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DERMATOLOGY

Skin Fold Dermatitis (Intertrigo) in Dogs

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Intertrigo, or skin fold dermatitis, is caused by frictional trauma resulting in inflammation and/or microbial overgrowth of closely apposed skin surfaces.^{1,2} Resolution is commonly achieved with topical treatment. Historically, skin fold dermatitis has been called *skin fold pyoderma* and classified as a type of superficial pyoderma.³ The current canine pyoderma classification—which is based on the depth of infection and inflammation—categorizes skin fold dermatitis, in conjunction with pyotraumatic dermatitis (“hot spots”), as a type of surface pyoderma.⁴

Although the histopathologic characterization of skin fold dermatitis has rarely been investigated, mainly due to difficulties in obtaining the skin biopsy specimens in the folded skin areas, it is important for clinicians to recognize that skin fold dermatitis can range from mild inflammation to severe ulcerations suggestive of a deeper dermal inflammatory process.

PATHOGENESIS

Close skin apposition with excessive folds is

typically the result of purposeful breeding (e.g., brachycephalic breeds, such as English bulldogs). Cutaneous hyaluronosis or mucinosis, an inherited disease in Shar-Peis, results in abnormal deposition of mucin and pronounced skin folding.⁵ Noninherited causes of skin folds include thickening of the dermis and/or subcutis from obesity or inflammatory conditions.¹

The current pathogenesis of skin fold dermatitis involves close skin surface contact that leads to irritation and decreased air circulation, resulting in a moist, warm environment that promotes overgrowth of surface microbes.² These microbes produce toxins and breakdown products that cause irritation, inflammation, and maceration of the skin, which enhances microbial penetration into deeper epidermal/dermal compartments and causes ongoing infection and inflammation.¹ Retention of excretions (e.g., tears, saliva, urine) and secretions (e.g., sebum) in these locations perpetuates microbial overgrowth.²

TOUGH SKIN

Intertrigo can range from mild to severe. Management strategies include cleansing wipes, topical products, steroids, and even surgical options.



Cutaneous hyaluronosis or mucinosis, an inherited disease in Shar-Peis, results in abnormal deposition of mucin and pronounced skin folding.⁵

Although microbiome studies of skin fold dermatitis have not been performed, the most common organisms found in cytology specimens from inflamed skin are cocci, rod-shaped bacteria, and yeast, suggestive of a mixed population of organisms including *Staphylococcus*, *Streptococcus*, *Pseudomonas*, and *Malassezia* species.

Not every canine breed with skin folds develops clinical signs of skin fold dermatitis, indicating other potential

underlying causes, such as allergic skin diseases and hormonal influences.¹

DIAGNOSIS

The history and clinical presentation of skin fold dermatitis are generally very striking. Skin fold dermatitis is characterized by erythema, exudation, and malodor in locations of close skin surface contact, rarely extending beyond the close skin apposition formed by the anatomic defect (**TABLE 1**).¹ Chronic lesions may result in hyperpigmentation and lichenification of the skin.² Clinical differentials include mucocutaneous pyoderma, atopic dermatitis, demodicosis, and mucocutaneous lupus erythematosus.¹

The diagnosis is supported by cytology results that reveal microbial overgrowth (**FIGURE 5**). Skin fold dermatitis lesions are rarely biopsied; histopathology is pursued if concern for other diseases, such as mucocutaneous lupus erythematosus, exists. On histopathologic examination, skin fold dermatitis and

TABLE 1 Locations of Skin Fold Dermatitis¹

LOCATION	PREDISPOSING FACTORS	EXAMPLES OF PREDISPOSED BREEDS	NOTES
Facial fold (FIGURE 1)	Brachycephalic breed	<ul style="list-style-type: none"> ▪ English bulldog ▪ French bulldog ▪ Pug ▪ Pekingese 	<ul style="list-style-type: none"> ▪ Facial folds can irritate the corneal surface leading to keratitis and ulceration. ▪ Increased moisture from ocular discharge can contribute to the dermatitis.
Lip fold (FIGURE 2)	Large lip flap	<ul style="list-style-type: none"> ▪ St. Bernard ▪ Spaniels ▪ English bulldog ▪ Basset hound 	<ul style="list-style-type: none"> ▪ Bacterial and yeast overgrowth is very common in this location. ▪ Can cause severe halitosis.
Neck fold	Obesity	<ul style="list-style-type: none"> ▪ Bloodhound ▪ Basset hound ▪ Shar-Pei ▪ English bulldog 	
Body fold	<ul style="list-style-type: none"> ▪ Obesity ▪ Prolonged recumbency ▪ Pendulous mammary glands 	<ul style="list-style-type: none"> ▪ Basset hound ▪ Shar-Pei 	
Vulvar fold (FIGURE 3)	<ul style="list-style-type: none"> ▪ Obesity ▪ Hypoplastic (recessed or juvenile) vulva 		<ul style="list-style-type: none"> ▪ Constant vaginal secretions and urine may cause keratinocyte damage, erosions, or ulcerations and promote microbial overgrowth. ▪ Dogs often lick this area, amplifying clinical signs and inflammation. ▪ Ascending bacterial urinary tract infection may be a complication.
Tail fold (FIGURE 4)	<ul style="list-style-type: none"> ▪ Corkscrew and ingrown tail causing pressure on perineal skin ▪ Tail partially obstructing the anus 	<ul style="list-style-type: none"> ▪ English bulldog ▪ Boston terrier ▪ Pug 	<ul style="list-style-type: none"> ▪ Accumulation of fecal material and anal sac secretions contributes to development in this area.



FIGURE 1. Moderately to severely erythematous, moist, alopecic facial folds in a **(A)** French bulldog and **(B)** English bulldog.

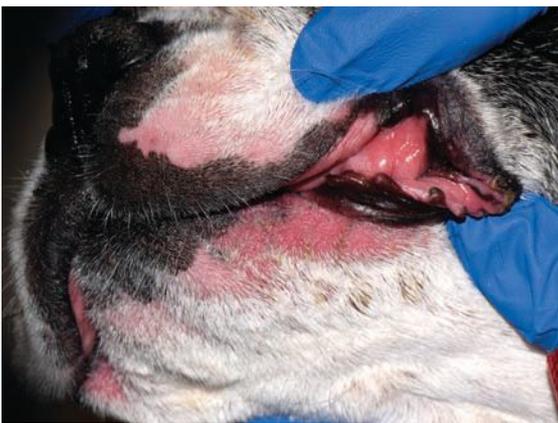


FIGURE 2. Moderately erythematous, moist, alopecic lip fold in an English bulldog.



FIGURE 3. Severely erythematous, erosive to ulcerative perivulvar fold with entrapped purulent material in a bearded collie.

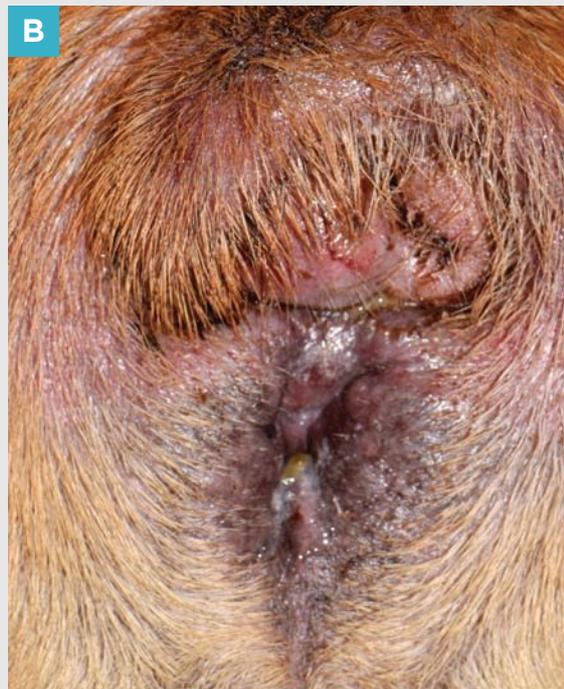


FIGURE 4. **(A)** Mildly erythematous tail fold with entrapped purulent debris and hairs in an English bulldog. **(B)** Moderately erythematous, alopecic, moist tail fold in an English bulldog.

mucocutaneous pyoderma are described as lichenoid impersonators; microscopic examination reveals a lymphoplasmacytic infiltration (“lichenoid band”) in the superficial dermis (**FIGURE 6**).⁶ Histopathologic features of cutaneous lupus erythematosus—such as keratinocyte vacuolation, apoptosis, lymphocytic epidermal infiltration, and satellitosis—are not observed in skin fold dermatitis lesions.⁷

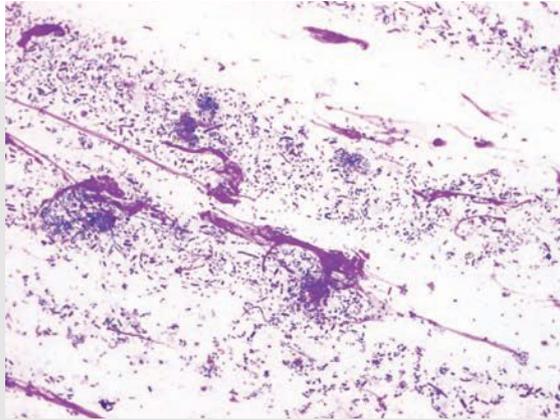


FIGURE 5. Mixed population (>200 microbes per high-power field/oil immersion) of predominantly rod-shaped bacteria with cocci in cytology sample of the facial fold in an English bulldog.

TREATMENT

Although skin fold dermatitis is commonly seen in practice, there are no therapeutic trials. Effective treatment of skin fold dermatitis involves resolving the inflammation and microbial infection and controlling the excessive moisture.¹ In many cases, long-term medical management is successful. Concurrent treatment of any diseases that may affect folds, such as atopic dermatitis, obesity, periodontal disease, and urinary tract infection, should be instituted. If medical management is unsuccessful, cheiloplasty for deep lip folds, episioplasty for excessive perivulvar folds or hypoplastic vulva, and caudectomy for ingrown tails are surgical options.^{1,8-10} Case reports of caudectomy for ingrown tails in brachycephalic breeds and episioplasty for perivulvar dermatitis in dogs with excessive vulvar folds have demonstrated resolution of clinical signs with minimal postoperative complications.⁸⁻¹⁰

Removal of the surface organism overgrowths and debris is considered crucial in the treatment of skin fold

dermatitis.¹ Most commonly, topical antimicrobial wipes (e.g., MiconHex+Triz wipes, dechra-us.com; KetoHex, vetone.net) containing chlorhexidine and antifungal (miconazole, ketoconazole) agents are used on intertriginous areas once to twice daily. Sprays and shampoos may be beneficial for more extensive lesions.

In cases of severe bacterial overgrowth with cocci, a topical antibiotic ointment (mupirocin) can be applied up to twice daily after cleaning with wipes. In cases of severe skin fold dermatitis with mixed bacterial

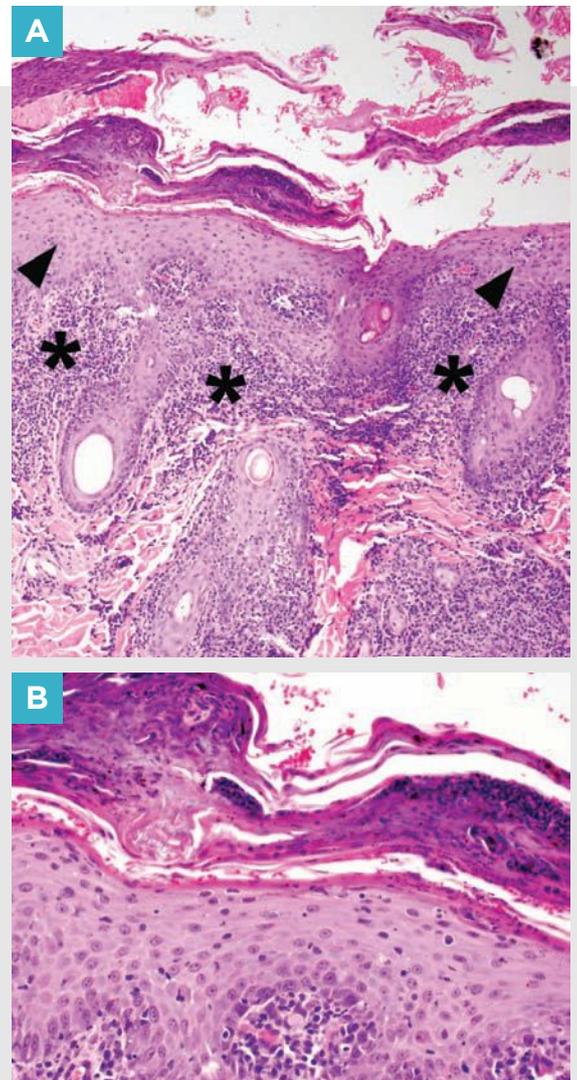


FIGURE 6. (A) Irregular epidermal hyperplasia (arrowheads) with neutrophilic exocytosis and moderate to severe perifollicular to superficial lymphoplasmacytic "band" dermatitis (asterisks; magnification 10×). **(B)** Higher magnification (40×) of the epidermis reveals neutrophilic exocytosis, parakeratosis, intracorneal serocellular crusts containing degenerative neutrophils, and lymphoplasmacytic superficial dermatitis.

In cases of severe skin fold dermatitis with mixed bacterial overgrowth (cocci and rod-shaped bacteria), topical silver sulfadiazine can be administered.



overgrowth (cocci and rod-shaped bacteria), topical silver sulfadiazine can be administered. With the emergence of multidrug-resistant bacteria, including *Staphylococcus* species, systemic antibiotics should be reserved for patients with severe skin fold dermatitis and clinical signs of deep pyoderma (e.g., draining tracts, hemorrhagic discharge); in these cases, bacterial culture and susceptibility testing are recommended before starting the antibiotic.

The role of inflammation in skin fold dermatitis has not been investigated. A short course of topical anti-inflammatory therapy with or without systemic glucocorticoids has been recommended.¹ Topical steroids have an anti-inflammatory effect and are the mainstay of therapy for bringing many inflammatory skin diseases under control.¹¹ In the authors' practice, topical products (e.g., ointments, gels, creams) containing glucocorticoid mometasone furoate (Mometasone furoate cream USP 0.1%; glenmarkpharma-us.com) are commonly applied to intertriginous areas to achieve faster control of the dermatitis.

Proactive therapy is defined as the low-dose, intermittent application of anti-inflammatory therapy to previously affected skin; this approach targets invisible inflammation in the usual relapse zones of dogs with atopic dermatitis.¹¹ Proactive maintenance treatment with antimicrobial wipes soaked in dexamethasone can be used 2 to 3 times per week to clean the folds and keep the dermatitis under control. For facial fold dermatitis with close proximity to the eyes, topical ophthalmic ointments with glucocorticoids and/or antibiotics can be used. **TVP**

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Dr. Banovic graduated from veterinary school in Zagreb, Croatia, and received his PhD in veterinary microbiology from the University of Zagreb. He finished a 1-year rotational internship at the Veterinary School in Munich, Germany, before completing a 3-year dermatology residency at North Carolina State University; afterward, he enrolled in a postdoctoral fellowship in investigative dermatology with a primary research focus on itch in atopic dermatitis and staphylococcal pyoderma. Dr. Banovic favors interdisciplinary approaches to biologic questions and incorporates basic immunology as well as cell biology and biochemical approaches in his research. He is presently an assistant professor of dermatology at the University of Georgia.



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