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A retrospective evaluation of efficiency in therapy for generalized canine demodicosis

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ABSTRACT

During the period 1993-2003, generalized demodicosis was diagnosed in 517 dogs. Two hundred and sixty-five (51.2%) dogs were cured with amitraz 0.025% solution, 199 (38.5%) were cured after amitraz 0.05% solution was introduced, and in 53 dogs (10.3%) mites were amitraz resistant. Among amitraz-resistent dogs, 48 were introduced to 600 μg kg^{-1} oral ivermectin protocol, and 45 (89.6%) of this number were successfully cured. Outcome data were lacking or were insufficient for 5 (10.4%) dogs. No ivermectin resistance was recorded. According to the data of our retrospective therapy evaluation, we anticipate an increase in cases of amitraz-resistant generalized canine demodicosis.

Key words: dog, demodicosis, amitraz, ivermectin

Introduction

Canine demodicosis (demodectic mange, follicular mange, red mange) is a common parasitic skin disease resulting from excessive proliferation of the mite Demodex canis within the hair follicles (SCOTT et al., 1995).

Two clinical forms of the disease, localized and generalized, have been recognized. Localized demodicosis occurs most commonly in young dogs of less than one year of age, and spontaneous remission occurs in most patients (MUELLER, 2004). The disease is considered to be generalized when a dog has five or more localized lesions, when an entire body region (e.g., facial area) is involved, or where the complete involvement of two or more feet occurs (SCOTT et al., 1995).

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Demodicosis in dogs is usually treated topically with amitraz, although this therapy sometimes fails. Recommended treatment protocols vary from 0.025% amitraz rinses used every 2 weeks in the U.S.A. (MULLER, 1983; SCOTT et al., 1995) to 0.05% weekly in Germany and Australia (FARMER and SEAWRIGHT, 1980; HAMANN et al., 1997). The success rate of amitraz therapy in canine demodicosis varies from 0 to 92% (KWOCHKA et al., 1985; SCOTT and WALTON, 1985; MEDLAU and WILLEMSE 1995). Adverse effects with amitraz therapy include depression, (KWOCHKA et al., 1985; SCOTT and WALTON, 1985), sleepiness (MULLER, 1983), sometimes ataxia and polyphagia/polydipsia (KWOCHKA et al., 1985).

In attempts to develop therapeutic alternatives for dogs with generalized demodicosis that do not respond to amitraz, ivermectin appears to have shown the greatest potential in terms of efficacy and cost effectiveness.

Oral ivermectin at a dosage of 350 μg kg^{-1} daily has cured only 30% of dogs (FONDATI, 1996). At a daily oral dosage of 600 μg kg^{-1} ivermectin has been shown to be 100% effective in treating dogs with generalized demodicosis (PARADIS and LAPERRIERE, 1992). Adverse effects in all of these studies were rare (PARADIS and LAPERRIERE, 1992; RISTIC et al., 1995), but severe adverse effects of ivermectin were reported in collies (PULLIAM et al., 1985; PAUL et al., 1987).

However, acute severe toxicity may develop in an individual of any breed (MUELLER, 2004) and it must be emphasized that the use of ivermectin in dogs is extra-label.

The aim of our study was to evaluate our results in the therapy of generalized demodicosis during the past 10 years, and to determine if other protocols should be established.

Materials and methods

A retrospective evaluation of the efficiency of therapy in canine generalized demodicosis was performed. During the period 1993-2003, generalized demodicosis (Figs. 1, 2 and 3) was diagnosed in 517 dogs. Breed, age, sex, and treatment protocols were recorded.

Affected skin was scraped with a dermal curette by a deep-skin scraping in the direction of hair growth until capillary bleeding occurred. The skin was firmly squeezed prior to and during the scraping to extrude mites from the hair follicles. Laboratory data were based on direct microscopy of skin scrapings in glycerine (Fig. 4).

Generalized demodicosis was considered amitraz-resistant when the prescribed topical amitraz rinses with 0.025% amitraz every 14 days failed (1 ml of a liquid concentrate containing 12.5% amitraz /Tactic®, Hoechst/ in ½ l of tap water), and afterwards failed to cure at 0.05% concentration (2 ml of Tactic® in ½ l of tap water) once a week. The very first evaluation of the therapy was performed 3 weeks after the beginning, and from then

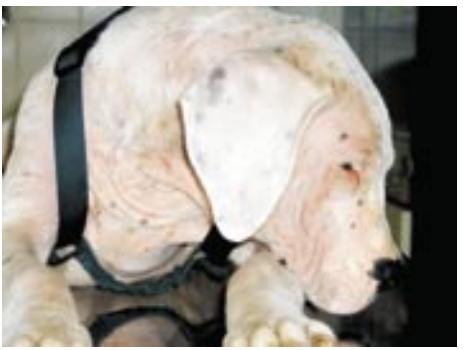

Fig. 1. "Red mange" in a "dogo argentino" puppy. Generalized erythema, folliculitis and alopecia.

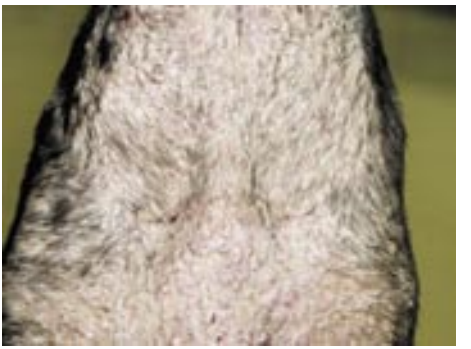

Fig. 2. Follicular papules, pustules, crusts, hyperpigmentation and alopecia over the ventral neck and chest of a young Doberman with generalized demodicosis

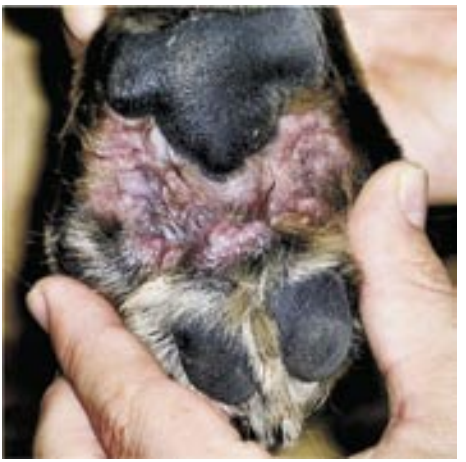

Fig. 3. Pododemodicosis in an adult German shepherd. Interdigital and plantar involvement.

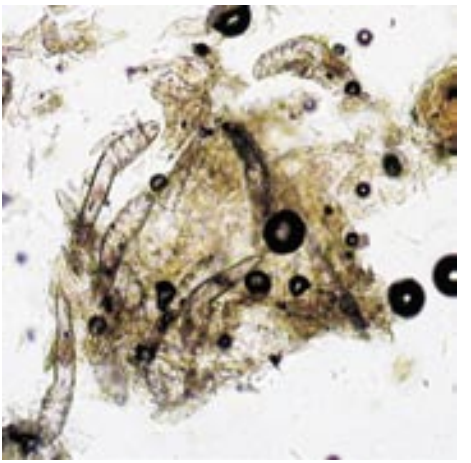

Fig. 4. Large number of adult mites in a skin scraping (x 400)

on evaluation was repeated fortnightly. Doses and protocols were suited to each individual animal according to the level of improvement.

For treatment of amitraz-resistant generalized demodicosis in dogs, oral ivermectin (Iverktin ® 1%, Veterina d.o.o.) at a dose of 600 μg kg^{-1} daily was used. The dose was gradually increased from 50 μg kg^{-1} body weight on day one, 100 μg kg^{-1} on day two, 150 μg kg^{-1} on day three, 200 μg kg^{-1} on day four, 300 μg kg^{-1} on day five, to the final dose of

600 μg kg^{-1} on day six. This dose was continued daily and the first evaluation of the therapy was performed 10 days after the initiation of the final dose, and afterwards fortnightly until the resolution of demodicosis.

If the clinical status was found to worsen at a check-up, the next step of switching to another therapy option was immediately initiated. Moreover, if the clinical status was found unchanged (without worsening, but without any benefit) at two consecutive check-ups, the next therapy option was initiated.

A remission was declared when patients were clinically normal, and skin scrapings from three sites where mites had been previously identified were negative. An animal was considered cured if it remained clinically normal for 1 year after the last amitraz rinse or administration of ivermectin.

Results

Generalized demodicosis was more frequently diagnosed in purebreds and their crosses than in mongrel dogs. The data for these dogs with regard to sex and age are shown in Table 1.

Table 1. Number of dogs with generalized demodicosis under treatment, according to breed, sex and age

	Breed		Sex		Age (months)			
	purebred or cross-breed	mongrels	male	female	<12	12-18	19-24	>24
N = 517	406 (78.6%)	111 (21.4%)	266 (51.4%)	251 (48.6%)	206 (39.8%)	201 (38.8%)	96 (18.5%)	14 (2.7%)

Male dogs represented 51.4%, bitches 48.6% of the total dogs under treatment.

Within the group aged up to 12 months there were 206 (39.8%) animals. In the group aged between 12 and 18 months there were 201 (38.8%) animals. Within the group aged between 19 and 24 months there were 96 (18.5%) animals. In the group aged more than 24 months there were 14 (2.7%) animals.

In Table 2, rows present the total number of animals that had been under therapy in each year during the period 1993-2003. In columns, three groups of animals can be identified from the results of two treatment protocols. In Group 1 are 265 (51.2%) dogs that were cured with 0,025% amitraz rinses. In Group 2 are 199 (38.5%) dogs that failed to be cured with 0.025% amitraz, but which were finally cured with 0.05% amitraz. Group 3. represents 53 amitraz-resistant animals (10.3%).

Table 2. Groups formed according to results in amitraz-protocols

Year	Total	Group 1	Group 2	Group 3
		Cured with amitraz 0.025%	Cured after amitraz 0.05% introduction	Amitraz resistant
1993	51	38 (74.5%)	11 (21.5%)	2 (3.9%)
1994	58	41 (70.6%)	12 (20.6%)	5 (8.6%)
1995	60	42 (70%)	15 (25%)	3 (5%)
1996	59	38 (64.4%)	16 (27.1%)	5 (8.4%)
1997	58	33 (56.8%)	19 (32.7%)	6 (10.3%)
1998	49	23 (46.9%)	20 (40.8%)	6 (12.2%)
1999	43	16 (37.2%)	22 (51.1%)	5 (11.6%)
2000	37	14 (37.8%)	20 (54%)	3 (8.1%)
2001	35	10 (28.5%)	20 (57.1%)	5 (14.2%)
2002	33	5 (15.1%)	23 (69.6%)	5 (15.1%)
2003	34	5 (14.7%)	21 (61.7%)	8 (23.5%)
	517	265	199	53

Table 3. Dogs introduced to ivermectin therapy

Year	A	B	C	D
	Oral ivermectin 600 μg kg^{-1}	Cured	Ivermectin resistant	Lost
1993	1	1	0	0
1994	4	3	0	1
1995	3	3	0	0
1996	4	3	0	1
1997	6	6	0	0
1998	5	4	0	1
1999	5	5	0	0
2000	3	3	0	0
2001	4	4	0	0
2002	5	4	0	1
2003	8	7	0	1
	48	43 (89.6%)	0	5 (10.4%)

In Table 3, Group A represents 48 amitraz-resistant dogs introduced to the ivermectin protocol. In Group B are shown 43 (89.6%) dogs successfully cured with ivermectin. Five (10.4%) dogs, represented in Group D, were considered "lost" because the outcome data were lacking or insufficient.

Discussion

Canine demodicosis is a common skin disease of dogs in which proliferation of *Demodex canis*, an acarine parasite of canine hair follicles, is associated with the development of cutaneous lesions (SCOTT et al., 1995). The disease is often localized to one or more discrete foci that regress spontaneously, or it may progress to widespread generalized cutaneous lesions. The initial lesions include alopecia and scale formation, but secondary bacterial infection often induces pustular and crusting dermatitis. According to SCOTT et al. (1995), pododemodicosis is also considered generalized demodicosis, regardless of the lack of lesions on other parts of the body.

Although a wide range of products have been used to treat generalized demodicosis, in the last two decades topical amitraz and systemic macrocyclic lactone ivermectin have been reported several times when evaluating various dosages and protocols (MULLER, 1983; HAMANN et al., 1997; MUELLER et al., 1999; FONDATI, 1996; SCOTT and WALTON, 1985; PARADIS and LAPERRIERE, 1992; MEDLAU and WILLEMSE 1995; MUELLER, 2004).

During the early 1990s it was observed at the Department for Parasitology and Parasitic Diseases, Faculty of Veterinary Medicine, Zagreb, that therapeutic protocol with 0.025% amitraz fortnightly rinses for canine generalized demodicosis had sometimes failed, regardless of the duration of the therapy. In 1992, weekly rinses with 0.05% amitraz were introduced, with some apparently resistant cases being cured. However, there was no improvement in several patients and in 1993 we decided to suggest oral ivermectin use at a daily dose of 600 μg kg^{-1}. Furthermore, in each successive year we noticed an increasing number of cases resistant to 0.025% amitraz, while the number of amitraz-resistant-at-all generalized demodicosis continued to increase (Table 2). Daily therapy with 600 μg kg^{-1} ivermectin orally was proposed to all owners whose dogs were presumed to be amitraz-resistant (Table 3). Some refused the extra-label therapy, and others never brought the animal in for a check-up during therapy. Such animals were considered "lost", although it is quite possible that some animals were cured, and the therapy was discontinued at the owner's decision. All dogs whose owners continued with the routine checkups were eventually cured, and no ivermectin resistance was recorded (Table 3). Moreover, no ivermectin toxicity was observed (except slight mydriasis and drooling in two dogs, a Doberman and a mongrel, respectively). Collies and their crosses were not challenged. Pruritus was very often recorded during the first few weeks, which is also the case after amitraz rinses, and occurs regularly in animals responding well to therapy. A relatively

frequently recorded amitraz adverse effect was transient sedation after rinses in miniature breed puppies. A Husky bitch developed head and neck oedema, and she was immediately switched to the ivermectin protocol.

It should also be emphasized that during the last few years we have resolved only a few cases of generalized demodicosis with 0.025% amitraz fortnightly rinses (Table 2); we propose abandoning this protocol in therapy. Exceptionally, this concentration might be in use weekly in very young or miniature dog breeds. Weekly 0.05% amitraz rinses should be introduced at the commencement of therapy, while in the case of an amitraz-resistant demodicosis, ivermectin protocol should be proposed to the owner.

According to the data from our retrospective therapy evaluation, we anticipate an increase in amitraz-resistant generalized demodicosis cases.

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SAŽETAK

U razdoblju od 1993. do 2003. generalizirana demodikoza bila je dijagnosticirana u 517 pasa. Izliječeno je bilo 265 pasa (51,2%) 0,025 postotnom otopinom amitraza, 199 (38,5%) 0,05 postotnom otopinom amitraza, a u 53 psa (10,3%) uzročnik je bio otporan na amitraz. Od 48 pasa u kojih je uzročnik bio otporan na amitraz, 45 (89,6%) ih je bilo izliječeno ivermektinom u dozi 600 μg kg^{-1}. Za 5 pasa (10,4%) nedostaju podaci. Nije zabilježena otpornost uzročnika na ivermektin. S obzirom na navedene podatke i nadalje se očekuje porast otpornosti uzročnika na amitraz.

Ključne riječi: pas, demodikoza, amitraz, ivermektin