BEST PRACTICES FOR TREATING OTITIS: Parts 1 & 2

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OVERVIEW
Managing patients with otitis can be frustrating and difficult. It is made more difficult by client restrictions (financial and compliance), availability of affordable diagnostics, and the limited number of commercial options for treating otitis externa. Selection of the route of treatment administration, active ingredients of your treatment, and specific treatment protocols for various problems can be confusing. There are, however, some “best practices” that will allow you to reach the maximum potential for these various treatments. The term best practices implies a method or technique set forth by an authority that has consistently shown superior results to those achieved with other means, and that are used as a benchmark. Ideally, these serve as clinical treatment guidelines and are integral to evidence-based practice of medicine.

IMPORTANT CONCEPTS PRIOR TO TREATMENT
1. Understanding the structure and function (anatomy and physiology) of the ear is crucial. The ear is essentially a tube of cartilage lined in the internal surface with skin. In addition, the shape of the ear canal provides some challenges for topical therapy.

2. The pathophysiology of otitis is also important: it underscores the importance of following the principles of therapy we are about to discuss. It is paramount to understand that there are predisposing factors, primary causes (or underlying factors), and perpetuating factors (secondary causes) in otitis. There is a difference between short-term management (and success) and long-term management (and success). Failure to address ALL of these pathogenic factors will result in long-term failure and recurring disease.

3. Client education is essential for success. Clients need (and usually want) to understand why we (the veterinarians) are managing their pet the way we do. It is very helpful to briefly explain the two points listed above AND the goals and expectations of treatment.

CLIENT EDUCATION AND COMMUNICATION
Client education starts on day 1….the first time you see a client/pet with otitis. Client education should include:
1. Some basic information about the pathophysiology of otitis (really important),
2. Information about your plan for their pet (i.e., identify secondary issues, treat those, then look for the underlying cause),
3. Diagnostic findings on their pet at the first visit,
4. Why the recheck exam is important and what will happen at that appointment (repeating diagnostics, switching from treatment to a maintenance plan, additions testing for primary factors, etc.),
5. The long-term picture of otitis

It is helpful to use analogies when speaking to clients. Analogies, such as the building block concept to describe the pathogenesis of otitis or the analogy of archeology to describe the layers of problems that are present with dermatological and otological problems, seem to really help clients understand the nature of otitis. Another great tool for client education are ear models. Several companies have provided these to veterinarians in the past, so ask your reps about one! These help to demonstrate the “L” shaped ear canal and for discussions of medication procedures.

Another great tool to facilitate client education and communication is the video-otoscope. These instruments allow clients to see the changes in the ear canals will definitely help to convince them that cleaning and medications are warranted. They also encourage client compliance when you show the client the positive results after cleaning or after treatment. The clinical effects of client education include: better client compliance, more cooperative clients, and better success. Everybody wins.

**BEST PRACTICES IN MANAGEMENT OF OTITIS**
1. Appropriate diagnostics
2. Preparing the ear canal for treatment
3. Choosing wisely (active ingredients, carriers)
4. Treatment applications (type, route, dose, duration)
5. Quality control and evaluation of treatment efficacy (recheck examinations, follow-up diagnostics)
6. Long-term maintenance therapy
7. Identification of and control of primary (underlying) factor(s)

**CLEANING THE EARS: “Preparing to Succeed”**
Cleaning the ears is an important and crucial component of effective management of chronic ear disease in dogs and cats. Cleaning the ears is important for the following reasons:
1. Cleaning removes debris, such as wax, that may cause irritation of the ear canal.
2. Cleaning removes debris that will block movement of medication into the horizontal canal and the self-cleansing mechanism.
3. Cleaning removes material that may interfere with the “self-cleansing” mechanism
4. Cleaning may help to lower the burden of bacteria in the ear.
5. Cleaning removes debris (e.g., pus, biofilm) that can interfere with the activity of topical (and systemic) otic medications.

The cleaner you get the canal, the better the chances are that your topical medication will work. Keep in mind that the efficacy of some topical medications, such as polymyxin B sulfates and
some aminoglycosides, is dramatically reduced in the presence of a suppurative exudate! It is to your patient’s and client’s advantage to start with an ear cleaning.

It is your choice, as the veterinarian, on which type of ear cleaning you select. For mild cases, it may suffice to use a basic technique of filling the canal with cleanser, massaging the canal, then removing excess cleanser and debris with a cotton ball…repeated until otoscopic exam confirms that most of the debris has, in fact, been removed.

A good rule of thumb: Deep ear cleaning or flushing (under general anesthesia) is indicated if you cannot definitively visualize the tympanic membrane prior to treatment.

**BEST PRACTICE: CHOOSING WISELY**
Choosing wisely involves making the best decisions about the active ingredients and carriers (i.e., formulations) to treat the specific conditions present in your patient. In order to make the correct decisions, the veterinarian must know the underlying cause (primary factor) and the secondary (perpetuating) factors in that patient. Most of our initial treatments are directed at managing…clearing…the secondary infections that dominate the picture in otitis externa. To clear these infections, we do have choices: topical vs. systemic therapy and antiseptics vs. antimicrobial therapy. To make these decisions, it is important to know the historical effectiveness of available antimicrobial agents against the pathogen identified in the case, the history of previous treatments (and their efficacies) in that patient, data based on culture and susceptibility testing, and knowledge and understanding of the mechanisms, advantages, and disadvantages of each commercial (or compounded) product.

**Topical Treatment of Otitis Externa**
Topical therapy is our treatment-of-choice in most circumstances, because we can achieve significantly higher concentrations of drug in the ear through topical administration than those achieved with systemic routes. In addition, topical therapy delivers the active agent directly to the affected areas (i.e., ear canal or middle ear) and may be less costly than systemic therapy. The disadvantages of topical therapy include questionable penetration into the skin of the ear canal and issues related to owner compliance, especially if the owner is unwilling to treat the ears or is poorly trained to apply medications properly.

Overall, the success of topical medical management of otitis externa depends on the following **Principles of Therapy:**

1. The ear canal should be prepared to allow maximum efficacy of topical treatments. Obstructions, such as hair and wax, must be removed to allow distribution of medications deep into the ear canal.
2. The integrity of the tympanic membrane should be determined and considered when selecting topical medications.
3. Topical medications should be select based on evidence that the active ingredients are the best choice for each individual situation (considering patient, infectious agents, owner, etc.)

4. The formulation of the medication should allow the product to distribute deep into the canal and provide adequate coverage of the surface area of the ear canal.

5. Adequate volumes of topical medications must be administered to facilitate coverage of the entire ear canal.

6. Topical medications must be administered using proper technique to ensure delivery of medicine throughout the full extent of the external canal.

7. Treatment of infections should be continued until the infection is cleared.

Ear medications are most often in the form of an ointment (emulsions of lipid in water) or as a solution (aqueous or other carriers). Emulsions containing lipids will enhance penetration of the active ingredient into the skin of the ear; however, most of these ointment formulations are so viscous, that they fail to penetrate down deep into the ear canal. They are especially ineffective in the presence of a heavy growth of hair in the canal. Less viscous medications are more likely to allow medication to distribute deeper into the canal, especially when there is significant hair in the ear canal or when the canal is hyperplastic. There is little data on the overall effect of viscosity on “spreadability” or distribution of topical medications over the skin that lines the ear canal.

**BEST PRACTICE: PROPER APPLICATION OF TREATMENTS**

In all cases when topical therapy is used, the owners MUST be educated about application of medications. This should include having the owner instill medication, IN THE PRESENCE of the veterinarian or technician. Owners should be taught to massage ears for 15-30 seconds after instilling medications…and to use proper amounts of medications. Once-daily treatment is generally sufficient for most cases of otitis, though severe infections may benefit from twice daily treatment. **Treatment should continue 1-2 weeks past clinical cure.** Clinical cure is defined demonstrated by 1) return of the ear canal to normal (or near-normal) appearance, 2) absence of infectious agents on cytology or culture, 3) absence of other clinical features of otitis (i.e., inflammation) such as pruritus, head tilt, pain, etc. The minimum recommended treatment time (with topical therapy) is 30 days.

**Dose (volume) recommendations:**

<table>
<thead>
<tr>
<th>Small dogs (&lt;15 kg)</th>
<th>0.4-0.5 ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium dogs (15 – 20 kg)</td>
<td>0.7-0.8 ml</td>
</tr>
<tr>
<td>Large dogs (&gt; 20 kg)</td>
<td>1.0 ml</td>
</tr>
</tbody>
</table>

The volume of medication applied into the ear during treatment appears to be critical. Dosing syringes work well to accurately measure volumes of otic medications. Failure to apply sufficient quantities to penetrate to these areas seems to be a major cause of treatment failure. Volumes recommended in this paper to achieve adequate penetration down the canal are based on existing literature and pilot studies performed by the author. You may promote distribution of otic...
medicine deeper into the canal by using “positional installation”, which is administration of the medication in the “up” ear while the animal is lying on one side. (It is best to do each ear at a different time to avoid losing the advantage of gravitation effects of distribution of medications.) Massaging the ear for 15-30 seconds after instillation may also help distribute medication deeper in the canal.

Keep in mind that higher volumes of otic medication may increase the likelihood of absorption of otic medications, especially glucocorticoids. It is important to understand that there may be systemic side effects if potent glucocorticoids are used.

Table 1. Commercial Veterinary Otic Preparations

<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
<th>Drops/ml*</th>
<th>Label dosing</th>
<th>Maximum tx time (days)‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aurizon®**</td>
<td>Vétoquinol</td>
<td>50</td>
<td>10 drops once daily</td>
<td>7-14</td>
</tr>
<tr>
<td>Baytril® Otic</td>
<td>Bayer Animal Health</td>
<td>30</td>
<td>&lt;35 lbs: 5-10 drops twice daily</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;35 lbs: 10-15 drops twice daily</td>
<td></td>
</tr>
<tr>
<td>EasOtic®**</td>
<td>Virbac Animal Health</td>
<td>NA</td>
<td>1 pump daily</td>
<td>5</td>
</tr>
<tr>
<td>Mometamax®</td>
<td>Intervet/Schering Plough Animal Health†</td>
<td>40</td>
<td>&lt;30 lbs: 4 drops once daily</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;30 lbs: 8 drops once daily</td>
<td></td>
</tr>
<tr>
<td>Otomax®</td>
<td>Intervet/Schering Plough Animal Health†</td>
<td>37</td>
<td>&lt;30 lbs: 4 drops twice daily</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;30 lbs: 8 drops twice daily</td>
<td></td>
</tr>
<tr>
<td>Posatex™</td>
<td>Intervet/Schering Plough Animal Health†</td>
<td>39</td>
<td>&lt;30 lbs: 4 drops twice daily</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;30 lbs: 8 drops twice daily</td>
<td></td>
</tr>
<tr>
<td>Surolan®</td>
<td>Vétoquinol</td>
<td>45</td>
<td>5 drops twice daily</td>
<td>7</td>
</tr>
<tr>
<td>Tresaderm®</td>
<td>Merial</td>
<td>40</td>
<td>5-15 drops twice daily</td>
<td>7</td>
</tr>
</tbody>
</table>

* Determined manually by author. Estimates ± 2 drops/ml. ** Not currently available in USA † Merck Animal Health USA   ‡ Label instructions

Table 2. Newer Extended-activity Otic Preparations

<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
<th>Active ingredients</th>
<th>Labeled dosing</th>
</tr>
</thead>
<tbody>
<tr>
<td>KetoCort®</td>
<td>TrilogicPharma</td>
<td>ketoconazole, hydrocortisone</td>
<td>Clean ears and dry. Instill adequate amount and repeat as necessary.</td>
</tr>
<tr>
<td>Osurnia®</td>
<td>Elanco</td>
<td>florfenicol, terbinafine, betamethasone</td>
<td>Clean ears and dry. Instill one tube, massage 1-2 minutes Repeat in one week.</td>
</tr>
<tr>
<td>Claro™</td>
<td>Bayer</td>
<td>florfenicol, terbinafine, mometasone</td>
<td>Clean ears and dry. Instill one tube.</td>
</tr>
</tbody>
</table>
The integrity of the tympanic membrane is critical in determining the best treatment options for a patient with otitis. The possibility of ototoxicosis is greatly enhanced if the medication is instilled directly into the middle ear. The best practice is to avoid topical therapy, if the tympanic membrane is torn or absent. However, there are some clinical indications, based entirely on anecdotal evidence, that vinegar: water (1:2) and enrofloxacin (parenteral formulation) are fairly safe.

**Systemic Treatment of Otitis**

Topical therapy is considered sufficient to manage most cases of otitis externa, if the principles of therapy discussed early are followed. However, systemic therapy offers some advantages, when:

- the infections are recurrent and severe;
- there are concurrent infections elsewhere, such as the skin, that would respond to the therapy;
- when the owners are incapable of treating topically (e.g., arthritis, elderly owner);
- when the patient is uncooperative; and/or
- when there are severe hyperplastic changes in the canal that preclude the ability of topical medications to penetrate deep down the ear canal.

Systemic antibacterial therapy is given higher consideration when inflammatory cells are present on cytology, when a pure infection of a gram - bacteria is present, in recurring bacterial infections, when ulcers are present in the external ear canal, or when systemic signs accompany the otitis. Systemic therapy may or may not be indicated when otitis media is present. The antibiotic selection depends upon the organism isolated. Drugs should be dosed at the high end of the recommended range….always go up on tablet size…never skimp on systemic drug doses!

Systemic administration of glucocorticoids are indicated in severe cases of otitis externa, especially for patients with painful ears, that may prevent or limit the ability of the owner to instill topical medications! They are also indicated for general purposes of reducing inflammation and in patients with hyperplastic / stenotic ear canals. Dosages range from 0.5 mg/kg of prednisone (or equivalent) PO once daily for inflammation to 2.2 mg/kg, PO once daily for severe hyperplastic changes. Glucocorticoids (e.g., prednisone) are generally prescribed by the author as follows (Example): 1 mg/kg/day PO for 5-7 days, then 1 mg/kg PO once daily every other day for 5 doses (10 days), then 0.5 mg/kg PO every other day for 5-7 doses. At this time, the patient will be re-examined to assess the effects of treatment and for further considerations. If glucocorticoids are still indicted, topical glucocorticoids should be effective from this point forward.

**Treat for a Sufficient Time**

Practically speaking, the goal of our therapy is the improvement of the clinical condition of otitis: reduced swelling, erythema, pain, and restoration of function. However, for long-term success in managing ear disease, it is important to CLEAR the infections. This generally requires
longer treatment periods and higher doses. For most infectious problems in dermatology, we recommend treating for 1-2 weeks past clinical cure, as mentioned above. This principle also applies for topical therapy as well as systemic therapy of otitis. As mentioned previously, folliculitis and furunculosis are actually common in chronic otitis, so an appropriate minimum time for therapy is 30 days. At that time, the patient should be re-examined and re-evaluated with appropriate diagnostics.

**BEST PRACTICE: QUALITY CONTROL / RECHECK EXAMINATION**

Quality control is the process of ensuring that our services meet consumer (and our professional) expectations. Simply put, these are the processes that evaluate the effectiveness of our prescribed treatment for that medical condition. A re-examination is essential to have adequate quality control. There are two primary functions of this recheck examinations:

1. Quality control of our treatment
2. Planning for future management of the patient

The recheck examination should be performed in each patient after an appropriate time has elapsed for the secondary infection(s) to be cleared. The purpose of this step is to determine if the infection has been *reduced/suppressed*, or *cleared*. There is a big difference. The examination should include 1) history since treatment was initiated, 2) physical examination, 3) otic examination, 4) cytology of the ear, and 5) in cases with recurring infections or gram-negative bacterial infections...repeated culture. If cytology and culture (when performed) are negative, we proceed to the next step.

**BEST PRACTICE: LONG TERM THERAPY (MAINTENANCE)**

The recheck examinations should establish whether the secondary infections are controlled and cleared. As soon as the recheck examination suggests the infection is cleared, maintenance therapy is recommended. The goals of maintenance therapy include 1) keeping the ears clean, 2) control or decreasing pain and pruritus, 3) control or decreasing the number of infectious agents, and 4) promoting “normalization” of the ear.

In most cases, these goals can be accomplished through the intermittent use of cleansers and/or non-antibiotic therapeutics (e.g., antiseptics, non-antibiotic agents). Specific agents/products should be chosen considering the causative infectious agents and the ability of the owners to use the products wisely. Intermittent use (e.g., weekly) of otic cleansers with demonstrated antimicrobial activities (e.g. EpiOtic Advanced-Virbac; Malacetic Otic-Dechra) are sufficient in many cases to prevent microbiological regrowth. Other compounds with antiseptic properties effective against bacterial and yeast include aluminum acetate (Burow’s solution), benzyl alcohol, salicylic acid, boric acid, parachlorometaxylenol, and chlorhexidine. antibacterial and/or antifungal activity. In some cases, more aggressive maintenance therapy is need to keep yeast infections from flaring. Some otic products (MalAcetic Ultra-Dechra; T8 Keto-Bayer) contain azoles for managing yeast infections. Though rare, yeast may develop resistance to repeated exposure to antifungal agents, such as the azoles, so caution should be the rule when selecting the best commercial product for long-term maintenance of yeast infections.
Maintenance therapy is continued until either 1) the underlying cause is identified and controlled, or 2) for long-term to reduce the frequency and severity of flare-ups of the infection.

**BEST PRACTICE: IDENTIFY AND TREAT THE UNDERLYING CAUSE**
As every veterinary practitioner knows, recurrence of otitis externa is common. This recurrence most often reflects recurrence of the secondary infections. Control of these infections often leads to a false confidence that the otitis is “cured” or controlled. The underlying cause, or primary factor, must be identified and controlled to prevent these recurrences that are so commonly seen.

Atopic dermatitis is clearly the most common primary factor of otitis externa in dogs. Therefore, directing diagnostics towards that condition makes the most clinical sense. Atopic dermatitis is diagnosed by identification of clinical features of that disease as outlined by Favrot and others. Allergy testing may be used to confirm that diagnosis and provide information for allergen-specific immunotherapy (ASIT). Glucocorticoids, and to a lesser extent, cyclosporine have some anti-inflammatory properties that may help alleviate symptoms of otitis. But other treatments for atopic dermatitis, such as oclacitinib and lokivetmab are directed at controlling pruritus, and therefore, have little to no direct benefit or place in the management of otitis. Patients on any therapy for atopic dermatitis can and will continue to be at risk for developing otitis.

Maintenance therapy with a mild topical glucocorticoid may be the best option to minimize recurrence once infections are cleared.

**Selected References and Recommended Readings**


