da Bir Kedide *Aelurostrongylus abstrusus* Enfeksiyonu ve Onun Moxidectin ve Levamisole ile Tedavisi

Özet: Onsekiz aydır dispne ve inkoordinasyon şikayetleri olan iki yaşında dişi bir kedinin dışkıında *Aelurostrongylus abstrusus* larvaları tesbit edildi. Larvaların arka ucunda S şeklinde bir çıkıntı ile subterminal dorsal bir diken mevcuttu. Larvaların büyüklüğü 363-378x15 µm (ortalama 370x15 µm) olarak ölçüldü. Önce bir yaşından büyük, sağlıklı 3 sokak kedisine deri altı yolla moxidectin (0.4 mg/kg) verilerek ilacın kedilerde istenmeyen etkisi olup olmadığı kontrol edildi. Kötü reaksiyon görülmemesi üzerine, moxidectin (0.4 mg/kg) enfekte kediyeye uygulandı (Sıfırinci gün). Ellibirinci gün moxidectin uygulamasının tekrarı yapıldı. İkinci moxidectin uygulamasından 79 gün sonra (130. gün) kediyeye oral yolla levamisole (8 mg/kg) verildi. Moxidectin tedavisi sadece larva çıkışını azalttı. Fakat levamisole 5 gün içinde larva çıkışını tamamen kesti. Kedinin klinik bulguları ilk moxidectin uygulamasından 5 hafta sonra düzeldi. Ne moxidectin ne levamisole istenmeyen reaksiyonlara yol açmadı. Bu yayının, Türkiye'den kedilerde *Aelurostrongylus abstrusus* enfeksiyonunu tanımlayan ilk rapordur.

Anahtar Sözcükler: *Aelurostrongylus abstrusus*, Kedi, Moxidectin, Levamisole, Tedavi, İstanbul, Türkiye

Introduction

Aelurostrongylus abstrusus localizes in the lungs of cats and occurs in many parts of the world (1-3). The parasite is ovo-viviparous. Its first stage larvae (L1) pass out with feces through air passages and the gastrointestinal tract (2-4). L1 is 360-400 µm long and has a tail with a terminal S-shaped (undulating) appendage and a subterminal dorsal spine (3,5). After entering the intermediate host (some species of slugs and snails), L1 develops to infective L3. Frogs, toads, lizards, snakes, sparrows, chickens, ducklings and small rodents may serve as paratenic hosts (2,5,6). Cats are infected either by ingestion of infected molluscs or by paratenic hosts (3-5). The prepatent period is 4-6 weeks (1-3, 5). The duration of patency was recorded as 2-3 months by

Scott (2), 4 months by Urquhart et al. (5), and 4-9 months by Soulsby (3). Some worms may survive in the lungs for several years without larvae appearing in the feces (5).

Aelurostrongylus abstrusus often causes infection without clinical signs. However, in severe infections, some symptoms such as coughing, sneezing, dyspnea and polypnea are seen and infection sometimes results in death (2,3,5). In infected cats, radiographic abnormalities such as bronchial thickening, bronchial opacity, focal or generalized alveolar lung disease and increased vascular and focal parenchymal densities might be seen (5,7). The literature (2,8-18) on the treatment of aelurostrongylosis in cats is summarized in Table 1.

Table 1. Summarized information on the treatment of aelurostrongylosis in cats.

Chemicals and dosage	Therapy Results and (Reference)
Fenbendazol: 20 mg/kg daily for 5 days, orally	Larvae disappeared from feces 2-4 weeks after treatment (8)
Fenbendazol: 50 mg/kg daily for 3 days, orally	Parasites were eliminated (9)
Fenbendazol: 55 mg/kg daily for 21 days, orally	Clinical symptoms were resolved by day 6 (10)
Fenbendazol: 50 mg/kg daily 3 successive days, orally	Larvae were absent from feces by day 14 but reappeared from day 18 (11)
Fenbendazol: 20 mg/kg daily for 5 days, twice, with an interval of 5 days	Feces became free of larvae and symptoms abated (12)
Levamisole: 100 mg orally every other day for 5 treatments	Larvae disappeared from the feces by day 4 and clinical improvement occurred (13)
Levamisole (2.5%): 11 mg/kg daily for 6 days, subcutaneously	Cats were successfully treated without side effects (14)
1) Levamisole: 30 mg/kg once orally 2) Fenbendazole: 25 mg/kg daily for 5 days	In the levamisole treatment, larvae were absent from fecal smears the next day. But this drug caused adverse effects. Therefore, treatment was continued with fenbendazole. The cat was clinically normal after 2 weeks (15)
Tetramisole: 65 or 130 mg/kg daily 5 consecutive days, orally	At 65 mg/kg, fecal larvae counts decreased and clinical signs improved. But relapses occurred when treatment stopped. No toxicity. At 130 mg/kg, typical organophosphate toxicity (16)
Tetramisole: 30 or 60 mg/kg every other day for 10-12 days, orally	At both doses, larvae were absent from the feces 10 days and 30 days after the initial set, fecal examination was negative for 3 successive days, no toxicity (2)
1) Ivermectin: 0.2 mg/kg, subcutaneously, 2) Levamisole (2%): 30 mg/kg	After unsuccessful treatment with ivermectin, the animal was treated with levamisole (17)
Ivermectin: 1) 0.2 mg/kg, 2) 0.4 mg/kg, subcutaneously	Initial application did not eliminate infection, a second treatment at a higher rate was necessary for elimination, drug well tolerated (18)

Case History

A 2-year-old female cat suffering from dyspnea and incoordination for 18 months was brought to our department. Its fecal examination revealed nematode larvae. The larvae had a terminal S-shaped projection and a subterminal spine. The larvae measured 363-378x15 µm (aver. 370x15 µm, n=10 larvae without fixation) (Fig. 1), and were identified as *Aelurostrongylus abstrusus* according to their characteristics (3,5,19). Two thoracic radiographs of the cat in different positions were taken. The evaluation of the radiographs showed slight bronchial thickening in the lateral position and nodular opacity on the left lung in the ventro-dorsal position.

The cat was hospitalized, and fecal examination and larval counting were performed daily between days -2 (2 days before first chemical application) and 64, and between days 117 and 145. The number of larvae per gram feces (LPG) was determined by the Baermann technique (20). The cat was kept at home by its owner between days 65 and 116 (keeping the cat indoors was



Figure 1. The first stage larva of *A. abstrusus* in the feces of the cat. A-General view (scale:100 µm) B-Caudal end (arrow-a points to the spine and arrow-b to the S-shaped projection)

recommended). Therefore, LPG values were not determined between days 65 and 116.

Before the application of moxidectin to the infected cat, the medicine at a dose of 0.4 mg/kg was given subcutaneously to 3 healthy stray cats over 1 year old. These cats were observed for adverse effects for a week

Table 2. The LPG (number of larvae per gram feces) values of the cat.

Day	LPG	Day	LPG	Day	LPG	Day	LPG	Day	LPG	Day	LPG
-2	265.3	14	5.24	32	1.25	2M 51	5.32	117	6.91	131	0.97
-1	245.2	15	3.9	33	1.66	52	1.49	118	3.2	133	0.07
1M 0	272.2	16	9.53	36	97.1	53	5.82	119	5.52	135	0.2
3	75	17	2.24	37	38.95	54	37.57	120	6.31	136	0
4	44.46	18	4.09	40	17.56	55	17.59	121	10	137	0
5	88.4	19	8.96	41	25.11	56	15.72	122	1.34	138	0
6	28.2	20	3.86	42	10.78	57	13.75	123	4.31	139	0
7	13.3	21	1.27	43	43.51	58	5.36	124	20.67	140	0
8	9.5	22	5.14	44	28.83	60	11.6	125	8.87	141	0
9	11.2	26	6.31	45	16.02	61	12.79	126	7.33	142	0
10	13.16	27	12.63	46	7.57	62	40.77	127	7.69	143	0
11	9.38	29	46.63	47	1.36	63	3.43	129	10.02	144	0
12	3.43	31	0.18	50	45.96	64	9.83	L 130	7.45	145	0

Abbrev.: The 1st (1M) and 2nd (2M) application days of moxidectin (0.4 mg/kg), and the application day (L) of levamisole (8 mg/kg)

and no adverse reaction was observed. Then moxidectin at a dose 0.4 of mg/kg was injected subcutaneously to the infected cat on day 0. After the application of moxidectin, LPG values declined sharply until day 12, and they stayed at very low levels between days 12 and 29 and showed irregularity after day 29, but never rose even half of the initial set (Table 2 and Fig. 2). In the cat, dyspnea and incoordination disappeared within 5 weeks of the application, but larvae were still present in the feces. The moxidectin application was repeated on day 51. But the exact result of this repetition was not obtained because its owner took the cat away on day 64. After the cat was brought back, a fecal examination was done on day 117. The examination showed that the cat was still infected with the parasite. After the larval output was determined for 13 days, levamisole at a dose of 8 mg/kg was given orally to the cat on day 130. Five days after the application of levamisole, the larvae were absent from the feces and were not detected throughout the following 10 days (Table 2 and Fig. 2). Neither moxidectin nor levamisole led to adverse reactions in the cat.

Discussion

Concerning the occurrence of this parasite in Turkey, only one record is available, in a book written by Oytun in 1961 (21). However, since in this book there is no literature conforming this record, this paper is the first

report on the occurrence of *Aelurostrongylus abstrusus* in Turkey.

As seen in Table 1, the results obtained from the treatment of aelurostrongylosis with fenbendazole (8-12), tetramisole (2,16) and ivermectin (17,18) are controversial. Eventually, 130 mg/kg tetramisole given orally showed toxicity (16). Another drug, levamisole, was reported to be effective (13-14) but adverse reactions were observed in one study (15).

In the present study, the treatment with moxidectin (0.4 mg/kg) resulted in only a decrease in larval output, whereas levamisole (8 mg/kg) ceased it within 5 days. The clinical signs of the cat improved within 5 weeks of the first application of moxidectin. Neither moxidectin nor levamisole caused adverse reactions.

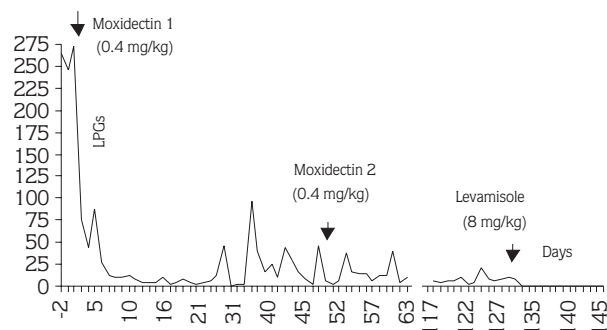


Figure 2. The larval output pattern of the cat.

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