Subcutaneous canine dirofilariosis due to *Dirofilaria (Nochtiella) repens* of american origin in Italy: case report

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**SUMMARY**

This report deals with a case of subcutaneous dirofilariosis due to *Dirofilaria (Nochtiella) repens* in a dog just arrived in Italy from USA (California). Climatic, geographical and pathogenetic evidences led to the exclusion of a parasitic infestation acquired in Italy.

**KEY-WORDS**: *Dirofilaria (Nochtiella) repens* - zoonose - dog.

**RÉSUMÉ**

Un cas de dirofilariose sous-cutanée canine à *Dirofilaria (Nochtiella) repens* d’origine américaine observé en Italie. Par W. TARELLO.

On rapporte un cas de dirofilariose sous-cutanée à *Dirofilaria (Nochtiella) repens* chez un chien importé de la Californie (USA) en Italie. Les observations climatiques, biologiques et pathogéniques font exclure une infestation acquise en Italie.

**MOTS-CLÉS**: *Dirofilaria (Nochtiella) repens* - zoonose - chien.

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**Introduction**

Subcutaneous dirofilariosis is a helminthic zoonosis that is nowadays reported with relative frequency in dogs in several parts of the world [2, 16, 19]. Its most important agent has clearly been identified in *Dirofilaria (Nochtiella) repens*, but other species (*Dirofilaria immitis, Dipetalonema reconditum*) can also be found in the subcutaneous tissues of dogs, according to the different geographical distribution of the agents and of suitable vectors [5].

Itching and skin sores are the most important symptoms of subcutaneous dirofilariosis, which is an illness conditioned by underlying predisposing factors (babesiosis, leishmaniosis, ehrlichiosis, stress) [19].

Among the new cases observed in Italy, the one reported here appears to deserve specific attention because of some peculiarities: a history of foreign provenance and of overseas travel, and the differential diagnosis, geographical origin and biological problems it posed.

**Clinical case**

A 10-months old, 23 Kg., female American pit bull terrier, imported from California in February 1998, was referred three months later (mid-May) to a veterinary practitioner in Alexandria (North-western Italy) for a dermatological-haemorrhagic syndrome that had appeared 3 weeks after its arrival in Italy. All vaccinations, including that for rabies, had been administered before departure from the U.S.A.

At the time of the first visit, the symptoms had a duration of two months and consisted of poor appetite, epistaxis, prolonged bleeding in estrus cycle, conjunctivitis, itching, cutaneous nodules and erythema. Skin lesions and
vaginal bleeding were observed during the initial physical examination. Laboratory examinations showed normal biochemical and hormonal profile (17-β-oestradiol = 4.98 pg/ml, progesterone = 0.7 ng/ml). Platelets count was between normal limits.

Eight *Dirofilaria repens* microfilariae were detected in the bloodstream with the Knott concentration test (Fig. 1), and a fresh blood smear stained with the Wright technique revealed the presence of *Ehrlichia canis* morulae in some monocytes (Fig. 2). These laboratory findings were consistent with the symptoms observed. An antigen test for heartworm (Witness Dirofilaria, Merial) proved negative. Subcutaneous dirofilariasis is a conditioned illness and *Ehrlichia canis* is known to favour opportunistic infections. Consequently, treatment with doxycycline (10 mg/Kg/day, 20 days) against ehrlichiosis was given before treating the dog with anti-filarial drugs. Conjunctivitis and vaginal bleeding subsided rapidly, and no further episodes of epistaxis occured. After two days of rest, macrofilaricide treatment (Melsarosmine, 2.5 mg/Kg., i.m., b.i.d.) was started, with recovery from pruritus and skin lesions. A microfilaricide drug (Ivermectine, 50 µg/Kg, s.c.) was administered 10 days later, when complete remission of the syndrome could be observed.

**Discussion**

Subcutaneous dirofilariasis can be diagnosed in the presence of pruritic dermatitis, of the finding of *D. repens* microfilariae in the bloodstream and a negative result of the test for circulating *D. immitis* antigens [19]. The case of the dog described here presented all such features, but differed under many aspects from the several other cases of subcutaneous dirofilariasis already reported in Italy. When considering the geographical residence (Alessandria, Piedmont) of the patient, one could assume that the *Dirofilaria repens* infection was acquired locally. A few circumstances seem not to agree, however, with this assumption:

1. Specific pathogenic effects, such as pruritus and skin lesions appeared in mid-March, only 3 weeks after the dog’s arrival from California and during a period free from indigenous mosquitoes.
2. The dog was brought in for a visit in mid-May, when mosquitoes are still rare in Alessandria [16], where the average temperature does not allow development of *D. repens* to the infective stage before June [4].
3. The first symptoms of dirofilariasis appeared at age 8 months, suggesting a trans-placental transmission, which has actually been described for *D. repens* [8].
4. Similarly, the animal could not have contracted the *Ehrlichia canis* co-infection locally during the wintertime, in the absence of living ticks in the environment.

According to some authors, *Dirofilaria (Nocchiella) repens* is indigenous to the European continent and absent in Northern America [2, 5, 14, 15]. The lack of local clinical reports seems to confirm it, but this is in contrast with our findings, suggesting that one case was imported from the U.S.A to Italy. In addition, brief mentions in some veterinary textbooks and articles point out the presence of *D. repens* in Central America and Florida [1, 7, 11], approximately located at the latitude of the warm southern belt of Northern America just as the birthplace of this dog.

Some authors [21] have recently observed that, considering that the naming of a nematode can be determined by the patient’s residence, *Dirofilaria (Nocchiella) repens* can be considered as synonymus with *Dirofilaria tenuis*, which has been described only in the USA, where it was held responsible for about 50 recorded zoonotic cases [5]. *Dirofilaria tenuis* is a common parasite of the raccoon [6], living in the subcutaneous and submucosal tissues [5], and is identified as the most frequent agent of human subcutaneous dirofilariasis in the USA [12], mostly reported from Florida [10]. Marked similarities between *D. repens* (cited as *D. conjunctivae*) and *D. tenuis* have been described by ORIHEL and BEAVER [12] in : the profile of the external cuticular indentations and structure of the longitudinal ridges, the large number of nuclei in the lateral chords and muscles, the number and structure of the muscle fibres, the large extension of the lateral chords and the structure of the walls of the genital and intestinal tubes. Furthermore, microfilariae of *D. tenuis* found in raccoons, have shown mean measurements (385 x 7.66 µm) superposable to those of *D. repens* microfilariae [10].

A recent human case reported by PAMPIGLIONE et al. [14] could not be defined as either *D. repens* or *D. tenuis*, but only *Dirofilaria (Nocchiella)* sp., even if the adult nematode appeared to have been acquired in Florida.

The difficulties in differentiating *D. tenuis* from *D. repens* require further comparative investigations; however, at the present time some authors [21] consider them as the one and same nematode.

Two canine filarias, *Dirofilaria immitis* and *Dipetalonema reconditum*, have been described [20] in California, and some intermediate hosts of *D. immitis* are also suitable vectors for *D. repens* [15].

During the last century, a large number of dogs of all European breeds have been exported to Northern and Southern America. In fact, some cases of canine subcutaneous dirofilariasis reported from Argentina [1] and Brazil [11] were related to animals imported from Europe [15]. Strict quarantine regulations seldom are an obstacle to the parasite’s life cycle, because the infestation becomes patent within 6-10 months or longer, and the adult parasites can live 2-4 years in the subcutaneous tissues of dogs. Suitable climates and vectors can therefore facilitate the trans-continental diffusion of this filarial nematode.
FIGURE 1. — *Dirofilaria repens* microfilaria in the blood of the newly imported dog from USA (x10, Knott test).

FIGURE 2. — *Ehrlichia canis* morula in a monocyte of the clinic case (x100, Wright stain).

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A great deal of field studies and laboratory research is being carried on about the agents transmitting *D. immitis*, which is present in Northern and Southern America. In the case of *D. repens*, research is limited and a positive identification of its natural vectors has not yet been made in many concerned countries [15].

In 1974, OTTO [13] presented a comprehensive subject review on *D. immitis* infestation in various aberrant localizations, including the skin of dogs, where normally only one single worm could be found.

A papulo-nodular dermatitis in a dog with occult (*D. immitis*) filariasis was described in 1987 by SCOTT and VAUGHN [18]; two years later HALLIWELL [9] published some cases of canine pruritic dermatitis, accompanied by microfilariae in the blood. A direct cause-effect relationship has never been demonstrated and many features of such cases are identical to those of chronic dermatitis due to *D. repens*.

A cooperative study of American and Norwegian authors [2] has recently suggested that some cases describing aberrant localizations of *Dirofilaria* species, mostly reported in the U.S.A. and assumed to be *D. immitis*, could have been *D. repens* because identification to the level of species was never made. Thus, they did not rule out the possible presence of *D. repens* in Northern America.

Another filarial nematode living in the subcutaneous tissue of dogs, *Dipetalonema reconditum*, has been described in the mid-Atlantic United States, Africa and Italy. It is not considered as clinically significant, although it may give elevated eosinophils and leukocytes counts. Differentiation between *D. immitis*, *D. repens* and *Dipetalonema reconditum* is mainly based upon the morphological features of the microfilariae. Microfilariae of *D. repens* and of *D. immitis* are respectively 6-7.3 µm and 4-6.2 µm wide, whereas those of *D. reconditum* are less than 5 µm wide. Length measurements are not as reliable as feature for differentiation [17].

The microfilariae found in the blood of our clinic case (Fig. 1) were large and squat, exactly as the larvae of *D. repens*. The tails of larvae of *D. reconditum*, as observed with Knott’s technique, tend to be bent and are normally thin like those of *D. immitis* [17]. The tail of *D. repens* microfilaria does not tend to be curved, as shown in Fig. 1.

In this case, negative antigen test and filtration examination ruled out *D. immitis*, and no microfilariae of *D. reconditum* were found in the circulating blood. The dermatological signs, the opportunistic evolution (following *Ehrlichia canis* infection) and the microfilaraemia observed suggested the diagnosis of subcutaneous dirofilariasis from *D. repens*. Furthermore, multiform erythema has already been described [3] in dogs with *Ehrlichia canis* infection.

The interest of the present report seems to lie in the confirmation of previous, occasional observations of *D. repens* in the New World [1, 7, 11]. This is apparently the first clinical description of a patent subcutaneous dirofilariasis in a dog imported from the U.S.A.

The attribution, made here, of an American origin of the infestation in this clinical case is based upon indisputable climatic factors and upon the sudden evolution of the syndrome, following the dog’s arrival in Italy. Itching and skin lesions are characteristic features of *D. repens* infestation, which is endemic in Italy. However, these symptoms appeared within 3 weeks after the animal arrived into this country, and during the mosquito-free wintertime, ruling out a locally acquired infestation.

A case of subcutaneous dirofilariasis acquired in South Africa has recently been described in a dog imported into Norway [2]. At a difference from Italy, indigenous Norwegian dogs are free from *Dirofilaria* species, because the climate is unfavorable to the development of the larvae in intermediate host mosquitoes.

This report provides a reminder that, as a consequence of the increased number of travelling pets, it is necessary to be aware of the geographical and climatic differences in the occurrence of the diseases. In addition, commonly accepted notions of geographical distributions may require revision.

References