The 7th Annual Vet Education International Online Veterinary Conference

“Surgery of the Ear”

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What did you say? Canine and Feline Ear Surgery

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This lecture is going to concentrate on surgical procedures of the external and middle ear of the dog and cat and will not specifically cover aetiopathogenesis, medical managements, pinnal diseases and surgery, detailed surgical anatomy, nor neurological conditions such as peripheral or central vestibular disease.

The main three surgeries this lecture will concentrate on are 1) vertical canal procedures (lateral and vertical canal ablation), 2) total ear canal ablation with lateral bulla osteotomy, and 3) ventral bulla osteotomy.

Ear and skin problems are common in small animal practice. Whilst certain breeds, such as the spaniels, are often cited as being common victims, ear disease affects a variety of individuals. Fortunately, the majority of skin and ear problems can be successfully treated medically. However, surgery can have a role to facilitate the efficacy of ongoing conservative management and a role to cure recurrent disease in which medical approaches have failed.

The first part of any surgical decision making in veterinary practice is establishing a correct diagnosis. Typically, this involves a thorough review of the history and a thorough full clinical examination (which may include blood and urine tests, including feline retroviral (FIV, FeLV) serology) followed by imaging (for example, otoscopy, radiography, CT / MRI scanning) and appropriate sampling from the ear (for example, cultures, cytology and or mass biopsy). Understanding the duration and type of symptoms as well as the prior responses to medical interventions, including dietary, is important.

1) Lateral Wall Resection of the External Ear’s Vertical Canal

This surgery entails “flapping open” the lateral aspect of the vertical canal. This removes the usual right angle bend that exists between the vertical and horizontal ear canals and thus allows better ventilation and access into the horizontal canal. This surgery does not stop the need for ongoing skin and ear management but aims to make ear infections less likely to develop and make them easier to treat if they do occur. This surgery is only indicated when there are no or reversible changes in the horizontal (and remaining vertical) canal(s). This generally means performing this surgery very early on in the course of recurrent ear disease. I start to mention this surgery to owners if I see a patient more than once with ear infections. One is less likely to experience post operative dehiscence and post operative infections if this surgery is done early.

It follows to say that the biggest problem I have seen with this surgery is it being employed too late – it is “too little, too late” if there are irreversible external ear canal changes. In that case, you are almost certain to fail in your attempts to control ear infections and it becomes a false economy.
2) Total Canal Ablation WITH Lateral Bulla Osteotomy

In this surgery, the entire external ear canal (other than the pinna) is removed along with a lateral approach into the tympanic bulla. The bulla MUST be accessed in this procedure to thoroughly remove residual debris and epithelia.

This surgery is indicated for ears that are irreversibly thickened and narrowed, typically due to chronic ear infections, and or those in which infections are not anticipated to resolve with medical management alone, such as multiresistant bacterial infections (e.g. Pseudomonas).

If done correctly, this is a satisfying surgery to perform with a very good prognosis and higher owner satisfaction but it does carry some higher risks both during surgery and post operatively.

I tend to advise clients that we are taking a “deaf and painful ear” and converting it into a “deaf and comfortable one”. Loss of hearing is often a concern for owners but I generally find these dogs have severely diminished hearing already and so the post operative change is not typically noticeable. These patients should still have the osseous transmission of sound waves (e.g. akin to hearing a watch ticking when placed against your skull behind your ear). Ear carriage is frequently affected in dogs such as German Shepherds and in cats; whilst this is only a cosmetic thing, it is definitely worth discussing with owners prior to surgery. There are procedures described to address this but, in my opinion, this is only really for the owners’ benefit and I wouldn’t compromise a good outcome for the patient by being overly concerned with this cosmetic issue.

Serious complications with TECA/LBO are rare when performed by experiences persons. They may include:

- haemorrhage at surgery; major bleeding is rare and can typically be managed at surgery.
- inducing peripheral vestibular disease (e.g. head tilt, nystagmus, circling, nausea); rare and typically due to over aggressive debridement of the bulla by the cochlear and or vestibular window(s) which may damage the semicircular canals of the inner ear. This complication typically resolves with time but can require increased hospitalisation. Note that if vestibular syndrome exists prior to surgery, it may not resolve post operatively.
- facial palsy due to facial nerve damage (always test facial nerve function pre-operatively);
- Horner’s syndrome; rare in the dog but encountered frequently in cats. Typically will resolve in time and generally does not affect quality of life.
- recurrence / development of cholesterol granuloma / cholesteatoma. Early surgical treatment of aural cholesteatoma may be curative but recurrence may be associated with advanced disease (which may be signalled by preoperative signs such as an inability to open the jaw, neurological symptoms, or bone lysis seen on CT imaging, stressing the importance of thorough pre-operative diagnostics). A recent report has further suggested that brachycephalic dogs may be more prone to developing cholesteatomas post TECA LBO surgery due to a relative increased difficulty in adequately accessing their bullae due to their anatomy. This again stresses the importance of adequately accessing the bulla to reduce the risk of leaving inflammatory / epithelial tissue and debris behind.
- para-aural abscessation – see following.
My biggest concern with this surgery is recurrent infection and the development of para-aural abscessation. Sadly, this is the most common reason I receive ear surgery referrals – that is, revision of someone else’s TECA/LBO. Without fail, I discover an inadequately accessed bulla which holds a lot of residual tissue and debris. Some appear (from the historic surgical description, from the CT imaging I invariably do prior to revising, and from the ultimate surgical findings which includes culturing and histopathology) to have had only a subtotal external ear canal resection, leading me to conclude on more than one occasion that the original surgeon has not understood the surgery originally undertaken. Revising TECA/LBOs carries higher risks of morbidity as the normal anatomy is disrupted. It behoves a surgeon new to this procedure to first perform it with someone who is accomplished at it.

3) Ventral Bulla Osteotomy – Inflammatory Polyps

Whilst benign inflammatory polyps do occur in dogs, these are generally considered the domain of our young (typically < 2 years old) feline friends. They may be occurring less commonly nowadays in line with fewer cases of upper respiratory viral infections being seen in practices with robust feline vaccination policies. Inflammatory polyps are thought to originate within the auditory canal or within the rostral aspect of the dorsolateral compartment. They may extend into the pharynx (nasopharyngeal polyps) and/or into the external ear canal; prior to this occurring, their presence may not be known although some will develop vestibular and or Horner’s syndrome(s). For those that extend into the naso- and common pharynx, clinical signs may include progressive stertor/stridor, sneezing, nasal discharge, coughing, dysphonia and dysphagia. They can present with life-threatening dyspnea, including cyanotic collapse. Bear in mind that animals with pharyngeal polyps may be tricky to intubate so extra anaesthetic caution needs to be taken with these patients. Those that expand into the external ear canal generally present with signs typical of otitis externa such as head shaking and scratching, and sanguinous to mucopurulent discharge from the canal. Upon scoping, a mass in the canal is typically visible and can be readily biopsied.

Polyp traction under full anaesthesia may be initially attempted and is obviously absolutely necessary in cases presenting with airway obstruction. This is reported to cause transient Horner’s syndrome in about 40% of cats (compared to about 80% following bulla osteotomy surgery). Success rates of 50-100% are reported with traction when it is combined with systemic and or topical medical managements (pain relief, antibiotics, and corticosteroid antiinflammatories).

My preference for cure of inflammatory polyps is ventral bulla osteotomy which has a very high success rate (>95%). It may also be recommended for those cases which are not amenable to traction (e.g. polyps contained within the bulla but causing clinical signs), and those that have recurred following traction.

The cat’s tympanic bulla is readily palpable ventrally. This is in contrast to the dog in which the VBO approach is technically more challenging. The surgeon must be mindful of the lingual and facial blood vessels and the hypoglossal nerve. Upon carefully entering the bulla (typically with a hand-driven Steinman pin or small drill bit), the access is enlarged with rongeurs. In the cat, there is an obvious bony septum (which is incomplete dorsally) and a visible mound known as the promontory. The septum divides the feline bulla into two compartments: a smaller dorsolateral one and a larger
ventromedial area. The ventral aspect of the bony septum can be partially removed with rongeurs to aid exposure but care must be taken to avoid overzealous curettage around the promontory to limit damage to the tympanic plexus (pre- and postganglionic parasympathetic and postganglionic sympathetic nerve fibres) and or vestibular structures. [The distribution of neural structures within the middle ear is similar in the dog but the dog lacks a septum and promontory, and the canine’s tympanic plexus is less exposed and / or is less sensitive to iatrogenic damage]. Despite care, many cats will recovery from VBO surgery with Horner’s syndrome; the literature reports rates around 80%. This is typically transient and will resolve with time. Those with pre-existing Horner’s and those with post operative Horner’s that lasts longer than 6 weeks may be permanently affected but Horner’s syndrome typically does not preclude a good quality of life.

Following thorough sterile saline lavage and gentle suction, the soft tissues are closed routinely and drains are not typically placed. With careful dissection and retraction, vascular trauma and hypoglossal nerve damage are rare.

**Typical Post Operative Instructions following Ear Surgery:**

- Submit fluid and tissue samples for culture and sensitivity testing and tissue samples for histopathology. Note: independent from surgical antibiotic prophylaxis, I tend to take culture samples as soon as I enter the bulla and again immediately prior to closure; both samples are submitted for culture and sensitivity. I hope to demonstrate at least a negative culture result from the latter sample although a positive result does not preclude a good ultimate outcome.

- Post operative antibiotics is controversial and is based on the disease being treated (e.g. feline inflammatory polyps are not typically accompanied by significant bacterial contamination, in contrast to a dog with chronic pseudomonal otitis externa) and based on the culture and sensitivity results. I typically use IV cefazolin at 20mg/kg 30 minutes prior to incision and every 90-120minutes during surgery. In cases that are deemed to require a postoperative therapeutic course of antibiotics, I will tend to use oral potentiated amoxicillin (15-20mg/kg q8-12hours), pending culture results, and maintain this for 7-10days.

- Stop self inflicted trauma including head shaking – dressings, bandages, collars.

- Soft foods for 2-4weeks – ear surgery is painful so anything that makes chewing easier.

- Analgesia – pre, during and post surgery. Think NSAIDs, opioids, local blocks during surgery, cold therapy.

- Eye drops – ‘fake tears’ to avoid dry eye in cases with impaired blinking or tear production.

- Antiemetics & Antacids.
Summary

The main take home points I would like delegates to walk away with are as follows:

1. Involve colleagues who have extra training in surgery and dermatology. Even post ear surgery, it is likely ongoing skin care will be advantageous to your patient. This is especially so with wall resections of the external ear’s vertical canal.

2. Know the disease you are dealing with – be a good diagnostician before talking surgery. Malignant neoplasms of the ear will obviously have a very different approach to chronic bacterial otitis or benign inflammatory polyps.

3. If you are going to perform vertical wall resection, do these early in the course of ear disease. This means prior to the development of irreversible changes in the vertical and or horizontal canal; otherwise these surgeries are too little too late. Remember vertical canal resection surgeries are part of the general management of ear disease and not a sole cure.

4. Know your neuro-vascular anatomy – especially before undertaking lateral or ventral bulla procedures. Get experience with other colleagues before undertaking such surgeries alone.

5. Revise and put into daily surgical practice the tenets of Halsted. Remember asepsis, haemostasis, gentle handling, tension free closure, and minimising foreign body introduction. These are good practice in any surgery and helps reduce the incidence of post operative complications. These 100 year old rules remain particularly relevant in a world increasingly concerned with antibiotic resistance.

6. Don’t use drains if you can avoid them. They are not a replacement for meticulous technique. Consider a closed active suction drain if you feel the need for drainage. If you must use a passive penrose drain, use it as a ventrally dependent egress-only drain (not ingress-egress), and apply a sterile cover dressing over it which you change any time there is strike through. Plan to remove it within a few days.

7. Don’t do a TECA without bulla surgery – PLEASE! You must adequately access the bulla or you will have serious complications. Know your canine and feline bulla anatomy. If you are not happy approaching the bulla, don’t do these surgeries.

8. Ear surgery is painful. Adequate multimodal analgesia is essential before, during and after surgery.

Useful Resources:

- Slatter’s Textbook of Small Animal Surgery
- Tobias and Johnston’s Veterinary Surgery Small Animal
- Fossum’s Small Animal Surgery
- Miller’s Guide to the Dissection of the Dog
- You Tube Clips (Canine TECA LBO & Feline VBO): Bath Veterinary Referrals, Dr Alasdair Hotston-Moore; [www.vetsurgeon.org](http://www.vetsurgeon.org)
- Vet Surgery Central, Dr Daniel Degner; [http://www.vetsurgerycentral.com/client_library_ear.htm](http://www.vetsurgerycentral.com/client_library_ear.htm)
Useful Ear Surgery Instrumentation List

- Spay hook
- Dental mirror
- Video-otoscope
- Flexible endoscope
- Electrocautery
- No.10 and No.11 scalpel blades
- Curettes
- Steinman pin / drill bits
- Air powered burrs
- Fine tipped suction
- Saline lavage fluid
- Local anaesthetic solution
- Rongeurs
- Osteotome/Chisel
- Periosteal / Freer elevators
- Self retaining (eg Gelpi) & hand held (eg Senn) retractors
- Culture swabs & formalin pottles
- Alligator Forceps
- Allis Tissue Forceps
- Monofilament absorbable suture