CHAPTER 7.

THE PINNA AND EXTERNAL EAR AUDITORY CANAL

1. PATHOLOGICAL SITUATIONS

SECTIONS

1.1 Pinna Conditions
1.2 EAC Infections
1.3 Exostoses
1.4 Keratosis Obturans
1.5 Carcinoma

1.1 PINNA

Common Conditions

a) Trauma
b) Neurodermatitis (Eczema, Lichen simplex)
c) Infection
d) Allergy
e) Seborrhoea Otitis Externa
f) Neoplasms

a) Trauma

Being exposed on the side of the head, the pinna is of longstanding susceptibility to trauma. As a defence, the vasculature is lush, such that healing of lacerations is generally rapid. Crushing or rolling injuries can however have more lasting effect.

Figure 1: Cauliflower ear. Old crushing injury. Haematoma auris, not evacuated at the time of trauma.

These injuries may strip the perichondrium off the elastic cartilage, resulting in haematoma auris – a clot between these two layers. If not evacuated, the underlying cartilage may suffer avascular necrosis, or substantial thick scarring may occur causing "cauliflower ear".

b) Neurodermatitis

Not uncommonly, the pinna and external ear canal may become pruritic due to retained wax and moisture, perhaps with mild infection. As in other parts of the body, the itch provokes rubbing or scratching in an effort to relieve the symptom.

The conchal bowl and external canal are lined with delicate skin overlying relatively firm or hard cartilage or bone. The skin is thus easily damaged...
by mild trauma, and this predisposes to further itch; a cycle of events is initiated. Sufferers may awaken to find themselves rubbing at the site, and the problem may become bilateral. Poor hygiene or tobacco tars from smoking may exacerbate the tissue reactions.

The results of the chronic self-trauma are characteristic. The bowl of the ear becomes reddened and swollen, with hard scaling dead skin that is highly irritating and which leads to further trauma during attempts to remove this. Cracking and infection result, especially just above the canal entrance. A watery discharge is often noted, more in the morning. Acute infection episodes may occur. Swelling often narrows the EAC, trapping infected debris deep in the canal.

The important start to treatment is for the habitual trauma to stop; counsel the sufferer specifically with regards the cause and effect and instruct appropriate measures to prevent further rubbing and scratching. This may be difficult; treatment will target the itch from the beginning.

Another immediate treatment eliminates the problem of the irritating scaling dead skin (exfoliation). This is best removed by soaking the scale for several minutes, then gently scouring the site with a fine cloth, peeling away the debris back to live skin. A steroid ointment is applied to eliminate further itch. Without trauma the skin will recover rapidly. Follow up with thorough canal cleaning and a steroid wick, with antibiotics included if infection is present, then supplement this with patient-administered topical ointment and drops as required, should further itch occur, to head off further trauma.

c) Infection

Small septic penetrating injuries (e.g. insect stings) of the pinna may result in bacterial infection of the elastic cartilage.

Staphylococci or pseudomonas are the usual culprits. The problem presents as an acutely inflamed and exquisitely tender swelling.

If untreated, septic necrosis of the cartilage may result, with long term crumpling deformity of the pinna. Initially arrange a culture/sensitivity study and begin intensive anti-staphylococcal/pseudomonal treatment until more specific treatment can be focussed from the culture results. Evacuate any pus collection or necrotic cartilage then pack the ear with the tissues positioned for optimal healing.

Figure 2. Neurodermatitis. Pruritus causing chronic self trauma by rubbing/scratching.

Figure 3: Acute perichondritis. Cherry-red inflammation and exquisite tenderness are characteristic.
d) Allergy

The external ear may be exposed to a variety of chemicals, frequently self-applied to the ear bowl or the external canal. Substances include cosmetics, across-the-counter generic ear wax agents, antiseptics or antibiotics. Some may excite an allergic reaction or hypersensitivity, particularly after repeated applications. Previously, antibiotics such as penicillin or choramphenical were notorious, but these are now seldom used. Agents such as iodine antiseptics remain more common and must be avoided during surgery or as wound/infection care around the ear insusceptible individuals.

The more florid examples are often antibiotics. The use of ear drops for

A preceding external ear infection is commonly related. Their application may be followed by considerable discomfort or even substantial pain. Marked swelling of the canal, ear bowl and pinna are present, and the skin surrounding the ear becomes reddened and diffusely thickened. Copious weeping of watery fluid may occur, and severe itch is present. The situation may persist until the possibility of allergy is recognised.

If possible, the offending agent is identified and its use discontinued. Thorough cleaning with plain water removes residue and discharge; avoid chemicals that may worsen the problem. The ear and canal are then managed with lavish application of steroid ointment that is effective in settling the tissues overnight in the absence of secondary infection.

Figure 4: Allergy to ciprofloxacin drops. Erythema of the pinna and surrounding skin.

It is important to remember the incident and to have the allergy noted in the medical records for future avoidance or management.

e) Seborrhoeic Otitis Externa

This is a dry, greasy exfoliating inflammation of the ear and scalp with associated dandruff. It is of uncertain cause, possibly with yeast or fungal components. Pruritis, and secondary infection from resultant self-trauma are common features. Management requires both scalp and ear care. Gentle regular shampooing reduces grease and dandruff. The external canal and conchal bowl are cleared of exfoliated skin and other debris, then treated with steroid and antibiotic ointment to reduce inflammation, infection and pruritis to avoid the development of neurodermatitis.
f) Neoplasms

Squamous or basal cell carcinomas on the pinna are prevalent amongst fair-skinned Europeans with a long history of sun exposure, due to the exposed nature of the ear. Lesions on the helical rim may be managed by a through-and-through wedge excision, followed by primary closure.

Figure 5: Seborrhoeic dermatitis. Greasy, erythematous and exfoliating skin. Dandruff usual.

Larger lesions of the central pinna require more aggressive excision, possibly total excision or partial petrosectomy.

Figure 6: Excision of small malignant pinna lesions. A through-and-through wedge excision allows adequate margins around the lesion. Approximation and closure will achieve an acceptable cosmetic result.

Figure 7: Squamous cell carcinoma of the external ear. Deeply infiltrating, extensive excision required, prognosis guarded.
1.2. EXTERNAL EAR INFECTIONS

Classification

a) Bacterial/Fungal
   i. Bacterial
   ii. Furunculosis
   iii. Otomycosis
   iv. Chronic Myringitis

b) Viral
   i. Herpes Zoster
   ii. Oticus
   iii. Bullous Myringitis

a) Bacterial Otitis Externa

Infections in the external ear canal are commonplace in any otological practice, with a spike in presentation during the warmer weather, particularly after water sports in soiled water such as rivers or reservoirs. The ear canal is effectively a warm moist tube in these circumstances; favouring bacterial or fungal growth.

Given the origins of the infection, bacterial varieties are generally due to a range of common environmental species (pseudomonal, streptococcal or gram negative types), but a minority arise from staphylococcal origins and are more severe.

Bacterial otitis Externa presents with blockage, gurgling and some discomfort. Pseudomonal types may cause more severe pain. Sodden, semifluid debris is seen in the canal, which may be oedematous or even haemorrhagic. Tenderness upon pinna palpation may be noted.

b) Acute Staphylococcal Otitis Externa (Furunculosis)

Staphylococci differ from other agents in otitis externa by the severity of pain induced. The patient may present in severe distress, despairing and heavily medicated with pain relief (if not, immediate strong analgesia is optimal).

Figure 8: Pseudomonal otitis externa, exhibiting the typical greenish debris.

Management necessarily begins with thorough canal cleaning by suction toilet and/or wet or dry mopping techniques. Then apply topical steroid-antibiotic cream, ointment, or drops. Avoid oily consistency drops; these form a troubling meniscus on the drum, persisting up to several weeks.

Figure 9: Staphylococcal furunculosis of the EAC. Scattered pustules, severe oedema and scanty purulent otorrhoea are evident.
The ear may be occluded by oedema with deafness due to retained debris. Minor epidemics occur in the mid-summer months. Small pustules are often evident, oozing purulent exudate.

Management is difficult due to the oedema and acute sensitivity of the canal. Cleaning the deep canal requires a gentle touch, preferably using an operating microscope, a small speculum and fine suction toilet. Combined gentamycin/ciprofloxacin and betamethasone ointment, applied with a soft (Allevyn) sponge wick will reduce oedema and permit better access within 1-2 days, for further cleaning. High dosage anti-staphylococcal antibiotics (dicloxacillin, gentamicin) will produce rapid improvement (1-2 days), when in combination with above initial management. The condition may in some case become complicated by deeper infection of the floor of the canal. Cartilage infection may cause a granulation on the floor of the canal that takes weeks to settle, resolving only upon extrusion of a sliver of infected cartilage. The patient should be warned of the risk of this situation if such a granulation is noted.

c) Fungal Otitis Externa
   (Otomycosis):

Fungal external canal infections are usually due to Aspergillus (nigra, flavum, fumigans) or Candida albicans. The presentation is similar to the general bacterial infections, but unsuccessful management is frequent, due to the culprit remaining undiagnosed; treatment focussed on bacterial infection will fail to impact upon the fungal site. Fungal infections are a common cause for referral for specialist care.

Fungal infections initially tend to be more subtle, typically blockage and pruritic (itchy), perhaps extremely so.

Figure 10: Aspergillus nigra otomycosis. Characteristic “chocolate ball” spores are evident.

The problem may progress to a painful stage as the fungus ulcerates the deeper canal and drum, sharply worsening if the drum is penetrated. Blackish or discoloured discharge may be seen or the classic chocolate or yellow spores intermixed with a furry mycelium. “Wet blotting paper” consistency debris is common. Candida may exhibit greasy pruritic creamy debris.

Thorough cleaning is essential for cure. Suction toilet, then wet mopping to scour infected keratin from the canal, and then repeat suction minimises the likelihood of residual disease. Topical application of clotrimazole is effective, mixed with ciproxin ointment if secondary bacterial infection has occurred. If the drum is intact, clotrimazole drops are used for a further two weeks. These drops are irritating if a perforation is present: serial cream applications are then required. Fortunately, with treatment many fungal induced perforations will heal rapidly.
d) Chronic Myringitis

Recurrent infection in the external ear canal sometimes forms a more chronic pattern, found also after surgery for chronic middle ear disease. The problem is usually found initially on the eardrum itself; hence the term “myringitis”, but later may spread beyond the drum.

Myringitis presents in three patterns. The mildest, and often the first, is a clear shiny ulceration of the normal drum skin, the site slowly leaking a mucoid discharge that tends to build up caked debris in the canal with time. This phase may lead to a thicker and reddened actively secreting phase. Later, the thickening leads to small granulations, then scarring that gradually thicken, obliterating the deeper canal with progressive loss of the deep canal skin. This may progress until the deeper half of the canal has been filled with a core of scar tissue, before healing over as a shortened stump of the canal. This produces considerable hearing loss.

The cause of the problem and its predilection for the drum itself remain unclear. The infection appears to be a biofilm of mixed fungi and bacteria.

Figure 11: Chronic myringitis, granular phase. Sessile granulations cover much of the pars tensa, and are beginning to spread on to the deep canal skin.

Myringitis is notoriously difficult to eradicate. Specialist management is usually essential. Topical or ingested antibiotics are ineffective. Chemical cautery (silver nitrate, phenol, trichloroacetic acid) of the site is helpful to reduce thickening, but in many instances surgical excision is necessary. In advanced cases, the obliteratorive scar tissue may require total excision, followed by skin grafting of the deep canal (canalplasty) to recover hearing. The surgery is effective in restoring hearing, but the myringitis may recur, necessitating revision procedures. Alternatively, an active bone conduction implant will restore hearing without canal surgery.

Figure 12: Cicatrising fibrosis resulting from advanced chronic myringitis that has destroyed the deep canal epithelium. Fibrous deep EAC obliteration is impending.

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e) Herpes Zoster Oticus

This infection is the basis of Ramsay Hunt Syndrome: Lower motor neurone facial palsy, external canal and/or conchal bowl vesicles. Associated viral labyrinthitis may cause profound deafness and vertigo. Management is often ineffective in restoring function. The vesicles are treated by local cleaning and antibiotic cream if infection intrudes.
1.3. EXTERNAL CANAL EXOSTOSES

The external ear canal has very thin skin, overlying cartilage superficially and bone in the deeper half. Bone reacts when chilled by cold water, thickening, and resulting the development of rounded bony swellings termed exostoses.

These lesions are very slow growing benign bony masses, usually two larger protrusions in the lower canal, and smaller pea-shaped variants on the canal roof, close to the drum.

f) Bullous / Viral Myringitis

This condition is characterised by painful blistering confined to the tympanic membrane and deep canal. The problem is an influenza virus, which may follow a respiratory infection. Blisters filled with a glairish or bloody fluid obscure the drum and deep canal. Watery exudate may be present.

They are not malignant, and the only adverse aspect is blockage of the deeper canal with ongoing exposure to further cold stimuli. Growth evidently ceases if the cold water is avoided.

Continued growth however, gradually occludes the canal, particularly if associated with wax deposits that may fill the slit between the swellings. The patient notices increasing difficulty clearing water from the ear after swimming, perhaps with prolonged period of deafness and even external canal infection.
When examined, the canal occlusion is readily evident. On palpation, the protrusions are ivory-hard and may be very sensitive to touch. A substantial hearing loss may be present if closure is complete or if debris is trapped between the drum and the overlying obstructions. Infections or small granulations may occur.

Surgical removal is indicated if the occlusion is troublesome. In the past, an incision behind the ear has been the common technique, but removal entirely via the ear canal itself is now the preferred method. This involves carefully lifting the skin off the bone, which is then drilled away and the skin replaced. The key requirement of the surgery is to retain the skin in good condition; its loss prolongs the recovery period and may lead to infection. In skilled hands healing is complete 4-5 weeks after surgery, and surfing is then possible.

1.4. KERATOSIS OBTURANS

The skin of the eardrum and the external auditory canal has the unique ability to move off the drum, then along the canal towards the exterior, carrying wax and any debris with its movement. This migratory action is intended to prevent the build-up of matter in the deep canal, deafening the ear. In some instances, the mechanism fails resulting in accumulation of dead skin, either on the drum or along the floor of the canal, forming a pattern called a keratosis Obturans.

With time, dead skin (keratin) accumulates on the floor of the canal (but not on the upper reaches). The process is silent, usually asymptomatic, and may cause problems only with complete occlusion of the canal. The accumulation excites a low-grade irritation and resorption of the floor of the canal, leading to a scalloped-out erosion of the canal floor. Active infection intervenes, causing inflammation raw tissue eruption (granulation) and bone infection. The last may cause extensive infiltration into the bone of the floor of the canal, dissolving bone causing a deep canal pit full of dead bone spicules (external canal osteitis, benign necrotising otitis externa).
Also, the keratin mass, if untended, may also erode the drum and middle ear, requiring reconstructive surgery.

Figure 17: Keratosis Obturans, A scalloped-out erosion of the canal floor is seen, filled with keratinaceous debris. Regular cleaning will halt the problem; neglect may lead to osteitis of the tympanic plate.

The problem is often noted as waxy debris in the canal, the extent of underlying bony erosion being obscured. Syringing fails to dislodge the keratin mass. Specialist care is usually then sought. Removal of the dead skin is often protracted, as the matter is too tough to clear by suction toilet, but too friable to easily clear with fine instruments. Piecemeal removal gradually clears the problem, perhaps with discomfort as the debris may be somewhat adherent to the drum or canal wall.

Because of the basic epithelial failure, periodic cleaning is advisable, on perhaps 6-12 months intervals.

1.5 CARCINOMA.

True primary carcinoma of the external canal is fortunately rare, although involvement by infiltrating disease from pinna or other primary sites is more common, and may require major resections – petrosectomy, canal ablation and radiotherapy. Recurrence from larger lesions is common.