Treatments for Otitis Externa

1) Treatment with internal medicine

Case study of one canine with multidrug-resistant *Pseudomonas aeruginosa*-related otitis externa improved by internal medicine

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Abstract

A standard poodle aged 2 years, 9 months came to the facility presenting with intractable otitis externa. A CT scan showed no infection within the tympanic bulla and localized infection in the external auditory canal only; however, the findings of bacteria culture studies revealed it was an infection of multidrug-resistant *P. aeruginosa*. Otoscopy showed severe inflammation within the auditory canal; but when administration of antibiotics was suspended and treatment was switched to an enzyme-containing solution only, clinical symptoms such as ear discharge ceased to appear, and otoscopy 1 month into the treatment showed that inflammation in the auditory canal had markedly improved. In treatment of otitis externa caused by multidrug-resistant microbes without infection in the tympanic bulla, the efficacy of one non antibiotic-dependent treatment option in internal medicine has been confirmed.

Introduction

Otitis externa is a general ailment among canines; many animals are afflicted with it and are treated by veterinarians for it. Although otitis externa is often treated by ear cleaning in the early stages, quite a few cases (depending on the breed and individual) are unhealed by ear cleaning, and the condition becomes serious. In cases where otitis externa develops easily, the ailment commonly stems from skin disorders such as atopy, food allergies, etc. It has been suggested that the blanket solution of using antibiotics, antifungals, and steroids to treat such cases also plays a part in the condition of otitis externa becoming chronic and more serious.

Total ear canal ablation (or TECA) surgery is one treatment method available for severe cases of otitis externa; many owners prefer to opt out of surgical treatment however, as these procedures are highly invasive and put the animal at risk for quite a few complications.

In this report, I discuss a case of multidrug-resistant *P. aeruginosa*-related otitis externa in which all antibiotics were stopped, in which improved condition was achieved through treatment by enzymatic ear solution only, and in which favorable conditions were still maintained more than one year later.

Case Study

Standard poodle, age 2 years 9 months. Female.

Subject was afflicted with bilateral malassezia otitis externa at 4 months and 10 months of age; in both instances, treatment achieved complete remission. Subject was also afflicted with bilateral coccal otitis externa at 1 year of age, but this too was quickly cured by irrigation and ear drops. At 1 year, 4 months of age, the subject contracted acute bacillary otitis externa. Although treatment by administration of antibiotics (first with subcutaneous injection of Convenia®, then with oral dosage of Talibid® and Kefral®) in addition to irrigation and ear drops improved the condition to an extent, it did not provide a cure. All medications were subsequently stopped in favor of irrigation only; as a result, the subject's condition improved.

The condition was stable for about 1 year after, but the subject was recently taken in for treatment of recurring acute purulent (coccal) otitis externa in the right ear. Both the external auditory canal and the pinna were severely inflamed, and covered with sticky pus.

Table 1 Results of auditory canal culture studies for *P. aeruginosa*

Ampicillin (ABPC)	−
Amoxicillin (AMPC)	−
Cefazolin sodium (CEZ)	−
Cephalexin (CFX)	−
Gentamicin sulfate (GM)	+
Ofloxacin (OFLX)	−
Enrofloxacin (ERFX)	−
Azithromycin (AZM)	−
Clarithromycin (CAM)	−
Ceftazidime (CAZ)	+
Cefaclor (CCL)	−
Chloramphenicol (CP)	−
Clavulanic acid/amoxicillin (CVA/AMPC)	−
Doxycycline (DOXY)	−
Erythromycin (EM)	−
Fosfomycin sodium (FOM)	−
Minocycline hydrochloride (MINO)	−
Orbifloxacin (OBFX)	−
Vancomycin (VCM)	−
Sulbactam/ampicillin (SPT/ABPC)	−
Cefpodoxime (CPDX)	−
Cefdinir (CFDN)	−
Kanamycin sulfate (KM)	−
Fradiomycin sulfate (FRM)	−
Lomefloxacin (LFLX)	−
Tosufloxacin tosilate (TFLX)	−

(+) Sensitivity (-) No sensitivity

Treatment 1: Antibiotic dosage and irrigation

Administration of cefovecin sodium (Convenia® injection) and firocoxib (Previcox®) was started at the treating facility. When dosage of ofloxacin (Talibid®) was also added after one week, it temporarily seemed as though drainage had abated and the condition had improved. After another week however, large quantities of sticky yellow pus began to emanate from the affected area, and test findings revealed a coccal infection. Because drainage continued regardless of antibiotic dosage, the antibiotic administration was stopped, and consecutive-day irrigation was begun. Little improvement in drainage was seen over 10 days of irrigation however, so dosage of anpicillin (Viccillin® capsule) was administered; but there was absolutely no improvement, and dosage was suspended after 8 days. Because the response to antibiotic dosage and irrigation was unusually poor, bacteria culture and sensitivity testing were conducted 1 month after the condition worsened, at which time the infection of multidrug-resistant *P. aeruginosa* was discovered (Table 1). When a CT scan and MRI were conducted one week later, the MRI showed no signs of intracerebral inflammation, infarction, or tumors, etc.; the VB value of 9% on the cerebral ventricle dilation index showed there was no cerebral ventricle dilation. The CT scan showed pathological changes (CT value approx. 40) within the right lateral auditory canal, but no abnormalities were found within the tympanic bulla.

Reevaluation of treatment methods

Due to ceaseless drainage from the right ear for over 1 month, it was decided that the subject would be taken for treatment at the Tokyo University of Agriculture and Technology Animal Medical Center, and that optimal treatment methods, including surgical ones, would be reviewed. Findings of hematological studies at the Animal Medical Center showed no systemic infection. Yellow drainage from the right ear was severe however, as was redness of the auditory canal and auricle. Otoscopy was performed to better determine the condition of the internal auditory canal (Fig. 1, video 1). The Karl Storz Endoskope (model 20043120) was inserted via the external auditory canal opening under general anesthesia. Observation of the internal auditory canal revealed severe inflammation in the lateral auditory canal, in the vicinity of the tympanic membrane (Fig. 2, video 2). The internal auditory canal was irrigated using a 5Fr nutritional catheter (Atom); skin and hair found inside the auditory canal were removed with biopsy forceps (Video 3). No damage to the tympanic membrane was discovered.

Fig. 1 Pus seen at the opening of the auditory canal at initial exam
Initial examination at the AMC found green, pus-like material (ear discharge) in the auditory canal of the right ear. Figure shows an image of auditory canal opening vicinity, taken at insertion of otoscope. See also Video 1.

Video 1 Auditory canal opening vicinity at initial exam

Treatment 2: Ear drops

Following irrigation of the auditory canal, administration of antibiotics was determined to have had little effect based on the findings of sensitivity studies, and it was decided that antibiotics be discontinued. Dosage was switched to Zymox® Otic Ear Protector (PKB Japan, Inc., Osaka) antimicrobial ear drops (hereafter "Zymox"), and subject was to be reexamined 1 week later (Fig. 3). In the 1-week follow-up examination, the owner reported that there were no problems administering the Zymox ear drops at home, that both drainage and foul odor from the ear had abated, and that the subject's head-shaking (due to ear discomfort) had all but ceased. After 1 more week, the ear seemed to be improving further, and otoscopy was once again conducted to

ascertain conditions within the auditory canal. Although there was residual epithelial tissue (likely an aftereffect of inflammation) inside the auditory canal, the accumulated pus and severe inflammation noted in previous otoscopy had vanished; redundant epithelial tissue was removed using biopsy forceps, and the procedure was concluded. Afterward, the owner was directed to continue regular administration of Zymox ear drops, and treatment at the Animal Medical Center was concluded.

Prognosis

Currently, although approximately 1 year has passed, the subject has not been brought back to the Animal Medical Center for treatment. In a telephone discussion, the owner confirmed there was no recurrence of ear discharge, and that the subject remained in favorable condition.

Discussion

Topical medications for treating otitis externa that are sold on the market consist of antibiotics, antifungals, and steroids. These medications are primarily intended for treating initial-onset acute otitis externa, and in fact produce extremely satisfying results with proper use in such cases. Due to their initial effectiveness however, in many instances this combination of medications is carelessly applied to chronic cases. Careless use of this combination of treatments poses the threat of promoting the outbreak of resistant microbes. Actually, the case discussed in this paper was also initially treated with the steroid-antibiotic combination therapy, after which the antibiotic was changed (for unknown reasons) and dosage was continued, inducing an infection of multidrug-resistant *P. aeruginosa* as a result. Because antibiotic agents suppress other microbes that would normally be competing with the multidrug-resistant microbe, an invasion of multidrug-resistant microbes is more likely to occur during treatment with antiboitics than when no antibiotics are being administered. Although TECA surgery is a last resort for advanced otitis externa, the purpose of the procedure is total removal of the otitis externa-affected tissue, after which the tympanic bulla is irrigated and closed up. Any overlooked infection in the tympanic bulla or surroundings can lead to an abscess in the future, so mid-procedure irrigation as well as post-operative administration of antibiotics should be thorough. As a treatment for an invasion of multidrug-resistant microbes in otitis externa, TECA poses a high risk of post-operative infection and abscess formation, so such surgical procedures should not be considered as treatment options for multidrug-resistant microbes that cannot be brought under control.

If resistant microbes are discovered when surgery has been decided, the Animal Medical Center proceeds by temporarily suspending antibiotics in favor of treatment with Zymox only. Even in the case discussed in this paper, the infection could be brought under control when dosage of antibiotics was suspended and treatment was switched to Zymox. The presence of otitis media is

one indicator of the advisability of surgical treatment. Fortunately, in this case study, no infection was ever discovered in the tympanic bulla, so the desired results could be achieved without surgical measures. With otitis externa, TECA carries strong implications of being not so much a *treatment* as a means to remove the afflicted area after one has *given up* on treatment. If possible, the infection should be controlled and the auditory canal should be kept intact. The subject in this case was still young, and being able to avoid surgical treatment at this point had significant meaning. Various factors such as constitution and anatomical structure come into play in the onset of otitis externa, and there is a risk of recurring otitis externa in the future.

As it is difficult to ride out a long period of otitis externa by treatment with antibiotics, treatment with periodic irrigation and dosage of antimicrobials (other than antibiotics) should be considered for keeping the infection under control.

Fig. 2 Severe inflammation found in lateral auditory canal at first exam
Pus found at the opening of the auditory canal was also found inside the auditory canal.

Video 2 Severe inflammation, infection in auditory canal at initial exam

Video 3 Skin and hair inside the auditory canal at first exam

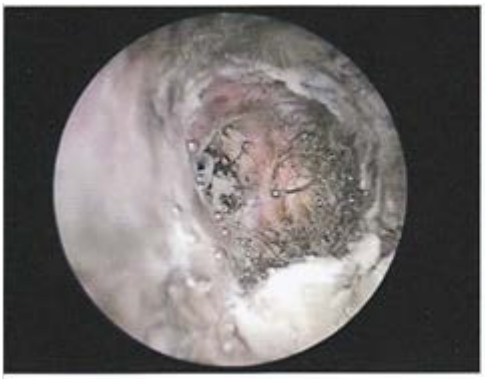
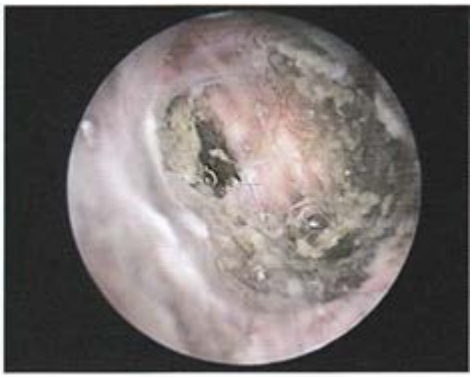


Fig. 3 Condition inside auditory canal 1 week after treatment and suspension of antibiotic dosage
Inflammation has subsided, and whitish color can be seen. Because inflammation has caused the epithelium inside the auditory canal to detach, the area appears to be full of debris. Clearing away this material reveals no inflammation or clinical manifestations of infection, however. See also Video 4.



Video 4 Irrigating the internal auditory canal with a nutritional catheter (Atom)
Hair and detached epithelium caused by inflammation are removed using biopsy forceps. Following removal of foreign substances, it can be seen that epithelial inflammation has subsided.

Conclusion

Although TECA is a known method of treatment for severe otitis externa, the procedure not only impairs hearing but is extremely invasive, with a high percentage of complications arising. The subject in this case was young, and there was a strong possibility of treatment by internal medicine. As a result, it was possible to avoid TECA; but I believe that there are many among clinicians who do not really know what kind of surgery TECA is. Next, I will use video to explain TECA operative procedure.

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