

Management of Otitis

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Chronic and recurrent otitis is frustrating!



Breaking down the problem

- Step 1- Identify the primary cause of otitis
- Step 2- Assess for predisposing factors of otitis
- Step 3- Treat the secondary infections
- Step 4- Identify the perpetuating factors of otitis

1- Primary causes- directly induce otic inflammation



What are most common causes of recurrent otitis....

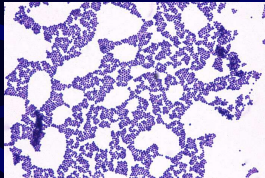
- Allergic disease in the dog- over 40% cases in one study
- Polyps and ear mites in the cat

2- Predisposing factors of ear disease

- These factors facilitate inflammation by changing environment of the ear!
- Ear conformation- stenotic canals, hair in canals, pendulous ears
- Excessive moisture or cerumen production
- Treatment effects- irritation from meds/contact allergy or trauma from cleaning



3- Secondary bacterial and/or yeast infections



- Address with ear cleaning, topical antimicrobial agents, most often topical steroids and in some cases systemic anti-infectives and systemic steroids

4- Perpetuating factors- prevent the resolution of otitis



- Epithelial thickening, glandular hypertrophy
- Dermal fibrosis, cartilage mineralization
- Stenosis of lumen
- OTITIS MEDIA

Otitis Externa

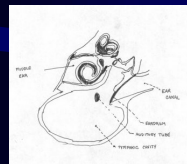
Clinical Signs

- Head shaking
- Scratching/rubbing at ears
- Odor
- Pain
- Itchiness in other locations

Physical Exam Findings

- +/- Pinnal erythema and hair loss
- Erythema, swelling and debris present in the external ear canal
- +/- Ceruminous gland hyperplasia
- Ear drum appears normal and intact
- +/- Concurrent skin disease

Otitis Media



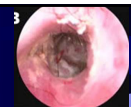
- Otitis media- inflammation of the middle ear
- Often an extension of otitis externa through a ruptured tympanic membrane
- May also occur from polyps or neoplasia within the middle ear

Otitis media

- In dogs with recurrent ear infections for 6 months or longer, up to 82% had concurrent otitis media¹
- AND in 71% of these cases of otitis media, the ear drum was intact at time of diagnosis¹
- Treatment of otitis media often involves greater than 6 weeks of systemic antibiotics
- Deep ear flush under general anesthesia greatly aids therapy of otitis media

1. Saridomichelakis MN et al. Aetiology of canine otitis externa: a retrospective study of 100 cases. Vet Derm 2007; 18: 341-347

Clinical signs of Otitis media



Clinical Signs

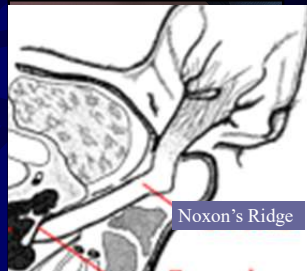
- Elevated third eyelid
- Drooping lip on one side
- Parasympathetic nose-unilateral hyperkeratosis
- Pain, odor, head shaking (any and all signs of otitis externa)
- Balance issues, head tilt (if concurrent otitis interna)
- Hearing loss

Physical Exam Findings

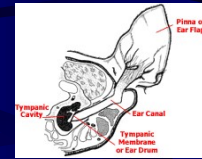
- Ruptured or intact tympanic membrane
- Intact membrane can be bulging, hemorrhagic, discolored and exudate may be visible
- Neurologic abnormalities- Horner's syndrome, facial nerve paralysis
- Neuro signs of otitis interna- peripheral vestibular disease, and deafness

Otoscopy

- Evaluate both ears
 - Use separate cone for each ear
 - Ear pinnae
 - Vertical ear canal
 - Horizontal ear canal
 - “Noxon’s Ridge”
 - Tympanic membrane



Otoscopy Normal



- Horizontal and vertical canals
 - Sebaceous glands- associated with HF, density greatest proximally
 - Ceruminous glands- greatest density deep in ear canal
 - Hair follicles- decrease in number distal to proximal (outside to inside)
 - There are a few fine hairs at entrance of external acoustic meatus, serve as helpful landmark for locating the eardrum

A normal ear is self cleaning!

- Epithelial migration- epithelium in the ear canal grows outward from the tympanic membrane toward opening of the external ear canal
- Epithelial cells carry debris with them
- When this is disrupted, we can see ceruminoliths
- Ear canal masses also interrupt self cleaning

Otoscopy Normal

- Horizontal and vertical canals
 - Light pink
 - Smooth
 - Minimal exudates
- Vertical canal 5-10 mm diameter where it meets horizontal canal



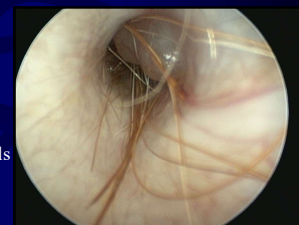
Otoscopy Abnormal

- Glandular hyperplasia
 - Acute:
 - Enlargement and hypersecretion
 - Chronic:
 - Elongated, full of colloidal cellular debris
 - Little secretory activity, duct openings plugged



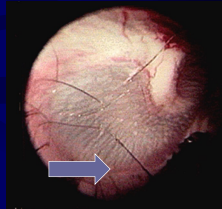
Otoscopy Normal

- Tympanic membrane
 - Pars flaccida
 - Upper quadrant
 - Pink with small vessels
 - Loosely attached



Otoscopy Normal Canine

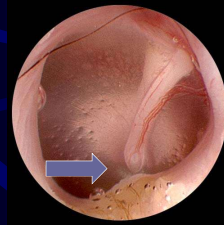
- Tympanic membrane
 - Pars tensa
 - Pearl-gray
 - Thin
 - Radiating bands
 - Tough
 - Manubrium of malleus (stria mallearis is outline of manubrium of malleus that can be visualized through membrane)



Curve points towards the nose!

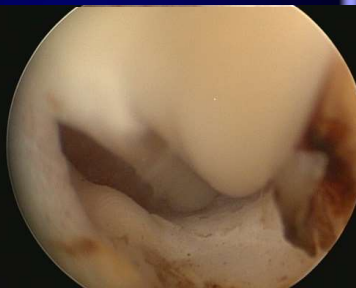
Otoscopy Normal Feline

- Manubrium of malleus is straighter in cats



Otoscopy Abnormal

- Ceruminolith
- Mass
- Foreign Body
- Inflammation
- Excess exudates



Otoscopy Abnormal

- Mass behind tympanic membrane
- Abnormal tympanic membrane
- Ruptured tympanic membrane



Tympanic Cavity

DOG

- Consists of small epitympanic recess and large ventral bulla
- There is incomplete bony septum (Rosychuk's Ridge) that allows communication between dorsal and ventral cavities

CAT

- Divided into 2 cavities by an almost complete bony septum
- Larger cavity is the ventromedial compartment
- To gain access you would need to break down this bony septum = likely nerve damage!!
- Leave that to surgeons! Refer for VBO if imaging shows mass or exudate there!

Tympanic Cavity

DOG



CAT



Therapy of otitis externa

- 1- Keep ear canal clean
- 2- Topical anti-inflammatory therapy
- 3- Topical antibiotics/ antimicrobials
- 4- TREAT THE UNDERLYING CAUSE
- 5- Monitor response to therapy with recheck exams and otic cytology

Therapy of otitis media

- 1- Keep ear canal clean
- 2- Topical and/or systemic anti-inflammatory therapy
- 3- Topical antibiotics/ antimicrobials
- 4- Systemic antibiotics and/or antifungals
- 5- Deep ear flush and otoscopy under general anesthesia
- 6- TREAT THE UNDERLYING CAUSE
- 7- Monitor response to therapy with recheck exams and otic cytology

1- Keep the ear clean

- Removes the nidus (ex. cerumen) of infection
- Removes bacterial and inflammatory debris
- Allows antimicrobials to penetrate the entire ear canal
- Prevents purulent debris from inactivating antimicrobial agents, especially important for aminoglycosides

1- Keep the ear clean

- Ear cleanser options:
 - Epiotic Advanced- creates acidified ear canal
 - Douxo Micellar or Cerumene- ceruminolytics
- Clean every 1-2 days



Ear cleaning instructions for owners- the gauze method



- 3 by 3 gauze
- Wet gauze with cleaner or pour cleaner into canal
- Gently massage gauze into ear canals
- It wicks up debris and cleans ear gently
- Repeat until clean gauze emerges
- Tends to be very well tolerated!

Following cleaning, presoak with Triz EDTA

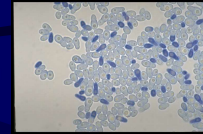


- Indicated in bacterial infections, especially when rod shaped bacteria such as *Pseudomonas* present
- Presoak the canal with Tris-EDTA product prior to medicating
- Do not wipe clean
- Done on a daily basis, prior to medicating ear

2- Topical and Systemic Steroids

- Unless medically contra-indicated, always treat otitis externa with topical steroids
- In preparation for deep ear flush and/or painful swollen ears- add 2-3 week course of oral glucocorticoids
- Steroids decrease inflammation and production of cerumen, reduce swelling and stenosis of canal, and make pets less painful

3- Topical therapy yeast otitis



- Topical antifungals- miconazole, clotrimazole, ketoconazole
- Can be used alone, or in conjunction with steroids
- Treat over 3-4 weeks with topical therapy
- In otitis externa/ media, treat until external canal cytology is negative

Antifungal topical recipes

- Miconazole 2% (1.5 to 3ml) with Synotic (8ml bottle)
- Miconazole 2% (20 ml) with Dexamethasone 2 mg/ml (5-10ml)
- Clotrimazole can be substituted



3- Topical therapy- bacterial otitis

- First time infections- cocci- gentamicin, florfenicol, Polymixin B or orbifloxacin are good choices
- First time infections- cocci, rods- gentamicin, enrofloxacin, orbifloxacin and Polymixin B
- Treat for 3-4 week period
- Important to recheck prior to end of therapy to ensure that infection has resolved

The role of *Pseudomonas* in canine otitis

- *Pseudomonas aeruginosa*- aerobic, gram negative rod bacteria
- Associated with chronic otitis externa and media in the dog
- Isolated in up to 20% of dogs with otitis
- Rapidly develops multi-drug resistance

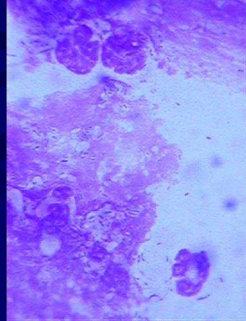
Clinical Signs- *Pseudomonas* otitis

- Head shaking or scratching
- Purulent exudate
- Malodor
- Swelling, inflammation and pain
- Ulceration
- OTITIS MEDIA



Recognize biofilm when you see it

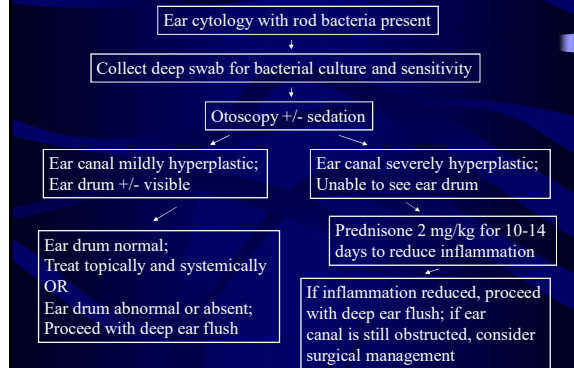
- Ear cytology from ear chronically infected with *Pseudomonas aeruginosa* toxic neutrophils, numerous rod bacteria, some within colonies in the dark purple material which is biofilm
- Culture and sensitivity is indicated for most cases where rods are seen and especially if biofilm noted
- Start preparing owner for deep ear cleaning



Therapy of *Pseudomonas* otitis

- 1- Keep ear canal clean
- 2- Topical antibiotics/ antimicrobials
- 3- Systemic antibiotics
- 4- Deep ear flush and otoscopy under general anesthesia
- 5- Topical and/or systemic anti-inflammatory therapy
- 6- TREAT THE UNDERLYING CAUSE

Pseudomonas ear infection



Antibiotics with potential activity against *Pseudomonas*

Antibiotic Class	Specific antibiotic
Aminoglycosides	Gentamicin, Amikacin, Neomycin, Tobramycin
Fluoroquinolones	Marbofloxacin, Ciprofloxacin, Enrofloxacin
Polypeptides	Polymixin B
Carboxypenicillins	Ticarcillin, Timentin, Carbenicillin
3 rd generation cephalosporins	Ceftazidime
Miscellaneous	Silver sulfadiazine

Disclaimer: Recipes formulated by dermatologists, not pharmacologists!

Issue of ototoxicity

- Aminoglycosides, polymixins, chlorhexidine, ceruminolytics (except Cerumene), and cleaners with alcohols are all potentially ototoxic
- When the aminoglycosides are used topically, the risk of toxicity may be overestimated
- Use of ototoxic med justified when guided by culture, a safer alternative is not available, and the owner has been notified of the potential risks

Products with reduced risk of ototoxicity

- Ciprofloxacin
- Enrofloxacin
- Ticarcillin
- Timentin
- Dexamethasone
- Fluocinolone
- Clotrimazole
- Miconazole
- Nystatin
- Cerumene
- Likely Douxo Micellar and Epiotic

3- Topical therapy



Enrofloxacin:

- 1- Epiotic (6ml), Dexamethasone- 4 mg/ml (2ml), Baytril- 22.7 mg/ml (2ml), +/- Miconazole- 1-2% lotion (2ml) = ½ oz. bottle
- 2- Tris EDTA solution (26.1ml), Baytril- 100mg/ml (2.9ml) = 1 oz. bottle
- 3- Synotic (8ml bottle)- add 1.5- 3ml of Baytril +/- Miconazole- 1.5ml (bottle has room for 3 extra mls)

Amikacin solutions

- T8 solution (26.9ml), dexamethasone- 4 mg/ml (2ml), Amikacin- 250mg/ml (1.1ml) = 1 oz.
- Saline (27ml), dexamethasone- 4 mg/ml (1ml), Amikacin- 250mg/ml (1ml) = 1 oz.



Ceftazidime

- Ceftazidime- reconstitute 1 gram bottle with 40 mls of saline, add 4 mls of dexamethasone (4 mg/ml)
- Refrigerate!



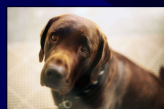
Silver sulfadiazine solutions

- 1% SS cream (1.5ml) and distilled water (13.5ml) = ½ oz.
- Saline (24ml), Dexamethasone- 4mg/ml (2ml), 1% SS cream (6ml) = 1 oz.
- Saline (25ml) and 1% SS cream (3ml) = 1 oz.



4- Systemic antifungals for otitis media

- Yeast otitis media
 - Ketoconazole- 5- 10 mg/kg q 12-24 hours
 - Fluconazole- 5-10 mg/kg q 12-24 hours
 - Itraconazole- 5-10 mg/kg q 12-24 hours
 - Terbinafine- 30 mg/kg q 12 hours



4- Systemic antibiotics for otitis media

- Bacterial otitis media- **USE C/S!!**
 - ✓ Enrofloxacin- 10- 25 mg/kg SID
 - ✓ Marbofloxacin- 2.75- 5.5 mg/kg SID
 - ✓ Ciprofloxacin- 25-30 mg/kg SID
 - ✓ Cephalexin- 22- 30 mg/kg BID
 - ✓ Cefpodoxime 5-10 mg/kg SID
 - ✓ Clindamycin- 11 mg/kg BID



What are the options when no oral drug is available?

- Cases of bacterial otitis externa/ media when the bacteria are only sensitive to systemic injectable medications
- Consider parenteral therapy- often declined by owner due to cost, side effects and/or frequency of injections
- However, success has been achieved with deep ear flush and topical therapy alone

5- Deep ear flush- Indications

- Failure to clear infection with home cleaning
- Relapse of infection despite home cleaning
- Purulent exudate/biofilm associated with many G(-) infections such as *Pseudomonas* sp.
- If there is suspicion of otitis media, foreign body or neoplasia
- ALLOWS FOR FULL EVALUATION OF THE EAR CANAL AND EAR DRUM, SAMPLING FOR C/S OR HISTOPATH AND CLEANSING

Deep ear flush- preparation

- Familiarize yourself with normal otic anatomy
- Radiographs, CT or MRI may be indicated to assess for ear canal mineralization, assess for neoplasia and extent of disease
- General anesthesia and intubation are a must!
- Collect ear cytology +/- external ear culture
- Soak external ear canal with ceruminolytic ear cleaner like Douxo or Cerumene to remove large debris and exudate

Video Otoendoscopy

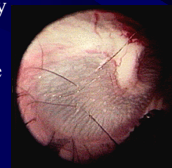


A few helpful tools...



Ear flushing technique

- Examine tympanic membrane
- Myringotomy- caudoventral aspect of the pars tensa- using 3.5 or 5 Fr polypropylene catheter or small culturette
- Collect for culture using sterile swab or via aspirate of fluid from middle ear cavity
- Collect cytology via similar methods
- Can be done with Video-otoendoscope or Hand- held otoscope



Ear flushing technique

- Once all samples have been obtained, flush middle ear repeatedly with sterile saline or distilled water
- At end of procedure can infuse bullae with injectable dexamethasone and/or non ototoxic injectable antibiotic
- Healing of the tympanic membrane in dogs- 21-35 days
- Healing of the tympanic membrane in cats- smaller perforations heal in about 25 days, larger ones take up to 60 days

Complications of deep ear flush



- Most are transient, more often in the cat than in the dog
- Pain and head shaking
- Horner's syndrome, facial nerve paralysis, vestibular disease and deafness
- Systemic steroids post procedure and gentle technique can limit these complications

6- Treat the underlying cause

- Non-seasonal otitis- start a food trial
- Seasonal otitis- consider allergy testing and allergy vaccine or symptomatic therapy
- Do other dermatologic findings point to other underlying diseases?
- Discuss maintenance therapy- prepare your owners for needs of their pet's otic disease based on residual persisting changes (WE CANNOT TURN BACK THE CLOCK!)

Questions??

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References

1. Saridomichelakis MN et al. Aetiology of canine otitis externa: a retrospective study of 100 cases. *Vet Derm* 2007; 18: 341-347
2. Cole LK, et al. Microbial flora and antimicrobial susceptibility patterns of isolated pathogens from the horizontal ear canal and middle ear cavity in dogs with otitis media. *JAVMA* 1998; 212: 534- 538
3. Steiss JE, et al. Healing of experimentally perforated tympanic membranes demonstrated by electrodiagnostic testing and histopathology. *JAAHA* 1992; 28: 307-310