

Causes of otitis externa

Edmund J. Rosser, Jr, DVM

*Department of Small Animal Clinical Sciences, College of Veterinary Medicine,
Michigan State University, East Lansing, MI 48824–1314, USA*

Otitis externa is the most common disease of the canine and feline external ear canal and is defined as inflammation of the canal, with an underlying reason for the infection and inflammation in essentially all cases. It is most important to note that the bacteria or yeast organisms associated with cases of otitis externa are invariably only opportunists and are not primary pathogens that are solely responsible for a given case of otitis externa. Even in instances when the problem does not recur after appropriate treatment, the infection present should still be considered the result of a transient nonrecurrent insult to the external ear canal. Therefore, in cases where the initial treatment is temporarily effective but infection recurs, one must develop a systematic approach to identify the underlying problem resulting in the recurrent nature of the disease. If this is not accomplished, the opportunistic bacteria and yeast organisms invariably become increasingly resistant to the various topical antimicrobial agents used over time, to the point where the infectious organisms may become resistant to all available antimicrobials.

Clinical signs and pathophysiology

During the early stages of acute otitis externa, the underlying process causing inflammation of the external ear canal initially results in varying degrees of erythema of the pinnae, external meatus, and lining of the external canal. Subsequently, there can be a wide range of clinical signs, including head shaking, ear scratching, otic discharge (ceruminous or purulent), evidence of self-trauma and excoriations (including aural hematomas and acute moist dermatitis near the base of the ear), malodor, swelling, and pain. In cases of recurrent or chronic otitis externa, these clinical signs may progress to include proliferative changes such that the

E-mail address: rosser@cvm.msu.edu

external ear canal becomes stenotic and is ultimately occluded; at that time, the tympanum becomes more susceptible to rupture and the development of a concurrent otitis media. This chronic inflammation is also associated with hyperplastic changes of the soft tissues surrounding the external ear canal. When the underlying problems are not addressed and identified, these chronic, hyperplastic, soft tissue changes may progress to the development of fibrosis and mineralization of the tissues surrounding the external ear canal. At this stage, medical treatment is invariably unsuccessful, requiring some form of additional surgical treatment. In addition, the lining of the external ear canal may develop erosions and ulcerations, resulting in a marked increase in pain of the canals.

Primary causes of otitis externa

These causes are defined as processes or factors that directly initiate the inflammation of the external ear canal [1]. The successful treatment of the patient thus requires specific identification and treatment of this process.

Parasites

Otodectes cynotis (ear mite) has been reported to account for up to 50% of cases of otitis externa in cats and 5% to 10% of cases in dogs [2]. Initially, the exudate is usually a dark brown to black color; however, chronic cases may become secondarily infected with bacteria or yeast; at that time, the exudate may develop more ceruminous or purulent characteristics.

Demodex canis may infrequently cause a ceruminous otitis externa in dogs (with or without concurrent skin lesions of demodicosis), and *Demodex cati* may infrequently cause a ceruminous otitis externa in cats.

Otobius megnini (spinous ear tick) is most common in the southwestern regions of the United States. The larvae of this tick attach to the lining of the external ear canal, causing inflammation and otitis externa more commonly in the dog and infrequently in cats.

Other parasites that cause inflammation and pruritus on or near the pinnae, causing head shaking and ear scratching and subsequent secondary otitis externa, include *Sarcoptes scabiei*, *Notoedres cati*, *Cheyletiella* spp, and *Eutrombicula* spp (chiggers).

Foreign bodies

Plant awns (primarily foxtails), prevalent especially in the southwestern portion of the United States, are a common cause of otitis externa during foxtail season. Plant awns are capable of migrating into the deepest portion of the horizontal ear canal and rupturing the tympanum, resulting in a concurrent otitis media. Less frequently observed foreign body reactions

may be induced by dirt, sand, dried otic medications, broken/loose hairs, and dead insects (especially flies and mosquitoes).

Hypersensitivity and allergic diseases

In the author's referral practice, greater than 90% of the cases presented for chronic/recurrent bilateral otitis externa (and occasionally unilateral disease only) are a result of the presence of atopic dermatitis or food allergy in dogs. In most instances, the history and physical examination indicate the presence of inflammation and pruritus on other areas of the body associated with the potential problem of atopic dermatitis or food allergy. These areas include the face (especially the muzzle and periorbital regions), feet, inguinal/ventral abdominal region, axillary region and flexural surfaces of the foreleg (elbow and carpus). It has been reported that up to 55% of dogs with atopic dermatitis have concurrent otitis externa, with 3% to 5% of cases exhibiting otitis externa as the only clinical sign [3]. Additionally, up to 80% of dogs with food allergy have concurrent otitis externa, with 25% of cases exhibiting otitis externa as the only clinical sign [4]. In comparison to atopic dermatitis and food allergy, allergic contact dermatitis (ACD) is an infrequent cause of otitis externa and may cause inflammation and pruritus of the un-haired aspect of the concave pinnae. The other contact areas of the body should be similarly affected, such as the ventral/interdigital skin regions, inguinal and axillary skin, perianal region, perineum, ventral tail base region, and scrotum or vulva. Because ACD is a type IV hypersensitivity reaction (delayed-type hypersensitivity), there should be evidence of an early papular eruption in the affected areas, and it is considered a so-called "rash that itches" in contrast to most early cases of atopic dermatitis and food allergy, which are considered as initial "itches that eventually rash." Having said this, ACD reactions as well as irritant and other immunologic contact dermatitis reactions (including cutaneous drug reactions like erythema multiforme) are occurring with an increased frequency in cases of chronic otitis externa in dogs because of reactions to the topically applied otic medications. This type of reaction should be suspected when the use of a given topical medication causes an increase in discomfort or pain to the patient, because the reaction is often deep within the horizontal ear canal and the owner does not initially notice any changes more externally. Owners need to be alerted to this possibility; if it is suspected, they should discontinue the otic medication immediately and the ear canal should be re-examined otoscopically for evidence of increased erythema, erosions, or ulcerations.

Keratinization disorders

Endocrine disorders, such as hypothyroidism, hyperadrenocorticism, and sex-hormone imbalances, may alter keratinization and cerumen gland

production in the external ear canal, resulting in an initial ceruminous and seborrheic form of otitis externa. A similar form of otitis externa may occur in cases of sebaceous adenitis and idiopathic seborrhea.

Autoimmune diseases

The autoimmune skin diseases that may affect the pinnae or the external ear canals include pemphigus foliaceus, pemphigus erythematosus, discoid lupus erythematosus, cutaneous vasculitis, bullous pemphigoid, and mucous membrane pemphigoid. These are all relatively rare causes of otitis externa, and, invariably, there are skin lesions at other locations of the body or lesions on various mucous membranes.

Predisposing causes of otitis externa

These causes are defined as processes or factors that increase the risk of developing otitis externa and work in concert with the primary or perpetuating causes of otitis externa to cause clinical disease. It is important to recognize and possibly control these problems as a part of the complete therapeutic plan.

Anatomic and conformational factors

These factors include dogs with long pendulous ears, stenotic ear canals, and excessive hair in the external ear canal. It is controversial as to whether or not such conditions alone can cause otitis externa. The author's personal observation is that there are more patients with such anatomic and conformational problems that have never developed otitis externa than there are those with such problems that have developed otitis externa. In many instances, such patients are ultimately determined to have other concurrent primary causes of otitis externa as discussed previously.

Excessive moisture

An excess accumulation of water from frequent swimming or bathing can lead to maceration of the stratum corneum lining the external ear canal. This removes the protective barrier to secondary infection, and the normal resident microflora of the external ear canal can become opportunists, causing a subsequent otitis externa. This frequent wetting of the ear canal may also stimulate the activity of the ceruminous glands, causing a ceruminous otitis externa.

Iatrogenic factors

These factors include the use of cotton-tipped swabs for ear cleaning, traumatic removal of hair from the ear canal, inappropriate topical or

systemic antibacterial treatment predisposing to resistant strains of opportunistic bacteria, and the use of known irritating solutions like ear rinses and cleaners (especially high-alcohol- and acetic acid-containing solutions).

Obstructive ear disease

Inflammatory polyps and tumors of the ear canal prevent exudate drainage, which predisposes the ear to secondary infection.

Perpetuating causes of otitis externa

These causes are defined as processes or factors that are not responsible for the initiation of the otitis externa but do cause the disease to continue once established. Once present, these causes must be specifically treated, but always in conjunction with treatment of the associated primary and predisposing causes.

Bacteria

It is important to emphasize that the external ear canal has a low number of resident as well as transient bacteria present under normal circumstances, and culture of the normal external ear canal has been reported to include *Staphylococcus intermedius*, *Pseudomonas* spp, *Streptococcus* spp, and *Proteus* spp [5]. Once overcolonization of the external ear canal occurs, the most commonly isolated bacterial pathogens include *S intermedius*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Escherichia coli*, *Corynebacterium* spp, *Enterococcus* spp, and *Streptococcus* spp [5–8]. In cases of chronic or recurrent bacterial otitis externa, the most common problematic opportunistic pathogen is invariably *P aeruginosa*.

Yeast

Similarly, it is important to emphasize that the external ear canal has a low number of resident yeast present under normal circumstances and that culture of the normal external ear canal may reveal the presence of *Malassezia pachydermatis* [5]. Once overcolonization of the external ear canal occurs, the most commonly isolated fungal pathogen is *M pachydermatis*, with the occasional isolation of *Candida* spp [5–8].

Otitis media

Inflammation and infection of the middle ear cavity often play an important role in cases of chronic or recurrent otitis externa. Such infection usually develops as an extension of otitis externa through a ruptured tympanic membrane but may also be present in instances where the

tympanic membrane is noted to be intact. Inflammation and infection of the middle ear cavity may also occur from potential pathogens in the nasopharynx via extension through the auditory tube (Eustachian tube) or, rarely, via hematogenous spread.

Progressive pathologic changes

The reader is referred to the section on clinical signs and pathophysiology.

Clinical evaluation of the patient with otitis externa

Importance of an accurate history and its proper use

The value of a complete history of a patient cannot be overemphasized when evaluating the patient with otitis externa [9]. This is especially true regarding chronic otitis externa. The ultimate goal is to define the primary problem or underlying cause of the recurrent otitis externa, and it is the historical development of the disease that most frequently gives us the clues as to the source of the problem. This should include a general history as well as a dermatologic history using a dermatologic history questionnaire (Box 1). Specifically, the history may reveal the following:

1. The patient is a regular swimmer.
2. The general history reveals evidence of a metabolic or endocrine problem, such as hypothyroidism, hyperadrenocorticism, or a reproductive hormone abnormality.
3. The general history reveals recent exposure of the patient to other dogs and cats (eg, humane society, boarding kennel), suggesting the possibility of a contagious disease, such as ear mites, scabies, or dermatophytosis.
4. The dermatologic history indicates the presence of pruritus on areas of the body other than the ear that is compatible with pruritic skin diseases like atopy, flea allergy dermatitis, food allergy, ACD, or scabies.
5. The medications used previously in the ear canal may have caused further irritation and inflammation, suggesting an irritant, allergic, or other immunologic contact dermatitis reaction to the topical medication itself.
6. The breed of the patient may be compatible with certain familial problems associated with that breed, including stenotic ear canals (Chinese Shar Peis), presence of excessive hair in the ear canal (Poodles and Schnauzers), or excessive production of cerumen (seborrhic breeds like Cocker Spaniels).
7. There may be a history of recurrent infections elsewhere on or in the body, such as a pyoderma or lower urinary tract infection. This leads

Box 1. Dermatologic history questionnaire [9]

1. How long has your pet had a skin problem?
2. Age of pet when obtained?
3. Age of pet when skin problem started?
4. Where on the body did the problem start?
5. What did it look like initially?
6. If your pet is scratching, did you notice the itching or the skin lesions first?
7. How has it spread or changed?
8. Does the skin condition seem better or worse during any particular season? Which one?
9. Do other pets in your household have skin problems?
10. Do any relatives of your pet have skin problems? Which ones?
11. Do any people in your household have skin problems?
12. Do you use any flea control products? Which ones? How often?
13. Do you bathe your pet? Which products? How often?
14. If your pet is female, are there irregular or abnormal heat cycles? Has she ever been pregnant or had false pregnancies? Has she been spayed? If so, at what age?
15. If your pet is male, does he have a normal interest in female animals? Has he been neutered?
16. Is there any condition or environment that makes the skin problem noticeably worse?
17. Has your pet experienced vomiting, changes in stool character, or disagreement with certain foods?
18. Has your pet ever seemed to be ill from its skin disease (eg, depressed, fever, not eating)?
19. Please indicate if you have noticed any of the following: scratching, biting, or licking; rubbing face on floor or furniture; scratching at ears, rubbing ears, or shaking head; dry skin or coat; greasy skin or coat; scaly skin (dandruff) or crusts on skin; reddening of skin, pimples, or bumps on skin; oozing sores or open bleeding sores; hair loss; darkening or lightening of the skin; thickening of the skin; or fleas.
20. List any medications your pet has received for the condition, including shampoos, lotions, ointments, dips, pills, capsules, and injections (now and previously).
21. Have any of these helped? If so, which ones?
22. Are there any thoughts you have relating to the skin disease? What do you think may be the cause of the skin problem?

one to consider the various diseases affecting the function of the immune system as well as a possible primary immunodeficiency.

8. The ear problem is present only on a seasonal basis, such as during warm weather, suggesting an atopic dermatitis.
9. The ear problem requires management and treatment on a year-round basis, and diseases like food allergy, scabies, or primary production of excessive cerumen should be considered.

The preceding examples illustrate some of the more common conditions associated with chronic or recurrent otitis externa, and these underlying problems would probably not be pursued further without taking the time to take a thorough history. It should be emphasized that the primary cause of chronic otitis externa is rarely the bacteria or yeast found on cytology. These organisms are usually opportunists that further aggravate the condition; invariably the primary or underlying disease needs to be discovered.

Physical examination

General physical examination

When evaluating the patient with the chief complaint of otitis externa, we often concentrate entirely on the affected area and overlook the importance of a complete physical examination. A thorough physical examination may reveal the presence of a localized or generalized lymphadenopathy (reactive lymph nodes versus lymphosarcoma), gynecomastia or pseudocyesis (possible ovarian imbalance), testicular abnormality (Sertoli cell or interstitial cell tumor, male feminizing syndrome), or concurrent conjunctivitis (suggesting an allergic component to the disease) [10].

Once again, as was the case with the history of the patient, the physical findings and their possible causes could be the underlying cause of what at first glance seems to be only the otitis externa.

Dermatologic examination

We must keep in mind that the external ear canal is lined by an extension of the integument from the surface toward the tympanum and is thus susceptible to the same type of changes caused by diseases affecting the skin elsewhere on the body. Examination of the skin may reveal evidence of erythema, scales, crusts, papules, excoriations, posttraumatic alopecia, or postinflammatory hyperpigmentation. The following primary problems should be considered depending on the distribution pattern of these lesions:

1. Atopic dermatitis: affects the ears, face (especially the muzzle and periorbital regions), feet, inguinal/ventral abdominal region, axillary region, and flexural surfaces of the foreleg (elbow and carpus) in various combinations
2. Food allergy dermatitis: affects the ears, face (especially the muzzle and periorbital regions), feet, inguinal/ventral abdominal region, axillary

region, flexural surfaces of the foreleg (elbow and carpus), neck, perianal/perineal region, and rump/tail base region in various combinations or virtually anywhere on the body

3. Scabies or scabies incognito: affects the ears, elbows, hocks, and ventral abdomen and thorax
4. ACD: affects the contact areas of the body, including the un haired aspect of the concave pinnae, ventral/interdigital skin regions, inguinal and axillary skin, perianal region, perineum, ventral tail base region, and scrotum or vulva

Additional diseases and their dermatologic findings include:

1. Endocrine diseases: may include a dull and dry hair coat, a diffuse thinning of the hair coat, easily epilated hairs, failure of clipped hair to regrow within 6 months, change of hair coat color, comedones, nonreactive/symmetric alopecia with or without hyperpigmentation, seborrheic changes, or recurrent pyodermas
2. Keratinization disorders: presence of ceruminous otitis externa with or without concurrent seborrheic changes on the skin (seborrheic breeds, especially Cocker Spaniels) or excess scaling, follicular casts, and partial alopecia (sebaceous adenitis, especially Standard Poodles) [11]
3. Autoimmune skin diseases: presence of pustular, vesicular, bullous, erosive, or ulcerative lesions in the external ear canal, on mucous membranes or mucocutaneous junctions, or anywhere on the skin

Whenever there are skin lesions present in a patient with otitis externa, the dermatologic examination often needs to include skin scrapings (to rule out scabies or demodicosis) and a fungal culture (to rule out dermatophytosis).

The preceding rule-outs include some of the more common underlying diseases found in a patient with otitis externa associated with a skin disease. It is important to note, however, that any of these diseases are capable of presenting with lesions only affecting the pinnae and external ear canal.

Summary

Dogs with long-standing, chronic, recurrent otitis externa often represent one of the most frustrating types of problems in daily clinical practice. The important aspect of this discussion is that the clinician may be presented with a patient in which the primary chief complaint is otitis externa but a wide variety of disease processes may be causing the problem, including various combinations of the primary, predisposing, and perpetuating causes as discussed previously. The use of a thorough history and general and dermatologic physical examinations often leads the clinician to establish a systematic approach to identify the specific underlying problems. Until this

is accomplished, the recurrent nature of the otitis externa will remain as a persistent problem.

References

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