Otitis externa is recognized as one of the more common problems encountered in clinical practice. Successful management is greatly facilitated by an understanding of the pathogenesis of the disease. The vast majority of otitis externa seen in dogs is caused by allergy (atopy and/or food sensitivity). Other, less commonly incriminated primary factors (i.e., those factors capable of causing inflammation in ears) include ear mites, foreign bodies, hypothyroidism, primary (idiopathic) seborrhea, sebaceous adenitis, zinc responsive dermatosis, autoimmune disease (e.g., pemphigus), juvenile cellulitis, ceruminous cysts, and neoplasia. These problems are often complicated by secondary Malassezia and/or bacterial infection (so called perpetuators of disease). Other perpetuators include debris within ears, proliferative changes, reactions to medications, and the presence of concurrent otitis media.

A similar list of primary and perpetuating factors is seen in cats. Ear mites are more common than in dogs. Allergies (atopy, food sensitivity) tend to be underdiagnosed. Foreign bodies, aural polyps, ceruminous cysts, and neoplasia complete the list. These problems may also be complicated by perpetuating factors (secondary Malassezia and/or bacterial infections, proliferative changes, debris, otitis media).

The following “tips” are noted to help in the resolution or control of otitis in the author’s practice:

1. **Video Otoscopy**
   Video otoscopes allow for excellent visualization of the ear canals and tympanum of the canine and feline ear. Reasonable visualization of the tympanic cavity (middle ear) is also possible when the tympanum has been perforated. Due to the degree of magnification, structures are better visualized than with conventional otoscopy (including degrees of inflammation, nature of debris, degree of proliferation, masses, nature and integrity of tympanum).

   “In examination room” use allows the client to visualize changes within the ear. This very commonly enhances compliance with respect to therapy. It provides easy rationalization for the need to do further diagnostics and therapeutics such as foreign body removal, deep ear cleaning, or biopsies. Digital pictures and movies can be captured for the record or the client. Lens fogging tends to be one of the major impediments to adequate visualization within the ear. This often has to do with temperature differentials (warm ear, cold scope). This problem can be minimized by warming the scope tip in warm water. We have constructed a small “bulb box” that the scope head sits in during the working day to keep it warm and minimize this phenomenon. If fogging is encountered, the author’s routine method of cleaning the otoscope tip is to wipe it with a cotton ball soaked in alcohol. Excess alcohol is dabbed from the tip of the scope prior to going in to the ear, to minimize irritation. It is possible that this “clearing” may have to be done several times before adequate visualization of the ear is possible.

**Procedures Done Through the Video Otoscope**

a. The operating channel in the video otoscope allows for fluid infusion, passage of graspers, biopsy forceps, ear currettes, catheters, myringotomy needles, and lasers. The operating channel exits the scope at 12 o’clock. This means that all instrumentation will exit from this position. This must be considered when trying to direct instrumentation at specific areas in the ear. The video otoscope head can be turned to facilitate access to various parts of the ear. A multi-channel (2-channel) adapter allows for simultaneous running of fluids while doing other manipulative work (graspers, biopsy forceps, diode laser).

b. Foreign body removal: grass awns, etc., can often be removed on a rapid, outpatient basis, with manual restraint or light sedation, with the patient in lateral recumbency.

c. Deep ear cleaning is made much more effective through the use of the video otoscope. Fogging and debris accumulation (impeding visualization) may be a significant problem, but is circumvented by frequent alcohol cleaning of the tip of the scope.

   **Cleaning Option 1:** In the anesthetized patient, the infusion of saline expands the canal and improves visualization, prevents fogging, and frequently is associated with loosening up and “flushing out” of debris. A significant amount of debris can be removed in this fashion.

   **Cleaning Option 2:** Vetpump II (Storz); other units are available—offers the option of flushing and suctioning through the same catheter, utilizing a “one-handed” button system (video otoscope held in one hand; flushing/suctioning unit held in the other). More suction is used when working more superficially in
the ear to remove large amounts of debris quickly; less suction when working deeply within the ear, especially around the tympanum. The tympanum can be perforated with excessive suction. It is always better to start with lesser amounts of suction if there is a question.

Cleaning Option 3: Flushing and suctioning can be done through the working channel utilizing a 16-gauge, 5.5-inch Teflon catheter (Abbot Hospital Incorporated) or a 5-inch, open-ended tomcat catheter attached to a 12 cc syringe (disadvantage—flushing with dirty water/saline—from suctioning; difficult to see). The operating channel can also be used for passage of grabbing forceps or an ear curette to facilitate rapid debris removal.

Cleaning Option 4: Homemade flushing and suction apparatus for use through the video otoscope: A 16-gauge, 5.5-inch Teflon jugular catheter (Abbot Hospital Incorporated, North Chicago, IL 60064), a 5.5-inch, open-ended tomcat catheter, or a 3F feeding or urethral tube can be attached via an extension set to a three-way stopcock. For flushing purposes, a 60 cc syringe is attached to the stopcock. The hose from a suction apparatus is then attached to the remaining portal on the three-way stopcock. One person performs the flushing and sucking at the instruction of the individual who manipulates the scope.

Cleaning Option 5: The video otoscope has a working channel to which can be attached a 2-channel adapter. The use of the adapter allows for simultaneous infusion of saline (ideally warm) and use of suction or the passage of grasping forceps or the ear curettes to facilitate debris removal. The author will also pass a “cut off” urethral catheter down the operating channel and do “directed” flushing of particularly difficult to remove debris (i.e., running fluids and flushing through the urethral catheter at the same time).

d. Biopsies; cyst and mass removal: Biopsies utilizing the biopsy forceps are best facilitated by grasping tissue and both pulling and turning the biopsy forceps at the same time. Because biopsy samples tend to be small, they should be placed in biopsy cassettes for purposes of submission to your pathologist. The author quite routinely uses a larger pair of biopsy forceps (available from Storz) through a conventional operating otoscope to remove larger amounts of tissue, then utilizes the smaller biopsy forceps or grabbers to remove remaining tissue.

e. Intratemporal glucocorticoids for proliferative otitis externa—dilute triamcinolone acetonide (6 mg/ml) to 2 mg/ml. Utilizing the Storz myringotomy needle or a 6-inch, 22-gauge spinal needle, go in to the ear as deeply as possible and inject approx. 0.1 ml of steroid within the wall of the horizontal canal or at the base of any proliferative lesions. If the canal is narrowed 360 degrees, then make 3 injections around the margins, back out 1 cm, and repeat the procedure; back out again 1 cm and repeat the injections until you are out of the ear. I have generally limited my total dose per dog to 6 mg of triamcinolone.

f. Middle ear cleaning: If the tympanum is perforated, the bulla can be flushed and aspirated as outlined above.

g. Myringotomy may be performed through the video otoscope, utilizing a 6-inch, 22-gauge spinal needle, a Storz myringotomy needle, or open-ended tomcat catheter or 16-gauge Teflon catheter (may help to cut tip of catheter off at an angle to facilitate penetration of the tympanum).

h. Laser: It is possible to do laser mass removal (cysts, neoplasia, proliferative tissue) and to perform myringotomies through the video otoscope (CO2 or diode laser).

i. Visualization of the tympanic bulla: Possible through a 2.7 or 1.9 mm arthroscope; manipulative functions are usually not possible.

2. Cytology—Do It Routinely!

A cytologic examination of the ear/ears should be performed at the initial visit and at every recheck until the ears are normalized. Morphologically describe and quantitate bacteria, yeast, inflammatory cells (e.g., use 0 to 4+ scale so can roughly compare numbers from visit to visit). If bacteria persist in the face of therapy—resistance? Poor owner compliance regarding therapy? If clinical evidence of otitis persists with no bacteria/yeast present—allergies, ceruminous otitis, overtreatment? Neutrophils present where neutrophils were not part of the original cytology may suggest a contact reaction or irritation produced by a topical medication. Cytology is noted to be more accurate in identifying Malassezia than culture.

3. Inform Owners about the Proper Technique of Medication Administration; Make Sure They Use Enough Medication.

One must take the time to properly instruct owners in how to “flush” and medicate ears. For flushing ears, emphasis must be placed on filling the ear with the cleansing solution. While massaging the ear canal, a cotton ball can be used to “wick” material from the ear.
Because ear “flushes” inherently tend to bother dogs and cats more than medicated solutions/ointments, flushing should usually be started 2–4 days after medicated solution/ointment therapy has been initiated. Individuals tend to tolerate these medications much better once the ear has been “quieted down.”

Owners can be given an instruction sheet that reviews the proper flushing and medication administration techniques.

It is imperative that enough medication be placed in the ear. Historically, it has been most common to administer most solutions/ointments twice daily to initiate therapy. At this frequency, “drop” guidelines for an ointment such as Otomax (Schering) would be 4–5 drops (approx. 0.1 ml) for a smaller breed dog (e.g., WHWT), 6–8 drops (0.15–0.2 ml) for a mid-sized breed (e.g., golden retriever), and 10–12 drops for a large breed (e.g., St. Bernard). Significantly larger volumes of medication can be used only once daily to achieve the same end (e.g., small dogs, 0.4–5 ml; medium-sized dogs, 0.5–0.7 ml; and large breeds, 1.0 ml).

Consider rebottling ear medications in multiple-dose vials that will allow owners to more accurately measure the quantities of solution/ointment placed in the ear.

4. Tris-EDTA—Containing Products—Appropriate Use

Tris-EDTA has been a very beneficial addition to our armamentarium of treatments for the management of bacterial otitis, especially *Pseudomonas* otitis. Tris-EDTA has been shown to increase the susceptibility of various bacteria (*Pseudomonas aeruginosa*, *Staphylococcus aureus*, *E. coli*, and *Proteus mirabilis*) to several antibiotics (enrofloxacin, cephaloridine, or kanamycin). It has also been shown that Tris-EDTA has some inherent antibacterial activity. There are currently several veterinary Tris-EDTA products on the market. T8 solution (DVM Pharmaceuticals) also contains benzoyl alcohol, which enhances its antibacterial effects. It contains surfactants, which provide some cleansing activity. There is some question about its increased potential for ototoxicity because of these additives. T8 Keto (DVM Pharmaceuticals) has an ingredient profile as for T8 but also contains ketoconazole which provides anti-*malassezia* effects. TrizEDTA (DermaPet Inc.) contains Tris-EDTA but none of the additives noted above for the T8 and T8 Keto products, and for this reason, has been suggested to be safe in the middle ear (not ototoxic). TrizUltra plus ketoconazole (DermaPet) contains TrizEDTA and ketoconazole.

Tris-EDTA products are used in several different ways:

a. To flush the ear 10 minutes prior to instilling topical antibiotic–containing products (e.g., especially for suspected Pseudomonas, when the tympanum is intact: Otomax [Gentamicin], Cortisporin Otic [Polymixin B; human product], Baytril Otic; when the tympanum is not intact or one is not sure—enrofloxacin: Synotic (1:2) or a mix of enrofloxacin (22.7 mg/ml): dexamethasone sodium phosphate (4 mg/ml) (1:2) or a mix of enrofloxacin: dexamethasone sp: 1% miconazole (1:1:2)

b. Enrofloxacin mixed with a Tris-EDTA solution: When using these products in combination, the author tries to achieve a final concentration of 10 mg/ml of enrofloxacin (i.e., 13 mls of 100 mg/ml injectable enrofloxacin per 118 ml bottle of TrizEDTA AQ—DermaPet or TrizUltra + ketoconazole—DermaPet). Others have claimed similar success with concentrations of 4–5 mg/ml of enrofloxacin. The combination product is used BID to initiate therapy (ear is filled with the combination and massaged in). The author has used a combination of enrofloxacin and TrizEDTA (DermaPet Inc.) in middle ears, without apparent ototoxicity. Due to the lack of an antifungal component to this product (TrizEDTA), a flare of Malassezia otitis may occasionally be seen during therapy. However, if the TrizUltra + ketoconazole product is used, this should not be a problem.


5. Systemic Therapy for the Management of Otitis Externa

The benefit of systemic antibiotic therapy in the management of otitis externa is controversial. There are only a very few studies that have involved treating bacterial otitis with a systemic antibiotic alone (e.g., *Pseudomonas* otitis externa treated with marbofloxacin; 28% of cases resolved, 43% improved; Carlotti 1998). The guidelines that the author uses to consider the use of systemic antibiotic include the finding of neutrophils along with bacteria in cytologic preparations. Neutrophils suggest that the bacterial infection is deeper seated in the ear (i.e., a folliculitis and/or furunculosis). Significant proliferative changes in ears also warrant consideration of systemic
antibiotic therapy. Systemic antibiotics are always indicated in the management of bacterial otitis media. Antibiotics that are used empirically by the author (based on cytologic findings) include cephalosporins for “cocci” and a fluoroquinolone (ciprofloxacin, marbofloxacin, enrofloxacin, orbifloxacin—in order of preference) for “rods.”

Systemic therapy for yeast appears to be variably effective. It is perhaps of most value as an adjunctive therapy when there are proliferative changes in the ears. It is always indicated in the management of Malassezia otitis media. Drugs used in the dog include ketoconazole (5 mg/kg BID), fluconazole—5 mg/kg q 24 hours, and itraconazole—5 mg/kg q 24 hours. Itraconazole is used in cats.

Systemic glucocorticoids are often of value in treating otitis externa. They will very rapidly reduce the inflammation and pain associated with otitis. This will often allow owners to more readily treat their pets. Oral glucocorticoids are also very valuable in reducing proliferative changes in ears. Therapy is usually initiated at anti-inflammatory dosages (in dogs, prednisone or prednisolone starting at 0.5–1 mg/kg/day; in the cats, double this dose). For severe proliferative changes, the dosage of prednisone/prednisolone in dogs is 1–2 mg/kg/day to start.

6. Chronic Management of Allergic Otitis Externa
Resolve secondary bacterial/yeast infections with a broad spectrum product such as Otomax (Schering), Mometamax (Schering), Panalog (Ft. Dodge), Tesaderm (Merial), etc. Consider long-term maintenance therapy with a topical glucocorticoid product devoid of an antibiotic. Combine these long-term topical glucocorticoids with routine flushes using a combination cleanser/dryer 1–2 times per week. Examples of glucocorticoid alternatives:

a. Less severely inflamed ears: For example, Malacetic HC (DermaPet Inc., acetic acid, boric acid, surfactant, hydrocortisone), Bur-Otic HC (Virbac; propylene glycol, water, Burrow’s solution, acetic acid, benzalkonium chloride); once every 48–72 hours long term.

b. In many allergic patients topical hydrocortisone is often not potent enough to reduce “flares” of allergic otitis. These ears are also quite prone to the development of secondary Malassezia infections. Improved control may be achieved with a mix of 1:2 or 1:1 dexamethasone sodium phosphate and 1% miconazole (Conofite, Mallinckrodt). The ratios are changed in accordance with the primary problem being managed within the ear (inflammation vs. Malassezia). A common application protocol for this mix in a golden retriever–sized dog would be 0.5 cc twice weekly, as a long-term maintenance regime. The “mix” appears to maintain its efficacy for 3 months.

7. Treatment Prior to Doing “Deep” Ear Cleanings
In cases of chronic otitis externa where inflammation and proliferation are more severe, but there is a need to thoroughly clean the ear and better examine deeper structures within the ear (i.e., tympanum), consider sending the patient home with 1–2 weeks of topical and systemic therapy (glucocorticoids + antibiotic + antifungal; choices based on cytologic examination) to “open up” the canals. This will facilitate access to deeper structures and allow for a more thorough cleaning.

8. Intralesimal Steroid Therapy for Proliferative Otitis
Intralosomal glucocorticoids: triamcinolone acetonide (2 mg/ml); spinal needle (3.5 inch, 22 gauge); injected following cleaning; 0.1 ml injections into proliferative lesions or if 360 degree proliferation, administer in a “ring” of 3 points around wall, with each “ring” 1–2 cm apart. The maximum triamcinolone dosage that this author usually uses in a 30–40 pound dog is 6 mg. Repeat administration may be considered in 3–4 weeks. When intralesimal therapy is used, there is usually a lesser need for very aggressive oral glucocorticoid dosages—i.e., instead of starting at 1–2 mg/kg/day, start at 0.5–1 mg/kg/day of prednisone/prednisolone.

9. The Use of “Wicks”—When and How
Ear “wicks” are polyvinyl acetate, highly absorbent sponges that can be placed in the ear (under anesthesia). They expand when hydrated. They are indicated in patients who are difficult to medicate or have proliferative otitis (wherein it is difficult to get medication where it needs to get to in the ear). After placement in the ear, the wick is hydrated with appropriate topical solution (antibiotic/antifungal/steroid). The wick is usually removed (and possibly re-placed) every 3–5 days.
10. Follow-up
The successful management of any case of otitis is strongly linked to appropriate follow-up (recheck visits). These should be done every 2–3 weeks until the otitis has been resolved, or a longer term work-up (e.g., for allergy) or maintenance plan can be established for the ears. The use of “in examination room” video otoscopy of enhances compliance with these rechecks (i.e., patients are more willing to return for reexamination if they are able to visualize the changes that are occurring within the ears).