Chronic Ear Disease – The Dog

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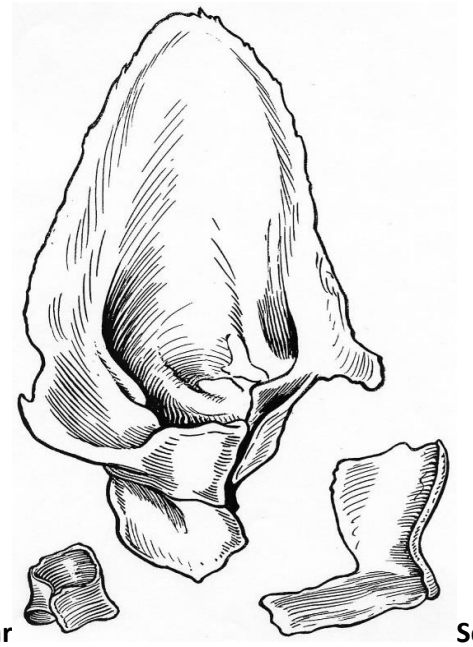
Summary

Anatomy

Most surgically related ear conditions initially involve the outer ear although they commonly progress to involve the middle ear and infrequently, the inner ear. The external meatus is formed around the auricular, scutiform and annular cartilages moving proximal to distal. The auricular cartilage itself is subdivided into several components (scapha, helix, anthelix, tragus, antitragus) and forms the pinna dorsally and the upper part of the cone-shaped vertical meatus below. Below the auricular cartilage the remained of the vertical meatus and proximal horizontal component is formed around the scutiform cartilage whilst the most distal section is created by the annular cartilage which is attached to the external auditory prominence.

The vascular supply to the outer ear is provided by the great auricular arteries (ex internal carotid artery). Venous drainage is via satellite veins to the internal maxillary veins. Innervation is provided by the auriculopalpebral branches of CNVII to the auricular muscles and sensory supply by C2 and CNV.

Auricular



Annular **Scutiform**

Aetiopathogenesis of Canine Ear Disease

The somewhat simplistic approach of *initiating, predisposing* and *perpetuating* aetiologies can be applied especially well to an analysis of ear disease in the dog.

Initiating causes initiate an inflammatory response or change the environment of the external ear (e.g. foreign bodies, parasites). Undoubtedly, the most important underlying aetiology in most cases of chronic otitis externa is chronic dermatological disease. **Predisposing causes** exacerbate the inflammatory process problem without initiating it. Breeds with conformational anomalies of the pinnae (e.g. Spaniel) are good examples of this.

Perpetuating causes increase the likelihood of disease becoming established or deteriorating, once initiated. Included in this category are micro-organisms, such as bacteria and yeasts although the concept of a primary bacterial or yeast otitis externa is most unusual.

Managing Chronic Ear Disease

Rational strategies for the management of chronic ear disease address the underlying primary aetiopathology and in the vast majority of chronic ear diseases therefore the elimination of specific initiating causes (e.g. dermatological disease) should be the primary

aim when managing the chronic ear. Resolution of the dermatosis can provide a good basis for successful medical management of chronic otitis externa.

Surgery may sometimes change the external ear environment thereby reducing the likelihood of further inflammatory episodes; lateral wall resection is still occasionally practised for modification of the external ear environment for this reason. However, surgical intervention is rarely indicated for removal of primary causes and should not be regarded as addressing underlying causes and sets out to achieve rather different aims to medical management.

The main role of surgery has therefore become the removal of chronically diseased tissue in patients in which medically management is no longer likely to be successful.

Surgical Interventions

A variety of surgical procedures are potentially available for management of external ear disease including:

- lateral wall resection (LWR)
- total ear canal ablation (TECA)

Of these, TECA is by far the most frequently used.

Interventions for the middle ear will not be considered here but include:

- lateral osteotomy of the bulla (LBO)
- ventral osteotomy of the bulla (VBO)

Lateral Wall Resection (LWR)

Indications: LWR is indicated where improved ventilation and / or drainage will reduce the inflammatory disease and the need for repeated medical management of persistent otitis externa. Removal of the auricular cartilage will in some cases also minimise the opportunity for frictional dermatoses. It cannot be stressed strongly enough that many persistent cases of otitis externa are the result of an underlying dermatological problem and attention should be paid to this aspect of the problem rather than simply relying on surgical management to change the local environment. In many cases surgery can be avoided provided that the underlying aetiology is suitably elaborated and hence today LWR is rather an unusual procedure.

Technique:

- LWR is a painful procedure. Patients should receive appropriate opioid analgesia which will usually need to be extended through the postoperative period. Additional NSAID therapy should be used wherever possible. The procedure should be regarded as a clean-contaminated, or even a contaminated, surgery and patients should receive peri-operative antibiotic therapy.
- The patient is positioned in lateral recumbency and an incision, or alternatively two parallel incisions, made over the vertical canal from the auditory meatus as far as the level of the horizontal canal. The auricular cartilage can then be exposed.
- The auricular cartilage is dissected free of the overlying muscle on its lateral aspect. The auricular vessels are ligated or coagulated with diathermy. The tissues overlying the vertical canal should be reflected to expose at least 50% of its diameter. The dorsal aspect of the parotid salivary gland is usually exposed during this procedure and although damage should be avoided can withstand considerable manipulation.
- Vertical incisions are made through the tragus (i.e. lateral aspect of the vertical canal) such that approximately 40% of the circumference is removed in a strip which is folded ventrally. The incisions are continued as far ventrally as the scutiform cartilage (horizontal canal opening).
- The resected lateral wall is then reflected ventrally and the integument remaining around the vertical canal inspected. Should any hypertrophic areas remain, they should be resected at this stage to avoid subsequent ongoing dermatological disease. The reflected lateral wall is then anchored in position. Where appropriate it may be necessary to place sutures to close any dead space that exists in the soft tissues surrounding the site. The cartilage is anchored with simple interrupted monofilament sutures to the surrounding skin. Any excess reflected tragus is amputated.
- Postoperative care should include ongoing analgesia opioid (24hrs) plus NSAID (3 - 4 days). Remember: a well-analgesed patient will not interfere with the wound! An E-collar should, however, be used to reduce the risk of self-trauma. Head bandages should be avoided at all costs since they are dangerous and rarely, if ever, indicated.

If employed at all they should compromise the loose elasticated netting-type combined with a contact layer dressing only.

Prognosis: LWR should always be used with suitable medical management, and it is a serious mistake to believe that LWR alone can solve all cases of chronic otitis externa. Despite the previous widespread use of the LWR there is no doubt that this procedure alone does not provide a complete solution to all chronic ear diseases. Reviews indicate that as many as half of LWR procedures end in failure or continuing ear disease. The reasons for LWR failure include:

- Poor surgical technique
- Unremitting middle ear disease
- Failure to control the underlying cause of the otitis externa (usually a dermatological problem)

Total Ear Canal Ablation (TECA)

Indications: TECA is a salvage procedure where there is no hope of resolving the aural disease by any alternative medical or surgical methods. The main indications for this procedure include:

- **Chronic proliferative changes in the ear canal:** the result of chronic, unresolved otitis externa is often the hypertrophic proliferative changes that 'cauliflower' around the opening to the auditory meatus termed the 'end stage' ear. This effectively prevents ventilation within the canal and entraps micro-organisms which usually lead to infection within the middle ear. Removal of entire canal and inspection of the middle ear is the only solution in these cases. Most of the dogs requiring this type of surgery will have undergone prolonged treatment previously and many will have had unsuccessful surgical interventions.
- **Complete ear canal stenosis / para-aural abscessation:** occasionally the horizontal canal may become completely stenosed due to either trauma or surgical intervention the result of which is bacterial proliferation which periodically erupts as a para-aural abscess. In the case of unsuccessful TECA's this condition develops due to residual integument being left in the region of the tympanic cavity.

- **Unremitting middle ear disease:** many cases of middle ear disease can be managed medically by irrigation, topical and systemic antibiotic therapy. Where this fails TECA is indicated to remove the normally diseased external ear and permit curettage of the bulla.
- **Neoplastic disease:** tumours which involve the pinna, external meatus or, in some selected cases, the tympanic cavity itself may be amenable to management by TECA.

Technique

- TECA is a very painful procedure! Patients should receive appropriate opiate analgesia which should be extended through the postoperative period. Additional NSAID therapy should be used. The procedure should be regarded as a clean-contaminated, or even a contaminated, surgery and patients should receive peri-operative antibiotic therapy.
- The aural canal is mobilised by incising around the opening of the vertical canal or, where LWR has been performed, by incising around the margins of the resulting meatus. The auricular muscles and soft tissues are bluntly dissected away from the auricular cartilage until the lateral aspect of the bulla is reached. This can be achieved by blunt scissor dissection or with fine haemostats.
- The facial nerve emerging from the stylomastoid foramen and running ventrally to the canal should now be identified. Inexperienced surgeons should isolate and retract this from the field of dissection.
- The ear canal is amputated at the osseous external auditory prominence (OEAP).The integumental residue lining the OEAP and bulla is carefully stripped away until a clean boney surface is left. This can be achieved with a Volkmann spoon and fine haemostats. The use of a burr has been described and should be avoided since entrapment of the facial nerve in the burr is a real risk.
- The tympanic cavity should be irrigated to remove all inspissated debris.
- Lateral bulla osteotomy is NOT necessary to permit bulla toilet and contrary to popular belief, bulla osteotomy is not essential for the success of TECA's; in fact, only a very few require this. It may be indicated in cases of very extensive middle ear disease, cholesteatoma, and neoplastic disease.

- The soft tissues are closed over the bulla placing taking care to minimise the potential for dead space. The skin is closed in T or inverted L shape.
- Postoperative care should include ongoing analgesia opioid (24hrs) plus NSAID (3 - 4 days). An E-collar should, however, be used to reduce the risk of self-trauma. Head bandages should be avoided at all costs since they are dangerous and never indicated.

Complications

Some early reports indicated levels of complication of 80+% however with careful dissection the incidence of serious complications should be less than 5%.

Facial nerve injury: inappropriate handling of the facial nerve will result in neuropraxia lasting 5 - 7 days. Sectioning of the nerve will result in permanent paralysis. Always check the patient's palpebral response on recovery: neuropraxia will develop within a few hours of surgery whereas paralysis will be evident immediately!

Wound dehiscence: seroma and self-trauma may result in partial or even, major wound breakdown but this is unusual.

Haemorrhage: the retroglenoid vein is located dorsal and rostral to the OEAP and may be damaged during removal of aural integument. This is potentially very serious since the vessels retracts within the bony foramen and is difficult to access. Major blood loss can occur and best dealt with by filling the foramen with bone wax / collagen sponge.

Chronic sinus tract development: failure to remove all auricular integument will result in the development of para-aural abscessation. The solution is a complicated re-exploration to retrieve all fragments of integument.

Vestibular signs: pre-existing middle ear infection or careless curettage of the tympanic cavity can produce severe vestibular signs.

Hearing function: most patients retain some hearing function either air- or bone-conducted and are not profoundly deaf. Removal of the ossicles should be avoided during TECA.

Prognosis

With care, the procedure can be extremely successful in resolving chronic ear diseases and greater than 95% success rates have been reported.

Ventral Bulla Osteotomy - dog (VBO)

The ventral approach to the bulla for the management of middle ear disease does not meet with consistent success and long-term relief of the infection in the dog.

The explanation for this lies in the fact that unlike man and the cat, most middle ear problems in the dog arise through external ear disease and unless this is addressed VBO is a temporary solution only. In the cat, where middle ear infection is usually ascending via the Eustachian tube VBO is often successful in managing middle ear lesions.