APPROACHES TO PYODERMA CASES

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Ariane Neuber discusses the key aspects of this common condition, including the underlying causes, and takes a look at the various treatments available

BACTERIAL skin infections are very commonly encountered in small animal practice.

Dogs are more commonly affected than cats. This condition can be frustrating to treat and is most commonly a secondary problem, rather than a primary disease (secondary versus primary or idiopathic pyoderma). The disease is often classified by the depth of skin affected.

Surface pyoderma affects the most superficial skin, and causes erythema and surface crusts. Hot spots are the localised form of surface pyoderma (Figure 1). Superficial pyoderma is localised in the superficial layers of the epidermis and into the intact hair follicles. Deep pyoderma involves the dermis and deep dermis. Furunculosis (ruptured hair follicles) can also be a feature.

*Staphylococcus pseudintermedius* causes most cases, but other aetiologic agents are also possible – for example, *Streptococcus* species, *Pseudomonas* species, *Proteus* species and others.

Pathogenesis

The pathogenesis is not fully understood, but certain factors seem to play a role, such as moisture (in skin folds or in diseases that alter skin humidity), immunosuppression (in dogs with hypothyroidism or hyper-adrenocorticism), staphylococcal adherence (this is increased in dogs with atopic dermatitis), trauma (due to pruritus in cases of ectoparasites) or staphylo-coccal...
hypersensitivity (in some dogs with atopic dermatitis).

**Clinical signs**

Pyoderma can manifest in a large number of different skin lesions or any combination thereof. Although they are not commonly seen in this disease, pustules (Figure 2) are probably the lesion most people would associate with bacterial pyoderma.

Pustules are also seen with pemphigus foliaceus, but in this disease they are typically much larger and span several follicular units (Figure 3). Circular alopecia (Figure 4), epidermal collarettes (Figure 5), scaling, crusting (Figure 6), hyper-pigmentation and erythema can all be found in affected patients. Short-coated breeds often show clinical signs, such as circular patches of alopecia (moth-eaten appearance), in combination with erythema and scaling.

**Cytology**

Finding any of the above lesions should prompt the clinician in charge to perform cytology. With a bit of practice, this can be easily and rapidly done in general practice.

Doing cytology as an in-house test has the advantage of providing an almost instant answer, and is cheaper than sending the slide to a laboratory. A good-quality microscope is essential, but not a lot more is needed in terms of equipment – microscopic slides, clear sticky tape, cotton buds, scalpel blades, cover slips and a rapid staining system of the Romanowsky-type, such as Rapi-Diff or Diff-Quik. Sampling is very easy as the skin is the most accessible organ. Impression smears can be taken from easily accessible areas, such as a crust on the dorsum.

Difficult to reach body surfaces – such as the ear canals, the interdigital spaces, the lip folds or around the claw bed – can be sampled by using a cotton bud, which is then rolled on the slide to transfer some of the material collected. Sticky tape can also be used in more difficult areas, especially in the interdigital spaces where erythema and a greasy exudate are common. For pustules, a small hypodermic needle can be used to make a small hole to obtain pustular content, which can be spread on the slide.

Dry waxy areas, such as nail beds with waxy adherent material, can be sampled using a scalpel blade, and the material can be spread on a slide using a motion akin to buttering bread. The samples obtained with the above methods are then air dried (or occasionally heat-fixed, if the material is very waxy or oily) and stained following the instructions of the system used. A cover slip is fixed to the sample with a drop of immersion oil or liquid paraffin, and the sample examined microscopically.

As cocci are only approximately 1.0µm big, the sample needs to be scanned under a low-power lens to find a field with sufficient sample material (“lots of purple”) and then be more closely
examined under higher magnification until the examiner finishes the assessment under the oil-immersion lens. The presence of cocci, neutrophils and, ideally, intracellular cocci is diagnostic of coccal pyoderma (Figure 7).

**Antibiotic choices**

*Staphylococcus pseudintermedius*

If cocci (round bacteria) are found, *S pseudintermedius* is the most likely causing organism. Most wild-type strains of *S pseudintermedius* usually have a very predictable susceptibility to first and third generation cephalosporins (such as cephalexin and cefovecin), beta-lactamase-resistant beta-lactam antibiotics and fluoroquinolones (such as enrofloxacin, marbofloxacin and pradofloxacin). Resistance rates of approximately 25 per cent are found to lincosamines (such as clindamycin and lincomycin), trimethoprim/sulfonamides and macrolides (such as erythromycin). Most dermatologists recommend reserving the use of fluoroquinolones for gram-negative infections or resistant cases after culture and sensitivity testing, and would consider beta-lactamase-resistant beta-lactam antibiotics or cephalosporins as their first line of therapy if systemic antibiotics are warranted. Potentiated sulphonamide can be a low cost alternative if financial constraints exist. However, side effects are more common with this drug, and resistance occurs in about 25 per cent of *S pseudintermedius* strains.

Most cases of superficial pyoderma respond very well to a three-week course of antibiotics. Treatment should always continue for one week beyond clinical cure and rechecks are, therefore, essential to avoid relapse of the condition. Deep pyodermas should be treated following culture and sensitivity testing, as long courses of antibiotics are usually needed. Antibiotic courses of several weeks, or even months, duration are not uncommon for this condition and treatment should continue for at least two weeks beyond clinical cure.

• **MRSA/P**

Methicillin-resistant strains of *S pseudintermedius* (MRSP) and *S aureus* (MRSA) are becoming increasingly important, and non-responsive cases of pyoderma need to be sampled for bacteriology and sensitivity testing to identify this potential threat. MRSA/P are usually multi-drug resistant. Methicillin resistance is caused by the mecA gene, which encodes a mutated penicillin-binding protein called PBP-2a.

MRSP should be considered resistant to all other beta-lactams, and often carries coresistance to lincosamines, macrolides, fluoroquinolones, tetracyclines and trimethoprim-sulfonamides.

Antibiotics should be chosen based on susceptibility testing. Chloramphenicol, tetracyclines, aminoglycosides or rifampin are drugs to consider if proven susceptible. Topical therapy – for example, with chlorhexidine shampoo, or topical antibiotics such as fusidic acid or mupirocin – can
also be very helpful. Very strict hygiene and barrier nursing for affected patients are essential.

Human health implications need to be discussed with the owners, especially if MRSA is found. More comprehensive guidelines on how to deal with MRSA/P can be found on the BSAVA website.

- **Rod-shaped organisms**

  Finding rod-shaped organisms in cases of skin disease is a rare event. If found on cytology, this should also trigger a sample being sent for culture and sensitivity testing, as bacteria such as *Pseudomonas, Enterobacter* and *Klebsiella* show less predictable susceptibility patterns. Fluoroquinolones and aminoglycosides are a good initial choice while awaiting culture results.

- **Recurrent pyoderma**

  In cases of recurrent pyoderma, in addition to dealing with the current infection, successfully managing the patient requires diagnosis and treatment of the underlying disease.

  Diseases commonly found as the primary disease in patients with pyoderma include atopic dermatitis, adverse cutaneous food reaction, endocrine diseases (such as hyperadrenocorticism and hypothyroidism) and ectoparasitic diseases. Cornification defects can also lead to skin infections. It is important to treat the infection and re-evaluate the patient. If the lesions have regressed and the pruritus has subsided, a non-pruritic condition (for example, endocrine disease, demodicosis or cornification disorder) or early allergic skin disease are likely to be the underlying disease.

  If the pyoderma lesions improve with antibiotic therapy, but the pruritus does not diminish, a primarily pruritic disease (such as an ectoparasite infection or allergic skin disease) is most likely to be causing the pyoderma. If the lesions do not respond to antibiotic therapy, the problem might be with client compliance, a resistant strain of bacteria is possible and culture and sensitivity testing is indicated, or the lesions were caused by a different disease (such as *Malassezia* dermatitis, pemphigus foliaceus and so on). Concurrent administration of glucocorticoids can also interfere with host immune defence and hinder resolution of the pyoderma.

**Initial work-up**

In addition to cytology samples to identify bacterial infections and possible concurrent yeast infections, skin scraping should be done on all cases that present with a pyoderma.

Ectoparasitic diseases are common, therefore they have to be suspected until proven innocent. Skin scrapings might help identify the underlying cause immediately (especially if *Demodex* species is suspected). If fox mange is a potential differential diagnosis, skin scrapings for *Sarcoptes scabiei* are only diagnostic in about 50 per cent of cases, but alternative ways of
confirming the diagnosis exist. A very reliable method is sarcoptes IgG serology, with a sensitivity and specificity of well above 90 per cent

However, to not miss any case affected by this potentially extremely pruritic disease, trial therapy is always indicated. Spot-on preparations containing selamectin or an imidacloprid/ moxidectin combination are convenient ways to conduct a therapeutic trial.

Flea-allergic dermatitis is also a possible underlying disease and long-term flea control, both on the patient and the in-contact animals and in the environment needs to be performed. It is important to educate the client about the flea life cycle and its implications for successful flea control. Limitations of flea control products also need to be observed. For example, patients that receive regular shampoo therapy or swim on a regular basis, benefit from a systemic flea control product, such as selamectin spot-on or spinosad tablets.

Client expectations also need to be addressed. Most people assume using a flea control product will immediately eliminate all fleas on the pet and in the house.

However, due to most life stages of fleas living in the house and most on-pet flea control products not affecting them, and the knock-down time it takes to effectively kill all the fleas on the patient, it can take a few weeks to months to eradicate fleas. This is not even taking into account the possibility of the patient picking up any more fleas outdoors. In addition, pupae are very difficult to kill and can stay viable in the environment for a long time, leading to the so-called pupal window, with fleas emerging for as long pupae remain viable in the house.

Flea control, therefore, has to include treating the environment as well as the pets in the house. The aims of flea control are to eliminate fleas on the patient, all in-contact animals and the environment – and to avoid re-infestation.

A wide variety of flea control products are on the market and all have a slightly different profile (parasites they are effective against, knock-down effect, frequency of application, route of administration, water solubility and so on), so it is worth studying the differences between the products to be able to advise clients and choose the right product for each patient.

**Allergic skin conditions**

Atopic dermatitis (AD) and adverse cutaneous food reaction (ACFR) are probably the most common underlying diseases once ectoparasites have been ruled out. As AD and ACFR look clinically identical, a diet trial should be performed in all cases. The food needs to be chosen based on the food history of the individual patient. Home-cooked food, commercial limited ingredient diets and hydrolysed diets are all suitable.

Many owners choose the more convenient commercially available options, as the diet needs to be
conducted for about six to eight weeks.

While intradermal allergy testing is considered the gold standard by most veterinary dermatologists, reliable serum allergy tests are also available. Allergy tests do not diagnose AD, but they identify the offending allergens in a patient that has been diagnosed with this disease, by showing compatible clinical signs and ruling out differential diagnoses first. The aim is to avoid the offending allergens and/or to formulate immunotherapy as the only specific treatment available.

### Endocrine disease

Hypothyroidism (HT4) and hyperadrenocorticism can also be the underlying condition in pyoderma cases. If suspected, haematology and biochemistry, followed by specific endocrine testing, are indicated and, if identified, the condition is treated accordingly.

### Idiopathic pyoderma

In some skin infection cases, no underlying skin disease can be found and the disease needs to be managed symptomatically. Topical therapy can hopefully avoid the long-term use of antibiotics. Staphylococcal bacterins can also be helpful in some patients.

### Summary

In summary, patients with pyoderma are common and can be frustrating to treat. A thorough work-up and management programme are needed to manage these patients successfully.