

CLINICAL KNOWLEDGE INSIGHTS

BACTERIAL SKIN DISEASES

DEEP BACTERIAL PYODERMA

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AT A GLANCE

- A deep bacterial infection of the epidermis and hair follicle leading to rupture of the follicle and development of furunculosis and cellulitis. Occurs secondary to allergic, parasitic (especially demodicosis), endocrine, autoimmune, actinic, neoplastic, pressure point, post-grooming or self-traumatic disorders
- *Staphylococcus pseudintermedius* is the most common causative organism; *S. schleiferi*, *S. aureus*, *Pseudomonas sp.* and other gram negative bacteria may also occur
- Staphylococcal antibiotic resistance can occur especially in patients with chronic infections and after multiple antibiotic courses
- Common in dogs; rare in cats

WHAT DOES IT LOOK LIKE?

- Can occur in any breed of dog; most frequent cause is generalized demodicosis
- Clinical signs include pustules, papules, crusts, erosions, ulcers, draining tracts with serosanguinous, hemorrhagic and/or purulent discharge; hemorrhagic bullae, reddish-purple tissue discoloration, and cellulitis
- Lesions may be focal, multi-focal, or generalized and are described by location and lesion: pododermatitis, elbow callus pyoderma, nasal pyoderma, chin acne, acute pyotraumatic dermatitis (hot spots in long haired breeds), acral lick furunculosis and post-grooming furunculosis
- Larger heavier breeds are more prone to pressure point deep pyoderma. Some German shepherd dogs have a genetically based generalized folliculitis/ furunculosis
- Post-grooming furunculosis is a subclass of deep pyoderma caused by a combination of microtrauma to the dorsal skin and *Pseudomonas sp.* contamination of shampoo
- The full extent of skin lesions may be difficult to appreciate until the hair is clipped
- Lesions are often painful but may be pruritic; lymphadenopathy is common
- Patients may be febrile, depressed, and anorexic if septicemia present

PATHOLOGIC IMAGE LIBRARY : DEEP BACTERIAL PYODERMA



Deep pyoderma secondary to demodicosis - crusted papules, erosions and draining tracts



Post-grooming furunculosis



German shepherd dog deep pyoderma



German shepherd dog deep pyoderma, close up

PATHOLOGIC IMAGE LIBRARY : DEEP BACTERIAL PYODERMA



Pododermatitis secondary to licking from atopic dermatitis



Elbow callus deep pyoderma with draining tracts



German shepherd dog deep pyoderma



German shepherd dog deep pyoderma, close up

WHAT ELSE LOOKS LIKE THIS?

- Other infectious, autoimmune, actinic and neoplastic dermatoses
 - Demodicosis
 - Deep fungal infection
 - Actinomycosis
 - Nocardiosis
 - Mycobacteriosis
 - Autoimmune and immune-mediated dermatoses
 - Actinic dermatitis
 - Cutaneous neoplasia

HOW DO I DIAGNOSE IT?

- Skin scrapings to rule-out parasites such as Demodex
- Fungal culture to rule-out deep fungal infection
- Skin cytology by performing an impression smear of pustules, papules, crusts or draining tract fluid: pyogranulomatous to suppurative inflammation with bacterial cocci and/or rods
- Bacterial culture / susceptibility testing using fresh purulent discharge or a macerated tissue biopsy
- Skin biopsy for dermatohistopathology shows deep pyogranulomatous to suppurative inflammation with folliculitis, furunculosis, panniculitis and cellulitis; bacteria may or may not be seen

DIAGNOSTIC TECHNIQUES VIDEOS: [ExcellenceInDermatology.com](#) → [Education Library](#) → [Videos](#)

DIAGNOSTIC TECHNIQUES SECTIONS: [ExcellenceInDermatology.com](#) → [Diagnostic Techniques](#)

HOW DO I TREAT IT?

SYSTEMIC ANTIBIOTICS (SEE TABLE 1)

- Systemic antibiotics should be selected based on culture and susceptibility testing as resistant infections are common
- Consider fluoroquinolones and clindamycin as they are carried to the source of infection by white blood cells and are not inactivated by purulent debris
- Antibiotic therapy may be needed for up to 8 weeks or longer in refractory cases
- Systemic antibiotics should be combined with frequent antibacterial topical therapy

TOPICAL THERAPY

- Chlorhexidine baths or whirlpool soaks daily to every other day initially, then at least twice weekly once infection significantly improved. Benzoyl peroxide shampoos are an alternative to chlorhexidine

[How to give a medicated bath \(.pdf\)](#)

- Chlorhexidine sprays and wipes 1-3 times daily on affected areas in between baths may be useful
- 0.5% sodium hypochlorite spray or soaks may also be beneficial in resistant cases
- Protective padding/ booties helpful for pressure point, acral lick furunculosis and pododermatitis forms of deep pyoderma (www.dogleggs.com)

TABLE 1. ANTIBIOTICS USEFUL FOR TREATMENT OF SUPERFICIAL STAPH. PYODERMA

DRUG	DOSAGE (MG/KG)	DOSE INTERVAL
amoxicillin trihydrate / clavulanate potassium	13.75	q 12 hours
cephalexin	22	q 8-12 hours
cefadroxil	22	q 12 hours
cefovecin sodium	8	subcutaneous, q 14 d
cefpodoxime	5-10	q 24 hours
chloramphenicol	40 - 50	q 8 hours
clindamycin	5.5 - 33	q 12 hours
	11	q24 hours
doxycycline	5	q 12 hours
	10	q 24 hours
enrofloxacin	5 - 20	q 24 hours
erythromycin	10	q 8 hours
lincomycin	22	q 12 hours
	15.4	q 8 hours
marbofloxacin	2.75 - 5.5	q 24 hours
orbifloxacin	2.5 - 7.5	q 24 hours
oxacillin	22	q 8 hours
sulfadimethoxine / ormetoprim	55 (day 1) 27.5 (subsequent days)	q 24 hours
trimethoprim / sulfadiazine	15	q 12 hours

COMMENTS

- Identify and manage the underlying cause by performing a thorough diagnostic work-up
- Perform bacterial culture and susceptibility in all patients prior to choosing an antibiotic
- Skin biopsy for dermatohistopathology is helpful in confirming the diagnosis and ruling out fungal, autoimmune, actinic and neoplastic differentials
- Use antibiotics that penetrate well into granulomatous tissue and treat for long enough
- Incorporate aggressive topical therapy into both initial and long-term treatment plans
- Control flare factors during treatment such as underlying atopic dermatitis, food allergy and flea allergy
- Consider referral to a local dermatologist for severe, resistant or recurrent cases

FURTHER READING & WEBINARS

[Infection control information and client hand-outs on methicillin-resistant *Staphylococcus* infections \(www.wormsandgermsblog.com\)](http://www.wormsandgermsblog.com)

[Information on methicillin-resistant *Staphylococcus* infections \(mrsainanimals.com/BSAVA.html\)](http://mrsainanimals.com/BSAVA.html)

[Infection control for veterinary hospitals \(.pdf\)](#)

- Hillier A et al. Pyoderma caused by *Pseudomonas aeruginosa* infection in dogs: 20 cases. *Vet Dermatology* 17(2006):432-439.
- Weese JS et al. Methicillin-resistant *Staphylococcus aureus* and *Staphylococcus pseudintermedius* in veterinary medicine. *Vet Microbiology* 140 (2010):418-429.