OTITIS IN DOGS AND CATS

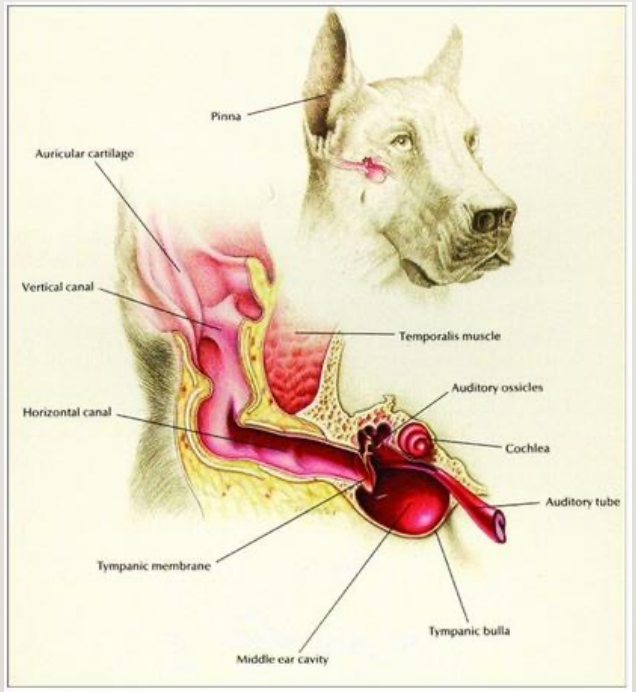
BY CAROLYN EMERY, DVM, DACVD

DERMATOLOGIST FOR CAPE COD VET SPECIALISTS (CCVS)

WHO AM I?

- I was born and raised in Falmouth, MA
- I went to UMASS Amherst for Animal Science and St. George's University for vet school
- , I was a tech a CARE in Dennis and Marion Animal Hospital Then I went around the country and back!
- Cornell Externship 2013
- NEAMC for rotating internship 2014
- GCVS for dermatology internship 2015
- PVSEC for dermatology internship 2016
- UC Davis for residency 2017-2019
- Relief GP for 8 months! 2019-2020
- Started my first dermatology job during shutdown in SLC! 2020-2023
- Currently back home at CCVS

OTITIS EXTERNA (OE), OTITIS MEDIA (OM), OTITIS INTERNA (OI)



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SYSTEMTIC WORKUP FOR OTITIS PSPP

- PRIMARY-Why? Allergy, endocrine, mass vs foreign body
- SECONDARY-Yeast, Bacteria, cytology-record it
- PREDISPOSING FACTORS-EX. Topical rxn, anatomical vs congenital changes
- PERPETUATING FACTORS-EX. Changes we see secondary to physiology, stenosis, calcification, accentuates secondary causes

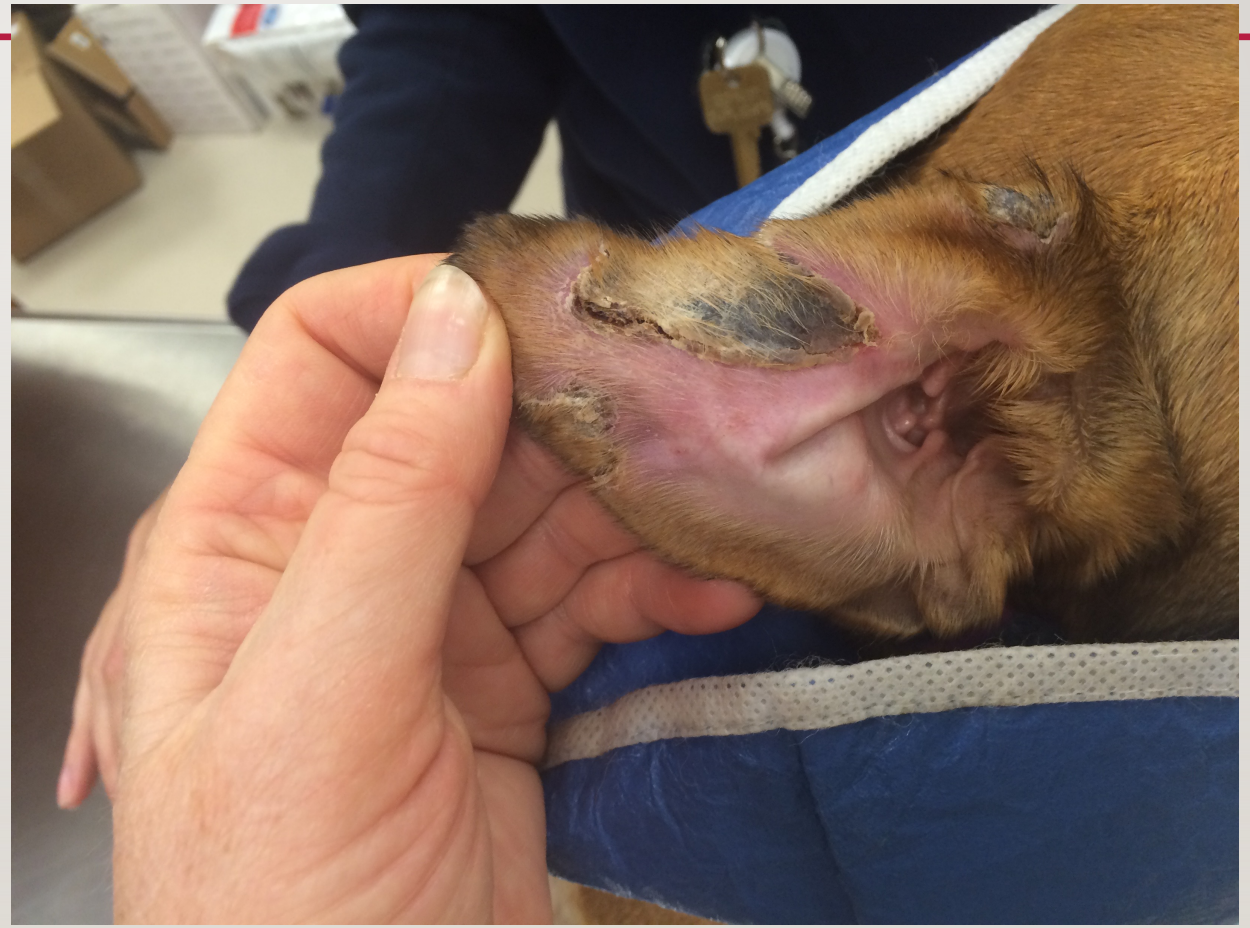
CAUSES OF OTITIS EXTERNA

- Allergy (food, environmental, infectious (flea/tick/mites-Demodex, Scabies/lice)
- Endocrine (Hypothyroidism, Hyperthyroidism, or Cushing's disease
- Foreign bodies (Grass awns, Fox tails, Ceruminoliths, literally anything)
- Tumors [benign (aural polyp or papilloma) vs malignant (carcinoma, lymphoma, MCT)]
- If only the pinna-topical reaction vs immune mediated disease (pemphigus vs vasculitis) vs tumor
- Swimming and not drying them after, moist dermatitis from an e-collar
- Feline specific diseases: Ceruminous Cystomatosis or Feline Proliferative and Necrotizing Otitis
- Idiopathic fungal ex. Aspergillus, Malassezia, or Ringworm
- King Charlies Cavalier Spaniels or Brachycephalics: Primary Secretory Otitis Media (PSOM)

NEED A GOOD HISTORY!

- If unilateral need to do a good p/e and look down the canal, make sure no foreign body or mass (benign vs malignant)
- Senior patients labwork: look for thyroid issues or Cushing's disease
- Under a year of age or older starting to just get ear infections: Food trial
  - Hydrolyzed (Hills Z/D, Royal Canin HP, Purina HA, or Blue Buffalo HF)
  - Novel Protein (RC PR, Rayne, BB Alligator, RC Kangaroo etc)
  - Home cooked under supervision of nutritionist or balanceit.com
  - If financial for food trial I will use Purina Sensitive skin and stomach lamb or salmon, since no chicken

EXAMPLES OF OE



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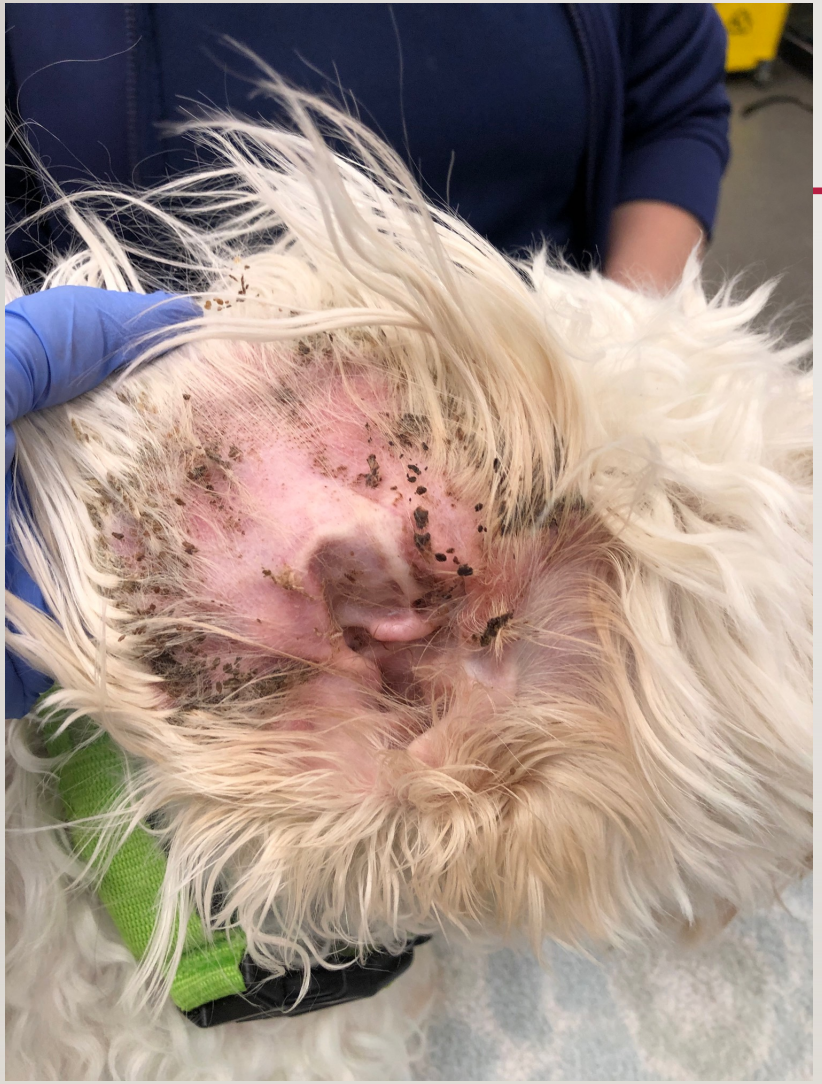

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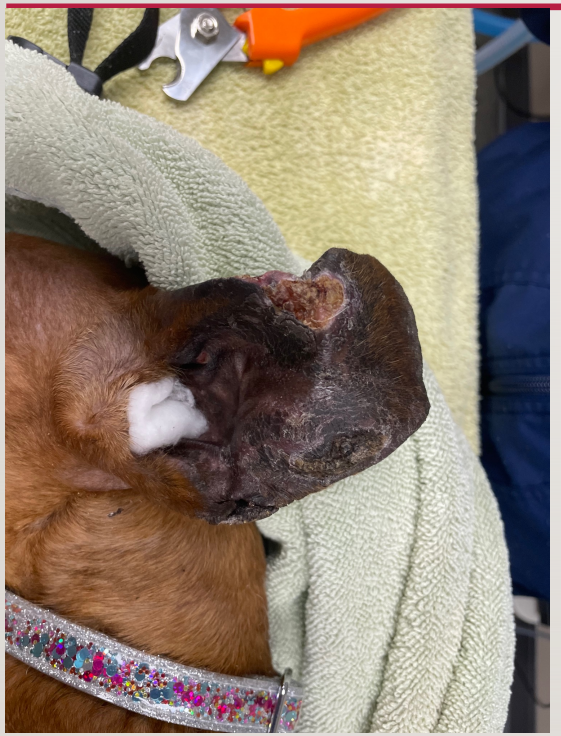

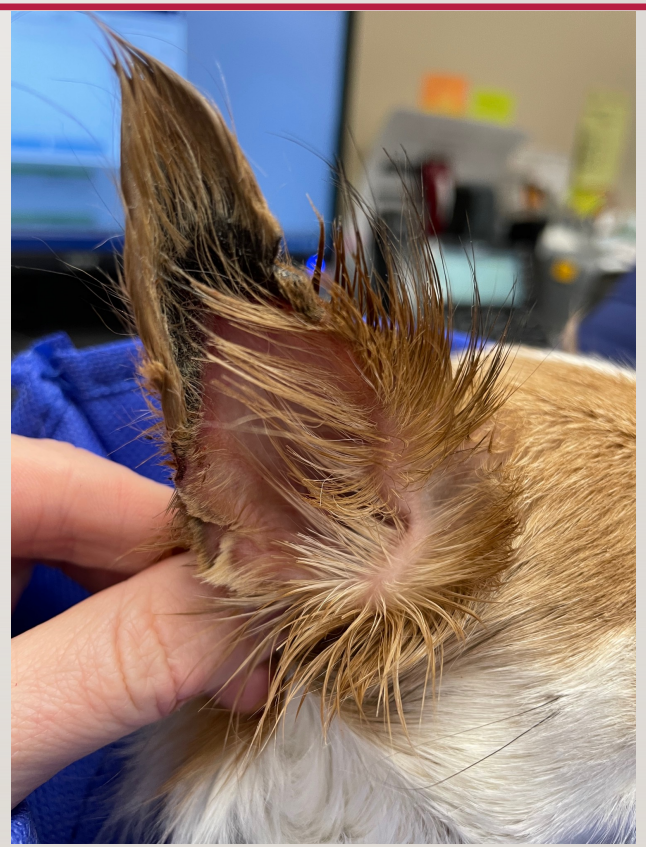

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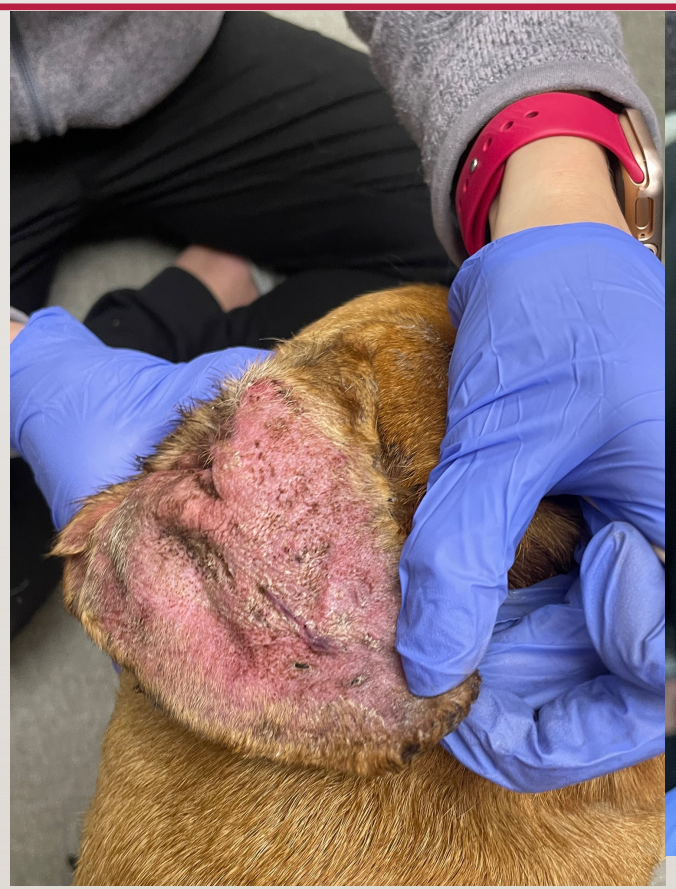

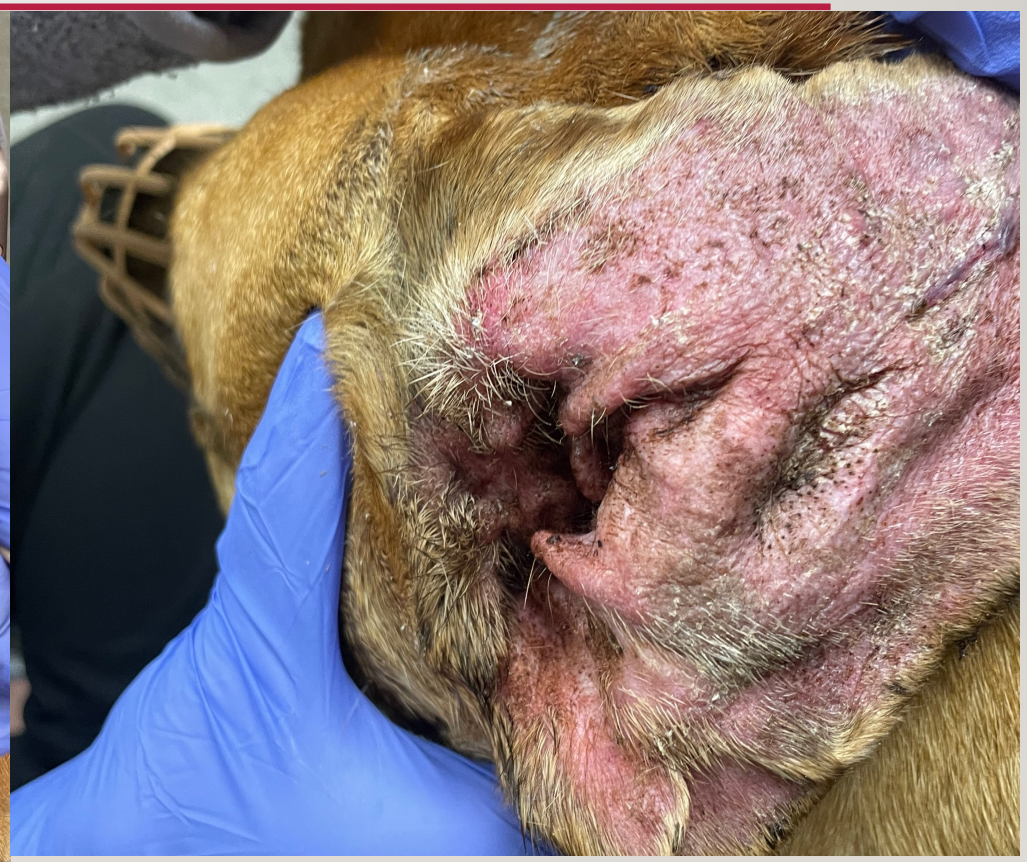

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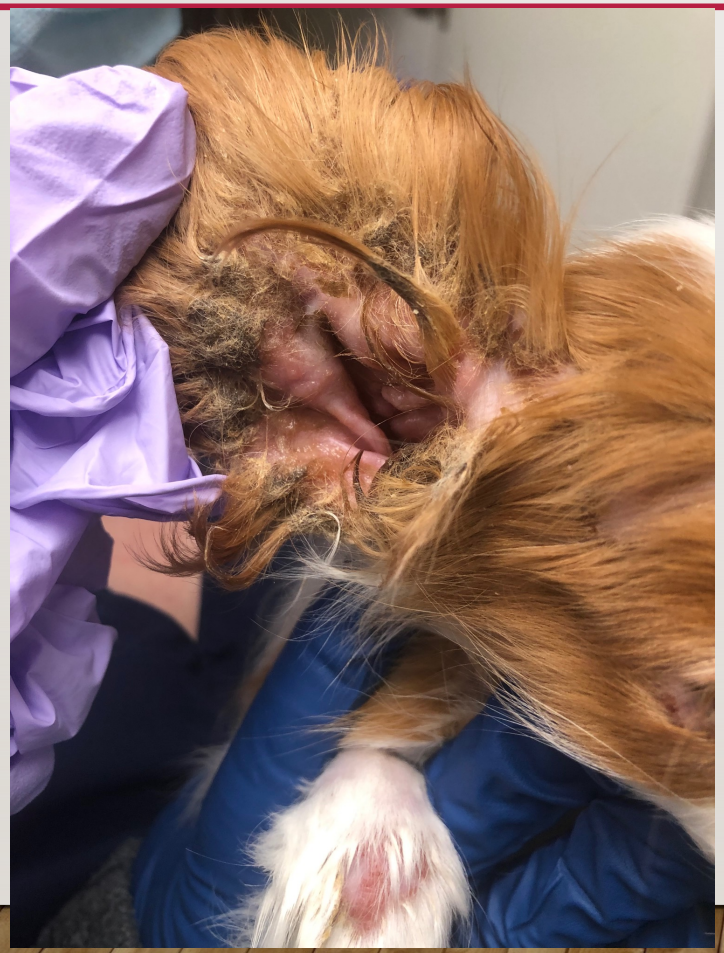


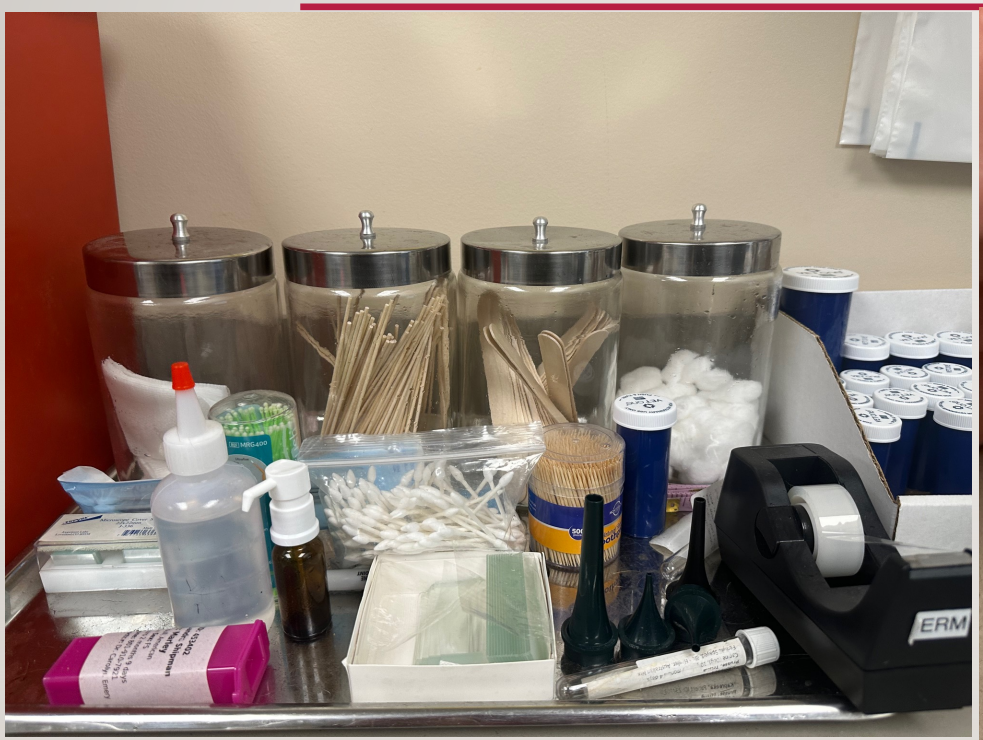
DERMATOLOGY OE WORK-UP

- Look down the ear to try the view the tympanic membrane (TM) in any patient for ears!
- If too painful start steroids for a few days and choose a safe option if open TM into the middle ear
- Recheck on gabapentin 10 mg/kg or if need be sedate at recheck
- Most important diagnostic for any work-up is the otic cytology
- Have a good microscope! Not one where it has not been serviced every 6 months and you can't tell the difference between debris and microbes
- Change your stain weekly and differentiate: blood smears vs ears/rears
- Charge for your time and services to review the cytology, either doctor vs technician
- Train your technicians to review: use the free training WACVD or Ashley Bourgeois, thedermvet on Instagram, free training info

EAR PHYSICAL

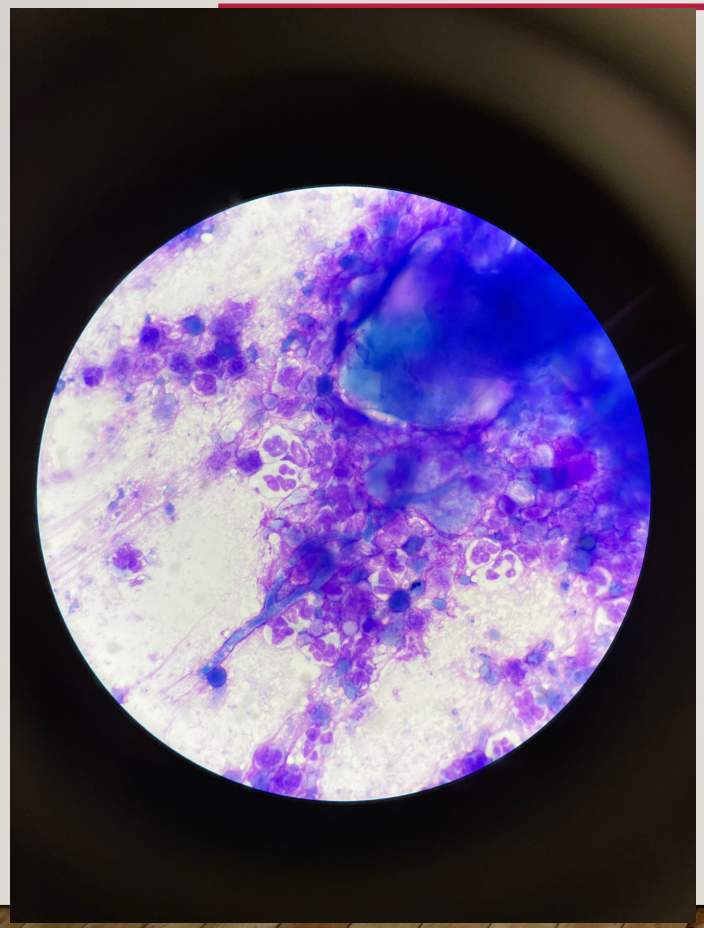
- First palpate the canal to see it is just swollen or calcification, only one of these can be fixed.
- Check the pinnae if it erythematous, scaly, lichenified or crusting. Sometimes the infection is just the flap.
- You may not have success with swollen shut ears, maybe just steroids and pain meds and reschedule for a week.
- Pull up vertically and out laterally, L shaped canal to straighten out, don't run into horizontal and vertical canal junction
- Vertical first and then horizontal, see the TM-pars flacida, pars tensa, and manubrium of mallus
- Look at the health of the TM or for microtears
- Make sure to have a good scope and light source (Welch Allen 20260)

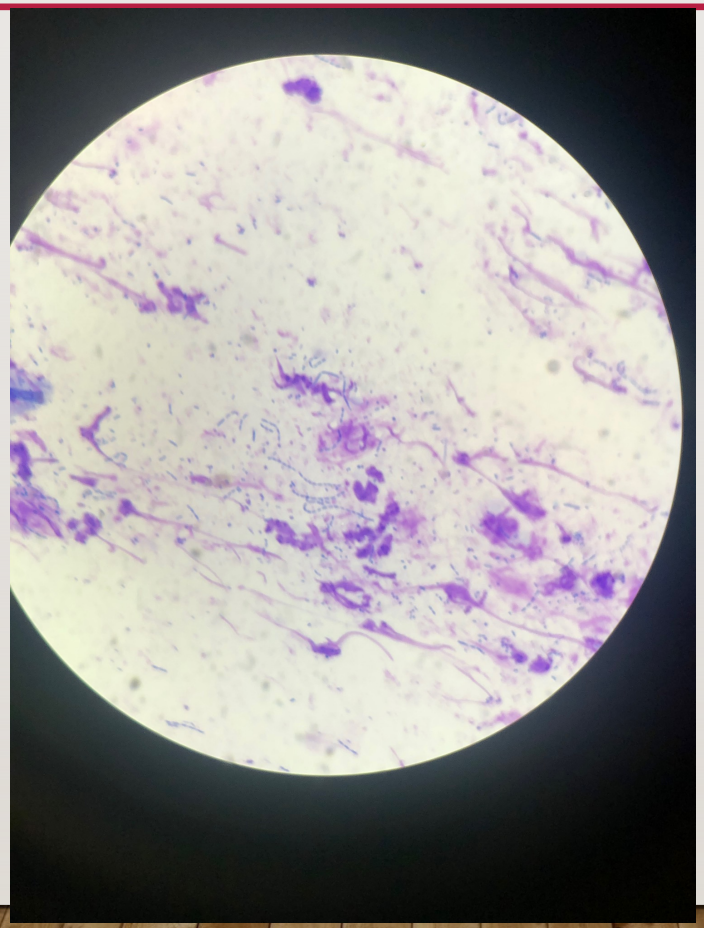
THINGS IS USE IN THE HOSPITAL

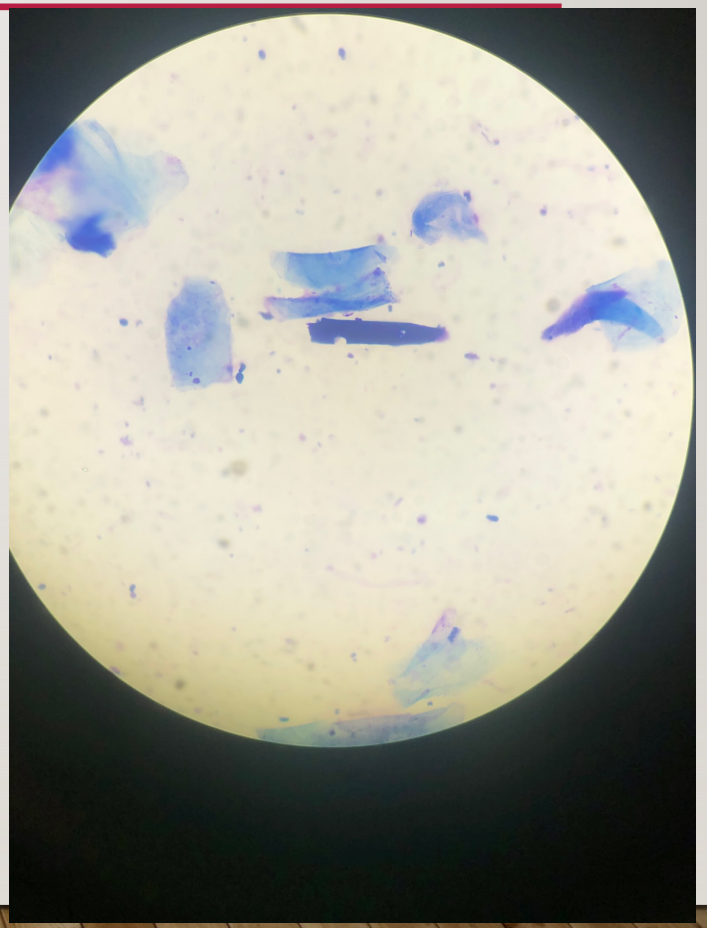


FAVORITE VIAL

CYTOLOGY







CYTOLOGY JARGON

- Rare (1 organism) and Occasional (3 organisms) per hpf
- Cytology
  - 1+= 0-3 per hpf
  - 2+= 3-10 per hpf
  - 3+= 10 – 20 per hpf
  - 4+= greater then 20, or too numerous to count (TNTC)

CYTOLOGY

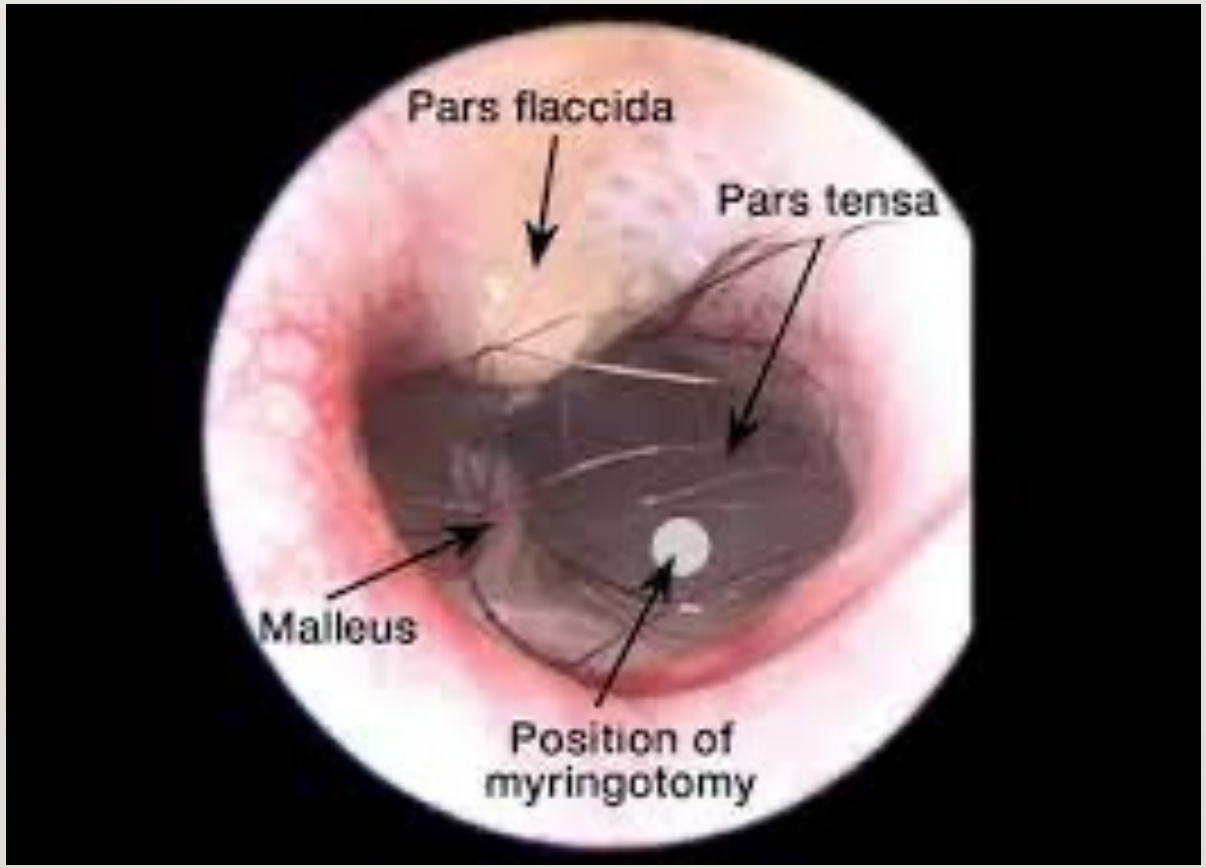
VETERINARY PRACTICE NEWS

Table 3. Findings: Discharge from Ear Canal

Microscopic Finding	Description	Diagnostic Finding
CYTOLOGY		
Bacteria	Cocci	*Enterococcus* *Staphylococcus* *Streptococcus*
	Rods	Coliforms *Proteus* *Pseudomonas* (**Figure 6**)
Inflammatory Cells	Degenerate neutrophils + proteinaceous debris	Acute disease (often accompanied by nucleated epithelial cells and bacteria)
	Degenerate neutrophils & macrophages + proteinaceous debris	Chronic disease (often accompanied by nucleated epithelial cells and bacteria)
Keratinocytes	Large anucleate epithelial cells (may be flat or rolled, with or without stain) (**Figure 7**)	Normal finding May be found in acute disease
	Large anucleate or nucleated epithelial cells + debris	Nonspecific finding Often present in chronic disease, especially allergies
	Rounded nucleate cells with nondegenerate neutrophils	Autoimmune skin disease, especially pemphigus foliaceus
Yeast	Peanut shaped	*Malassezia pachydermatis* (**Figure 8**)
ECTOPARASITES		
Mites	Long cigar-shaped mite; adult has 8 legs	*Demodex canis*
	Large oval-shaped mite; adult has 8 legs	*Otodectes cynotis*

TYMPANIC MEMBRANE (TM)

VETERINARY PRACTICE NEWS



MAKE A PLAN

- Evaluate what is on the slide and make your plan
- If only some waxy debris and few inflammatory cells: probably only need a good ear cleaner
- The type of ear cleaner can make a difference!
- In Europe they manage a lot of cases with a good cleaner and topical steroid (Synotic, dexamethasone, or hydrocortisone aceponate)

FIRST TREATMENT

- If ear canals are stenotic or closed 1-2 mg/kg prednisone PO or equivalent, prednisolone, methylprednisolone, triamcinolone, on injectable dexamethasone to open them
- Can not treat them if canals closed, #1 mistake in GP
- Ear canals should open-up in 2 weeks, if not prognosis is poor and Total Ear Canal Ablation (TECA BO) may be considered
- Cardiac patients: canine patients can still use steroid if approved by Cardiology, but extreme caution with feline patients
- Apoquel or Cytopoint will not treat or prevent ear infection
- If you don't want to manage on prednisone can be maintained immunotherapy, Atopica (cyclosporine), or topical steroids

EAR CLEANERS

- Ceruminolytics break up cerumen-Cerumene by Vetoquinol (need to order) or mild waxy and gentle cleaner Douxo Micellar, rarely used if open TM
- Epi-Otic Advanced: Drying and good to be use against Pseudomonas and Yeast, not used in open TM
- Dechra TrizUltra+Keto and Dechra TrizEDTA: can be used in TM, synergistic with abs and good against Pseudomonas
- Other good options for maintenance Malacetic or Mal-A-Ket

TREATMENT OPTIONS TO HAVE AT YOUR HOSPITAL

- Entederm: Should not be used! (other names Animax or Panalog) or Zymox does not treat active infection, ok for some inflammation and cats
- Tresaderm: thiabendazole, neomycin and dexamethasone, approved for cats
  - Good for mild-mod. cocci infection, ear mites, need TM intact not good for yeast
- Otomax: gentamycin, betamethasone, and clotrimazole
  - Good for yeast, cocci, and rods, not good if a lot of purulent debris, need intact TM, #1 ab. cause for deafness
- Mometamax: gentamycin, clotrimazole, mometasone
  - Good for yeast, cocci, rods, not good if a lot of purulent debris, need intact TM, #1 ab. cause for deafness
- Easotic: hydrocortisone aceponate, miconazole, and gentamycin)
  - Good for yeast, cocci, rods, great applicator and topical steroid, still the same abs as Otomax/Mometamax but don't get the same problems
- Surolan: miconazole, polymyxin, prednisolone acetate, and paraffin
  - Good for yeast, cocci, rods, need in intact TM and not great if a lot of debris, good for resistant Pseudomonas
- Posatex: orbifloxacin, mometasone, and Posaconazole, I use this in cats
  - Good for yeast, cocci, rods, not good if need a lot of purulent debris, need intact TM ideally but, have used in open TM, good for resistant yeast infection
- Claro-30 day leave in, florfenicol, terbinafine, and mometasone
  - Good for mild to mod. cocci, mild yeast, NO rods, questionable use in cats, and need intact TM, please stop pulse dosing this monthly

EASOTIC IS BACK ON THE MARKET!

AMINOGLYCOSIDE TOXICITY

- Can cause toxicity of vestibular (balance) or cochlear (hearing)
- Gentamycin, tobramycin, and streptomycin Vestibulotoxic
- Amikacin and kanamycin cochleotoxic
- Cochleotoxic-hearing impairment
- Vestibulotoxicity-ataxia, dysequilibrium, and oscillopsia (visual blurring with head movement)

COMPOUNDING LAWS ARE CHANGING

- Aqueous meds now only have a 14 day expiration date compared to prior 14 days
- Do need a stability study to in-house mix and recommend a hood
- They may come down stricter and ban all in-house meds not made in a certified compounding pharmacy
- I used Wedgewood and Mixlabs for East Coat, Road runner on West Coast
- Chloramphenicol Otic will need gloves! Bone marrow suppression in people.

TREATMENT OPTIONS TO BE MADE IN HOUSE

- Amikacin/miconazole/dexamethasone or tobramycin
- Enrofloxacin/miconazole/dexamethasone
- TrizUltra+Keto/enrofloxacin/dexamethasone (4 oz, 10-15 cc of 22.7 or100 mg/ml, 10-25 cc 2 or 4 mg/ml)
- Pseudomonas—Ceftazidine, Piperacillin, Amikacin
- Mupirocin and SSD diluted down
- Miconazole and dexamethasone 4 mg/ml: 1 oz or 2 oz
  - 25:5 mls or 50:10 mls ratio, measured liquid can go in stenotic canals or purulent debris
  - Will get warm to the touch, chemical reaction

TREATMENT LENGTH

- Minimum 10-14 days for simple, and complicated 30+ days
  - Small dog/cat: 4 drops, medium 6 drops, or large 8 drops ointment
  - Compounded small dog/cat: 0.25 mls, medium 0.5 mls, large 1 ml
  - Can be SID or BID dosing
  - Can be compounded into a flush and the directions is just to fill the ear canal
  - For compounded always attached a stopper for syringe attachment
- OM-can be 1-3 months

WHAT HAPPENS IF THE OWNERS CANNOT TREAT?

- I will culture no matter what.
- I will sedate to look at everything with a quick use of the VO scope.
- Normally I will utilize oral options
- I will use Claro/generic or Osurnia
- If rod based, I make a weekly gel for 4 weeks to put in and NEVER LANOLIN
- Lanolin bases can expand and rupture out the side of the canal or facial skin
- Do not put something that needs to expand in a stenotic canal!
- Sedation normally I sedate first visit and then chill protocol of gabapentin/trazodone the rest of the visits

WHEN IS A CULTURE NECESSARY?

- I almost never do it for Otitis externa-because in house compounding choices will overwhelm the MIC on culture
- The culture is for the BREAK POINT FOR SYSTEMICS, tissue levels not topical that will get through the zone if inhibition
- What cultures I use: fungal and aerobic c/s, very rare for aerobic and anaerobic, Idexx> Antech and Zoetis
- You may not get all pathogens. still Please do a cytology to ID primary pathogens.
- Only times I do culture
  - OE-suspect Pseudomonas (small rods) and want an oral
  - OE ulcerated canal
  - OE opening ventral to the canal swollen
  - Contact drug reaction of pinna
  - OM/OI
  - Fungal

CULTURE RESULTS

- Specify-For ears need to the lab know and tell them grow out all microbes, speciate and sensitivity
- Can call and request extended sensitivity panel if chronic and know likely to be resistant MRSP
- If you need to culture then normally 3-4 weeks are needed for topical and oral
- Think about age and species for selection of the treatment
  - I will never use Amoxicillin (unless Actinomyces on culture) for any skin or ear
  - doxycycline (not in young animals)
  - fluroquinolones (enrofloxacin no oral for cats, but yes topically, can use pradofloxacin, ofloxacin, or marbofloxacin for them) (enrofloxacin-not ideal young and growing puppies), no ciprofloxacin
  - Never should use aminoglycosides if cannot confirm TM intact
  - Pseudomonas-special topicals can be made

ANTIBIOTIC ORAL OPTIONS FOR STAPHYLOCOCCUS

- Tier 1:
  - A: Clindamycin 11 mg/kg or Cephalexin 22-30 mg/kg or Clavamox 14-22 mg/kg PO BID
  - B: Cefovecin: 8 mg/kg or Cefpodoxime: 5-10* mg/kg-not to be used as first line
- Tier 2:
  - TMS 15-30 mg/kg BID and Doxycycline 5 mg/kg BID or 10 mg/kg SID, azithromycin a lot of side effects 10 mg/kg SID
- Tier 3:
  - Chloramphenicol 30-50 mg/kg TID or Fluoroquinolones SID (enrofloxacin 10 mg/kg, marbofloxacin 5 mg/kg, pradofloxacin, orbofloxacin, or moxifloxacin 10 mg/kg)
  - Referral is normally recommended for imaging and VO and cleaning
- Tier 4: Amikacin or Rifampicin
- Vancomycin or Linezolid: should not be used in veterinary medicine

ANTIBIOTIC OPTIONS FOR PSEUDOMONAS

- Normally a fluoroquinolones for oral use
- After this we normally run out and need to utilize topical therapy
- We need to break up the BIOFILM
- Triz EDTA vs acetylcysteine, TrisNAC flush from Nexmmune vs NAC infusion 2% saline

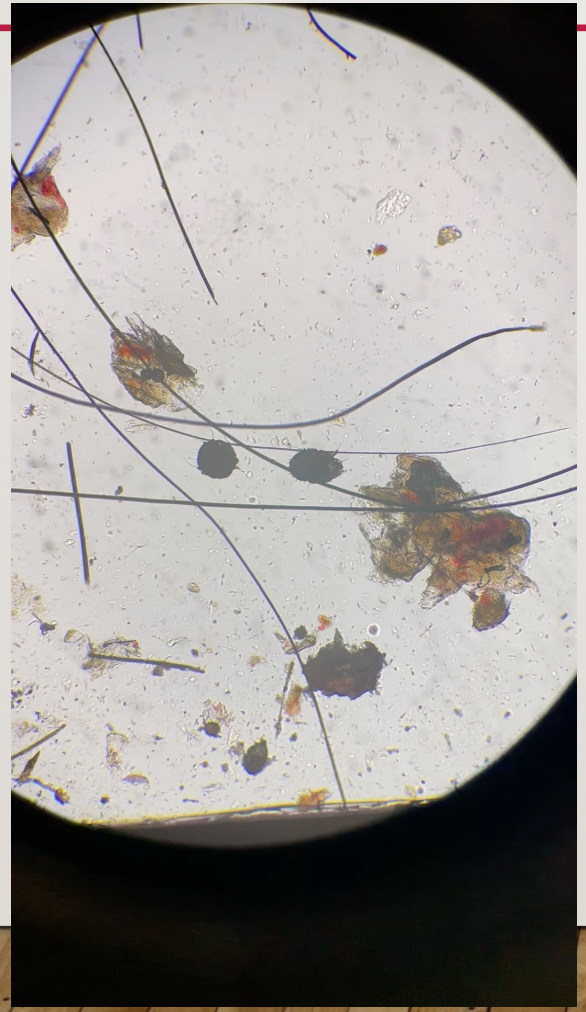
ORAL ANTIFUNGAL OPTIONS

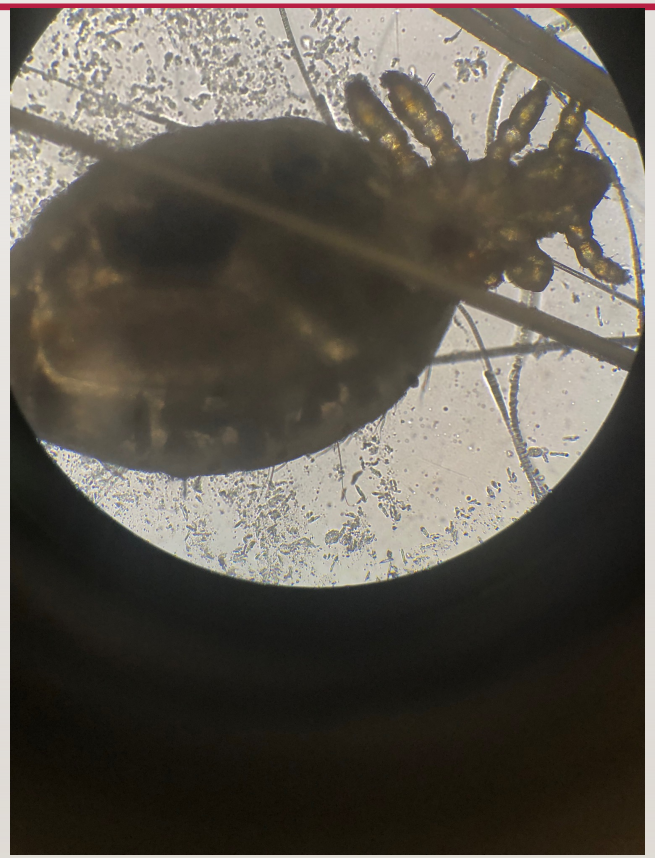
- Fluconazole 2.5-10 mg/kg PO SID, 5*
- Ketoconazole 5 mg/kg SID
- Terbinafine 30 mg/kg PO SID
- Itraconazole liquid 5 mg/kg PO SID
- Never use the generic itraconazole
- Itraconazole or Voriconazole, normally specialist use

MITE TREATMENTS TO KEEP IN STOCK

- Isoxazolines for any mites:
  - Feline: Topical BravectoOral Bravecto for canines-treats all
  - Canine: Bravecto, Credellio, Nexgard, +/- Spectra, Simparica, +/- Trio
  - Felines-Bravecto, Revolution Plus
- Eradamite topical topically for ear mites
- Tresaderm topically for ear mites

MITES AND LICE





AURAL HEMATOMAS

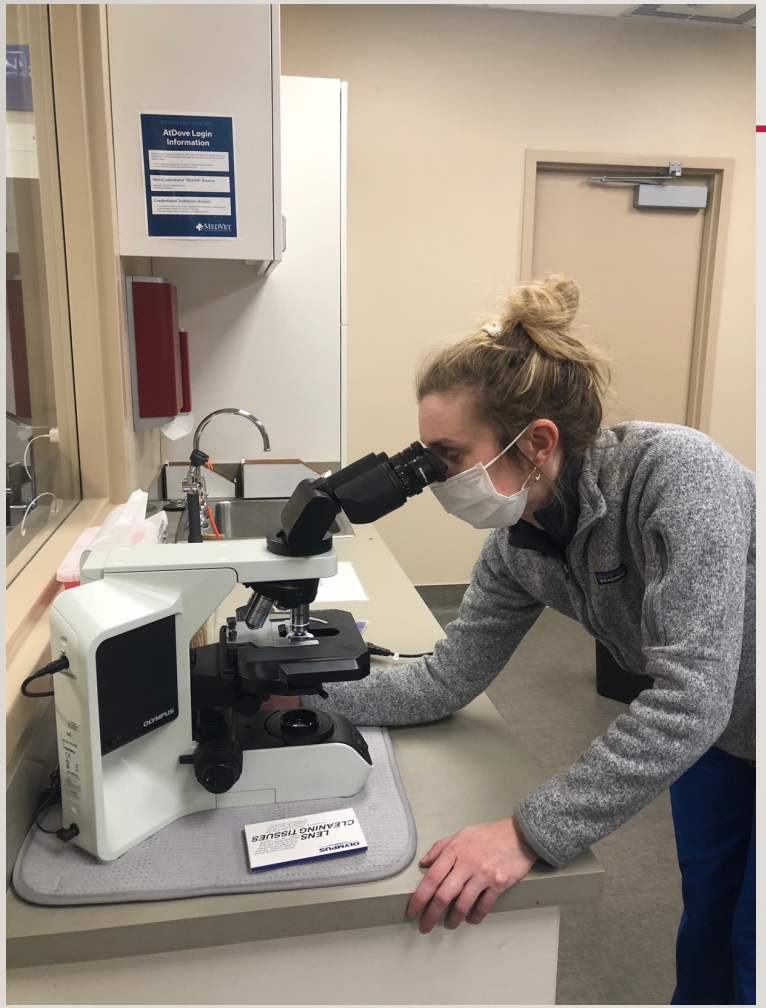
- Normally, I do not place mattress sutures/teat canula unless fail this treatment 2x
- I will drain with a butterfly and place 0.1-0.2 mg/kg Vetalog (triamcinolone) into pinna
- Sometimes only need to proparacaine + lidocaine/bicarb block or can use sedation
- 1 mg/kg prednisone taper, gabapentin 10 mg/kg PO BID-TID, and treat microbe based on cytology with appropriate topical therapy
- Underlying cause: Foreign body, Otitis secondary to allergy vs endocrine, or Pit Bull's have this underlying idiopathic flapping
- Sometimes need to order No Flap Ear Wrap (www.noflapearwrap.com or online retailers)

NO FLAP EAR WRAP

WHEN IS IT TIME TO OFFER REFERRAL?

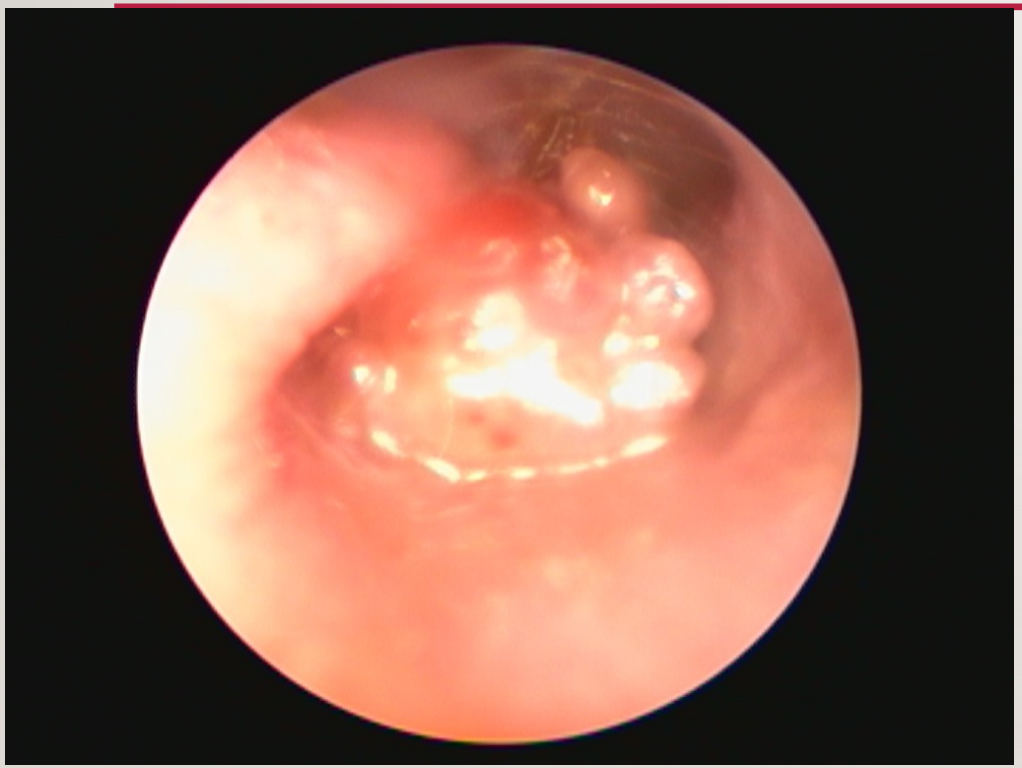
- Normally chronic otitis >1-2 months
- Pulse dosing Claro every month
- Foreign body can't be safely reached with biopsy forceps or a mass seen
- ER Referral: If felines and canines if Horner's signs or Vestibular signs normally Otitis media and they need imaging, VO, and myringotomy
- ER: Facial paralysis needs imaging ASAP normally means lysis of the bullae and the ear may be salvageable, but Otitis interna may already be present and TECA BO surgery is the treatment of choice

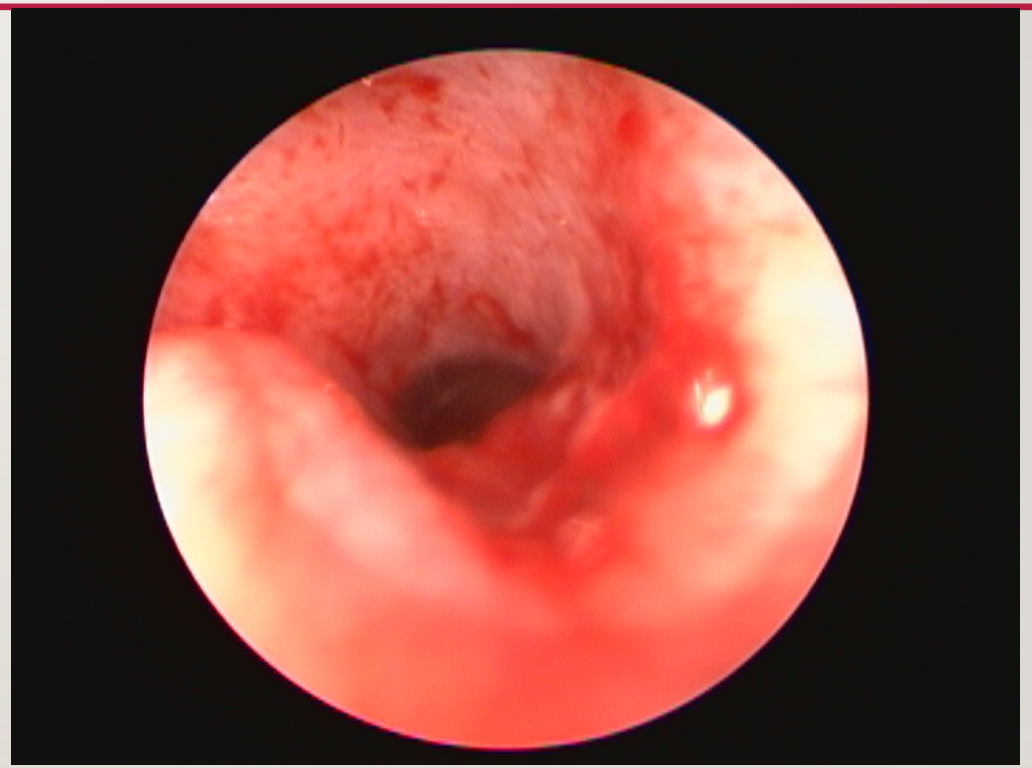
DERMATOLOGY AT WORK



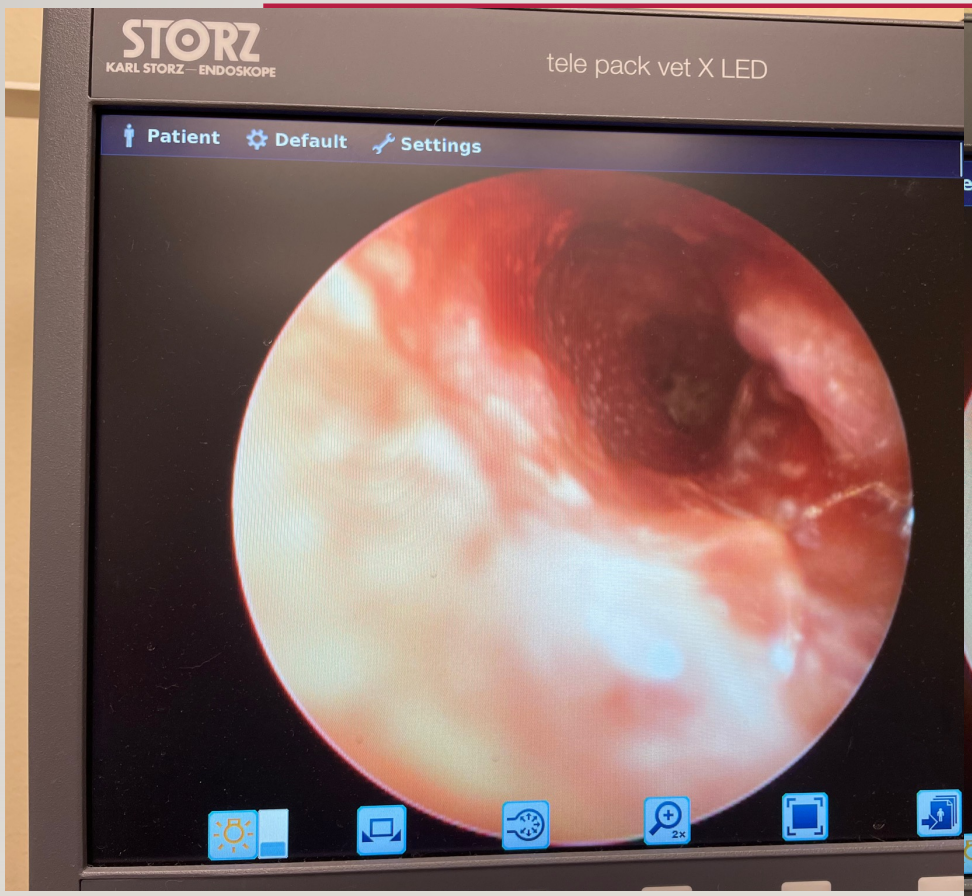
CCVS TEAM

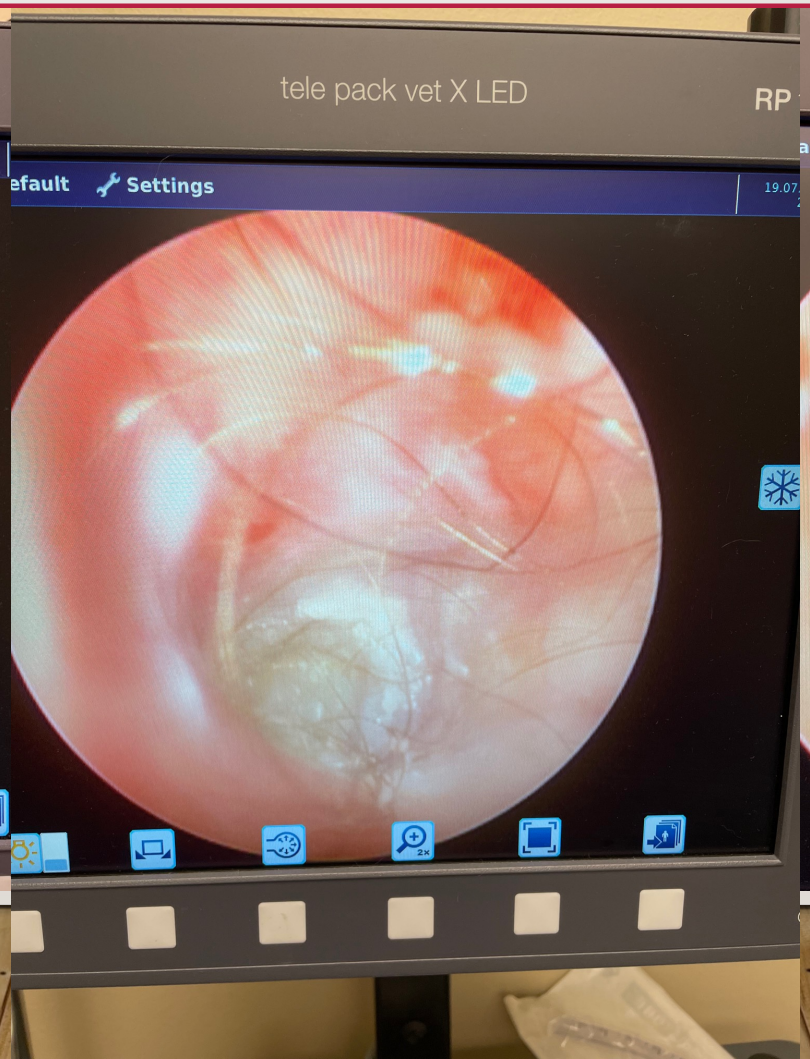
BEFORE AND AFTER VO/MASS REMOVAL

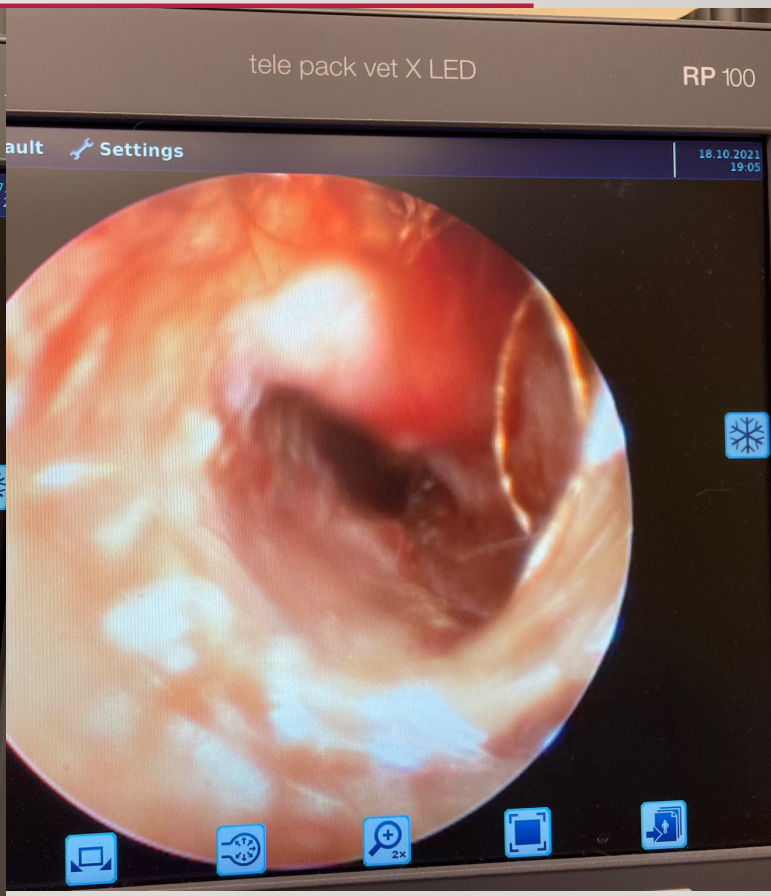




OTITIS MEDIA







WHEN TO DO VIDEO-OTOSCOPY (VO), AND/OR MYRINGOTOMY?

- Suspect FB removal
- Suspect aural polyp/papilloma in a young animal, excisional biopsy and now CO2 laser to cauterize
- Chronic Otitis greater > 1-2 months should get imaging: mass, OM, fungal, Pseudomonas, or Biofilm (Staphylococcus, Yeast, or Pseudomonas)
- Sometimes can not get rid of infection until packed in debris (dark packed ceruminolith debris or purulent debris
- Feline middle ears have a double compartment, so need to remove as much as possible, especially in chronic rhinitis or pharyngitis cases to get ahead of debris/effusion

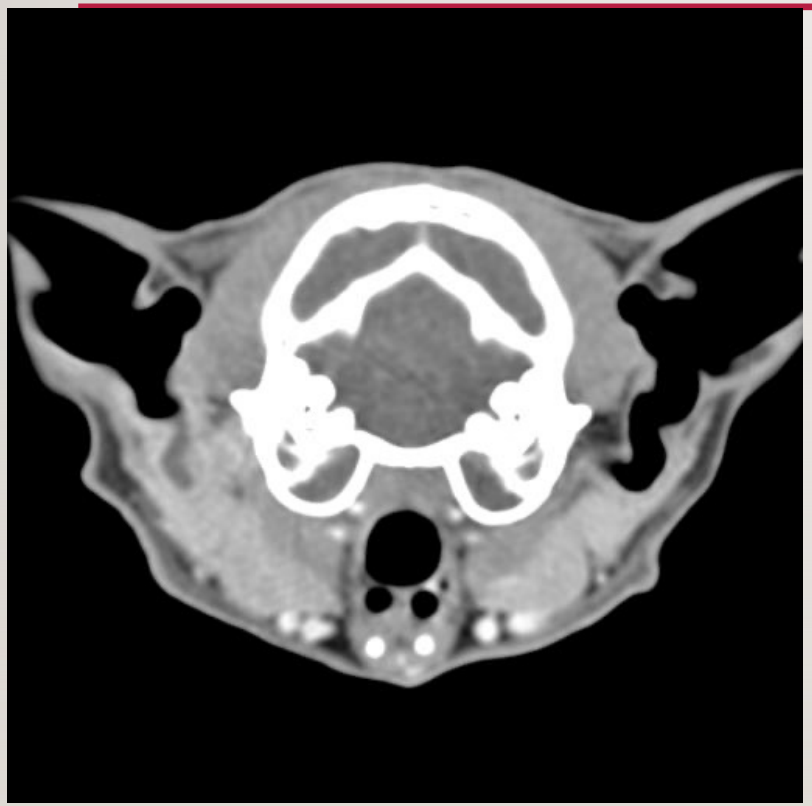
WHEN TO IMAGINE: RADIOGRAPH, CT, MRI

- Chronic Otitis >1 month
- Mass suspected
- Horner's signs, Neurologic Signs, Vestibular Signs, or Facial nerve paralysis
- For any referral Otitis case it should be offered to the client: other than obvious fox tail in external canal or wax ball removal

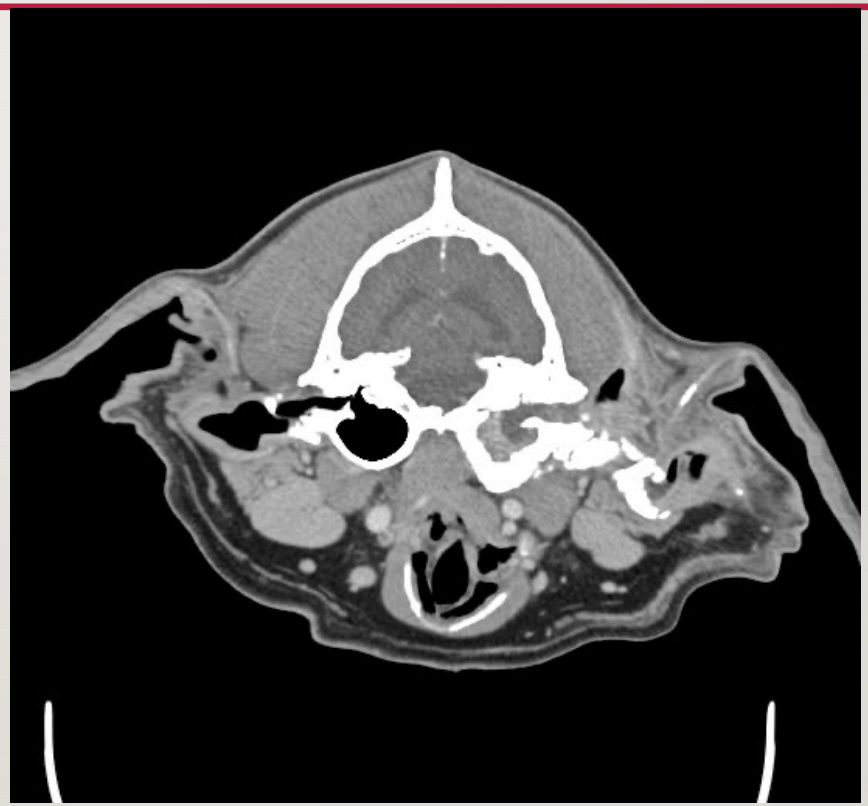
RADIOGRAPHS

- 25% of OM missed on radiographs
- 75% of positive cultures missed on radiographs
- 25-33% End stage OM missed on radiographs

CT IMAGING

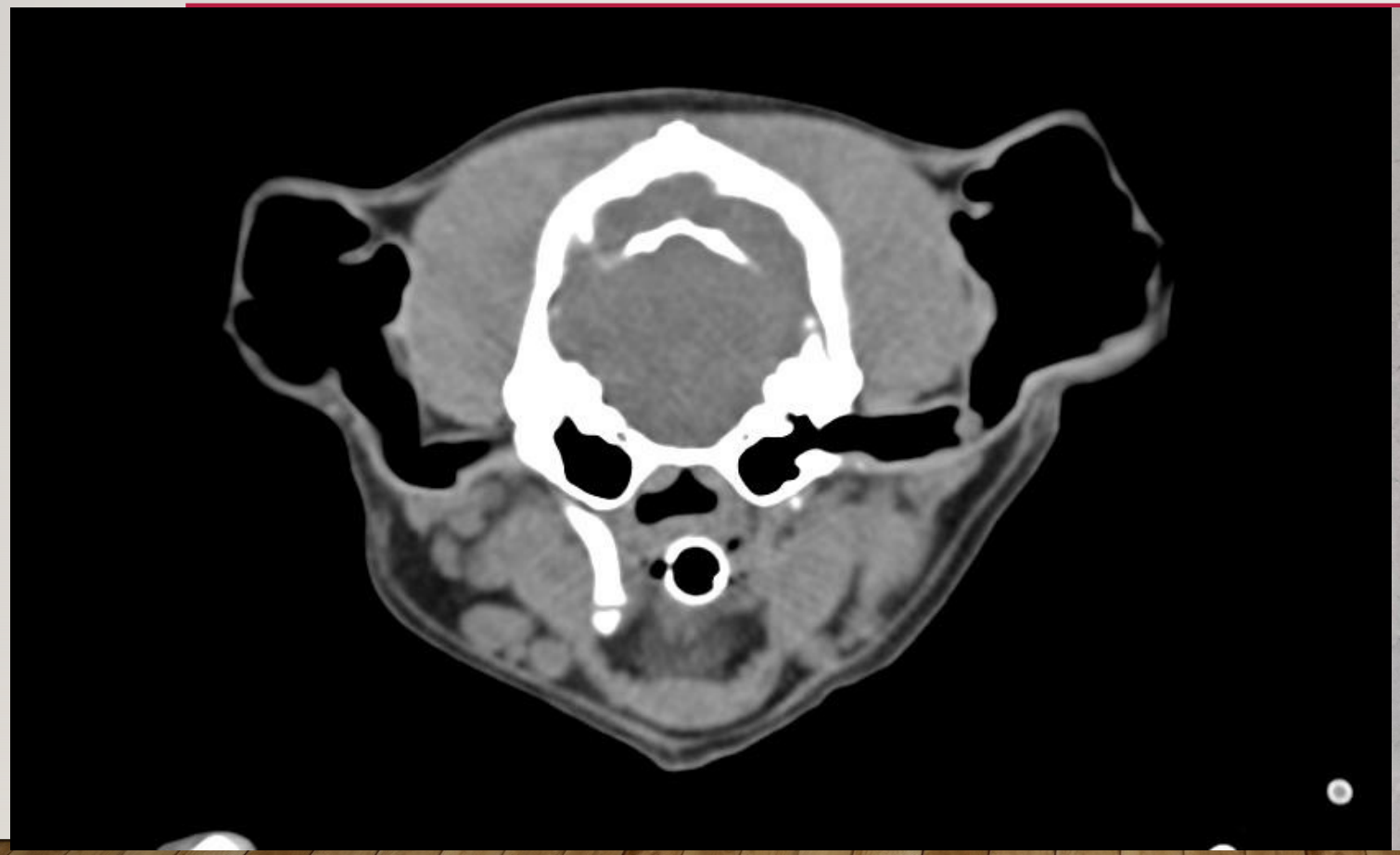


Feline



Canine

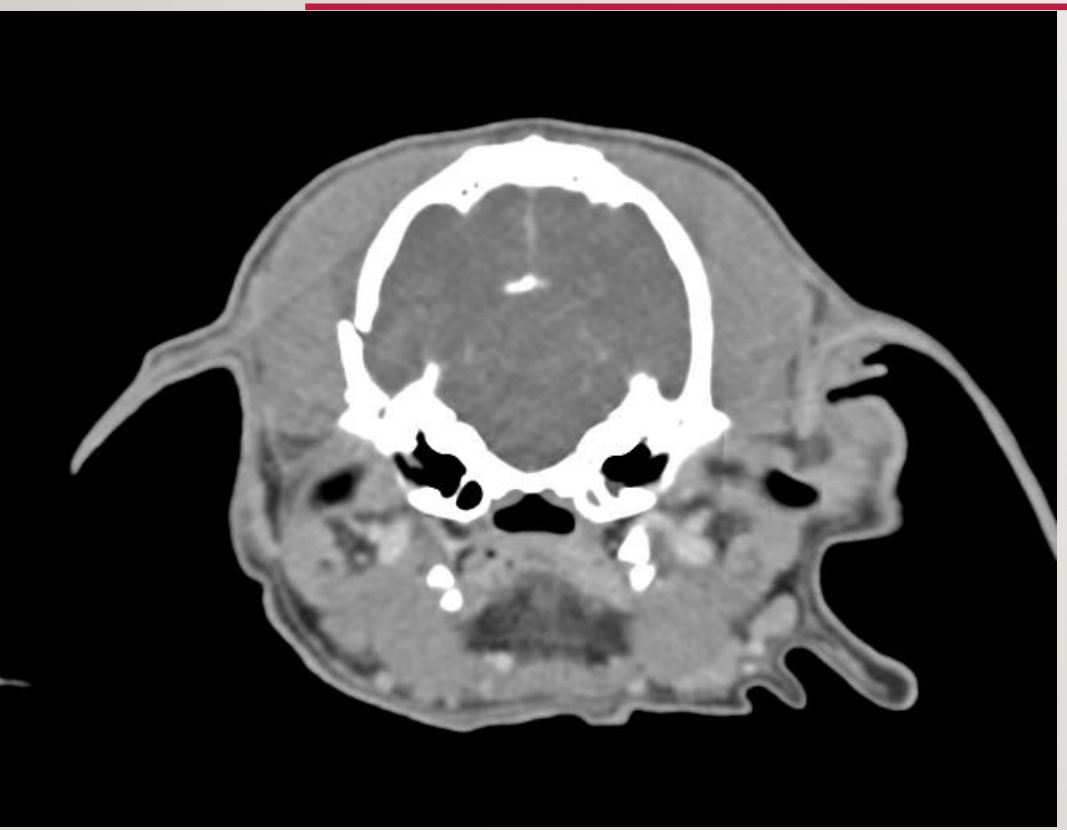
CT IMAGING NOT SO HELPFUL, 5 YO MC MIXED

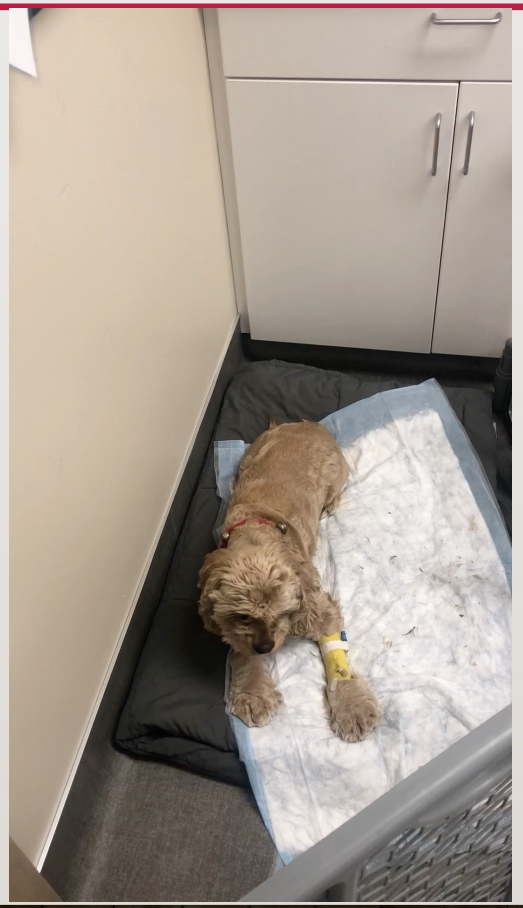


CT IMAGING VERY HELPFUL IN THIS CASE

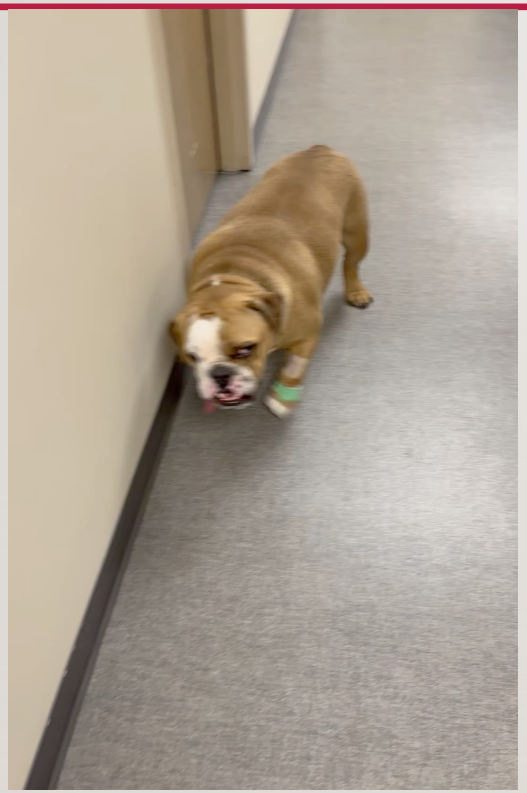
- Holly 6 yo FS Cocker Mix
- Presented for acute seizures, nystagmus, and severe head tilt and left sided neurologic deficiencies

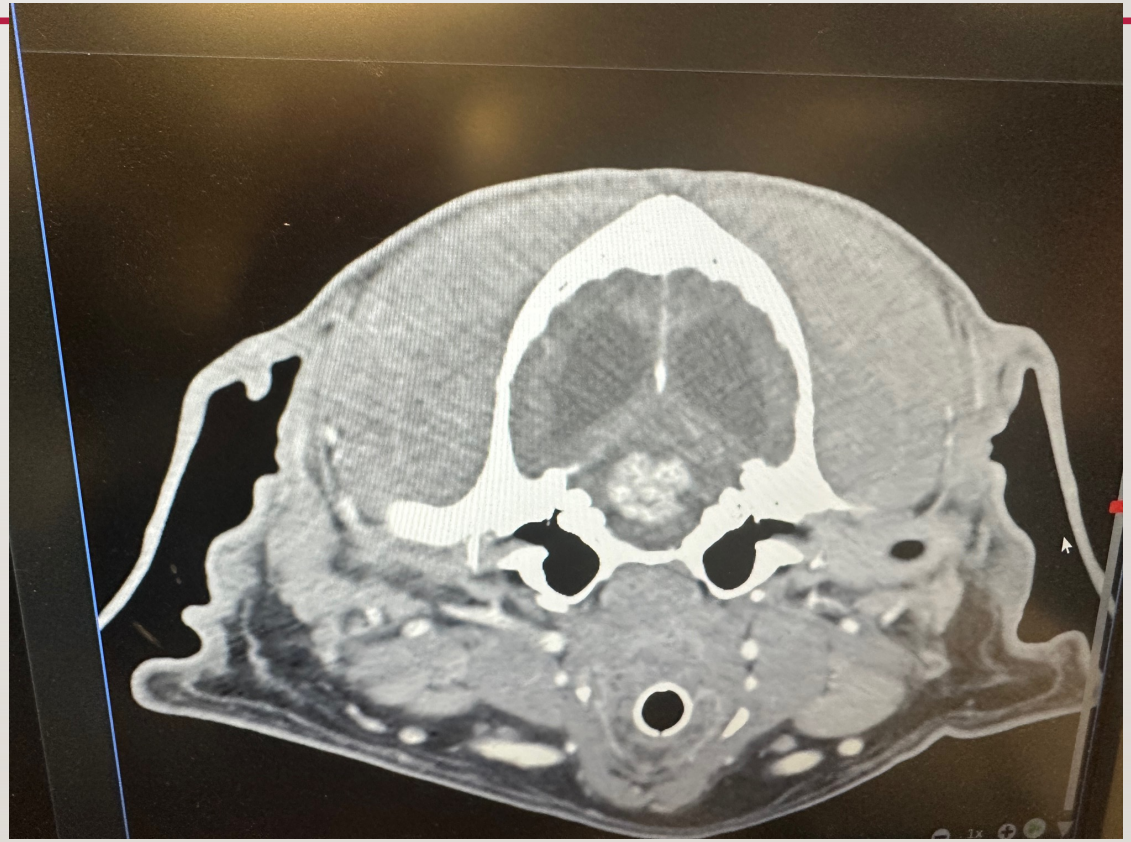
BEFORE AND AFTER LEFT VO AND RIGHT SKULL FRACTURE



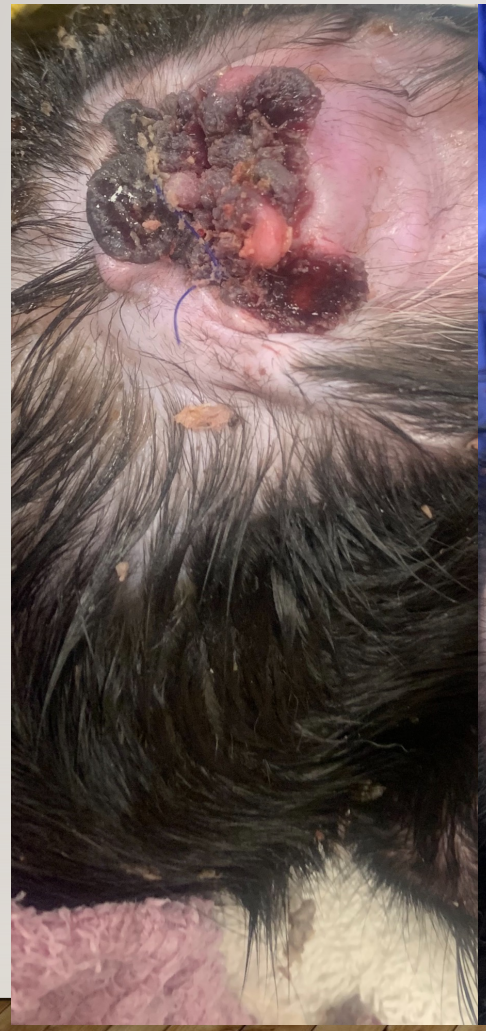
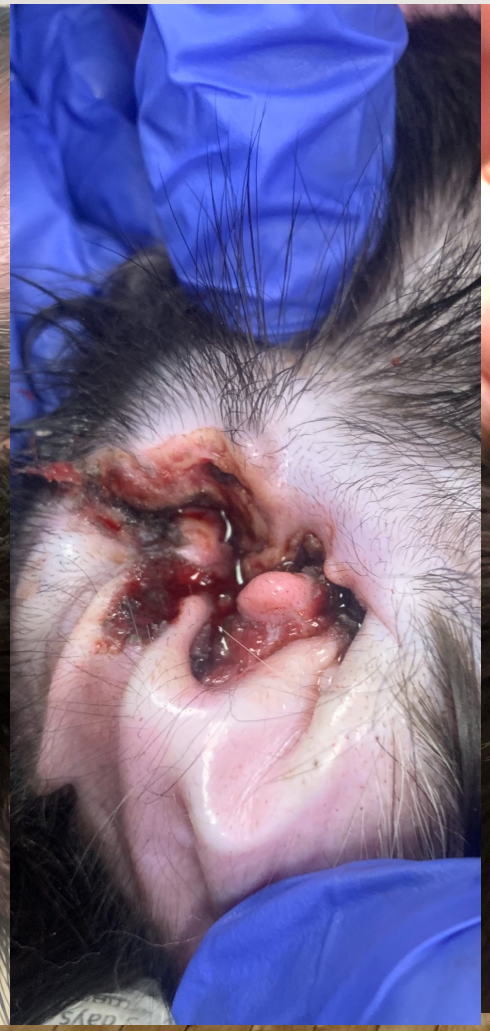
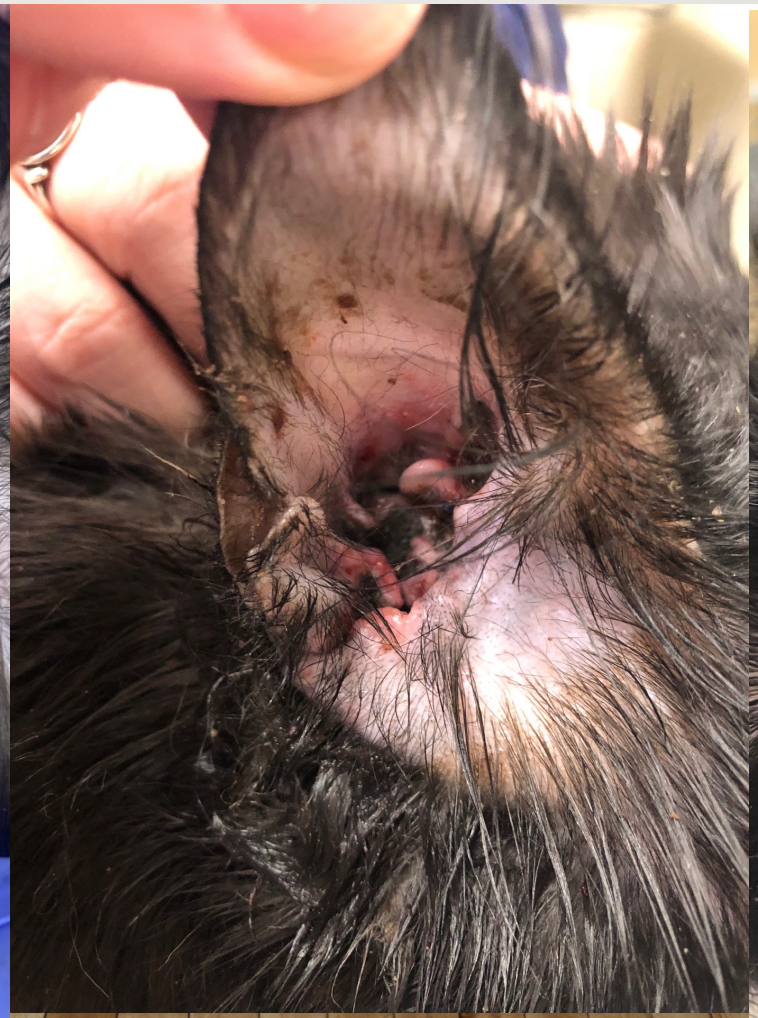


CT BEING HELPFUL

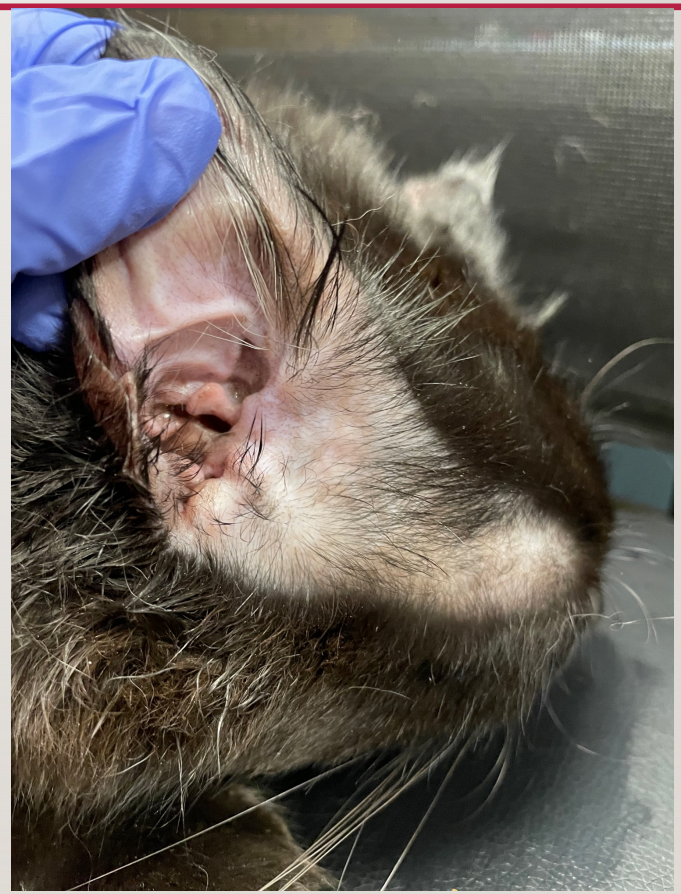




USING AESCULIGHT CO2 LASER IN EARS
(PNOE) PROLIFERATIVE AND NECROTIZING OE

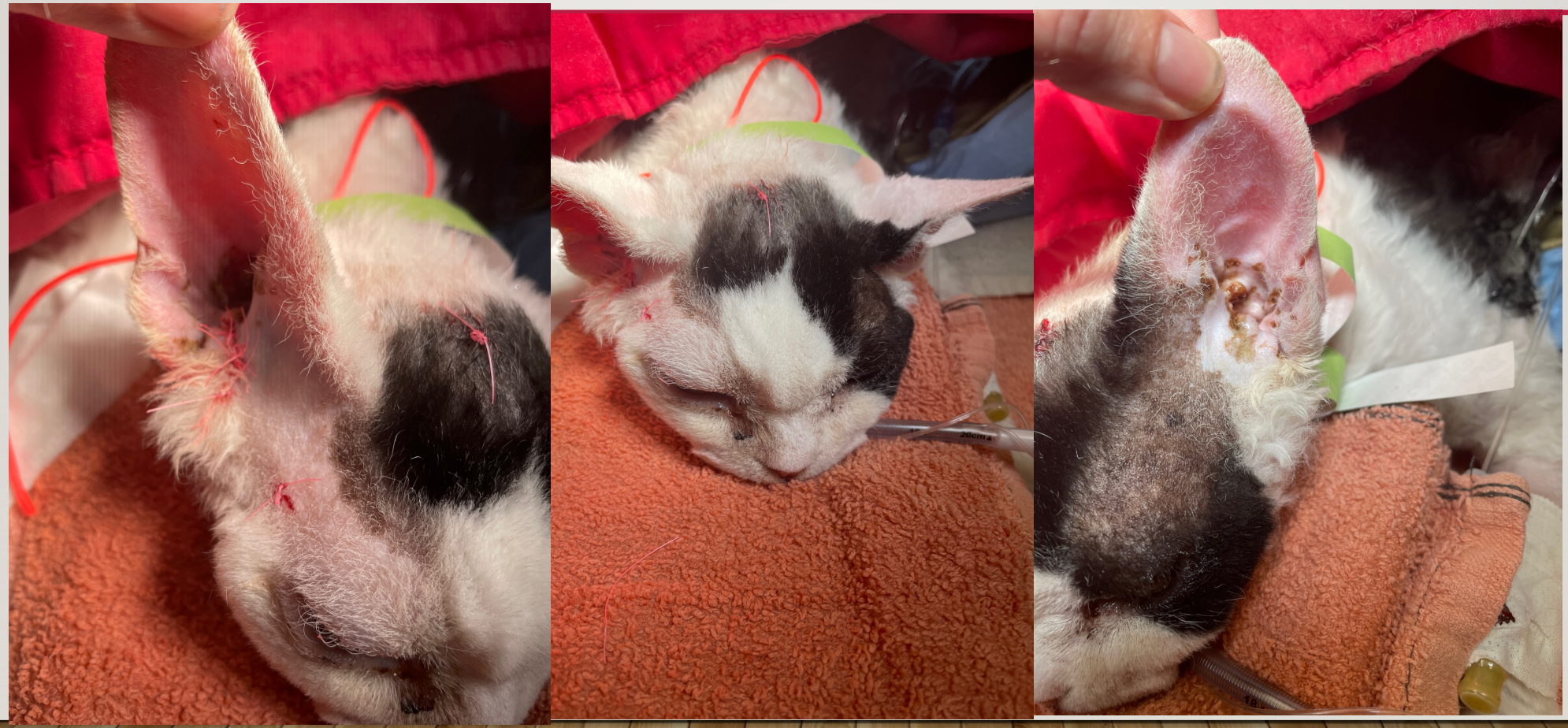





HEALED 4 MONTHS LATER



USING AESCULIGHT CO2 LASER IN EARS CERUMINOUS CYSTOMATOSIS

USING AESCULIGHT CO2 LASER IN EARS



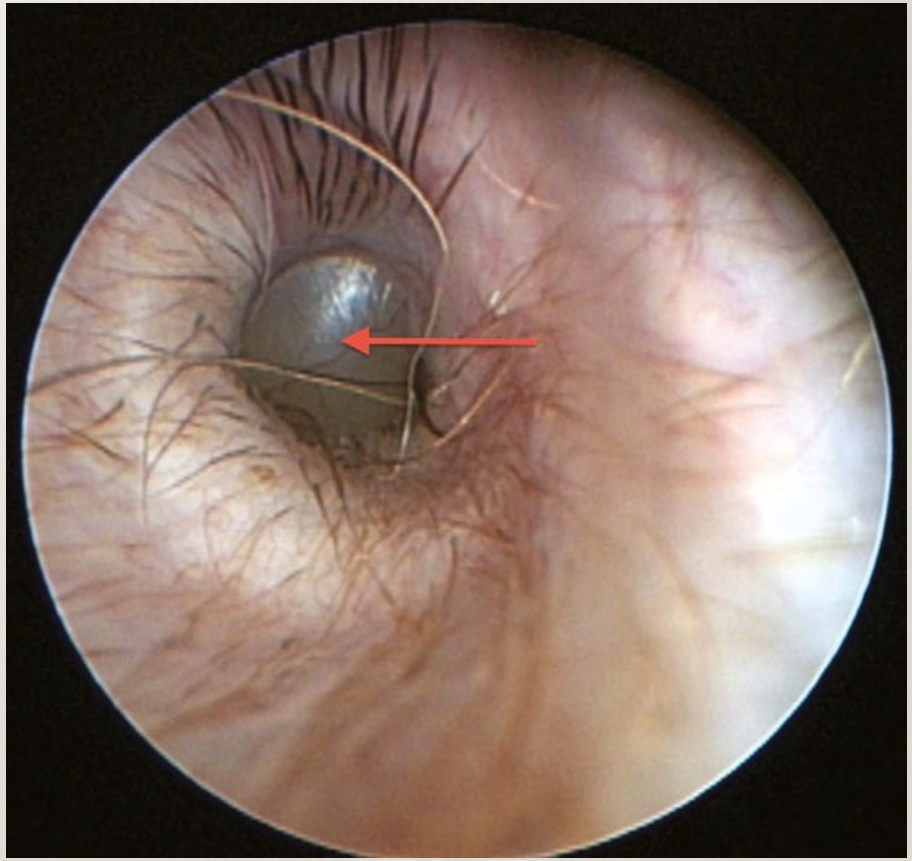
OM MEDIA REGIMEN

- DOG
- Steroids to open up canal 1 mg/kg taper
- Gabapentin for pain 10 mg/kg BID
- Cerenia or Meclizine if needed for dizziness
- Triz Keto Enro/Dex: 5-10 ccs of each (4 mg/ml dex and 100 mg/ml enro) into the bottle (Remember we have a label and charge in therapeutic)
- Oral med: Normal marbo 5 mg/kg SID pending culture
- Rarely fungal organisms: Will use topical miconazole dex until they speciate on culture

- CAT
- Steroids to open up canal 1 mg/kg taper
- Gabapentin for pain 10 mg/kg BID
- Cerenia or Meclizine if needed
- Triz Enro/Dex: 5-10 ccs of each into the bottle (Remember we have a label and charge in therapeutic)
- I have used Posatex and miconazole/dex safely off label for them for OM
- Oral med: Normal Veraflox 5 mg/kg SID pending culture

PRIMARY SECRETORY OTITIS MEDIA (PSOM)

- A sterile effusion, "glue ears" known in cavaliers or brachycephalic ex. Boxers
- Cavalierhealth.com



PSOM

- https://www.youtube.com/watch?v=Vnl_7WcF-W0
- D4A

SOME CHRONIC OTITIS CASES NEED LONG TERM THERAPY

- Ear cleaner followed by Synotic
- Douxo Micellar and Epi Otic Advanced with dexamethasone
  - 2-3x weekly, then sometimes 1x weekly to every other week
- Open TM Dechra TrizUltra+Keto and dexamethasone
- Severe cases miconazole and dexamethasone, pulse 2-3x weekly
- In EU will use this first before even use oral antibiotics to reduce resistance

WHY IS TREATMENT NOT WORKING?

- First ask the clients if they actually can do the topical or oral
- Normally client and patient compliance #1 problems
- If allergy and you not getting to the underlying problems just going to come back
- Is there a biofilm: seen in Pseudomonas #1, Yeast, and Staph. pseudintermedius,
  - Sometimes TrizEDTA, but normally a dilute < 2% acetylcysteine and saline mixture
  - Or Tris NAC

UPDATES FROM NAVDF 2021 CANINE

- Choleastoma (inclusion cyst) now called tympanokeratoma, if not attached to wall some can be managed topically by draining instead of TECA BO
- Piperacillin tazobactam-treated multi drug resistant microbes: Pseudomonas, Proteus, Staphylococcus, Enterococcus, E. coli, Beta Streptococcus, no s/e, but Malassezia in 38.5%
- The big talk is all about biofilm!
- Topical antibiotics may be bactericidal, but not enough to overcome to biofilm and if not achieved resistance continues
  - Topical antibiofilm Tris EDTA sodium or 3% tetrasodium EDTA (not used as much)
  - N'acetylcysteine-used injectable diluted, <0.5% appears to be safe in the middle ear

UPDATES FROM NAVDF 2021 FELINE

- 20% of normal bulla have bacteria growing (pharynx bacteria microbes)
- OM: Horner's more likely, lysis of bones facial nerve c/s more likely
- OI vestibular, nystagmus, hearing issues
- Neurologic signs resolve in 2-8 weeks, 10% ataxia head tilt remain
- 11/16 tx OM medically in recent study
- Sterile inflammatory process, steroid helps
- Aural polyp traction and evulsion <5% reoccurrence at CSU with steroids, 8 weeks taper from 2 mg/kg to 0.5 mg/kg

UPDATES 2022 NAVDF

- Not many updates!
- Now we have a new company in the US NextMuneUS which in 2022 launched some of the ICF products that have been available in Europe to the United States and 2 have been approved by the FDA for use in dog and cat ears. The first product is Tris-NACTM which when opened and mixed is a combination of 1.35% N acetylcysteine and Tris-EDTA and when refrigerated has a shelf life of 2 months. I will let that sit in the ear for at least 5 minutes then a quick 1ml rinse and allow that to be shaken out then a second one ml application with Dechra TrizChlorTM flush or OtodineTM which are both a combination of Tris-EDTA with low concentration 0.15% chlorhexidine gluconate or digluconate and then that is left in the ear. Craig Griffin, DVM, DACVD 178.

UPDATES FROM 2023

- NOTHING UNDER THAN CHANGES TO COMPOUNDING RULES

POLLS FOR RACE CREDIT

- What medication can you combine with Triz-EDTA to facilitate puncture into bacteria
- A) Miconazole
- B) Neomycin
- C) Enrofloxacin
- D) TMS

ANSWER

- What medication can you combine with Triz-EDTA to facilitate puncture into bacteria
- A) Miconazole
- B) Neomycin
- C) Enrofloxacin*
- D) TMS

WHAT MEDICATION IS NOT SAFE IN THE MIDDLE EAR ?

- A) Enrofloxacin
- B) Miconazole
- C) Triz-EDTA
- D) Amikacin

THANK YOU!

- Thank you to anyone willing to listen to me for an hour
- Thanks to all the local GPs, techs, groomers and receptionists that are being so helpful as we get up and running.
- Thank you to new job at CCVS
- Thank you to my techs Jenna and Amanda, our manager Chloe and Michelle the liaison.

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THANK YOU TO MY MOM

QUESTIONS OR CONCERNS FOR OTITIS?

- Ask anything!
- Email dermatology@capecodvetspecialists.com

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REFERENCES

- 1. Dermatology Edition 7th.
- 2. https://todaysveterinarypractice.com/dermatology/diagnostic-approach-to-otitis-in-dogs/

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WACVD SUMMER 2024!

NOTICE

- CE credit certificates & presentation slides will be emailed to you. If you do not receive an email with this information within a week, contact Nichole - nicholemanfredi@capecodvetspecialists.com

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