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Successful Management of Mixed Infestation with Generalised Malasseziosis, Demodicosis and Pyoderma in a Pug Puppy

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Abstract

A 6 months old pug puppy breed was brought with poor general health condition, alopecia, crusted lesions, pruritis, skin scales and moist skin folds. Based on clinical and laboratory examinations it was diagnosed as mixed infection of malasseziosis, demodicosis and pyoderma and treated with oral ivermectin, ketoconazole, and amoxicillin/clavulanic acid and atarax tablets and along with these, used amitraz, kiskin and imidectin spot on as topical applications with ketochlor shampoo and supportive medications. After 60 days of treatment, the animal was perfectly normal *i.e.*, two successive deep skin scraping examinations yielded no mites, and no yeasts on staining examination, and no microbial growth on culture media, considered complete recovery from malasseziosis, demodicosis and pyoderma.

Keywords: Malasseziosis • Demodicosis • Pyoderma • Amoxicillin/clavulanic acid • Imidectin spot on

Introduction

Nowadays concurrent occurrence of mixed infection by yeast, mite and bacteria are becoming common among pet dogs [1]. This may be due to the unhygienic management and complications post demodicosis. Due to itching and scratching by mite infestation, skin is predisposed to bacterial invasion and hence development of pyoderma. Malassezia spp. Is a commensal lipophilic yeast and a cutaneous microflora of most warm blooded animals. These may suddenly act as oppurtunistic pathogens causing dermatitis or otitis in dogs [2]. A change in skin environment, such as increased sebum or moisture, or alteration of epidermal defense system, genetic predisposition, immunodeficiency disorders and long term exogenous corticosteroid and antibiotic administration predisposes to Malasezzia infections [3,4]. Canine demodicosis is an inflammatory parasitic skin disease caused by a proliferation of host specific follicular mite of the genus Demodex. This disease allows the mite to proliferate in the hair follicles and sebaceous glands leading to alopecia, erythema, scaling, hair casting, pustules and secondary infections. Infection is acquired either from infected animal or objects or following immunosuppressive conditions or treatments, or may be related to a genetic immune deficiency [5,6]. The parasite is not considered contagious except during a few days after birth, when puppies acquire mites through direct skin contact from their mother. Canine demodicosis can be divided into two types: Localized and generalized according to the extent of lesions.

The localized form appears as small patches of alopecia and mild erythema in young dogs and it generally regresses spontaneously without treatment. Whereas, generalized form is more severe and can even be fatal and may develop from the localized condition or occur in older animals, especially those undergoing severe stress or with underlying diseases. It requires prolonged treatment therapy [7]. Canine demodicosis can be a challenge to treat due to several factors such as recurrence of disease after treatment, progression to generalized form, immunosupression and treatment duration. Lymphadenopathy is commonly associated with the disease and secondary bacterial infections are very frequent [8, 9]. The diagnosis is typically based on clinical signs and is confirmed by the presence of mites in deep skin scrapings. Although *Demodex* mites are part of the normal microfauna, it is uncommon to find the mites, even by performing several deep skin scrapings. If a mite is found, this should raise suspicion and additional skin scrapings should be performed. Finding more than one mite is strongly suggestive of clinical demodicosis and a high number of *Demodex* spp. [10]. Mites within follicles and sebaceous glands cause canine demodicosis [11]. Dogs suffer from a variety of skin infections; canine pyoderma is one of the most common diseases. Pyoderma literally means pus in the skin and can be caused by infectious, inflammatory, and/or neoplastic etiologies; any condition that results in the accumulation of neutrophilic exudates can be termed pyoderma. Most commonly, however, pyoderma refers to bacterial infections of the skin.

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Pyoderma classified according to the depth of infection into surface, superficial and deep pyoderma. Surface pyodermas are those infections that are restricted to the surface of the skin and not extended into the follicle; it does not extend deeper than the stratum corneum or into hair follicle. Superficial pyodermas include infections that involve the hair follicle but do not extend into the dermis. Deep pyoderm are infections that extend into the dermis and underlying panniculitis. Pyoderma is caused most frequently by staphylococci as primary and or concurrent infection of demodicosis and yeast dermatitis [12].

Materials and Methods

The present investigation was carried out in the diagnostic laboratory, department of veterinary clinical complex, college of veterinary science, Rajendranagar, Hyderabad with a history of skin lesions associated with pruritus. Detailed clinical examination revealed poor general health condition, thickening of skin, moist skin folds, skin scales, alopecia, crusted lesions, erythema and pyoderma (Figure 1).

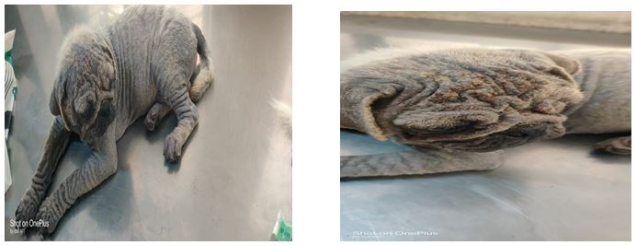

Figure 1. Affected animals suffering from *Malasezia*, demodicosis and pyoderma pre-treatment.

Laboratory examination done with deep skin scraping, field staining, culture swab and haematological analysis (Table 1).

Haematological analysis			
Parameters	**Before treatment**	**After treatment**	**Normal ranges**
Hemoglobin (g/dl)	13.4	15.2	12-18
PCV (%)	34	42	37-55
RBC (10^6/µl)	4.86	5.2	5.5-8.5
Platelets (10^3/µl)	1.96	2.56	200-500
WBC (10^3/µl)	21.6	16.33	6-17
Neutrophils (%)	96	82	55-80
Lymphocytes (%)	30	32	12-30
Monocytes (%)	2	3	3-10
Eosinophils (%)	6	2	2-10
Basophils (%)	0	0	0-1

Table 1. Haemotological parameters of affected dogs.

Before collection of skin scraping, the scalpel blade was dipped in liquid paraffin and collection of scrapings was continued until there was slight ooze of blood from dermal capillaries. Material was digested with 10 ml of 10% KOH put under flame for five minutes. It was centrifuged under 10000 RPM for 5 minutes and discarded the supernatant. A drop of sediment was taken on a microscopic slide, placed the cover slip and examined less than 10X of microscop, and for cytology used field staining for identifying of microorganisms under 100X of microscope [13]. And isolated *Staphylococcus* organisms by using of mannitol salt agar from skin followed by antibiotic sensitivity test.

Results and Discussion

Microscopic examination of skin scrapings, cytology staining, and culture examination revealed *Demodex canis* mites, *Malasezia* yeasts and *Staphyococcus* organisms respectively., Based on the clinical history and laboratory findings, the present case was diagnosed as mixed infection with *Malasezia* yeast (Figure 2), *Demodex canis* (Figure 3). And *Staphylococcus* bacteria (Figure 4).

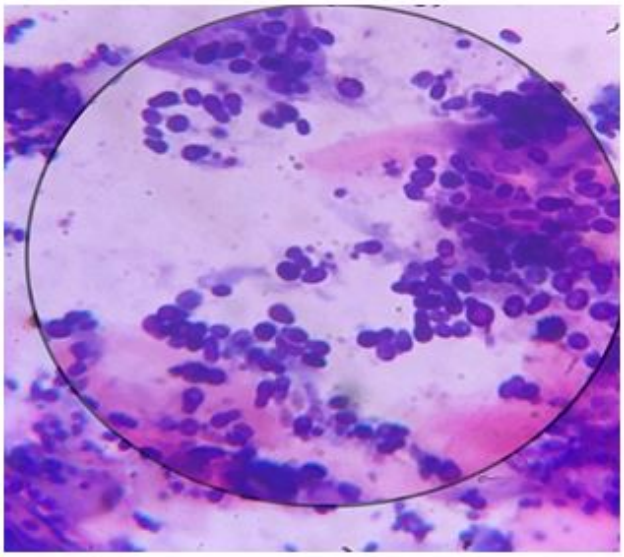

Figure 2. *Malasezia* organisms under microscope, 100X.

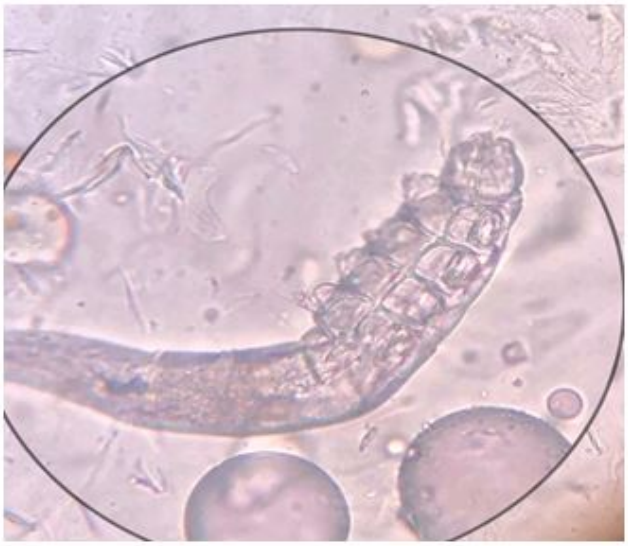

Figure 3. *Demodex canis* (10X) in skin scraping of affected animals.

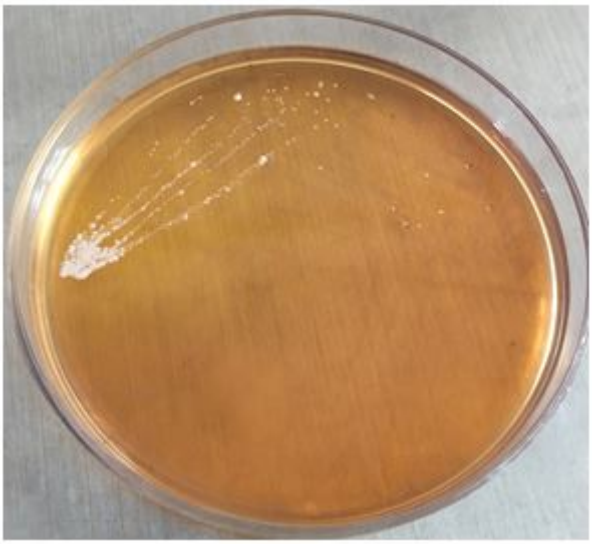

Figure 4. Growth of *Staphylococcus* organism on MSA.

Complete blood picture revealed elevated white blood cell counts. Affected dogs were treated with Inj. Chloril at 2 mg/ kg body wt I/M for 5 days. Oral medications with TOXO-MOX (Amoxicillin/clavulanic acid) –250 mg, ½ tablet daily for 14 days, tab: Neomec-6 mg at 200 µg/kg b.wt for 10 days as alternatively, tab: Atarax (Anti-histamine) -10 mg, ½ tablet daily for 14 days, tab: ketoconazole-200 mg, ½ tablet daily for 14 days, advised pet ben and ketochlor shampoo combinedly for bathing, twice weekly for removal of crusts and debris, followed by two doses of imidectin spot on as 15 days interval., topical application of 0.05% Amitraz solution as weekly once for 2 weeks and Kiskin cream two times in daily for 21 days. Supportive therapy with livocare syrups, 4 ml BID for 1 month and drools absolute salmon oil syrup, 4 ml BID for two months. After one month of therapy, the general skin condition was improved and pruritus, pyoderma controlled. Microscopic examination of skin scrapings revealed decreased number of mites, and yeasts on staining under microscope [14,15]. Complete disappearance of yeasts and mites and re-growth of hair was noticed after two months of therapy (Figures 5 and 6).

Figure 5. Isolated *Staphylococcus* sensitive to amoxycillin +clavulanic acid.

Figure 6. Clinical improvement of animal 30 days after treatment.

Malasezia pachydermatis belongs to the resident flora in various mammals and birds. However, it may also cause diseases, especially otitis and dermatitis, as an opportunistic pathogen [16]. Two mechanisms that have been suggested to trigger overgrowth of the yeast are alterations in host defense mechanisms and changes in the cutaneous microenvironment. A disrupted epidermal barrier renders the skin more prone to bacterial and yeast infections. Diseases that can cause a decrease in cutaneous barrier function and are commonly associated with *Malassezia* dermatitis are hypersensitivity diseases (especially atopic dermatitis), parasite infestation and keratinization disorders [17,18]. Shipstone, proposed that the critical factors for the appearance of demodectic mange are genetic predisposition of breed and/or immunosuppressive conditions. Localized demodicosis is a common mild and benign self-limiting disease, however the generalized form initiates with the progression of multifocal, erythematous, partially alopecic, crusted macules that eventuate in plaques and can be life threatening if left untreated.

In the present case for treating Malasseziosis, Demodicosis and pyoderma, we used oral ketoconazole, ivermectin and amoxicillin/clavulanic tablets, respectively. Amoxicillin/clavulanic acid has an increased spectrum of activity against gram-negative bacteria due to the presence of the "suicide" drug, clavulanic acid. Clavulanic acid irreversibly binds to f-lactamases, allowing the amoxicillin fraction to interact with the bacterial pathogen. This combination usually has excellent bactericidal activity against, B-lactamase-producing *Staphylococci*, *E. coli, Klebsiella* spp., *Pseudomonas* spp., *Enterobacter* spp, Pencillins have greater stability to lactamases. So they have greater activity against *Staphylococci* and gram negative bacteria [19]. Ketoconazole is the most commonly used drug. As with all azole derivatives, Ketoconazole acts in binding to cytochrome P450, which inhibits synthesis of ergosterol, an important component of fungal cell membrane. This results in alterations of cellular permeability and activity of various membrane enzymes. Ketoconazole also has anti-inflammatory properties through an action on leukotriene synthesis and it has an action on keratinisation process through an action on all Trans' retinoic acid. Amitraz acts by inhibiting monoamine oxidase and prostaglandin synthesis and by stimulating the alpha 2 adrenergic receptors of the arthropod nervous system. Treatment protocols vary according to the extent and severity of lesions. Whole body rinses to topical treatment of localized lesions at different concentrations and intervals. Using of combination therapy with Ivermectin and Amitraz gives good efficacy for mangement of generalized demodicosis. We also noticed good results with Imidacloprid Moxidectin spot on and it's very effective for management of generalized demodicosis.

Conclusion

Puppy was completely recovered clinically within 60 days. It can be concluded from the present study that combined infection of malasseziosis, demodicosis and pyoderma can be effectively controlled by oral medications with TOXO-MOX (Amoxicillin/clavulanic acid), ivermectin and ketoconazoles, followed by topical application of Amitraz, kiskin and imidectin spot on with petben and ketochlor shampoos. In conclusion, it is extremely important to critically evaluate dermatological disease during each examination with the proper baseline diagnostic testing. It is also essential to understand the risks, benefits and possible side effects of all therapies administered when creating a long-term treatment.

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