**Diagnosing and Treating Otitis**

**Features**

Otitis externa is an acute or chronic inflammatory disease of the external ear canal. Its causes are numerous and almost always have an underlying, primary disease (Table 15.1) that alters the normal structure and function of the canal resulting in a secondary infection (Table 15.2). Otitis externa is common in cats and dogs, with Cocker spaniels especially at risk for developing severe and chronic disease.

Otic pruritus or pain is a common symptom of otitis externa. Head rubbing, ear scratching, head shaking, aural hematomas, and a head tilt, with the affected ear tilted down, may be noted. An otic discharge that may be malodorous is often present. In acute cases, the inner ear pinna and ear canal are usually erythematous and swollen. The ear canal may also be eroded or ulcerated. Pinnal alopecia, excoriations, and crusts are common. In chronic cases, pinnal hyperkeratosis, hyperpigmentation, and lichenification, as well as ear canal stenosis from fibrosis or ossification, are common. Decreased hearing may be noted. Concurrent otitis media should be suspected if otitis externa has been present for 2 months or longer, even if the tympanic membrane appears to be intact and no clinical signs of otitis media (drooping or inability to move ear or lip, drooling, decreased or absent palpebral reflex, exposure keratitis) are evident. Rarely, symptoms of otitis interna (head tilt, nystagmus, ataxia) may be present. Oral examination may reveal pain (severe otitis media), inflammation, or masses (especially polyps in cats). Depending on the underlying cause, concurrent skin disease may be seen.

**Diagnosis**

**1.** Based on history and clinical findings

**2.** Otoscopic examination: assess degree of inflammation, ulceration, stenosis, and proliferative changes; amount and nature of debris and discharge; presence of foreign bodies, ectoparasites, and masses; and integrity of tympanic membrane

**3.** Mineral oil prep (ear swab): look for otodectic and demodectic mites and ova

**4.** Cytology (ear swab): look for bacteria, yeasts, fungal hyphae, cerumen, leukocytes, and neoplastic cells

**5.** Bacterial culture (external or middle ear exudate): indicated when bacteria are found on cytology in spite of antibiotic therapy, or when otitis media is suspected

**6.** Fungal culture: indicated when dermatophytic otitis is suspected, especially in long-haired cats that have ceruminous otitis

**7.** Radiography (bulla series), computed tomography (CT), magnetic resonance imaging (MRI): evidence of bullous involvement (sclerosis, opacification) is seen in approximately 75% of otitis media cases

**8.** Dermatohistopathology: may be indicated to identify primary cause (e.g., autoimmune disease, sebaceous adenitis, erythema multiforme), if neoplasia is suspected (ear canal mass), or if ear canal resection or ablation is performed because of end-stage otitis

**Treatment and Prognosis**

**1.** Primary causes of the otitis should be identified and corrected, if possible (Table 15-1).

**2. For swimmer’s ear**, maceration of ear canals can be prevented by prophylactic instillation of a drying agent after the dog gets wet (swimming, bathing), or two to three times per week in very humid climates. Effective products are ear products that contain astringents/alcohol

**3. For allergic otitis**, long-term management includes control of underlying allergies, resolution of any secondary bacterial and yeast otitis, and institution of ear cleaning and treatment every 3-7 days to prevent the recurrence. In animals whose underlying allergies cannot be identified or completely controlled, the judicious use of steroid-containing otic preparations as infrequently as needed may prevent otitis flare-ups

**4. For mild/acute otitis**, at home, the owner should perform ear cleaning every 2 to 7 days with a ceruminolytic agent (that does not need to be flushed out) to prevent earwax and debris from accumulating. Lifelong ear cleaning every 3 – 7 days may be necessary to prevent relapses of otitis. The use of cotton swabs (which may damage the epithelium) is not recommended.

**5.  For severe/chronic otitis**, in-hospital ear cleaning and flushing should be performed to remove accumulated exudate and debris from the vertical and horizontal ear canals (under sedation or anesthesia if necessary). The procedure should be repeated every 2 to 7 days until all debris has been removed.

Products that can be used for ear flushing include the following:

n Water or saline

n DSS diluted in warm water or saline

Non-ototoxic ear cleaning product

n Povidone-iodine 0.2%-1% solution (may be ototoxic)

n Chlorhexidine 0.05%-0.2% solution (may be ototoxic)

n Pretreatment (5 minutes before lavage) with a urea peroxide cleaning product is very effective at dissolving exudate but MUST be flushed out of the canal(may be ototoxic)

**6. Systemic glucocorticoids** should be administered if the ear is painful or the canal is stenotic from tissue swelling or proliferation. For dogs, prednisone 0.25 to 0.5mg/kg PO should be administered every 12 hours for 5 to 10 days. For cats, prednisolone 0.5-1.0mg/kg PO should be administered every 12 hours for 7 to 14 days.

**Individual Diseases**

**7. For ear mites**, affected and all in-contact dogs and cats should be treated. When otic treatments are used, additional treatment to eliminate ectopic mites should be concurrently administered. Effective therapies for ear mites include the following:

n Otic miticide as per label directions (ivermectin and milbemycin products are safe and highly effective)

n Selemectin 6-12mg/kg topically on skin twice 2-4 weeks apart (dogs)

n Tresaderm 0.125-0.25 mL AU q 12 hours for 2-3 weeks

n Ivermectin 0.3mg/kg PO q 7 days for 3-4 treatments, or 0.3mg/kg SC q 10-14 days for 2-3 treatments

n Fipronil 0.1-0.15 mL AU q 14 days for two to three treatments (based on anecdotal reports)

**8. For demodectic otitis**, Effective therapies for ear mites include the following:

n Otic miticide as per label directions (ivermectin and milbemycin products are safe and highly effective)

An alternative treatment is to use 1% injectable ivermectin solution 0.1 to 0.15 mL instilled AU every 24 hours, continuing at least 2 weeks past complete clinical resolution with no evidence of mites on follow-up ear smears.

**9. For yeast otitis**, antifungal-containing ear preparations should be repackaged into a bottle to provide more accurate dosing; dropper bottle, brown amber bottle, etc. Then, 0.2 to 0.4 mL (1/4-1/2 dropperful) should be instilled in the affected ear every 12 hours for at least 2 to 4 weeks. Treatment should be continued until follow-up ear smears are cytologically negative for microorganisms, the external canals are no longer edematous or inflamed, and the ear canal epithelium has normalized.

Effective products include the following:

n Clotrimazole

n Miconazole

n Thiabendazole

n Nystatin

**10.**  **For severe refractory yeast otitis externa or otitis media**, in addition to topical antifungal treatment, systemic antifungal therapy may be helpful if administered for at least 3 to 4 weeks, then continued 1 to 2 weeks beyond complete clinical cure. Effective therapies include the following:

n Ketoconazole 5mg/kg PO q 12 hours, or 10mg/kg PO q 24 hours with food

n Fluconazole 5mg/kg PO q 12 hours, or 10mg/kg PO q 24 hours with food

n Itraconazole 5-10mg/kg PO q 24 hours with food

n Pulse itraconazole 5-10mg/kg PO q 24 hours with food on 2 consecutive days each week

**11. For bacterial otitis**, antibiotic-containing ear preparations should be repackaged into to provide more accurate dosing; dropper bottle, brown amber bottle, etc. Then, 0.2 to 0.4 mL (1/4-1/2 dropperful) should be instilled in affected ears every 8 to 12 hours for at least 2 to 4 weeks. Treatment should be continued until follow-up ear smears are cytologically negative for microorganisms, the external canals are no longer edematous or inflamed, and the ear canal epithelium has normalized.

Effective products include the following:

n Gentamicin

n Neomycin

n Polymixin B and neomycin

n Polymixin E and neomycin

**12. For bacterial otitis media**, Systemic antibiotics may not achieve sufficient tissue concentrations to kill *Pseudomonas* and to prevent antibiotic resistance, the highest possible dose of antibiotic that is safe should be administered with concurrent high-concentration topical therapy of the same antibiotic. If topical has been used aggressively and has been unsuccessful, systemic antibiotics may be indicated, based on culture and sensitivity results, for a minimum of 4 weeks, and continued 2 weeks beyond complete clinical cure.

Antibiotics include the following:

n Ormetoprin-sulfadimethoxine 27.5mg/kg PO q 24 hours

n Trimethoprim-sulfa 22mg/kg PO q 12 hours

n Cephalexin, cephradine, or cefadroxil 22mg/kg PO q 8 hours

n Ciprofloxacin 5-15mg/kg PO q 12 hours

n Enrofloxacin 20mg/kg PO q 24 hours *(may increase the risk of resistant bacteria)*

n Orbifloxacin 7.5mg/kg PO q 24 hours *(may increase the risk of resistant bacteria)*

n Marbofloxacin 5.5mg/kg PO q 24 hours *(may increase the risk of resistant bacteria)*

**13. For *Pseudomonas* otitis**, aggressive treatment should be provided for at least 2-4 weeks, then continued 2 weeks beyond complete clinical cure. All underlying/primary diseases should be identified and addressed. Currently, the most effective treatments include tris–ethylenediaminetetra-acetic acid (EDTA) solutions with high concentrations of antibiotics instilled in high volumes (to ensure deep penetration and prevent dilution by exudate). Antibiotics should be selected according to culture and sensitivity results. Systemic antibiotics may not achieve sufficient tissue concentrations (mutation prevention concentration) to kill *Pseudomonas* and prevent antibiotic resistance. If systemic antibiotics are used, the highest possible dose that is safe should be administered, along with concurrent high-concentration topical therapy of the same antibiotic.

n The tris–ethylenediaminetetra-acetic acid (EDTA) solution should be combined with enrofloxacin to make a 10- to 20-mg/mL solution. The solution should be used q 12-24 hours to completely fill the ear canal. Even as the sole therapy, the surfactants in T8 Solution act to clean the ear while allowing the high concentration of enrofloxacin to penetrate into the deep canal. This treatment is 80% effective in chronic, recurrent otitis cases, even if the bacteria are reported to be resistant to enrofloxacin (because of the tris-EDTA and high concentration of antibiotic)

n Tris-EDTA solution (with/without enrofloxacin 10mg/mL, gentamicin 3mg/mL, or amikacin 9mg/mL) 0.4 mL instilled q 8-12 hours

n Combination 3 mL enrofloxacin (Baytril Injectable 22.7mg/mL) plus 4mg dexamethasone sodium phosphate plus 12 mL ear cleanser: 0.2-0.4 mL instilled q 12 hours

n Amikacin sulfate (Amiglyde V Injectable 50mg/mL), undiluted, 0.1-0.2 mL instilled q 12 hours

n Silver sulfadiazine (Silvadene) 0.1% solution (mix 1.5 mL [1/3 tsp]) of Silvadene Cream with 13.5 mL distilled water, or mix 0.1 g silver sulfadiazine powder with 100 mL distilled water), and instill 0.5 mL q 12 hours

n Ticarcillin equine intrauterine infusion (Ticillin), undiluted, 0.2-0.3 mL q 8 hours

n Ticarcillin powder for injection (vial should be reconstituted as directed, then frozen in TB syringes as 1-mL aliquots). New syringe should be thawed each day and kept refrigerated. A dose of 0.2 to 0.3 mL should be instilled into affected ears q 8 hours

**For End-Stage Ears**

**14. For chronic proliferative otitis**, aggressive medical therapy is needed. Weekly ear cleaning should be instituted. For bacterial/yeast otitis externa and media, long-term (minimum, 4 weeks) systemic and topical antibiotics or antifungal medications should be administered, then continued 2 weeks beyond complete clinical resolution of the infection. To reduce tissue proliferation, prednisone 0.5mg/kg PO should be administered every 12 hours for 2 weeks; then, 0.5mg/kg PO should be administered every 24 hours for 2 weeks, followed by 0.5mg/kg PO every 48 hours for 2 weeks. These ears rarely return to complete normalcy, so long-term maintenance therapy with steroid-containing otic preparations, as described for allergic otitis, is almost always necessary.

**15. For end-stage ears, indications for surgery** include the following:

n Traction-avulsion or surgical resection of inflammatory polyps/masses

n Lateral ear canal resection, which aids in ventilation and drainage and allows for easier application of medication but rarely results in cure because a large amount of diseased tissue is still present

n Vertical ear canal ablation, if proliferative changes are present in the vertical canal but the horizontal canal is not affected. Total ear canal ablation and lateral bulla osteotomy is usually indicated to alleviate chronic pain and discomfort when end-stage otitis externa and otitis media are no longer responsive to medical management

**16.** The prognosis is variable, depending on whether the underlying cause can be identified and corrected, and on the chronicity and severity of the otitis externa. Because Cocker spaniels are especially at risk for chronic and severe otitis externa, early and aggressive management of primary otitis externa and secondary inflammation is warranted in this breed.

**Author’s Note:**

The most important component for successful long-term treatment of otitis are

1. Identify and control the underlying, primary disease; infectious otitis is secondary and recurrence can only be prevented if the primary disease is treated.
2. Use sufficient volumes of otic medications to completely coat and penetrate the ear canal; most patients need a minimum of 0.25 ml to provide enough medication.
3. Don’t treat and stop; treat and stop but rather use frequent (every 3-7 days) cleaning or treatment to prevent otitis recurrence.

It is extremely important to base treatment decisions on cytology (initial and recheck) and clinical impression together.

The most consistently successful and least ototoxic treatment for Pseudomonas otitis is a high concentration enrofloxcin solution mixed into a trisEDTA (making a 10mg/ml final solution). If the infection is not improving, consider a deep otic lavage and evaluation of the otic bullae. Systemic antibiotics do NOT seem to improve treatment efficacy beyond the topical solution alone.