Oh no otitis! When to reach for antimicrobials, which one to choose and more

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Learning Objectives

- **Define key terminology** related to ear canal changes in otitis, including erythema, stenosis, hyperplasia, ceruminous discharge, and purulent discharge
- **Analyze case examples of progressive otitis externa** to inform therapeutic decision-making.
- **Select appropriate antimicrobial and anti-inflammatory therapies** based on disease progression and presentation.
- **Recognize anatomic variations in brachycephalic breeds** and adapt treatment strategies to optimize outcomes in these patients.

The ear examination

Palpate the ear canals on both sides

- [ ] First/Second time offenders should have soft and pliable canals
- [ ] Chronic offenders may have firm to hard (calcification) ear canals
- [ ] Chronic offenders may have nodular hyperplasia(large bumps) in the ear canal that make the canal feel thick and non pliable.

Evaluate the pinna and entrance of the canal

- [ ] Are the pinna affected?
- [ ] Look for nodular hyperplasia at the entrance of the ear canal

Otoscopic examination

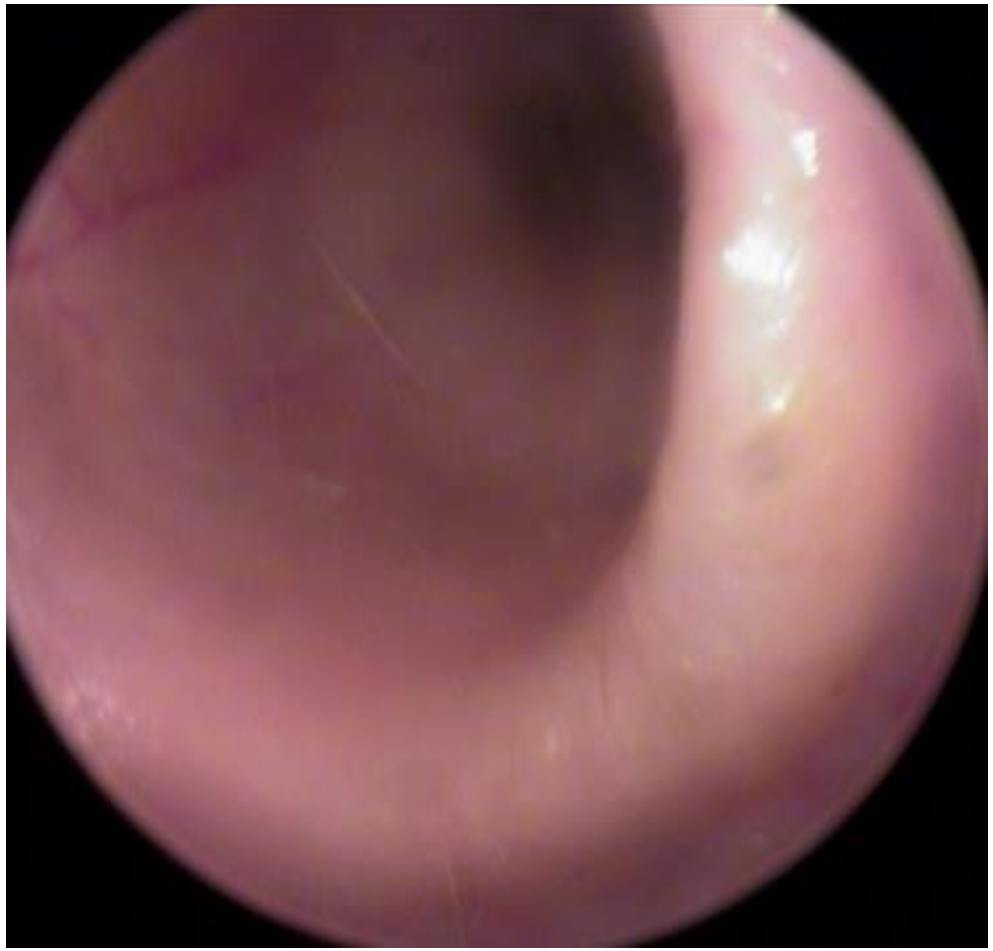
- Pull the pinna towards you and down slightly.
- Your head should be at the same or just above the height of the patient ear

The normal ear canal

The normal ear canal is temperature, pH, and humidity regulated.

Normal ear canals rely on the lipid content of cerumen, host defense(antimicrobial) peptides, and regulated desquamation to maintain homeostasis.

The ear canal is light pink, smooth, and has minimal debris.



Erythematous ear canals

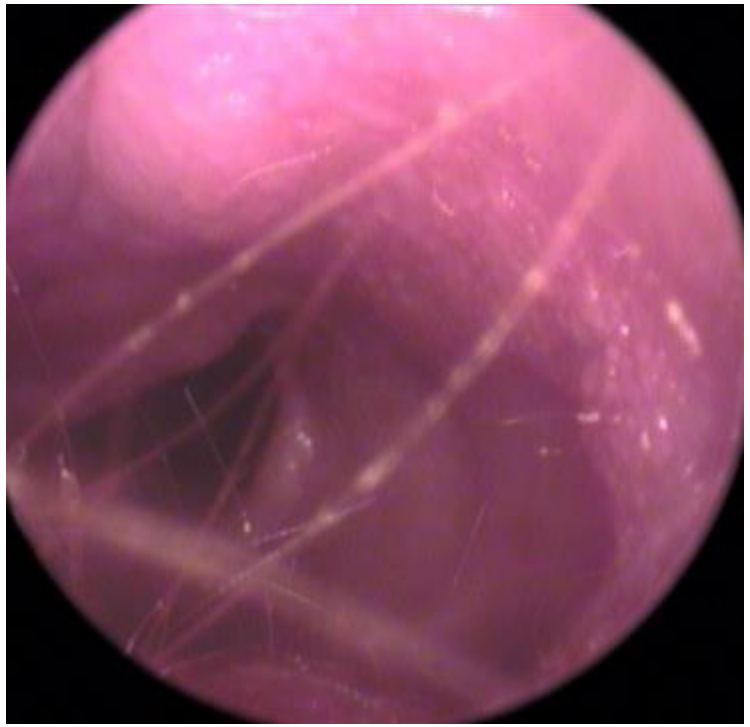
Erythema, stenosis

Erythema, stenosis, nodular hyperplasia

Erythema, stenosis, epithelial hyperplasia

Ear canal wall changes- epithelial hyperplasia

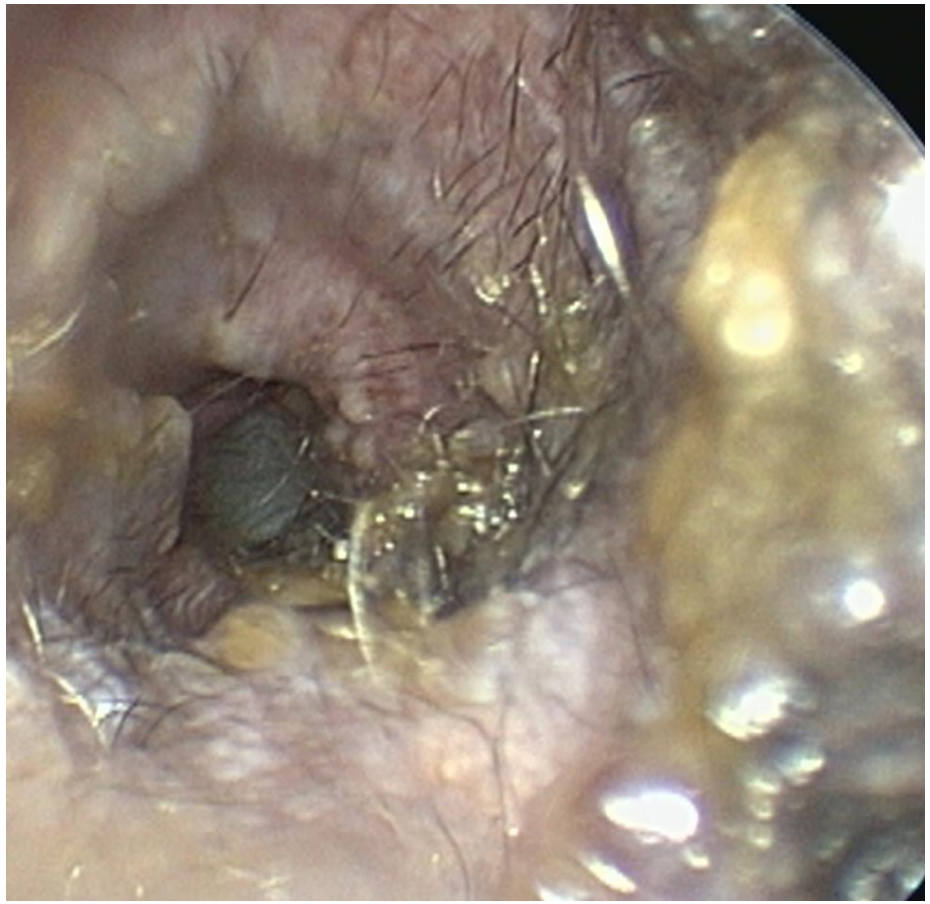
Minimally erythematous smooth walls



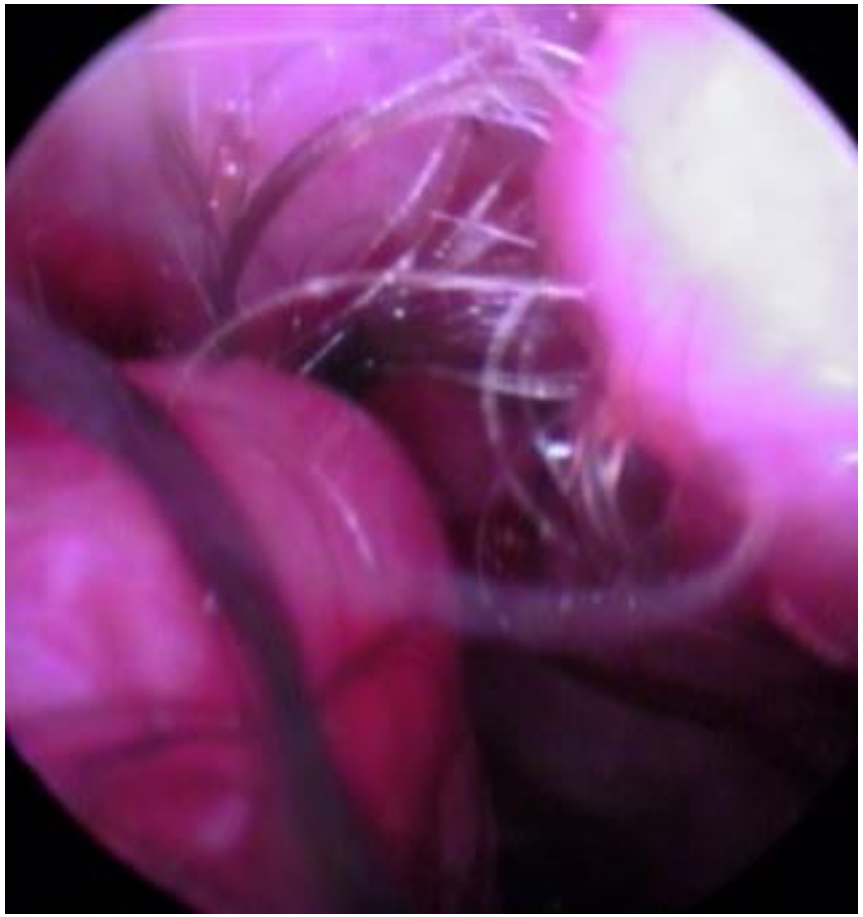
Mild erythema and mild epithelial hyperplasia with stenosis

Mild erythema and moderate epithelial hyperplasia with stenosis

Ear Canal wall changes-nodular hyperplasia

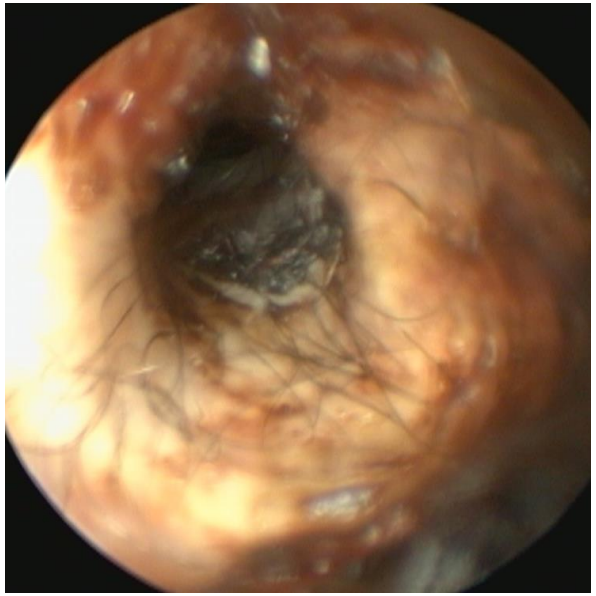


Irregular nodular hyperplasia and stenosis

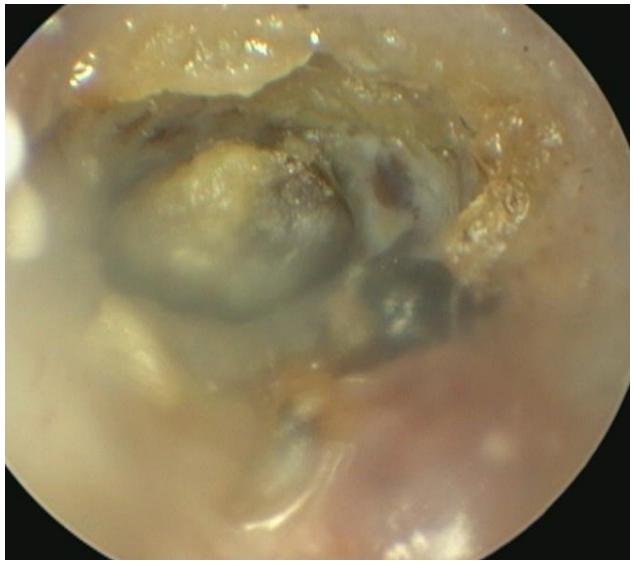


Large nodules obstructing the canal

Description of debris



Mild to moderate ceruminous debris, obstructs TM



Heavy ceruminous debris with ceruminolith formation

Moderate purulent debris

Slimy purulent debris with biofilm formation

Tympanic Membrane of the Dog and Cat

The tympanic membrane (tympanum, TM) is external border of the middle ear cavity.

The slight concavity of the pars tensa is due to the insertion of the manubrium of malleus attachment under the epithelium applying slight pressure to the tympanum

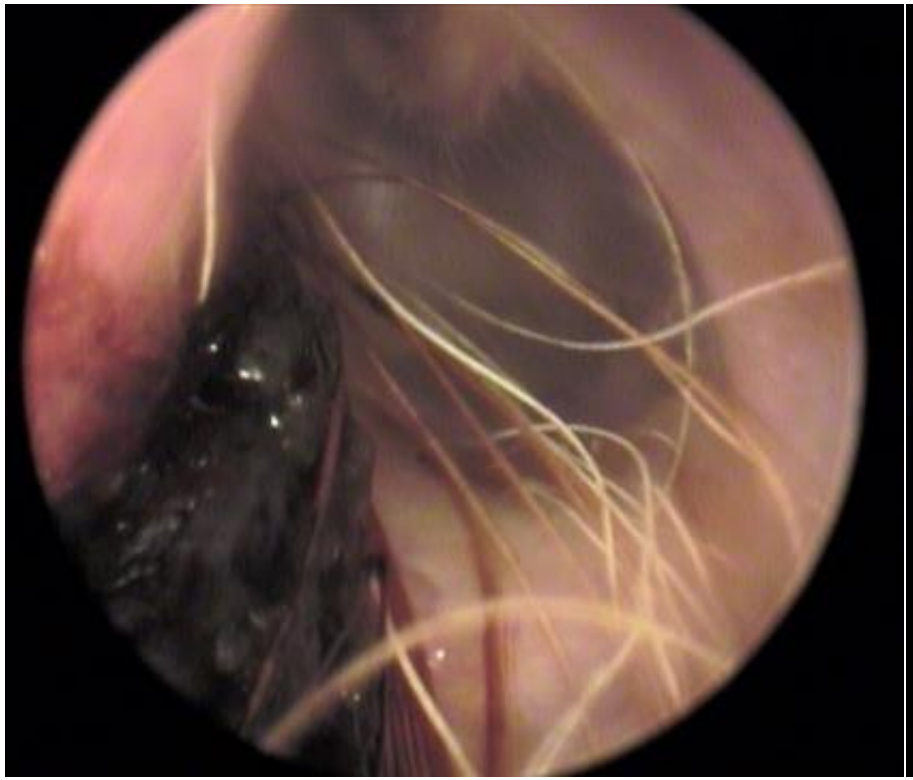
(This part of the TM is easiest to visualize in the normal dog)

The pars flacida is confined to the upper quadrant

(This part of the TM is harder to visualize in the normal dog)

Feline Tympanic Membrane with manubrium of malleus visible

Tympanic membrane in the dog

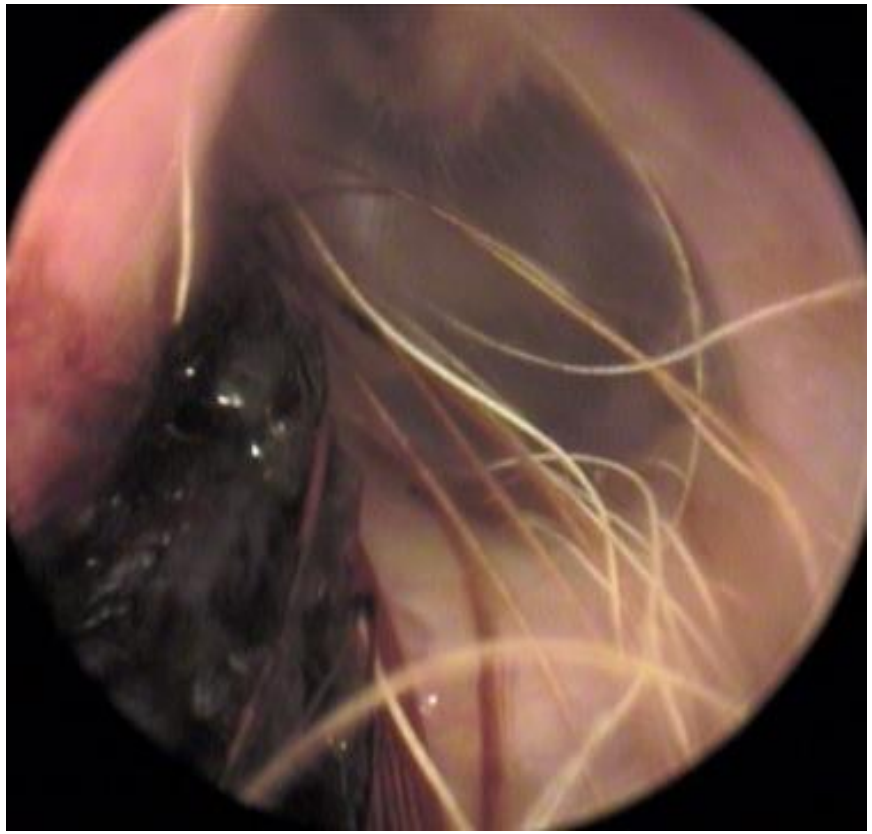


Clear TM with hair tuft attached to adjacent canal wall

Slightly opaque but fully visible TM

Opaque TM is partially covered b ceruminous debris

Evaluation of ear drums- Tympanic membrane rupture



Intact canine tympanic membrane

Ruptured canine tympanic membrane

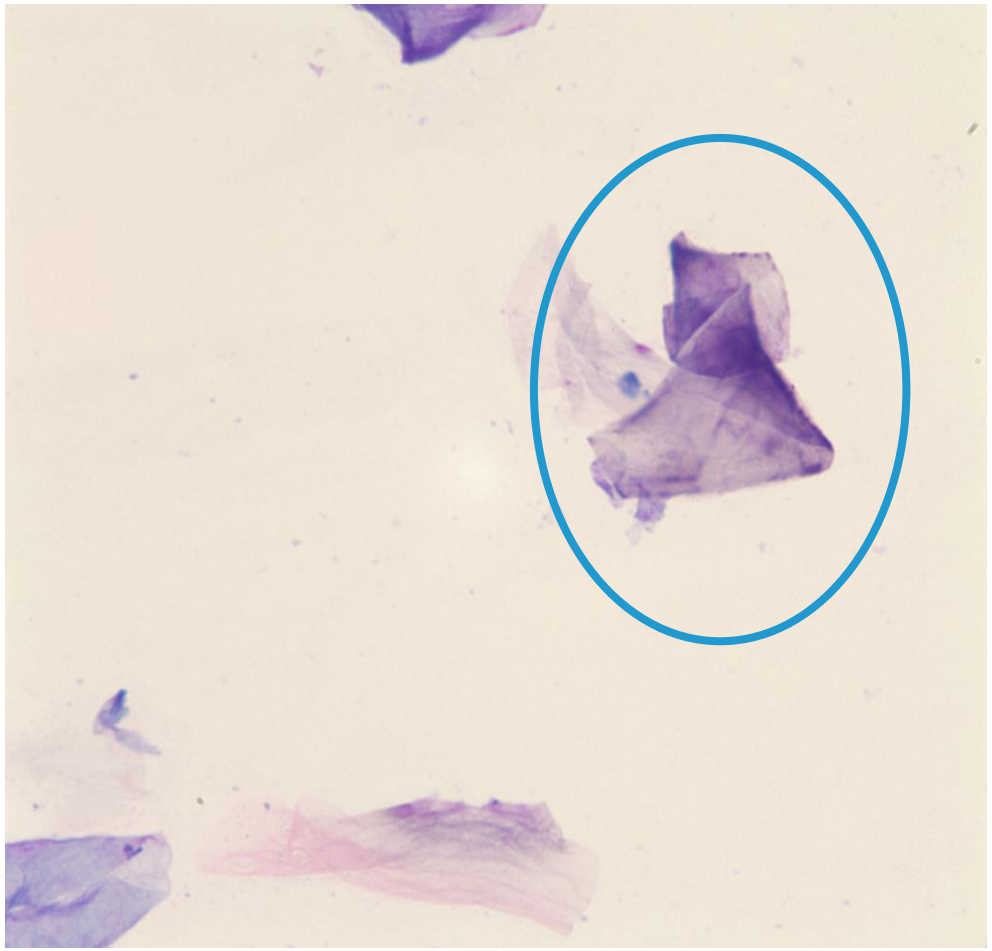
Impression cytology of the normal ear

Unstained samples will appear nearly clear and slightly greasy

After staining it is still nearly clear since the lipid does not take up much stain

Few anucleated keratinocytes(squamous cells) will pick up purple stain

***A few yeast or cocci adhered to squamous cells is within the realm of normal



100x objective, few keratinocytes

Malassezia Yeast

Malassezia pachydermatis

Opportunistic pathogen that is part of the normal flora

Bowling pin, snowman, peanut shaped when budding

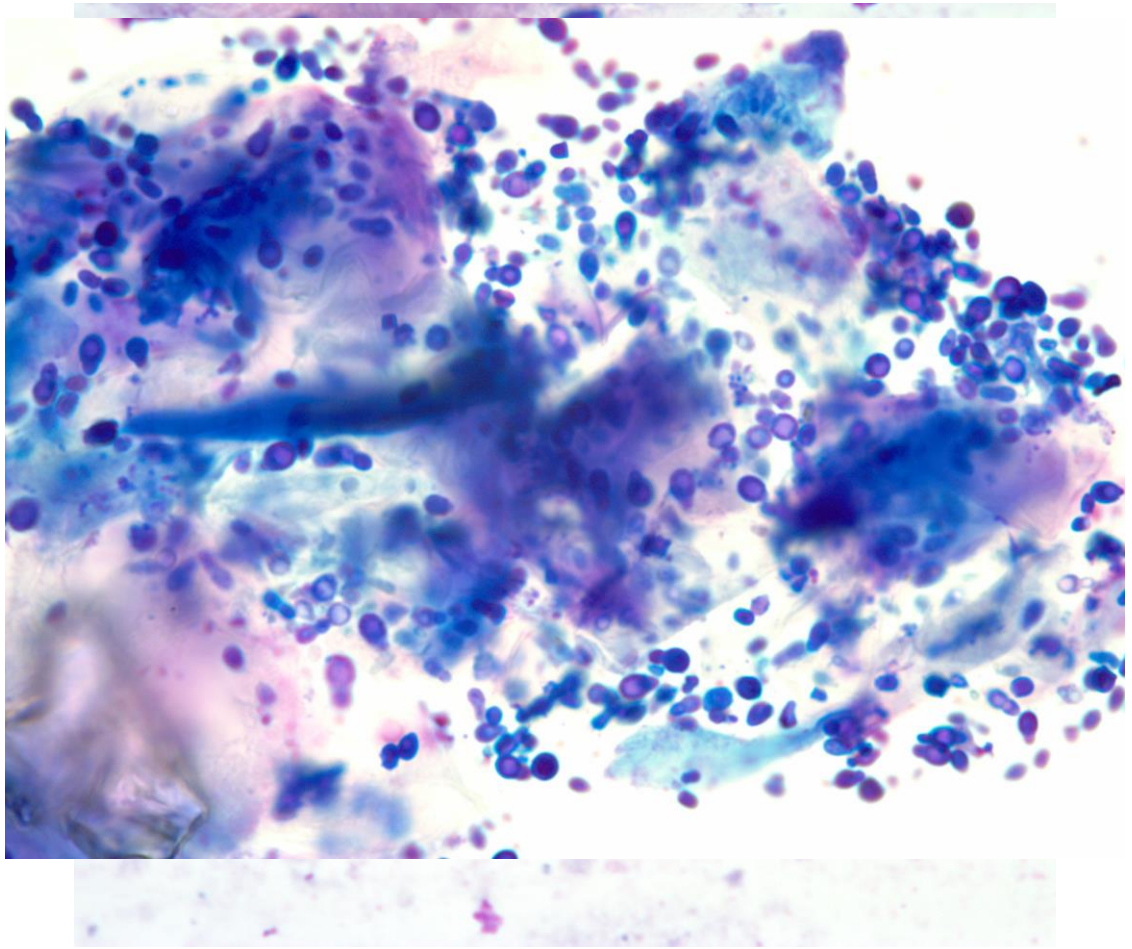
Stain deep blue/purple with Diff Quick®

Treatment:

Terbinafine

Azoles (Posaconazole, thiobendazole, miconazole, clotrimazole)

Corticosteroid Ototopical



Cocci bacteria

Staphylococcus pseudintermedius

Opportunistic pathogen that is part of the normal flora

Deeply blue/purple perfect circles when stained with Diff Quick®

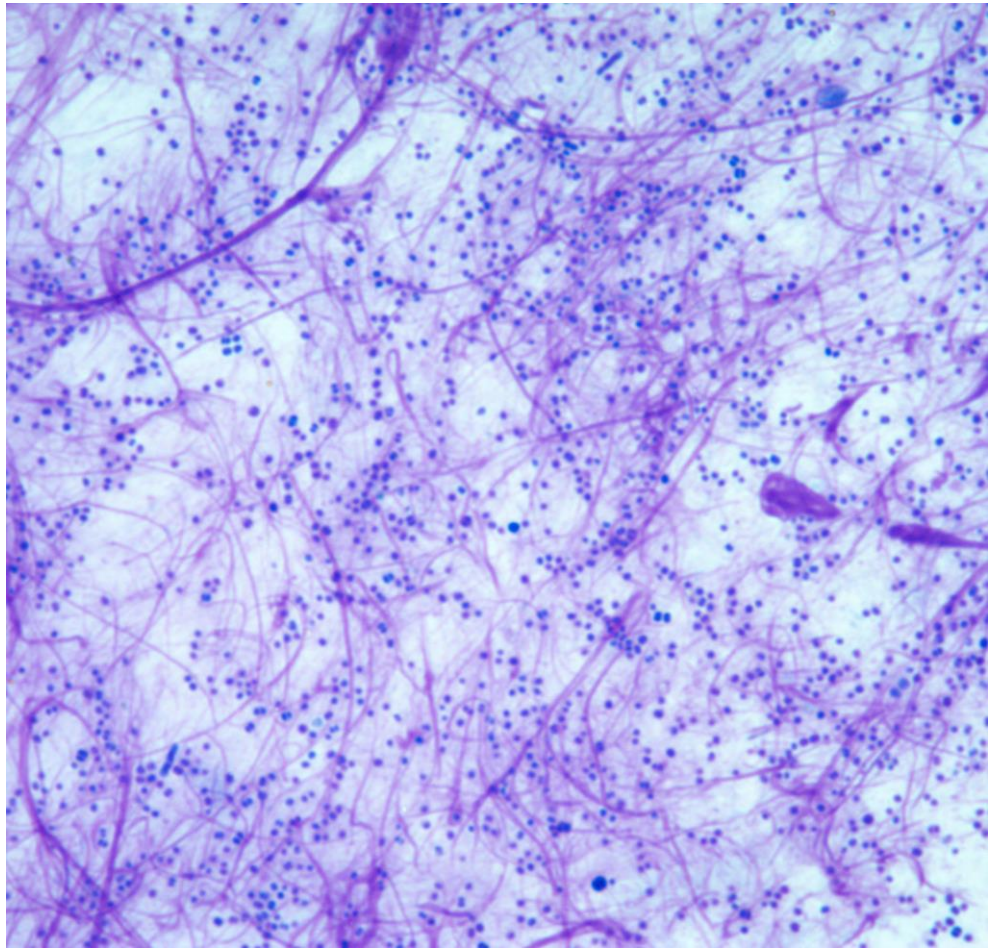
Treatment:

Aminoglycoside (gentamicin, neomycin)

Florfenicol

+/-Fluroquinolone (enrofloxacin)

Corticosteroid Ototopical



Rod Shaped bacteria

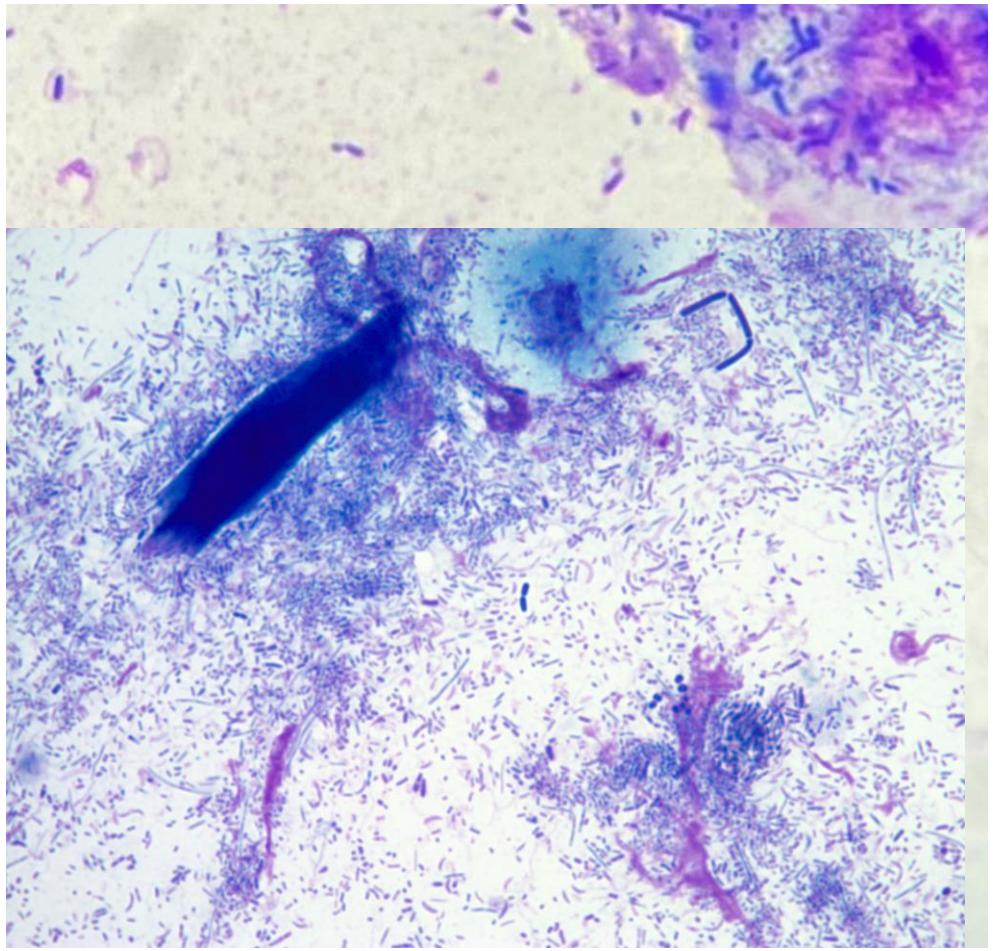
Pseudomonas aeruginosa

-Rod shaped bacteria are never ‘normal’ on otic cytology

- Deeply blue/purple rods

-*Pseudomonas* requires inflammation + predisposing factor(increased humidity, increased pH) to overgrow

-Rod shaped otitis is more common in ears that have chronic changes from previous inflammatory and infectious (cocci, yeast) insults.



Treatment:

Polymixin B

Flouroquinolone (enrofloxacin)

Silver Sulfadiazine

Aminoglycoside (Amikacin)

Treatment of otitis externa- TM intact

Yeast Otitis	Cocci Otitis	Rod shaped otitis
EasOtic® Mometamax® Leave ins Claro®, Osurnia®, Mometamax Single®, DuOtic® Stand alone topical corticosteroid	EasOtic® Mometamax® Leave ins Claro®, Osurnia® Mometamax Single® Stand alone topical corticosteroid	Surolan® Baytril Otic® Mometamax Single® (*Pseudomonas*)

Treatment of otitis externa- unknown TM status/ TM ruptured

Yeast Otitis	Cocci Otitis	Rod shaped otitis
Miconazole /Dexamethasone	Enrofloxacin/ Miconazole/ Dexamethasone in Triz-ETDA base	Enrofloxacin/ Miconazole/ Dexamethasone in Triz-ETDA base

Ear Flushing and Otitis

Ceruminous Otitis Externa

Products that are oil based or feel ‘oily’

Squalene- Cerumene®

pH Notix®

Douxo® Micellar Solution

Products that are drying

Salicylic acid – EpiOtic Advanced®

Malacetic Ultra®

Cort/Astrin® Solution

Purulent

Antibacterial agents

Isopropyl alcohol

Chlorhexidine

Hypochlorous acid

Adjunctive Antimicrobial

Triz- EDTA

Monosaccharides, polysacaccharides

Case Presentation -2 year old GSD Mix

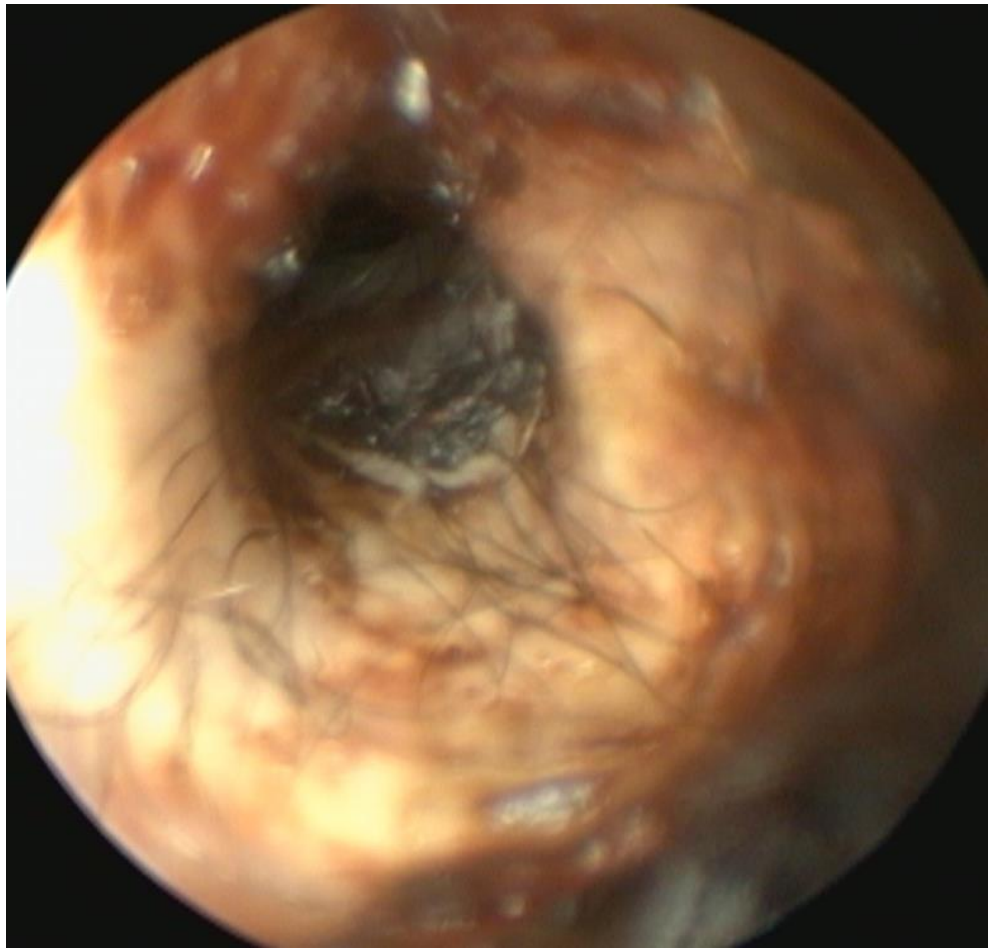
First Time Offender

HX: Went swimming in the pond twice last weekend and is now shaking head.

No prior ear infection, mild pedal pruritus in the spring and summer, monthly isoxazoline flea/tick control. Presumed healthy animal.

PE: No skin erythema, no ectoparasites, BCS 5/9

Both ear canals similarly affected. TM are intact



Minimal erythema, moderate dark brown waxy debris

Case Presentation- 2 year old GSD Mix

First Time Offender

Treatment:

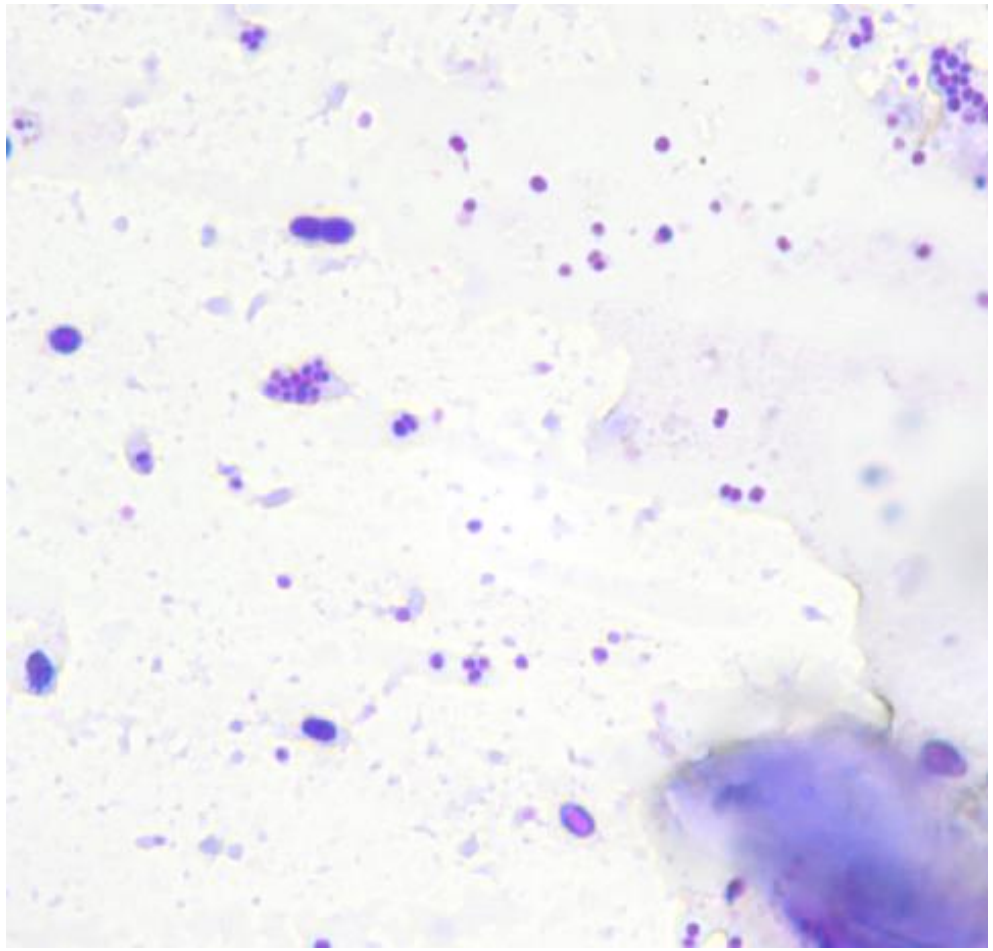
Corticosteroid ototopical and cleanser

OR leave in terbinafine + antibacterial ototopical

OR azole ototopical + antibacterial ototopical

Do I clean this dog's ears before sending it home?

Honestly, no –unless it's recommended prior to placing a leave in product



Moderate cocci and fewer yeast

When to flush ear canals?

Prior to treatment

In ceruminous otitis with heavy debris

If recommended by the leave in product manufacturer

During treatment

Ceruminous otitis – 1-2x weekly

Purulent otitis- 3-4 times weekly (may be daily if your antibiotic is compounded into a flush solution)

When to flush ear canals- after treatment

If there is underlying allergy leading to ceruminous build up

- Consider flushing canals 1-2 times per week with a flush that also contains a topical steroid

If there is underlying sebaceous adenitis leading to dry wax build up

- Consider flushing canals 1-2 times per week with a flush that hydrates the ear canals

First Time Offender

Recheck 2 weeks later

HX: Applied medications as directed, head shaking has resolved

PE: No skin erythema, no ectoparasites, BCS 5/9

Ear canals have minimal erythema, but otherwise normal on otoscopic examination

Treatment: monitor for new clinical signs, cerumenolytic and antimicrobial cleanser after swimming

Few anucleate keratinocytes

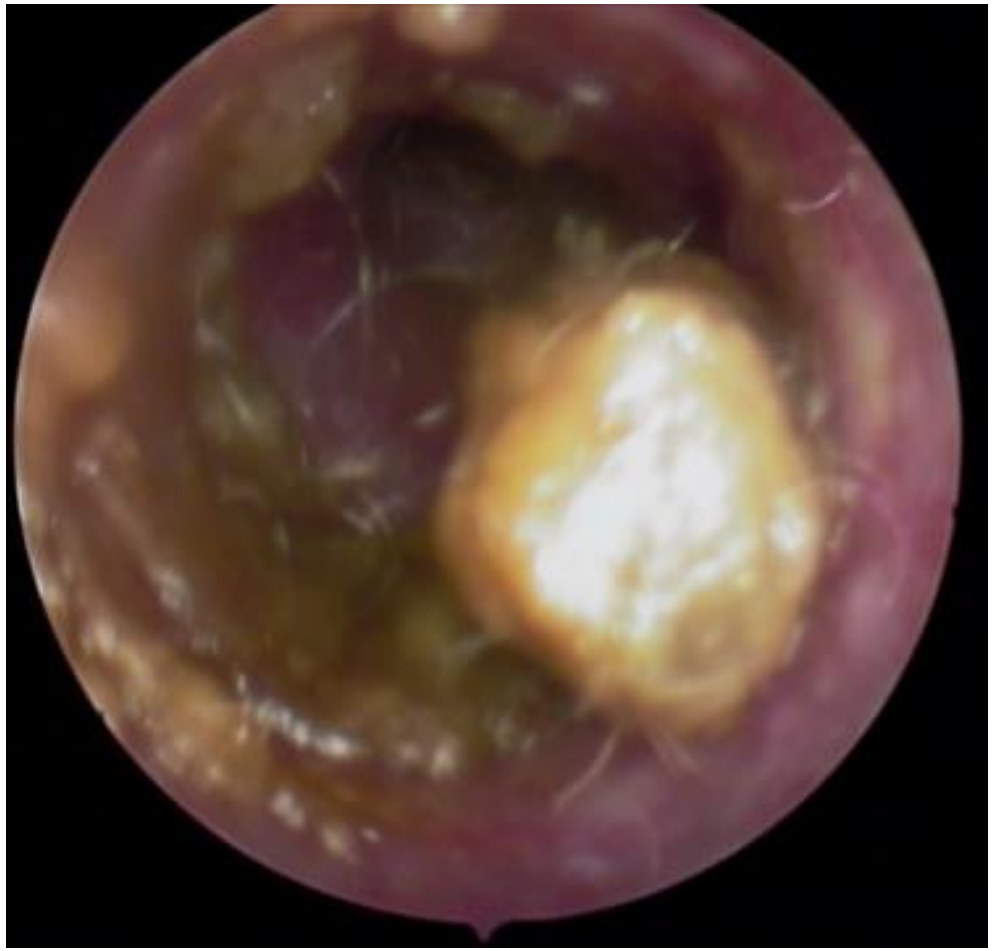
Case Presentation- 2 year old Bull Terrier

Repeat Offender

HX: Went to the ranch for the weekend and is head shaking and digging at the ear. Four prior ear infections, moderate spring-fall pruritus of paws and trunk, monthly isoxazoline flea/tick control.

PE: Salivary staining on paws, excoriations on the axilla with occasional papules on axilla and inguinal region , no ectoparasites, BCS 5/9

Both ear canals similarly affected. TM are intact



Erythema, epithelial hyperplasia, ceruminous debris, ceruminolith

Case Presentation – 2 year old Bull Terrier

Repeat Offender

Topical Plan

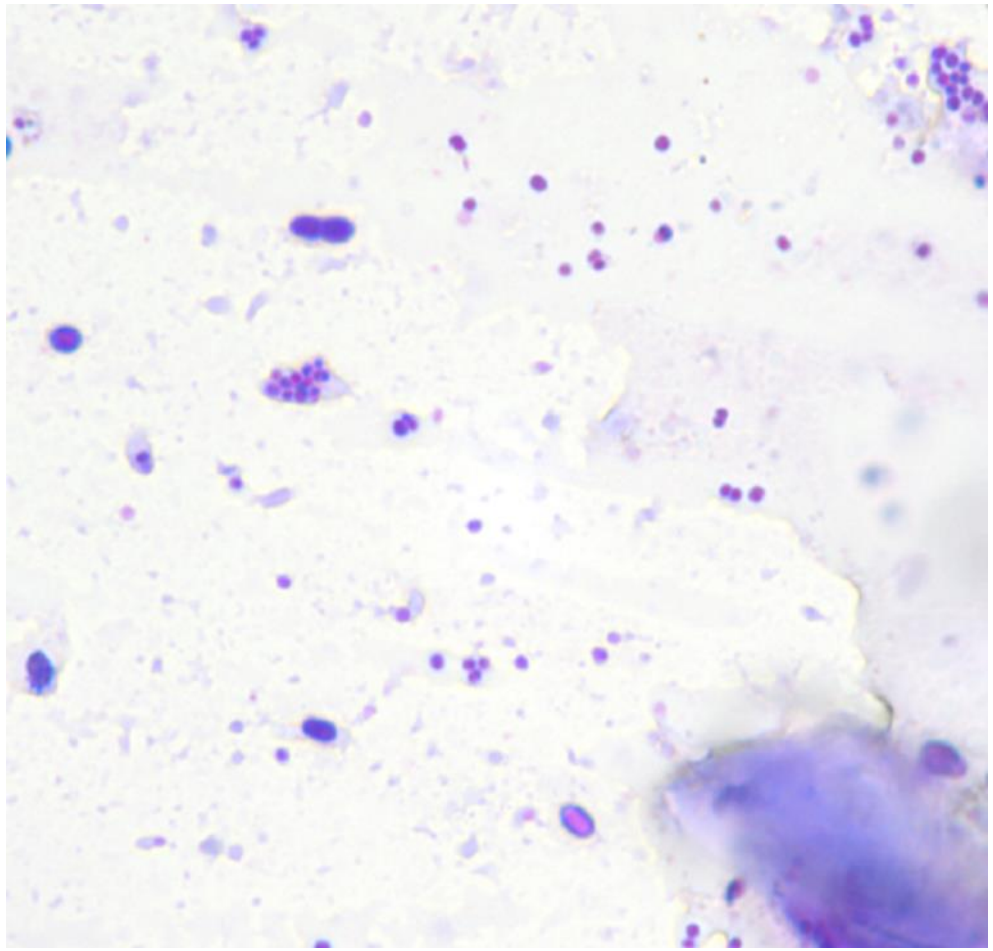
Corticosteroid ototopical and cerumenolytic cleanser

OR azole antifungal ototopical + topical antibiotic and ceruminolytic cleanser

OR Terbinafine ototopical + topical antibiotic and ceruminolytic cleanser

Systemic Plan

Oral corticosteroid 0.5-1mg/kg per day until resolution of inflammatory changes, then taper



Moderate cocci and fewer yeast

Why oral corticosteroids?

- Oral steroids are best to reduce ear canal inflammation and ear canal discomfort
    - Improves medication compliance
    - Reduces risk of immediate relapse
- Oral steroids can prevent and sometimes reverse chronic changes to the canal
    - Decrease hyperplastic change that increase risk of infection
    - Decrease risk of progression to ulcerated and purulent otitis

How is the oral steroid dosed?

Moderate to high anti-inflammatory is continued until the patient is showing significant improvement.

0.5-1mg/kg q 24 hours for 7-14 days

0.5-1mg/kg q 48 hours for 7-14 days

0.5mg/kg q 72 hours for 7-14 days

Case Presentation- 2 year old Bull Terrier

Recheck 2 weeks later

HX: Owner administered medications as directed, head shaking is improved but not resolved

PE: Reduced salivary staining on paws, papules and excoriations resolved.

Ear examination shows minimal debris with erythematous slightly irregular ear canals and focal stenosis

Erythema, epithelial and glandular hyperplasia, mild stenosis

Case Presentation - 2 year Bull Terrier

Maintenance Plan

Topical Plan

Ototopical steroid daily until inflammation resolves +/- a few times per week longer term

Ceruminolytic and antimicrobial flush 1-2 times per week and after swimming

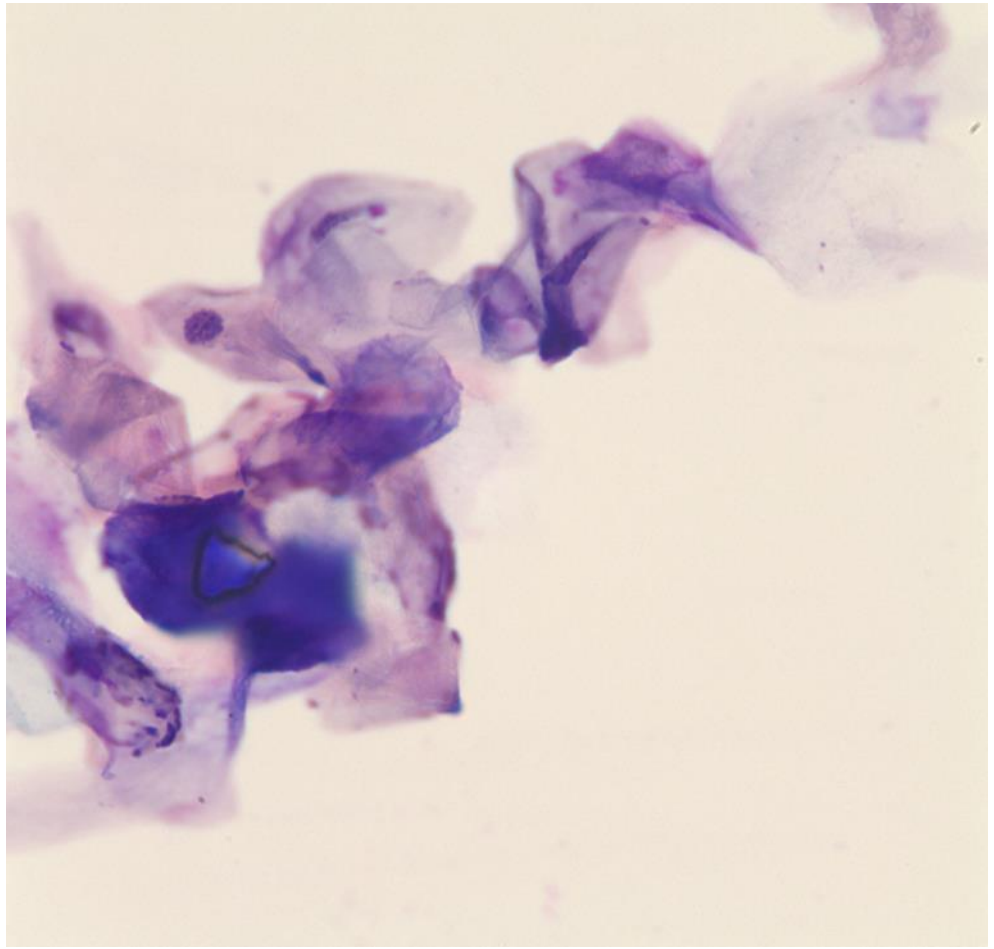
Systemic Plan

Taper oral steroids

Modified cyclosporine

Oclacitinib or Ilunocitinib

Allergy specific immunotherapy (+ CsA or oclacitinib)



Variably stained keratinocytes

When to reach for chronic otic topical corticosteroids?

- Lower potency steroids for infrequent or mild inflammation

  -Hydrocortisone

- Higher potency steroids for frequent otitis or moderate inflammation
  - -Mometasone (less systemic absorption)
  - -Injectable dexamethasone (moderate systemic absorption)
  - -Fluocinolone acetonide (more systemic absorption)

* For maintenance apply 1-3x per week

Why push for otic topical corticosteroids?

Prevent worsening and potentially reverse chronic ear canal changes

- **Reduces new ear infections**
- Limits end stage ear disease in predisposed breeds

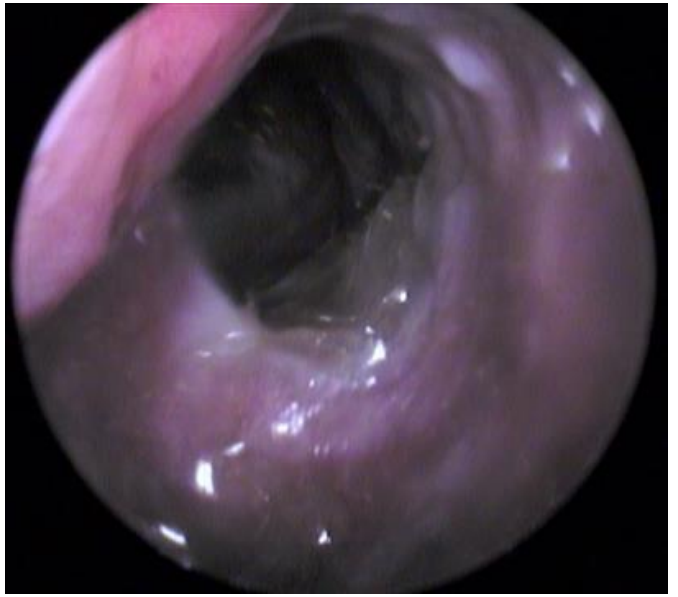
Improves patient comfort

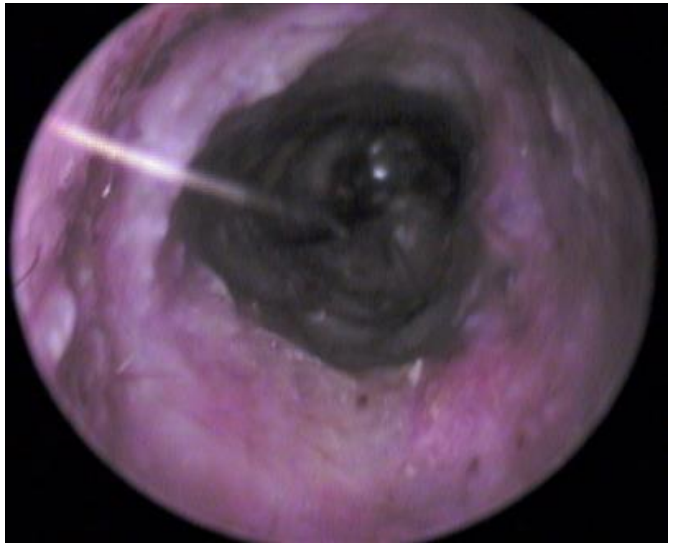
- Chronic ear inflammation is painful and may lead to resistance to ear treatments over time

Case Presentation-6 year old Poodle Mix
(second opinion)

Hx: Ear infections 2-3 times per year since 1 year of age. Since last summer is ‘always’ having an ear infection. Treated with compounded packing in prior years, but switched to a gentamicin based drop when that stopped working

PE: Both ear canals are firm, but not hard and the patient cries when ear canals are manipulated. Mild salivary staining of groin, otherwise no skin changes. On monthly isoxazoline prevention.





Case Presentation- 6 year old Poodle Mix

Second opinion

Topical Plan

Enrofloxacin based ear drop

OR Polymyxin B based ear drop

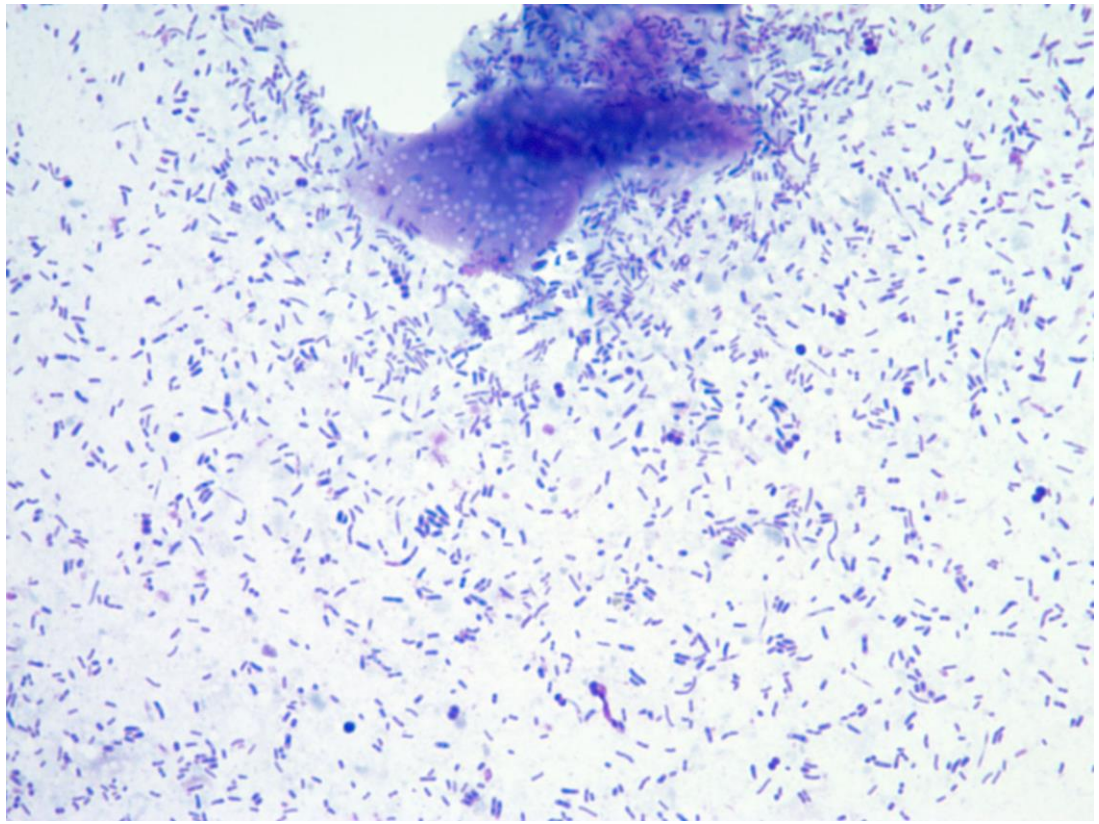
AND strong topical steroid q 24 hours

AND ear flush containing Triz EDTA q 24-48 hours

Systemic Plan

Oral corticosteroid 0.5-1mg/kg per day until resolution of inflammatory changes, then taper

Gabapentin 10-20mg/kg q 8-12 hours



Mixed population of predominantly rod shaped bacteria

Case Presentation- 6 year old Poodle Mix

Recheck 3 weeks later

Hx: All oral and ear medications have been administered, patient was a bit resistant of initial therapy but this improved after 1 week. Mild pu/pd.

PE: Both ear canals are firm, but not hard, slight discomfort on palpation. No skin changes.

Vertical canal is smooth, focal erosions of horizontal canal with irregular mass effect in the horizontal ear canals

When do I sedate or anesthetize a patient for an ear exam?

Concern for foreign body of mass in the ear canal

Neurologic signs

Heavy rod shaped bacterial overgrowth and initial cleaning may be helpful

I need to know the status of the TM prior to dispensing medication

Sedation for examination and a light cleaning

Anesthesia for biopsy, most foreign body removals, thorough ear cleaning.

Case Presentation- 6 year old Poodle Mix

Recheck 3 weeks later

Procedure under anesthesia:

Earigator system used to flush debris (does not budge)

Endoscopic forceps grab at material which comes out in large pieces.

‘Mass’ is a mix of packing material, keratinaceous debris, and infectious material

Case Presentation- 6 year old Poodle Mix

Recheck 3 weeks later

Topical Plan

Enrofloxacin based ear drop

OR Polymyxin B based ear drop

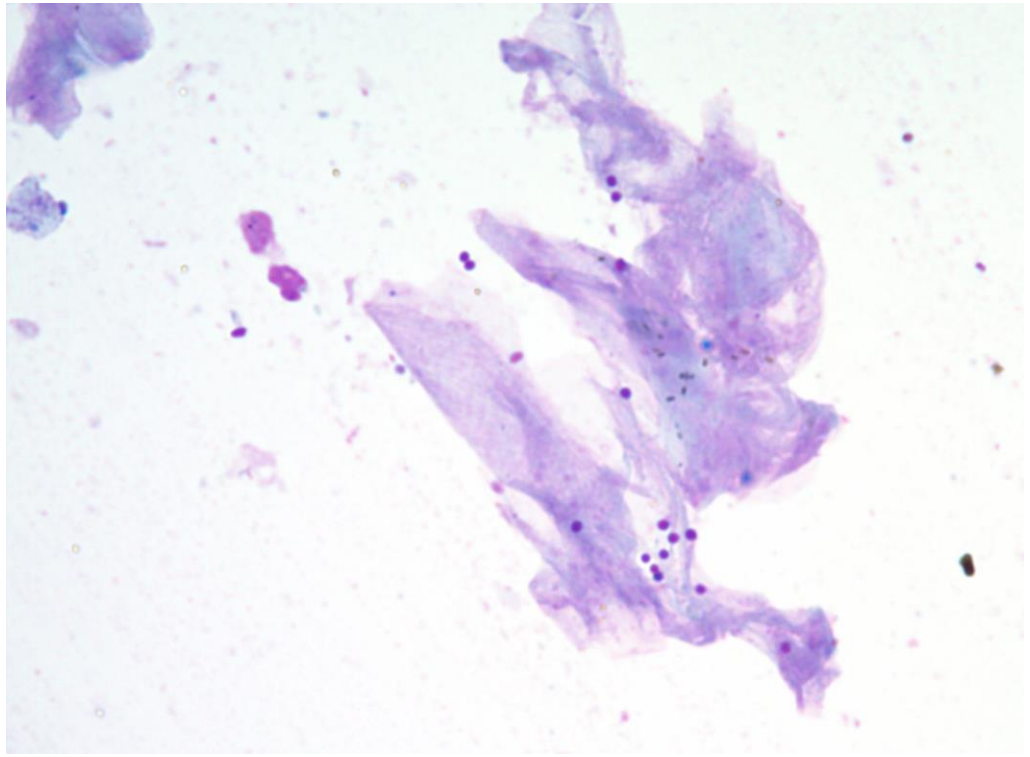
AND fluocinolone acetonide drops q 72 hrs

AND ear flush containing Triz EDTA q 72 hours

Systemic Plan

Oral corticosteroid 0.5mg/kg q 48 hours x 14 days, then 0.5mg/kg q 72 hours until recheck

Gabapentin 10-20mg/kg q 8-12 hours until recheck



Low number of cocci with few degenerate neutrophils.

Case Presentation- 6 year old Poodle Mix

Recheck 3 weeks later

Topical Plan

Fluocinolone acetonide drops q 72 hrs

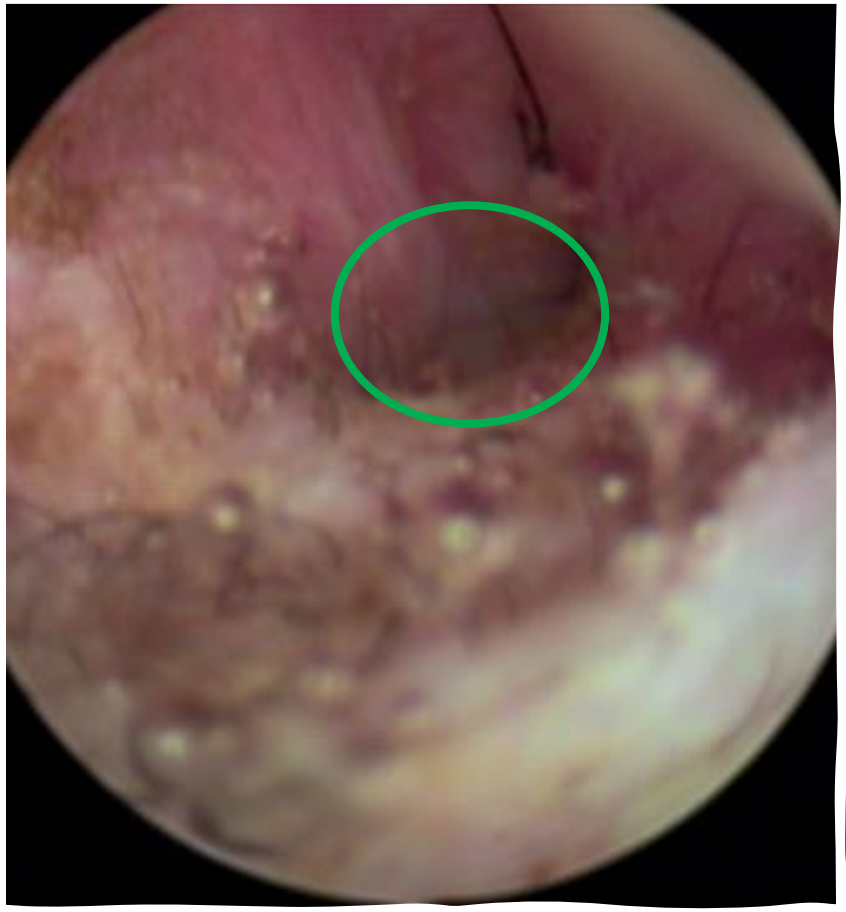
Ceruminolytic ear flush q 72 hrs

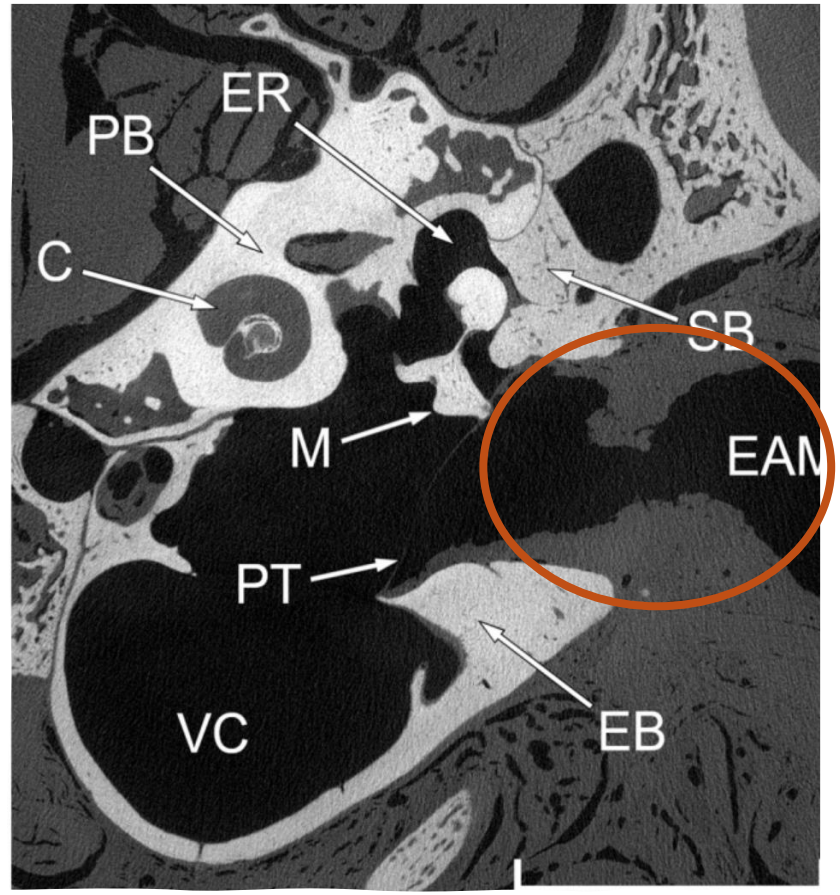
Systemic Plan

Consider oclacitinib vs ilunicitinib vs cyclosporine based on response to topical therapy

Opaque tympanic membrane, mild erythema, and mild ceruminous debris

Brachycephalic external acoustic meatus and TM invisibility





Narrow external acoustic meatus (EAM) and hidden pars tensa in the French bulldog

Mason MJ, Lewis MA. Structure and scaling of the middle ear in domestic dog breeds. *J Anat*. 2024;245(2):324-338. doi:10.1111/joa.14049

Case Presentation- 4 year old French Bulldog

emergency hospital

Hx: Three ear infections in the past year. Environmental allergies treated with lokivetmab q 30 days and intermittent oclacitinib for flares of itch. Body itching responds well to lokivetmab and oclacitinib.

Presents today with concern of eye infection and vomiting

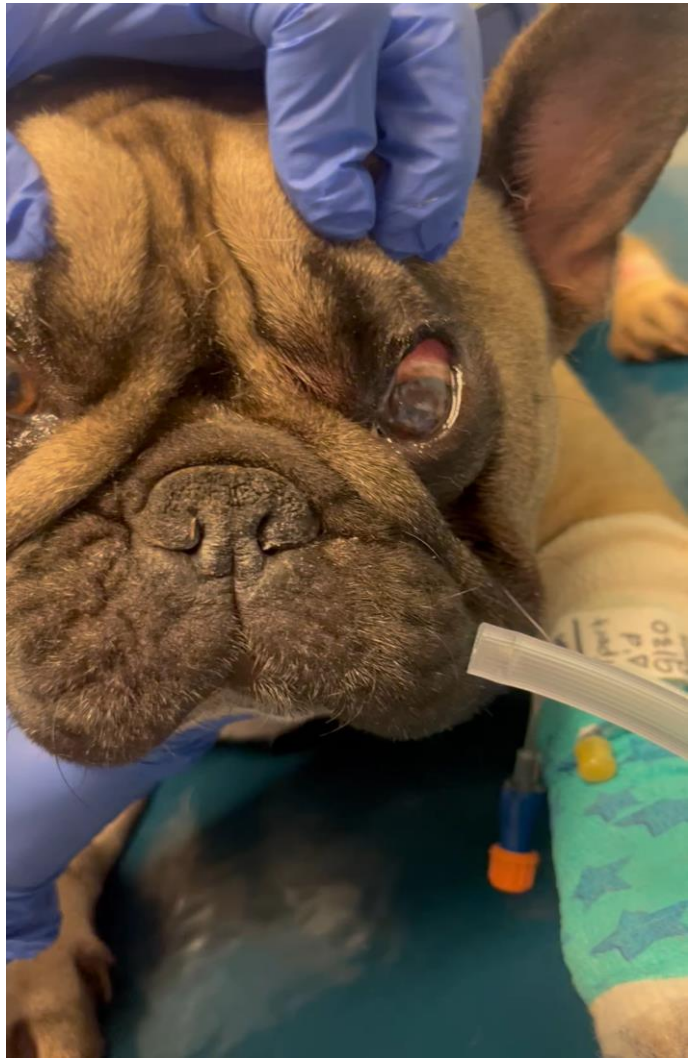
PE: Both ear canals are firm, but not hard and the patient winces when right ear canal is manipulated. Moderately erythematous and slightly swollen interdigital spaces. On monthly isoxazoline prevention.

Mixed ceruminous to purulent golden to green sticky mucoid discharge in the right ear canal.

4 year old French Bulldog- neuro examination

Peripheral vestibular disease and facial nerve paralysis

- Horizontal to Rotary Nystagmus- (fast phase away from the lesion for peripheral vestibular disease)
- Unilateral ventral strabismus
- The right eye is inflamed- corneal ulcer is present
- Complete lack of blink response on the right side



Case presentation-4 year old French Bulldog

Plan

Computed Tomography (CT) imaging of the skull

Clean ear canal while patient is under anesthesia

Topical therapy

Enrofloxacin based ear drops

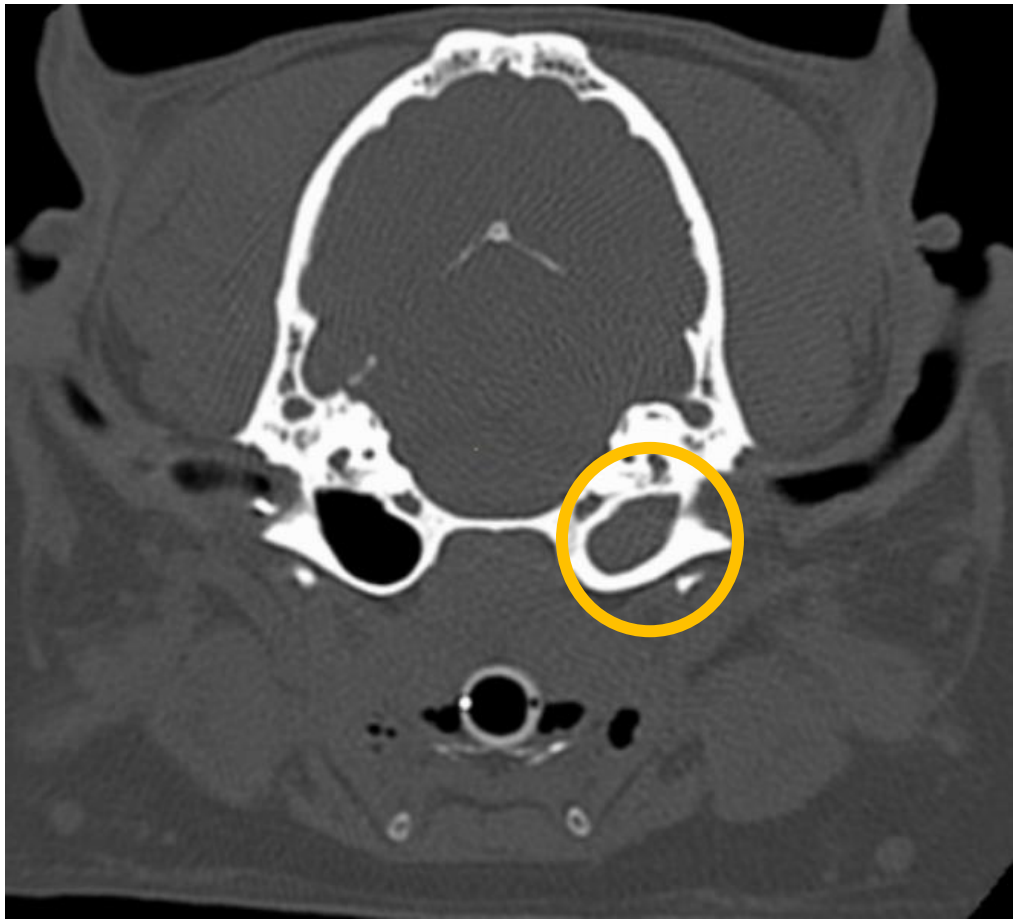
- Cocci ear cytology

Cocci present with nuclear streaming

Otitis media without bony lysis

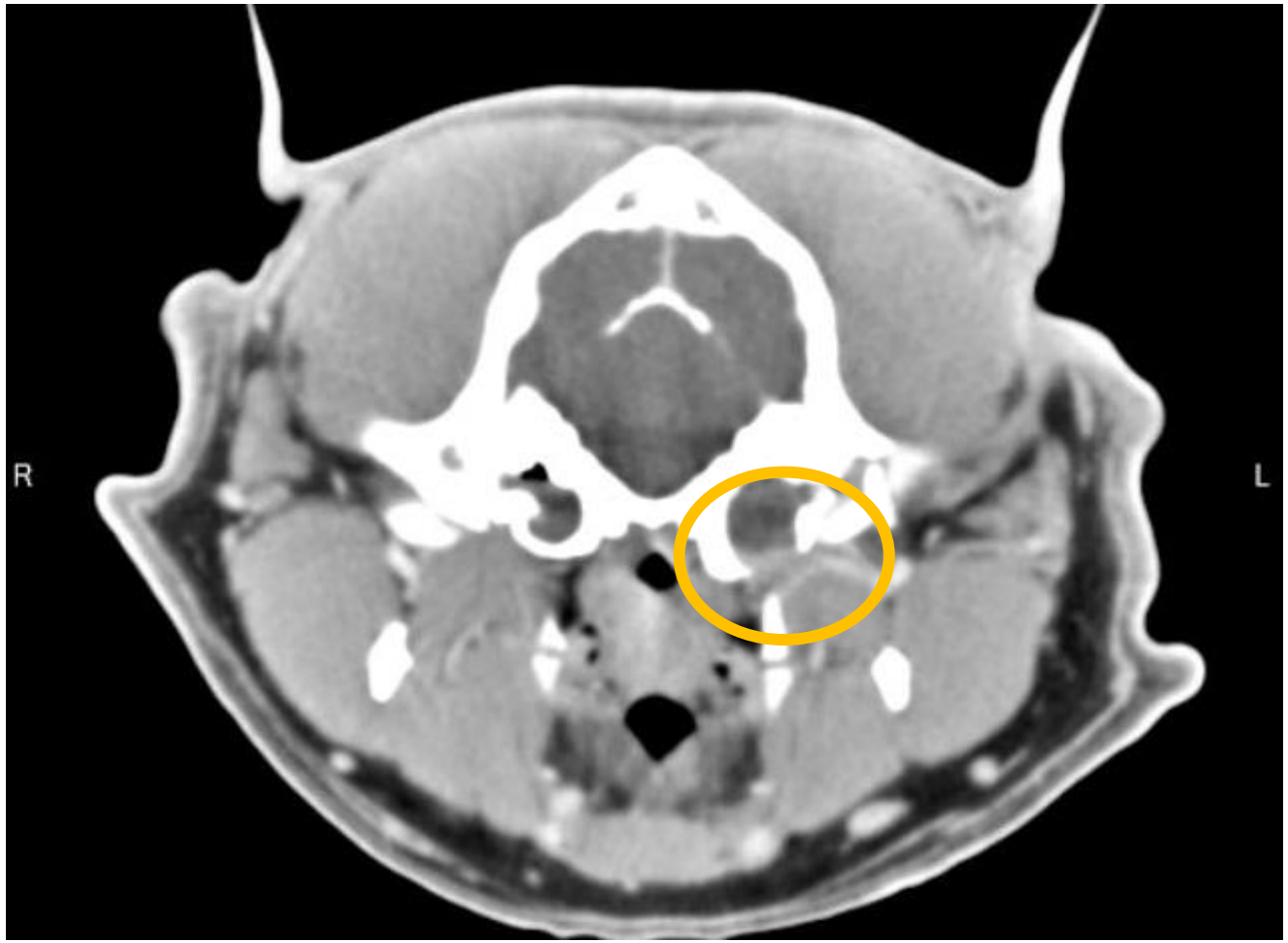
Medical Management

Erythematous and erosive era canal walls with moderate stenosis and scant purulent debris



Thickening of the tympanic bulla due to bacterial otitis media

Tympanokeratoma (Cholesteatoma)



Expansile masses of keratin and cholesterol that form secondary to chronic infection or inflammation

More common in brachycephalic dogs

The masses progressively expand leading to lysis of the bulla and neurologic signs.

Surgery is required

Key Points

- Ear canal inflammation and disease severity does not have to match with skin inflammation and disease severity
- Glucocorticoids topically along with ear canal cleaning is a good first line for uncomplicated otitis externa
- Oral steroids should be considered early in the treatment of chronic ear disease
- Patience is required when treating chronic otitis externa
- The presence of neurologic signs should prompt a recommendation for advanced imaging especially in a brachycephalic breed

Questions?