CANINE PEDIATRIC DERMATOLOGY

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We are going to speak about diagnosis and treatment of skin diseases in dogs presented before maturity, usually before reached its first year old, with the exceptions of giant breeds (15-18 months of age).

HOW TO MAKE A CORRECT PEDIATRIC DERMATOLOGICAL DIAGNOSIS?

To make a correct Pediatric Dermatological Diagnosis, clinicians should to follow the next three steps: establish a lesional pattern, formulate a differential diagnosis, and perform the correct diagnostic tests.

ESTABLISH THE LESIONAL PATTERN

First at all we should be able to recognize primary and secondary lesion during a deep clinical examination and associate them with the predominant morphologic pattern. It is very important and not easy to describe correctly the skin condition because we need an accurate description in order to do pattern diagnosis effectively. It is absolutely necessary to differentiate a scale from a crust, a papule from a pustule or a vesicle. That means, the Veterinary must to recognize with precision different types of lesions because without that important part of the diagnostic protocol an accurate diagnosis is impossible.

Primary skin lesions: macule, patch, papule, plaque, pustule, vesicle, bulla, wheal, nodule, tumor, and cyst.

Secondary skin lesions: epidermal collarette, scar, excoriation, erosion or ulcer, fissure, lichenification, callus.

Lesions that may be primary or secondary: alopecia, scale, crust, follicular casts, comedo, pigmented abnormalities.

After asking specific questions in a methodic order (clinical history) and after a physical examen of the skin, we can select the predominant lesion pattern between the eight major categories:

- Pigmentary dermatosis
- Vesiculo-pustular dermatosis
- Papule-nodular dermatosis
- Alopecic dermatosis
- Erosive-ulcerative dermatosis
- Exfoliative dermatosis
- Indurative dermatosis
- Maculo-papular dermatosis

FORMULATE A DIFFERENTIAL DIAGNOSIS LIST

Once we had determined what is the corresponding lesional-pattern to our case, we can made a differential diagnosis list, considering the relation of skin diseases that can affect dogs less than one year of age

- Pigmented Pattern ➔ histiocytoma, demodicosis (red), vitiligo, tyrosinemia (white),
- Vesicle - pustular pattern ➔ dermatomyositis, epidermolysis bullosa, demodicosis, dermatophytosis, muzzle forunculosis, adverse food reactions.
- Papule-nodular pattern ➔ dermatomyositis, dermatophytosis, juvenile cellulitis, leishmaniasis, viral papillomatosis, histiocytoma.
- Alopecic pattern ➔ demodicosis, bacterial pyoderma, dermatophytosis, cutaneous asthenia, cheyletiellosis, lice infestation, color dilution alopecia, leishmaniasis.
- Erosive-ulcerative pattern ➔ fleas, demodicosis, sarcoptic mange, leishmaniasis, dermatomyositis, cutaneous asthenia, epidermolysis bullosa
- Exfoliative pattern ➔ ectoparasitism, demodicosis, dermatophytosis, leishmaniasis, zinc-responsive dermatosis, tyrosinemia, ichthyosis.
- Indurative pattern ➔ urticaria, juvenile cellulitis, bacterial granuloma.
- Maculo-papular pattern ➔ allergy (atopy, food adverse reaction), endoparasite infection, ectoparasite infestation, bacterial folliculitis, dermatophytosis, muzzle forunculosis.

PERFORM DIAGNOSTIC TESTS

Depending of the differential diagnoses list inside the skin-lesion-pattern we can decide which diagnosis test to perform becomes more convenient.

Skin scraping, cytology (impression smears, fine-needle aspirate), cultures for dermatophytosis, and histopathology, are the most useful diagnostic procedures (minimum database) for diagnosis in the first step. If the cause has not been found at this level, tricogram, complete blood count, biochemistry, urinalysis, cultures and antibiotic sensitivity could be next selected tests to perform.

WHAT ARE THE MOST IMPORTANT CAUSES OF CUTANEOUS DISEASES IN CANINE PEDIATRIC PATIENTS?

External parasites are very frequently causes of skin diseases in young dogs: canine demodicosis, otodectic mange, sarcoptic mange, flea infestation, cheyletiellosis, and ticks infestation are most common.

- Canine Demodicosis. Is an inflammatory parasitic skin disease characterized by an excessive proliferation of Demodex canis mites within the hair follicles. An inherited or acquired immune defect is thought to be involve and there are breed predilection (Shar-pei, Wetterrier, English bulldog, Scottish-terrier, Great Dane). Canine demodicosis is classified as localized or generalized according to the extent of the disease, as the course and prognosis of the two types of demodicosis are vastly different. Canine localized demodicosis is a benign disease, the presence of secondary pyoderma and pruritus is rare, and most cases resolve spontaneously before 8 weeks. The use of acaricides does not seem to alter the course of canine localized demodicosis. Canine generalized demodicosis is one of the most severe canine skin diseases and one of the
most frustrating dermatosis to treat. Canine generalized demodicosis has a guarded prognosis and euthanasia was common in past, but today with the use of adequate and intense treatment 90% of the cases can be cured. Both generalized and localized demodicosis onset during puppyhood. **Diagnosis** by skin scrapping and histopathology. **Treatment** should be considered underling immunosuppressive diseases and exacerbating drug as corticosteroids. An elevated number of cases of generalized demodicosis involve a secondary bacterial skin infection, which requires administration of systemic antibiotics for several weeks joint with the acaricidas treatment. Acaricide treatment used in Spain included topical amitraz (0.025-0.075% dilution weekly baths) or daily oral administration of ivermectin (0.6 mg/kg), milbemicyn oxime (1-2 mg/Kg), or moxidectin (0.4 mg/Kg). The average treatment duration with these oral alternatives is 4 months (range of 3 to 10 months).

**Fleas infestation.** Fleabite hypersensitivity is not commonly reported in young animals, but fleas infestation can be a serious health risk to young dogs. Fleas can carry various disease agents as tapeworms, plague, *Pasteurella spp*, *Bartonella spp*, or tularemia. In puppies, anemia could also result as consequence of serious flea burden. Flea control in a pediatric patient should be establish with care because the potential risk of some insecticides. New products have been developed in the last years that are less toxic than organophosphates and organochlorines. Today we know that treat immature forms of fleas is an important point in the fight against them (insect growth regulators as pyriproxifen, methoprene, fenoxicarb; insect development inhibitors such as lufenuron). To kill adult fleas, insecticides that combine residual protection with safety should be choused (imidacloprid, fipronil). Pyrethrins and pyrethroids have even quicker knockdown effects but less residual activity. Indoors, for control immature forms, we can use pyrethrins and insect growth regulators or borates with safety. Outdoors, organophosphates such as diazinon and chlorpyrifos can be an alternative, but must be used cautiously to avoid danger to pets and household members.

**Otodectic mange.** Is a very common disease in young pups. *Otodectes* species live on the surface debris in the ear canal and on the skin surface and can induce pruritus or to be asymptomatic. **Diagnosis** by otoscopy visualization or by microscope examination of the canal exudate can be done. The mites live in the auricular canal but can leave it and travel across the body surface. Then, it should be necessary the application of an adequate insecticide on the whole body surface of the affected animal and all in-contact pet (fipronil ). Other alternatives: ivermectin (0.2-0.4 mg/kg, PO, q 14 days, 2 times), milbemicyn oxime (2 mg/kg, PO, q 14 days, 2 times) and selamectin (three times, every two weeks). The treatment must continue for at least 4 weeks (life span mite is 3 weeks).

**Bacterial skin infections** are frequent in young dogs. Impetigo and superficial bacterial folliculitis are most important superficial pyoderma affecting pediatric dogs.

- **Impetigo** is characterized by subcorneal pustules that affect hairless areas of the skin. It is not contagious and appears before puberty. In half per cent of the cases impetigo has been demonstrated secondary to parasitism, viral infection, a dirty environment, immunomediated disease, or poor nutrition. Pruritus is uncommon. Impetigo may regress spontaneously, but therapy can contribute to healing the process. Topical therapy (mupirocin, chlorhexidine, ethil-lactate) can be effective. Benzoyl peroxide should be used carefully because skin of puppies is easily irritated by this substance. Concomitamment to therapy, we should check health management procedures to eliminate debilitating factors that may have inmited the onset of the disorder.

- **Superficial bacterial folliculitis** is an infection limited to the superficial portion of the hair follicle caused in most cases by *Staphylococcus intermedius*, although other bacteria may be involve. Usually is a secondary infection to local trauma, bruising or scratching, seborrhea, demodicosis, hormonal factors, local irritants or allergies. The three most common etiologic agents in canine folliculitis are *Staphylococcus intermedius*, dermatophytes and *Demodex canis*. Multifocal alopecia and papular-pustular lesions with follicular orientation are clinical features characteristic for the three diseases. Skin scraping, hair examination, and fungal cultures should be performed to rule out other causes of folliculitis. Cytologic samples should be evaluated. Degenerative neutrophils, cocci, and evidence of bacterial phagocytosis may be seen by microscopic observation and permit to confirm the diagnosis. Skin biopsies may be necessary to define the problem. A special diagnostic effort should be done to determine underlying causes of the infection. Clinical management needs 3-4 weeks course of antibiotic. Appropriate antibiotics to choose when treating first occurrence pyoderma could be: clindamycin (5,5 mg/kg q 12 h.), erythromycin (15 mg/kg q 8h.), tylosin (20 mg/kg q 12h), lincomycin (22 mg/kg q 12h), Oxacilllin (20 mg/kg q 8h), cephallexin (20 mg/kg q12h or 30 mg/kg q 24h), amoxicillin-clavulanate potassium (15 mg/kg q 12h), trimethoprin-sulfadiazine (15-30 mg/kg q12h). Administer the optimal doses is mandatory. If it is not available, to overdose is better than underdose. Most prescribed antibiotics are relatively safe. Nevertheless, virtually all antibiotics occasionally could cause vomitting or diarrhea. Doberman pinscher breed is at high risk for drug reaction to sulfonamides. Enrofloxacin should not be used in young growing dogs because it may damage articular cartilages. Erythromycin is more likely to produce vomitting initially. Long term use of sulfonamides could produce keratoconjutivitis sicca.
Allergic disease. The most frequent allergic dermatitis presented in puppies are atopic dermatitis and cutaneous adverse food reaction.

- **Atopic dermatitis** is a genetically predisposed inflammatory and pruritic skin disease with characteristic clinical features. It is associated with IgE antibodies to environmental allergens including dust mites, pollens, mold spores, dander, insects and other miscellaneous allergens. Is a common disease in dogs (10-15% of the dogs are affected by atopic dermatitis). Clinicians should suspect the disease in dogs that present with common problems such as pruritus, bacterial folliculitis, Malassezia dermatitis, and otitis externa. Three criteria must be met to diagnose atopic dermatitis: 1) there must be a suggestive history, 2) must be present typical clinical sings, and 3) a differential diagnosis must have been rule out. Neither skin test, nor serum allergy tests specifically detect allergy. Pruritus is the outstanding feature in most dogs with atopic dermatitis. Involvement of the one or more of the following body locations gives us the first strong key to a possible diagnosis of atopic dermatitis. a) face, periocular area, muzzle and chin; b) ears including otitis externa; c) ventrum including neck, axilla, abdomen, and groin; d) distal limbs, carpal and tarsal area, digits and between digits. Other body locations associated with atopic dermatitis include perineum and flexural surfaces of the limbs joints. The first clinical signs appear usually after 6 months of age. Some conditions are commonly associated with atopic dermatitis and perpetuate the disease: staphylococcal pyoderma, Malassezia dermatitis, and otitis externa (present in up 86% of atopic dogs). Around 10% of dogs with atopic dermatitis have concurrent cutaneous adverse food reaction but true incidence of concurrent disease waits further investigation. It is usually impossible to distinguish between both diseases based on the history and clinical signs alone. Hypoallergenic elimination diet trials are necessary to diagnosis. Features that may be more suggestive of cutaneous adverse food reaction included: 1) age at onset (very young, less than 7 month or very old, more than 7 years), 2) severe pruritus from the beginning, 3) consistently poor response to glucocorticoids, 4) concurrent gastrointestinal sings. The primary tool in the therapy is to eliminate perpetuating factors and after that try symptomatic anti-inflammatory treatment (essential fatty acids, antihistamines and topical anti-inflammatory drugs). Finally if we can not control the disease at this step, drugs with efficacy evidence in treating atopic dermatitis (glucocorticoids and cyclosporine) can be used, but usually is not necessary in puppy patients.

Fungal skin diseases. Superficial mycosis are frequent process in young dogs.

- **Dermatophytosis** is a zoonotic, superficial fungal disease caused by Microsporum, Trichophyton and Epidermophyton species. *M.canis* cause most of the problems in young dogs. Most dogs with a healthy immune system are relatively immune to most superficial fungal infections. Puppies exposed to dermatophytes could be susceptible to infection because immature immune system. The most characteristic clinical manifestations of dermatophytosis in young dogs is a focal/multifocal alopecia. The diagnosis is confirmed by dermatophyte test medium (DTM) or agar dextroxa Saboureaud medium cultures. Treatment requires removing the fungi from the animal's skin and haircoat, disinfecting the environment, minimizing dissemination to other animals and humans, and preventing recontamination of the household environment. Effective topical therapy includes enilconazol and miconazol. Systemic antifungal drugs used: microsized griseofulvime (25-50 mg/kg q 12h), ultramicrosized griseofulvime (2.5-15 mg/kg q 12h), itraconazol (10-20 mg/kg q 24h), ketoconazol (10 mg/kg q 12h-24h), and terbenaifene (30-40-mg/kg q 24h). Environmental decontamination: lime sulfurs dilution 1:30, blench dilution 1:10, and enilconazol 20 µl/ml.

Viral infestations are uncommon but we can find some cases of distemper and viral papilomatosis

Other autoimmune, congenital and hereditary diseases such as dermatomyositis familiar epidermolysis bullosa, cutaneous asthenia, hypotrichosis, congenital alopecia, acral mutilation syndrome, lethal acrodermatitis, or primary seborrhea, are rare disorders. Regular skin biopsies for histopathological assessment, electron microscopic, electrolymography studies, and biochemical analysis could be required for definitive diagnosis and specific therapy for these dermatosis.

REFERENCES