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Sarcoptic mange

- The value of serological diagnosis in a "common" disease, easy to cure

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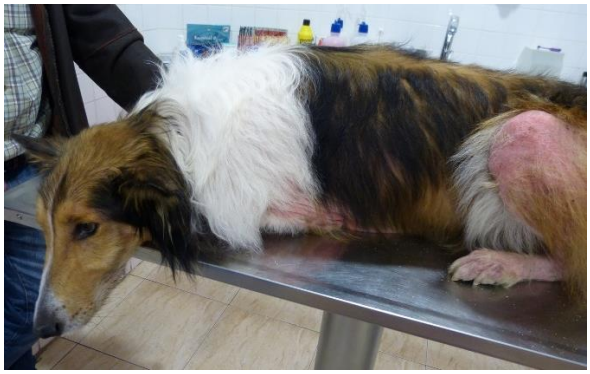
Introduction

Sarcoptic mange is a highly pruritic and contagious parasitic disease, caused by the burrowing mite *Sarcoptes scabiei*. Transmission of the infestation occurs mainly as a result of direct contact with an infested animal. However, despite the limited presence of the parasite in the environment, animals can be infested from a contaminated environment.
The presence of this ectoparasitic disease remains high, with increasing number of infested animals in the free-living mammal population[1] (e.g. rabbit, fox, wolf, deer). The presence in the canine population is also relatively high, despite the existence of effective drugs. In the dermatological clinic of the author (Madrid), sarcoptes was found in 3.5% of the animals examined during the last two years. In a study in southern China 1.18% of pet dogs suffered from this disease.[2]

The disease is primarily pruritic, which makes it easily mistaken for an allergic disease. This, combined with the difficulty of finding the parasite in skin scrapings, leads to the frequent mistreatment of a disease that - with a good diagnosis - is easy to cure. The use of serology to identify anti-sarcoptes antibodies is an excellent option to confirm or rule out the disease.

In this article we will review the disease and the available diagnostic tests as well as the treatment for its control.



The parasite

Sarcoptes scabiei spp is an obligate parasite with a biological cycle of 2-3 weeks and completely adapted to its host. The adult parasite is oval in shape, with a diameter of 200-400µm and has two pairs of short front legs and two pairs of rudimentary hind legs. The anus is terminal. The forelimbs bear a stalked empodium that ends in a pad. The hind legs have long bristles. The males are smaller than the females and bear pads also on the fourth pair of legs.

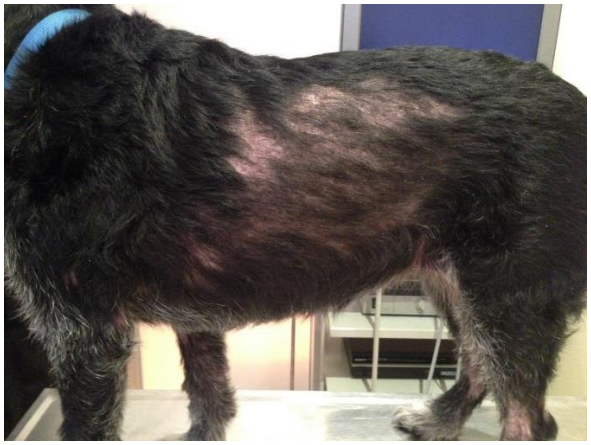
The females burrow tunnels in the epidermis where they deposit the eggs. From the egg emerges a hexapodal larva that

develops into protonymphs, tritonymphs and lastly into an adult.
In every phase of its development, the mite leaves the tunnels to moult in the surface of the skin[3].

The burrowing activity of the parasite leads to the formation of thick and adherent scabs, mainly located on elbows, tarsus and edges of the pinnae. A host humoral immune response is triggered, with the immediate production of specific IgM and IgA, which later switches to specific IgG production. Specific canine IgG anti-sarcoptes antibodies are detectable 3-5 weeks after infestation or 1-3 weeks after the onset of clinical signs[4,5]. There is a cross reaction between *Sarcoptes scabiei* and dust mites, though. Infested animals usually show additionally high values of antibodies against dust mites, which can generate confusion at the time of diagnosis. Sensitization to dust mites after *S. scabiei* infestation has also been described, which could explain the persistence of symptoms after treatment[6,7].

Clinical signs

The main clinical sign of the disease is pruritus. It usually appears weeks after the infestation and increases progressively, probably linked to the host's sensitization to the mite. The hypersensitivity to the mite explains the intense itching even in the absence of a large number of parasites on the animal.
Lesions seen are: erythema (associated with inflammation of the skin), scaly scabs more or less thick (derived from the burrowing activity of the parasite) and the possible presence of papules. Secondary lesions, alopecia and excoriations, are derived from pruritus and the scratching can be very severe.
The presence of an oto-podal reflex after rubbing the edges of the pinna is quite characteristic. This sign have a sensitivity of 81.8% and a specificity of 93.8%[8].
The lesions have a characteristic ventral distribution, affecting extremities and the ventral area of the body below a line that starts above the elbows and reaches to the middle part of the femur. Lesions develop initially and with increased intensity on the elbows, tarsus and margins of pinna. Lesions can also be seen periocular and on the face.
The pruritic intensity and severity of lesions is variable depending on the individual animal. It seems to be more related to the degree of hypersensitivity than to the parasitic load[9]. In general, the pruritus is intense and does not respond to antipruritic treatment.



Differential diagnosis

Differential diagnoses are mainly other pruritic ectoparasitic and allergic diseases (flea allergic dermatitis, food induced allergic dermatitis, atopic dermatitis and contact dermatitis). There may be secondary Malassezia infections and pyodermas. Sometimes pemphigus foliaceus can be a differential diagnosis.
It is mandatory to add sarcoptic mange to the list of differential diagnoses of any pruritic patient and to perform the relevant tests to rule out the parasite, before going on with the diagnostic protocol of an allergic dermatitis. It is not uncommon to mix up sarcoptic mange with allergic

dermatitis. In our referral clinic, many of these patients arrive with a wrong diagnosis of atopic dermatitis.

How to diagnose sarcoptic mange?

The diagnostic plan includes:

1. Superficial skin scrapings

The microscopic observation of the parasite is diagnostic (100% specificity), but **the probability of finding the parasite is very low** (20% sensitivity)[10]. Not detecting the parasite in superficial skin scrapings does not rule out the disease and other diagnostic techniques are necessary.

2. Serological test

The measure of serum anti-Sarcoptes IgG is a very sensitive (92-98%) and specific test (93.75-96%)[11,12,13]. Antibodies can be detected after 3-5 weeks of infestation. This is the usual time for the patients to develop clinical signs, but in case of a negative result and high clinical suspicion, diagnostic treatment should be made. After therapy, antibody levels slowly decrease over the next 1-4.5 months[14]. The long presence of antibodies makes the serological test not helpful as control of treatment.

3. Response to treatment:

Currently, there are highly effective treatment options against this infestation. An effective response to a correct anti-acaricidal treatment in an animal with a clinical picture compatible with sarcoptic mange, can be used as a diagnostic tool. The allergic reaction against the parasite delays the resolution of the clinical signs and can make the diagnosis difficult, though.

The author recommends to confirm the diagnosis by serology, when it has not been possible to find the parasite in skin scrapping. This simple test allows you to make the diagnosis, give a good prognosis and assure the efficacy of the treatment. That is of great benefit to the animal, the owner and the veterinarian.

4. Sarcoptes PCR

Based on skin scrapings, the *Sarcoptes* PCR test is an easy to use, highly specific, technically sensitive and simple test to identify *Sarcoptes scabiei* infestation[15]. A positive test result is diagnostic.

5. Skin biopsies

When submitting skin biopsies for pathology, it is only diagnostic if the parasite itself is observed in the stratum corneum of the epidermis. There are no pathognomonic lesions for this infestation, when the parasite is not there. Furthermore, the histopathological pattern is more or less the same as that of an allergic dermatitis[16]. The sensitivity of the biopsy is as low as that of skin scrapings and is not recommended for the diagnosis. The low sensitivity cannot justify the invasiveness and the cost of the technique.

Prognosis

If the diagnosis is made, prognosis is good, provided of course that a correct treatment is prescribed.

Treatment

The affected animal, as well as all contact mammals, must be treated (including cats, rabbits, ferrets …).

Drugs for treatment are:

Isoxazolines have demonstrated their efficacy against infestation in many studies[17,18]. Schedule and dose after the indications of the prospect of the molecule, but for at least 2-3 months. Afoxolaner and

Sarolaner are registered for the treatment of sarcoptic mange in dogs in Europe.

Topical Selamectin and Moxidectin every 2-3 weeks, at least 3 doses, are also effective drugs [19,20,21,22] . The dog must not be bathed 2 days before and after the application of the spot-on

Other ectoparasitic drugs do not have the high effectiveness as the previous ones and therefore not recommended. In earlier days, macrocyclic lactones were used, but with the development and registration of new and safe drugs, they must not be used as they can have severe adverse effects and are not registered for use in dogs.

Supportive therapies

Therapeutic baths that hydrate and soothe the skin and help to eliminate scabs, scales and parasites (remember that they act as allergens) are always recommended.

Antipruritic treatment should always be performed to control the itch and the inflammation of the skin. Following the acaridal treatment, pruritus will decrease, but the death of the parasites may increase pruritus during the first days of treatment. The duration of the antipruritic therapy depends on the individual animal. Usually it is not needed for more than one week, but in some cases, the chronic pruritus and the allergic factor makes them require antipruritic treatment for weeks.

Conclusions

- Canine sarcoptic mange is a current and frequent disease that causes pruritus and makes both the animal and its owner very unhappy.
- It can easily be mistaken for allergic disease.
- High titres of antibodies against dust mites can be found in dogs with sarcoptic mange. These findings can lead to misdiagnosis if the diagnostic protocol of atopic dermatitis is not correctly followed.
- A fast and accurate diagnosis is mandatory, it will ensure the prognosis and the efficacy of treatment.
- The first step of the diagnosis of a pruritic patient, is to rule out a possible parasitic disease such as sarcoptic mange.
- All mammals in contact with the affected animal (e.g. dog, cat, rabbit) must be treated. They can act as reservoirs and make the resolution of the problem difficult.

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