

MANAGEMENT OF OTITIS EXTERNA / MEDIA IN THE DOG AND CAT

Rod A.W. Rosychuk DVM, DACVIM

Colorado State University

PATHOGENESIS OF OTITIS MEDIA

Inflammation within the middle ear may be infectious (bacterial, fungal) or noninfectious (foreign body, neoplasia, polyps, trauma, cholesteatoma).

Otitis media is most commonly an extension of an otitis externa, through a perforated tympanum. Extension of infection up the Eustachian tube does occur, but is rare in the dog. It is more common in the cat, likely because cats have a higher incidence of posterior pharyngeal inflammatory disease due to viral infections. With ascending infections, the tympanum is usually intact. In the middle ear of both dogs and cats, mucoid secretions are normally produced that drain through the Eustachian tube in to the posterior pharynx. The middle ear of both dogs and cats have a normal bacterial flora. Obstruction of the Eustachian tube due to posterior paryngeal inflammatory disease or neoplasia may result in the accumulation of secretions within the middle ear. Otherwise normal microflora of the middle ear may then produce infection. These fluid accumulations may also be sterile.

It is not uncommon to see concurrent otitis interna along with otitis media in both the dog and cat. In these instances inflammation/infection accesses the inner ear through the round and oval windows, both covered by only by a thin layer of epithelium.

Clinical signs that are associated with a higher incidence of a perforated tympanum and concurrent otitis media (when the tympanum cannot be visualized) include:

1. In the dog, a stenotic horizontal ear canal (chronic proliferative disease) is associated with a concurrent otitis media in 50 – 80% of cases. Debris is unable to exit the ear and instead places pressure on and finally perforates the tympanum.
2. Severe bacterial infection (usually *Pseudomonas* spp) has been associated with a higher incidence of perforation. These ears are usually severely inflamed and have purulent exudates.
3. When the tympanum cannot be seen due to debris accumulation and there are neurologic signs of otitis media/interna (see below).

In the dog, the bacteria and yeast associated with otitis media, in roughly decreasing order of occurrence include *Staphylococcus pseudintermedius*, *Malassezia pachydermatis*, *Pseudomonas* spp., *Corynebacterium* spp., *Enterococcus* spp., *Proteus* spp., *B-hemolytic streptococcus*, alpha-hemolytic streptococcus, *Citrobacter* spp., *E. Coli*, and Anaerobes. While there are few reports of the bacteria associated with otitis media in the cat, the bacteria seen in the middle ear in cats with aural polyps include *Pasturella multocida*, *Beta hemolytic streptococcus*, *Staphylococcus hominis*, *Bacteroides* sp., *Pseudomonas* sp., and *Streptococcus zooepidemicus*. Most bacteria were sensitive to Clavamox and enrofloxacin / marbofloxacin.

Cholesteatoma (only seen in the dog) are formed when the tympanum is pushed into the bulla by usually drier waxy accumulations. Epithelial debris continues to be produced and accumulates within this “pouch”

until it fills the entire bulla. With time, pressure from expanding debris accumulation may be placed on the bulla wall to result in bulla expansion, bulla wall thinning and even perforation.

Clinical Signs: In most cases, the signs of otitis media mimic those of otitis externa (pruritus, head shaking, pain, exudation). There may be pain associated with opening the mouth. Neurologic signs are less commonly encountered (approx. 25% of cases). They include facial paresis and paralysis (more common in the dog than in the cat because in the dog the facial nerve is covered by only epithelium, in the cat, it passes through a bony channel in the dorsal middle ear), Horner's syndrome, KCS and xeromycteria (unilateral drying and hyperkeratosis of the planum nasale on the affected side; seen in the dog, usually do not see in the cat). In that otitis media may extend to also involve the inner ear, other neurologic signs that may be present include inner ear signs: deafness, head tilt, asymmetric ataxia and horizontal nystagmus (peripheral vestibular signs).

Differential Diagnoses of otitis media: it is possible to see neuropathies that will target certain nerves that can mimic the changes induced by otitis media/interna (facial, sympathetic, parasympathetic nerve dysfunction and also vestibulitis/vestibular dysfunction syndromes).

Diagnosis

1. The diagnosis of an otitis media is often made on a clinical basis, by observing a perforated tympanum and the presence of debris within the middle ear.
2. In many instances, the tympanum cannot be seen due to wax accumulation or stenosis. In such instances, a high "index of suspicion" of otitis media is made based on the criteria noted previously that suggest a higher incidence of tympanum perforation.
3. When the ear drum is intact, the presence of a bulging pars tensa suggests an otitis media.
4. The presence of an abnormal tympanum - thickened, opaque, neovascularized; discolored - may suggest the presence of active middle ear disease.
5. Radiographs, CT or MRI of the middle ear. CT scanning is the "gold standard" used by most. This not only tells you if there is material within the middle ear, but also helps prognostically (e.g. osteomyelitis, suggested by lytic changes within the bulla wall is usually a poor prognosis for successful medical management).
 - a. Myringotomy – this procedure is recommended in those instances wherein there is a high index of suspicion for otitis media and the tympanum is intact. A high index of suspicion: Material within the middle ear as seen on radiographs or CT; Neurologic signs suggesting otitis media/interna; "Bulging" pars tensa; Abnormal tympanum - It is very important to note that it is very common to see the tympanum become abnormally thickened and opaque if debris has been sitting on its surface for some period of time.

Management Considerations:

1. Cleaning the middle ear

- a. Anesthesia required - to minimize potential for trauma; entubation assures that fluid will not pass through Eustachian tube in to the posterior pharynx and be aspirated.
 - b. Recall that the opening to the tympanic bulla in the dog is caudoventral. When cleaning the middle ear , catheters should be directed caudoventrally.
 - c. Recall that in the cat, only the upper (dorsolateral) chamber of the middle ear can be cleaned; there is inadequate communication to the ventromedial chamber to allow this be flushed
 - d. Flushing (saline) through 5 ½ inch open ended tomcat catheter. Suction through suction apparatus that has a method of controlling suction (minimize negative pressure when suctioning within the middle ear).
 - e. Commercial flushing and suctioning apparatus (e.g. VetPump II; Storz) – flush large volumes of saline through the middle ear. This does a great job of removing debris, even without suction.
 - f. Flushing middle ear utilizing a curved catheter (to facilitate getting in to the tympanic bulla). To make a curved catheter (slight curve at the catheter tip), using a 14 or 16 gauge Teflon catheter; place a circlage wire through the catheter and bend the tip. Heat the catheter in boiling water. This will give it a permanent “memory” when the wire is removed.
 - g. To assure cleaning, large volumes of sterile saline are flushed through the middle ear (in dogs, 300 – 400 ml; cats 50 – 100 ml).
2. “Safer” topical medications to be used to treat ears (canals and middle ear); will not cause ototoxicity:
- a. For bacteria : injectable enrofloxacin (22.7mg/ml): dexamethasone sodium phosphate (4mg/ml) at a ratio of 1:2
 - b. For *Malassezia* : dexamethasone sodium phosphate: 1% miconazole (1:1)
 - c. For bacteria and *Malassezia*: enrofloxacin:dexamethasone sodium phosphate: 1% miconazole (1:1:2).
 - d. Topical Potent Glucocorticoid - Synotic (fluocinolone and DMSO) +/- enrofloxacin (22.7 mg/ml) – 2:1 mix
 - e. Other antibiotics noted to be safe if placed in the middle ear : ciprofloxacin, aqueous gentamicin (emphasis is on aqueous because other vehicles in which gentamicin is commonly found make these combinations ototoxic – e.g. Otomax, Mometamax, Merck); although the author has used ticarcillin or ticarcillin/clavulonate in a number of middle ears without apparent problems, recent data would suggest that it does have the potential to be ototoxic.
 - f. Safer Ear flushes:
 - a. Mal-A-Ket Plus (Dechra) – ketoconazole, chlorhexidine, TrisEDTA
 - b. Douxo Micellar Solution (Sogeval)
 - c. dilute white vinegar and water (1:2)
3. Systemic Therapies: systemic antibiotics, anti-fungals and glucocorticoids are routinely used in the management of otitis externa.

- a. Systemic antibiotic therapy is generally chosen on the basis of culture, but empiric, initial treatments are generally based on cytologic findings (e.g. for cocci seen cytologically, a cephalosporin; for mixed infections (rods and cocci), ceftriaxone-amoxicillin, for “rods” – marbofloxacin, enrofloxacin.
Duration of therapy – 4 – 6 weeks.
- b. For *Malassezia* - in dogs, ketoconazole, 5 – 10 mg/kg BID, for cats, itraconazole – 5 mg/kg q 24 hrs.
- c. Oral glucocorticoids – prednisone/prednisolone starting at 0.5 – 1.0 mg/kg/day; decreasing dosages over 2 – 4 weeks.

Management Scenarios

- A. Acute otitis externa, perforated tympanum, debris within middle ears +/- neurologic signs; unable to do anesthesia (cost concerns)
 1. Cytology from canals.
 2. Topical safe ear solution BID, safer ear flush once daily
 3. Systemic antibiotic based on cytology (e.g. cocci – cephalexin, Clavamox; rods – marbofloxacin, enrofloxacin)
 4. Systemic anti-fungal – if *Malassezia* seen on cytology – (e.g. ketoconazole, fluconazole or itraconazole)
 5. Systemic steroid – prednisone / prednisolone – starting at 0.5 – 1.0 mg/kg/day for 5 – 7 days, then gradually taper over 3-4 weeks.
- B. Acute otitis externa, perforated tympanum, debris within middle ear +/- neurologic signs
 1. Anesthesia
 2. Cytology and culture (if bacteria) from canals, cytology and culture from middle ear (cultures can be combined for plating)
 3. Clean canals / middle ear
 4. Safe topical steroid/antibiotic/anti-fungal solution BID; safe ear flush once every other day
 5. Systemic antibiotic/antifungal based on cytology and culture (see above)
 6. Systemic steroid (as above)
- C. Chronic otitis externa, cannot see the tympanic membrane because of severe stenosis +/- neurologic signs
 1. “Pre” treatment to “open up canals – oral and topical glucocorticoid, topical antibiotic/anti-fungal (safer product) and systemic antibiotic and /or antifungal - 2 weeks therapy.
 2. Once canal has been “opened up”: anesthesia for bulla radiographs or CT scan, cytology/culture from canals and middle ear; deep ear cleaning (including middle ear)
 3. After ear cleaning (pending culture) - topical and systemic therapy as outlined above (definitely to include an oral steroid) because of proliferative ear changes.
- D. Neurologic signs, intact tympanum (possibly abnormal in appearance and or bulging - i.e. pars tensa bulging).

1. Anesthesia
2. +/- radiographs, CT of bullae
3. Thoroughly clean and dry ear canals
4. Myringotomy
5. If material found within the middle ear – cytology, culture and sensitivity testing; open up a larger hole in the ventral / caudoventral aspect of the pars tensa of the tympanum and flush the middle ear.
6. Topical and systemic therapy based on cytologic findings.

Prognosis

1. Perforations of the tympanum – if the pars flaccida of the tympanum and/or the area around the handle of the malleus (found within the tympanum) is permanently preserved (i.e. not destroyed), even very large holes in the pars tensa will heal over (once inflammation/infection has been controlled in the ear, often within 3-5 weeks for very large holes). If the pars flaccida and area around the handle of the malleus have been permanently destroyed, the tympanum will not regrow. Many dogs and cats do well without a tympanum. Emphasis is placed on maintenance topical therapy (safe ear flush) used on a regular basis (e.g. once weekly) to facilitate the removal of wax that may accumulate within the ear. This is very important when patients have concurrent allergic otitis externa. In these individuals, the use of chronic topical steroids (e.g. twice weekly) will help to reduce wax accumulation within the canals and middle ear. Re-accumulation of wax within the middle ear may be a predisposition to infection for some individuals, but, in many it does not pose a problem. If it is problematic, consideration can be given to routine flushing of the middle ear, once every 6 – 12 months (under anesthesia).
2. Neurologic signs – Horner's syndrome and facial nerve paresis/paralysis are often transient, but with chronic otitis media, may be permanent, even with complete cleaning of the ears/resolution of infection etc. We tend to see parasympathetic dysfunction (causing xeromycteria) mostly with chronic otitis media. These changes are often permanent. Signs associated with concurrent otitis interna are also variable. Head tilt commonly improves very significantly, but often persists to some degree (often minor). Affected individuals usually cope very well with these abnormalities. In general, the more chronic the otitis media/interna, the more likely the neurologic signs will persist to some degree.
3. Cholesteatoma (with dilated, thin bulla walls) – generally very difficult to remove the copious amounts of epithelial debris accumulated in these ears. Prognosis is poor and these individuals are usually sent to surgery for a ventral bulla osteotomy or, if there is chronic, severe canal disease as well – total ear canal ablation
4. If severe stenosis of the canals persists in the ears (usually associated with calcification of the periauricular tissues) and medications cannot be delivered to the middle ears through the canals and the middle ears cannot be cleaned, the management of choice is total ear canal ablation and lateral bulla osteotomy.

5. Patients are only rarely sent to surgery for ventral bulla osteotomies in our practice because we do a reasonably good job of removing debris from the middle ears. It should be emphasized that, leaving some debris in the bulla after a deep ear cleaning is not uncommon. This debris (often predominantly epithelial debris) does not appear to cause a problem. The one scenario in which we do more routinely pursue ventral bulla osteotomy would be a situation in which there appears to be an osteomyelitis involving the bulla wall (on radiographs or CT). Infectious problems of this severity are often not amenable to medical management.

PRIMARY SECRETORY OTITIS MEDIA IN THE CAVALIER KING CHARLES SPANIEL

This syndrome involves the accumulation of mucoid material within the middle ear (may be unilateral or bilateral). The reason behind the fluid accumulation is unknown, but likely is related to dysfunction of the auditory canal. It probably should not be considered an “otitis” in that inflammatory changes are usually not seen on cytologic examination of the mucoid material. The mucoid accumulation may be related to loss of hearing /deafness. Occasionally, pain manifestations may be noted – pain localized to the head or cervical area. Pruritus may be directed at the ear. Rarely, there may be neurologic signs of otitis media/interna. The problem is suggested by the presence of a dilated pars flaccida on otoscopic examination (although the pars flaccida does not have to be dilated in all cases). The diagnosis is supported by finding fluid within the middle ear on radiographs / CT or MRI (although this is not a mandatory diagnostic) and by myringotomy. Once mucoid material has been documented within the middle ear, a large hole is made in the pars tensa (ventral aspect) and the mucoid material is flushed from the middle ear. In order to accomplish this, a 14 or 16 gage Teflon catheter is placed deeply within the middle ear until the catheter hits bone; saline is then flushed in to the middle ear, dislodging the mucoid material. This flushing action works better than suction to remove the material. The mucoid secretion is usually very tenacious. It is usual to have the mucoid material re-accumulate over variable time (usually months). Repeated middle ear flushes are often associated with lesser tendencies towards re-accumulation.