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The ear consists of three parts, the outer ear, the middle ear, and the inner ear. The outer ear and the middle ear conduct sound to the cochlea, acting as a mechanical transmission system, converting sound (air pressure waves) into fluid waves in the inner ear. The external ear, the pinna, in dogs can easily be moved towards the origin of a sound and gathers the sound energy and focuses it on the eardrum. The external ear varies in size and shape among dog and cat breeds; the auricular cartilage determines the appearance of the external ear. A number or ridges can be identified on the concave aspect of the pinna which form important landmarks for ear surgery; the tragus, anthelix, pretragic and intertragic incisure. The vertical ear canal and the distal part of the horizontal canal are contained within the rolled plate of this auricular cartilage. The annular cartilage is interposed between the proximal end of the auricular cartilage and the distal end of the external acoustic meatus and forms most part of the horizontal ear canal. The tympanic membrane separates the external ear from the middle ear cavity. The ear canal is covered by skin that secretes cerumen and has hairs on its surface. Deep to the parotic salivary gland which overlies the lateral and proximal portions of the vertical ear canal are the facial nerve, the internal maxillary vein and branches of the external carotid artery. The facial nerve exits the stylomastoid foramen caudal to the ear and courses ventral to the horizontal canal close to the middle ear.

Clinical signs of outer ear diseases and clinical examination of the outer ear.

Clinical signs associated with outer ear diseases are those of otitis externa, the most common outer ear disease in dogs and cats. They consist of head shaking, scratching, otic pain (otalgia) and otic discharge (otorrhea). In some cases, aural hematomas (othaematoma) can be seen. Causes of otitis externa are numerous, therefore a thorough and complete clinical examination is mandatory for correct diagnosis and therapy. It should include a general physical, dermatologic, neurologic (cranial nerves) and otoscopic examination. For complete visualization of the tympanic membrane and prior to therapy, ear flushing is necessary. However, before flushing, material should be obtained from the horizontal part of the ear canal for cytologic examination, culture and susceptibility testing. After flushing, masses can easily be identified and samples can be taken for histopathology. Additional examination, like diagnostic imaging (radiography, CT-scan, MRI), is usually not necessary for outer ear diseases except in case of neoplasia.

Otitis externa

Otitis externa is common in dogs and cats and has numerous causes, usually classified as primary, predisposing or perpetuating factors. Primary factors directly cause otitis externa and include parasites (ear mite; otodectes cynotis), foreign bodies, inflammatory polyps, tumors, hypersensitivities (atopy, food hypersensitivity), endocrine abnormalities (hypothyroidism) and keratinization disorders. Predisposing causes of otitis externa make the ear canal more...
susceptible to inflammation and secondary infection. These factors include anatomical conformation (pendulous ears, narrow ear canals and excessive hair growth) and changes in the external environment of the ear canal (excessive moisture, excessive ear cleaning or trauma from cotton swabs). Perpetuating factors exacerbate and maintain the disease even after the primary factors are eliminated and include secondary bacterial and/or yeast infection, otitis media and inappropriate treatment.

In most cases of chronic otitis externa, primary factors, predisposing and/or perpetuating factors can and should be identified and treated. In chronic cases, elimination of underlying factors however, usually doesn’t end the inflammatory process. Management should then be aimed at thoroughly cleaning and drying the ear canal and administering appropriate topical therapy for a longer period of time, sometimes even a life-long treatment is necessary. Ointments with broad-spectrum antibiotics and corticosteroids should be used with careful attention to complete filling of the entire ear canal and tapering off the frequency of treatment based on clinical effect and control otoscopy. Total ear canal ablation is reserved for unresponsive or proliferative chronic otitis externa.

Ear mite

Otodectes cynotis is the most common parasite affecting the ear canal of especially young dogs, cats and ferrets. This highly infectious disease is transmitted by direct contact. Pruritis can be significant, accumulation of dark brown to black cerumen is usually noted. The saliva of these mites contains potent allergens responsible for hypersensitivity reactions, especially seen in cats. The diagnosis is made by observation of the mites on otoscopy or on microscopic identification (mineral oil cytology). Various commercially prepared topical medications are available for the treatment of otocariasis of which selamectin has recently been proven save and effective. Considering the lifecycle of the parasite, treatment should be repeated after 3 weeks. Secondary bacterial infection should be treated concurrently.

Foreign body

The most common foreign body associated with otitis externa is the grass awn, foxtails, dirt, sand or toys however can be found on occasion. Acute inflammation, scratching at the ear and head shaking are usually noted. In chronic cases, suppurative inflammation is seen and even otitis media as a result of migration can occur. The diagnosis can be made on otoscopy after flushing the ear canal, with special forceps the foreign body usually can be removed. Severe edema of the epithelial lining of the ear canal can prevent visualization of foreign bodies. Treatment with ointments with antibiotics and corticosteroids can be necessary to reduce the edema before a foreign body can be detected and removed or after removal to treat secondary infection and inflammation.

Inflammatory polyp

Nasopharyngeal polyps, also called otopharyngeal or inflammatory polyps, are benign pedunculated growths of uncertain origin but thought to arise as a result of chronic inflammation. Polyps have been associated with rhinitis and otitis resulting from various bacterial and viral agents, a congenital origin has been suggested as well. They may originate from the mucosal lining of the middle ear, auditory tube and nasopharynx, all of which are similar histologically. Otopharyngeal polyps occur in cats of any age, although most animals are less than 2 years of age. Polyps in the external or middle ear mimic signs of otitis externa, otitis media or otitis interna.

Otoscopic after flushing may reveal a visible pink or gray smooth, spheric mass occluding the canal. Cytologic or histologic examination of biopsies will reveal the nature of the tissue when diagnosis is not straightforward. Some surgeons perform a ventral bulla osteotomy but recurrence is uncommon with simple traction-avulsion after an incision in the vertical ear canal.

Tumor

Ear tumors occur in older cats (mean age of 7 and 11 years for benign and malignant tumors, respectively) and dogs (9 and 10 years of age). The most frequently observed clinical signs are those of a mass, otic discharge, odor, pruritis, and local pain. Neurologic signs are observed in
approximately 10% of dogs with malignant tumors and 25% of cats with either benign polyps or malignant tumors. Approximately 25% of malignant forms will have evidence of bulla involvement, and skull radiographs and/or computed tomography are recommended as part of the diagnostic work-up. Benign tumors are papillomas, basal cell tumors and ceruminous gland adenomas, especially found in dogs, and ceruminous gland cysts usually found in cats. Malignant tumors include ceruminous gland adenocarcinoma (dog and cat), squamous cell carcinoma (dog and cat) and carcinoma of unknown origin (dog).

Even malignant tumors can usually be treated successfully by surgical resection alone (total ear canal ablation).

Othaematoma (aural hematoma)

Aural hematoma results from bleeding within the cartilage layers of the pinna and is characterized by a fluctuating mass between the concave and convex sides of the pinnae. The exact cause is unknown, but in most cases otitis externa is found as well. Surgical treatment is necessary in most cases because without treatment the pinna will shrivel and subsequent ossification of the cartilage will cause continuous irritation. Surgery should be postponed until coagulation has taken place, usually after 3-5 days. The purpose of surgery is to remove the blood clot and to press the layers of the pinna together. With an S-shaped incision the pinna is opened on the concave side and blood clots and fibrin are removed. Interrupted mattress sutures are placed through all layers of the pinna with atraumatic absorbable suture material on a straight needle. Systematic interruption of the blood vessels should be prevented by placing the sutures parallel to the incision line or in a criss-cross manner.

Pinnectomy

Indications for pinnectomy are malignant tumors (squamous cell carcinoma in cats), severe trauma and pinnal abscess in dogs. A skin incision is made around the pinna, near to its attachment to the skull. In cats branches of the cranial and caudal auricular vein and caudal auricular artery can be coagulated with electrocautery, in dogs these vessels should be ligated. Pinnectomy is performed with scissors in both species. In cats, the dorsal skin can be advanced over the cartilage edge and sutured to the medial skin with interrupted sutures using absorbable material. In dogs closure of a subcutaneous layer, if necessary over a penrose drain, helps in diminishing tension on the skin sutures. The skin is closed with interrupted sutures using absorbable or nonabsorbable material.

Total ear canal ablation

Indications for TECA are chronic unresponsive or proliferative otitis externa or neoplasia of the ear canal. A V-shaped incision is made in the skin from the intertragic incisure to the ventral limit of the vertical ear canal and from thetragohelicine incisure to the same ventral point. The skin flap is retracted dorsally and the lateral aspect of the vertical ear canal is exposed. The cartilage and the skin of the medial wall of the ear canal are separated from the cartilage and the skin on the inner side of the base of the pinna by use of strong scissors. The vertical ear canal is now dissected to the level of the horizontal ear canal. Appropriate care should be taken to avoid the facial nerve in this area. The dissection is continued with freeing the horizontal part of the ear canal from the surrounding tissues to the level of the external acoustic meatus. The cartilaginous part is separated from the osseous part with scissors and removal of all of the skin lining the osseous external ear canal is accomplished with a small curette. The pinna is then remodeled and sutured with absorbable suture material. A penrose drain is placed and subcutaneous tissue and skin under the pinna are closed in a routine matter. Complications are facial nerve paralysis, wound infection and dehiscence and chronic fistulation.