

Lecture III - Otology

The ears have two functions; they receive auditory stimuli and maintain equilibrium and balance. The ear is divided into two parts: the external and internal aspects of the ear.

- The external ear anatomy consists of the ear flap (**pinna**) and the canal that leads from the ear drum outward (**external acoustic meatus**). These structures function as a funnel – like receptacle that collects sound vibrations and focuses them toward the inner ear.
- The inner ear structures, housed within the bony skull, are composed of the **middle and inner ear which functions to** transmit and convert the sound vibrations into nerve impulses; also acting as a receptors for equilibrium.

In a general practice, the majority of otic disease is presented as an inflammatory external ear problem (**Otitis**). In severe cases, the patient may present with balance and deafness issues. Otitis externa may be associated with bacterial, fungal, yeast or parasitic infections (ear mites). Otitis can be made worse with other systemic problems; such as allergies, hormonal disease (i.e. Hypothyroidism), and localized masses and tumors (i.e. polyps). Narrowing of the external ear canal, hair growing in the ear canal,, and a pendulous floppy ear pinna may be associated with inadequate air circulation in the ear and may predispose the patient to an infection.

Obtaining a history in patients with otic disease: Key points when obtaining a history from a patient with ear disease are:

- **Does the pet have a history of chronic ear infections?** – As previously discussed with skin allergies (See chapter XIX), it is important how often ear infections occur and what was used to treat the ear in the past.
- **Does the pet itch, scratch and chew elsewhere, or does the patient have a history of skin allergies?** – Animals with chronic skin allergies can also have flare ups of ear infections. These patients may also need systemic medication for allergies to help reduce whole body inflammation and pruritis.
- **Is the patient (canine) being treated for hypothyroidism?** – Low thyroid animals can be more predisposed to ear infections.
- **Is the animal a swimmer?** – Pets that swim heavily can predispose themselves to chronic ear infections.
- Does the animal have a long pendulous pinna that covers the opening of the external ear canal?

- **Does the pet have exposure to strays and other animals?** – Pets with exposure to other animals and strays have increased risk of contracting ear mites.

Physical changes to the Eye on Initial Assessment

When evaluating an animal on an initial assessment, some very simple observation of the ears can tell you a great deal about ear infections and the overall health of the animal. These factors are:

- 1) Is there debris, odor or purulent discharge evident in the ear canal? Does the ear canal seem swollen and inflamed (See Figure 3.1)? Does the ear canal appear to be narrowed?



Figure 3.1: Image of an infected ear canal. Note the severe swelling of the canal itself.

2) Is there unusual pigment or bruising to the ear flap?

- a) Yellowing of the ear flap (Jaundice) can be seen with liver disease or autoimmune hemolytic anemia. (See Figure 3.2).
- b) Bruising on the ear flap and on other parts of the body can suggest a problem with the pet's ability to clot blood.



Figure 3.2: Image of a yellow ear flap. This pigmentation can suggest liver / an autoimmune disease.

3) Does the pet have a head tilt?

- a) Animals with severe inner ear infections will sometime present with significant head tilts to the left or right side.
- b) The direction of the tilt can suggest which ear is affected.

4) Does the pet have a balance problem, rapid side to side eye movement or act as if he or she cannot balance themselves?

- a) Inner ear disease can present with severe loss of balance, rapid eye movements (**Nystagmus**), and incoordination so severe that the pet may almost seem as if they are seizing.
- b) However, it is important to note, that loss of balance can also be related to central nervous system disease as well.

Diagnostics of ear disease: As with the eye, there are specific ear diagnostics to help identify the cause of the problem. However, it is important to note that since the ear is also part of the integumentary system, other diseases can set up a secondary Otitis. Further, some patients are very painful and may need sedation or a short acting anesthetic to perform a thorough ear examination. Some potential diagnostic test may be:

- **Ear cytology:** A clinical diagnostic test for acute / chronic ear disease is an ear cytology using tri-color / Diff quick stain. Cytology can show bacterial and fungal pathogens, as well as the presence of white blood cells.
- **Ear Mite Cytology:** Similar to ear cytology, the debris from the ear is placed on a slide containing mineral oil. If ear mites are present, the mite and its eggs may be observed.
- **Culture and Sensitivity:** When chronic bacterial infection is suspected, the bacteria can be cultured and an effective antibiotic can be indicated.
- **Diagnostic Blood work:** When concerns of systemic disease causing changes to the skin and ear canal are suspect, diagnostic blood work might be suggested:
 - Complete Blood Count
 - Chemistry Panel
 - Thyroid Level
 - Viral Serology: Felv / FIV
 - Infectious Screens: Fungal

Discussing Clinical Diagnostics for the Ears:

- **Ear Cytology:** By taking an ear swab and examining it under the microscope, the veterinarian can observe if the infection is caused from yeast, bacterial or mixed infection. This will aid in the choice of medication for treatment.
- **Ear Mite Cytology:** By examining the debris in mineral oil under magnification, the veterinarian can observe if adult ear mites or ear mite eggs are evident.
- **Culture and Sensitivity:** With chronic severe ear infections, the debris can be cultured to find out exactly what type of bacterial component is evident, and determine what types of antibiotics the bacteria are sensitive to.
- **Diagnostic Blood Work:** Since ear infections can occur secondary to other systemic diseases, general blood work, thyroid levels and infectious diseases titers may be suggested.

Diseases of the Ear

Ear Infections (Otitis)

- **General:** Typically, Ear infections are inflammation and / or infection of the external ear canal by bacterial or fungal infections. These infections (**Otitis externa**) are generally the most common and benign. More rarely, infections of the inner ear canal (**Otitis media or Otitis interna**) can be much more serious as the infection can begin to affect balance.
- **Signalment:** Ear infections can affect both cats and dogs of any age. However, dogs with long earflaps are more predisposed. Some species with this type of ear anatomy are Cocker Spaniels, Springer Spaniels, Golden Retrievers, Terriers and Poodles. There is no age or sexual predilection.
- **Etiology:** The disease is caused by a chronic build up of waxy debris and bacteria that cause a progressive inflammation within the ear canal. As the infection becomes more chronic, the ear canal's cartilage can become chronically infected, swelling shut, and calcifying into bone. As the ear canal begins to close shut, infection continues at a more rapid rate infecting the inner ear. Otitis can occur secondary to masses and polyps within the inner ear or from a blood born infection (rarely).
- **Common Points in Medical History:** Patients will present with a history of shaking the head, rubbing at their ears, malodor coming from the ears, ear sensitivity, and observable debris within the ear canal.
- **Common Observations on Initial Examination:** Physical symptoms are dependent on the type of ear infection, its chronicity, and severity of infection. Common signs may be:
 - Physical signs with **Otitis Externa**:
 - Ears appear red and inflamed
 - Scratching of the ears
 - Tilting of the head
 - Pain and sensitivity around the ear
 - Odor and debris in the ear canal
 - Physical signs of inner or middle ear infection (Otitis Media / Interna):
 - Shaking of the head
 - Smell noted from the ears

- Ears appear red and inflamed
 - Tilting of the head
 - Pain and sensitivity around the ear
 - Problems walking / Incoordination
 - Vomiting / Nausea
 - Inability to eat properly
 - Rapid movement of the eyes back and forth (**Nystagmus**)
 - Elevation of the third eyelid
- **Complications:** If not diagnosed and treated, an outer ear infection (Otitis Externa) can become a chronic severe infection which enter the middle and inner ear drum; causing problems with the animal's ability to balance and hear.
 - **Diagnosis:** As discussed above, clinical diagnostic for the ear can involve cytology, culture and sensitivity, and possibly systemic blood work. The clinical tests are dependent on how the patient presents, the appearance of the ear canals based on preliminary examination, and past history of ear infections, diagnostic tests will be selected.
 - **Treatment:** Treatment is focused on destroying the infection present in the ear and returning the ear to proper health. **It may be necessary to continue treating the ear infection until all signs of infection have been gone for 2-3 weeks. Stopping treatment to early can set up bacterial resistance to antibiotics and produce a severe chronic ear infection.** Some possible treatment options are:
 - **Medications:** With mild ear infections, ear cleaning liquid and topical medication may be suggested. Systemic antibiotics are also possible given the evidence of severe infection.
 - **Surgical Ear Flush / Otoscopy:** With chronic infection or evidence of deeper infection, an ear flushing and inner ear exam under anesthesia can be extremely beneficial. This will allow the veterinarian to examine the deeper ear canal for foreign material, polyps or masses or possible punctures to the inner ear drum, while also allowing them to clean the ears with large quantities of antiseptic solutions.
 - **Surgical Repair to the ear canal and opening of the inner ear drum:** This procedure is generally only done in severe infection of ear cartilage with closing of the ear canal and infection of the inner ear and bony labyrinth. This surgical resection of the ear canal and opening of the inner ear to allow drainage and removal of infected material may be the only way to resolve a severe chronic infection.

- **Prevention:** Routine cleaning of the pet's ear and monitoring for changes in odor and debris can help prevent or detect early infection before a more serious long-term problem can occur.

Discussing Bacterial or Fungal Otitis:

- Ear infections are inflammation of the outer ear canal, middle ear or the inner ear drum and bone caused primarily by bacterial or fungal infections.
- In most cases, infections are mild of the outer ear canal producing discharge and odor from the ear, sensitivity and redness.
- In severe cases, ear infections can infect the cartilage and bone of the ear producing chronic inflamed ears that may not easily respond to medication. Further the pet may also have deafness and balance problems.
- Diagnosis of ear infections is based on cytology of the ear debris, culture and sensitivity, and possibly general blood work if a systemic cause of the disease is suspected.
- Treatment is based on topical and systemic medications. In very sensitive or chronically infected ears, surgical options to flush and clean the ear may need to be explored.
- If not treated, severe chronic ear infections can occur, producing early deafness, balance problems and severe infections that may require surgery.

Ear Mite Infection (Otitis)

- **General:** Ear mite infections are inflammation of the outer ear canal caused by the ear mite, *Otodectes cynotis*.
- **Etiology:** It is a common infection in young puppies and kittens or outside cats. There is no age, breed or sexual predilection. **The disease is spread by direct contact from animal to animal is very contagious.**
- **Cause of Disease:** The disease is caused by the ear mite *Otodectes cynotis*.
- **Common Points in Medical History:** Patients will present with a history of shaking the head, rubbing at their ears, malodor coming from the ears, ear sensitivity, scratching at the ears, self-traumatizing the head and ear regions, and observable debris within the ear canal.
- **Common Observations on Initial Examination:** Physical symptoms or an ear mite infection can are:
 - Shaking of the head
 - Smell noted from the ears
 - Ears appear red and inflamed
 - Black to red flaky debris evident in ears
 - Tilting of the head
 - Scabbing and hair loss on head and ear region
 - Pain and sensitivity around the ear
- **Complications:** If not diagnosed and treated, ear mite infection can produce a chronic irritated outer ear infection that is infectious to other animals in the household.
- **Diagnosis:** **Ear mite cytology** is usually suggested to observe the ear mite and its eggs.
- **Treatment:** Treatment is focused on topical or systemic medication that kills the ear mites and cleaning the ear. Repeat treatment to prevent reinfection may be necessary, as well as treating all pets within the household.

Discussing Ear Mite Otitis with the client:

- Ear mite infections are caused by a microscopic mite, *Otodectes cynotis*.
- In most cases, infections are mild of the outer ear canal producing discharge and odor from the ear, sensitivity and redness.
- Ear mites are contagious to other animals.
- Diagnosis of ear infections is based on observing mites and/ or their eggs on a ear mite cytology.
- Treatment is based on topical and systemic medications.
- If not treated, severe chronic ear infections that can be infective to other animals.