Ear

Must know

- Appearance of normal tympanic membrane
- Wax removal
- Foreign body removal
- Ear syringing / mopping
- Infections
    - OE / AOM / COM
- Complications
    - Mastoiditis
    - Cholesteatoma
- Bell's palsy
- Acute idiopathic nerve deafness
- Approach to acute dizziness

Nice to know

- Inner ear problems
    - Tinnitus
    - Complicated vertigo
- Causes of hearing loss
- Skull base trauma

External Ear

External ear canal infections

Risk factors

- Trauma
    - Ear buds
    - Chemical
- Wet ear canal
    - Swimmers
    - Hearing aids
    - Climate
- Skin conditions
- Anatomical obstructions
- Immune-suppression

Types

- Diffuse
    - Otitis externa – Swimmer's ear
    - Cellulitis
- Localized

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    - Furuncle
- Cartilage
    - Chondritis
- Skull base
    - Malignant OE / Necrotizing OE
    - Skull base osteomyelitis

Aetiology

- Bacterial
    - Staph / Pseudomonas / E.Coli
- Fungal
    - Candida / Aspergillum
- Viral
    - Herpes zoster
    - Very rare
- Combination

Treatment

- Clean ear canal
    - Ear bud – mopping = Ear toilet
    - If it's swollen shut, you need to insert some type of plug – see below
- Bacterial
    - Ofloxacin and steroid ear drops
        - Cilodex®
        - Safe in external and middle ear
    - Boric acid
    - Gentamycin and others
        - Sofradex®, Covomycin D® etc.
        - Toxic to the inner ear. Therefore, unsafe if there is a tympanic membrane perforation!
- Fungal
    - More difficult to treat
    - Canestan cream®
    - Swimmers drops, Acetic acid, Gentian violet, Methiolate, Boric acid
- Combination
    - Quadriderm cream®
    - Mupirocin / Clotrimazole / steroid
- Ear canal swollen shut
    - Creams as above on a ribbon gauze, and then inserted into the external ear canal

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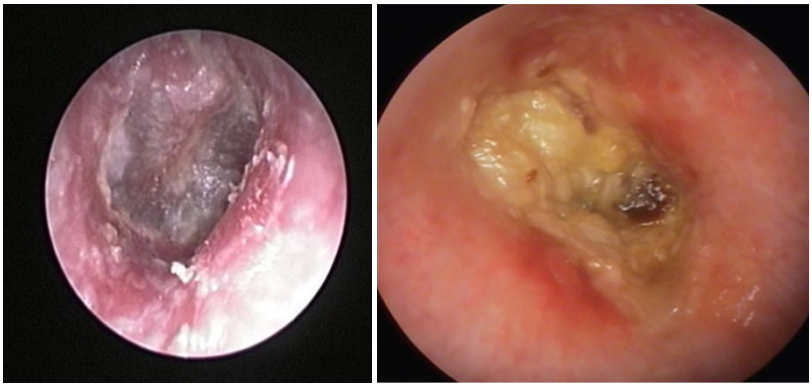
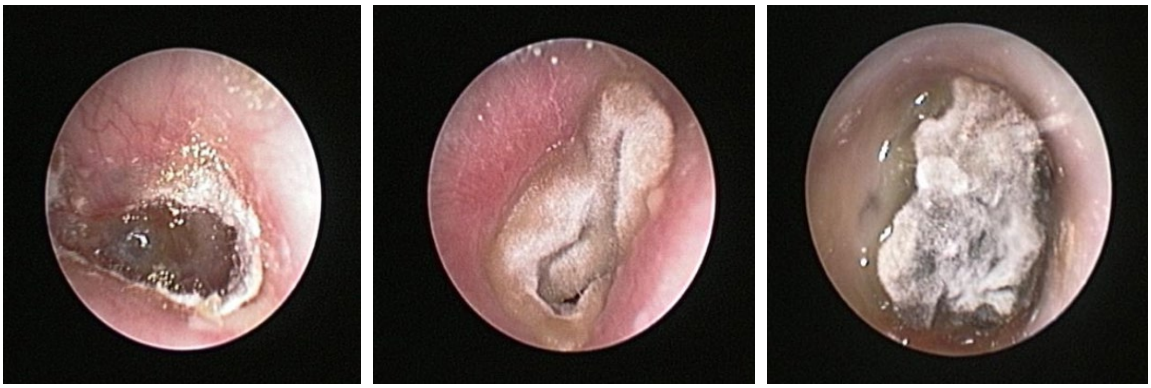


Three examples of bacterial OE. The picture on the left might fool you in not thinking the OE is severe. Sometimes there is minimal erythema of the ear canal. The picture in the middle shows think pussy secretion medial in the ear canal. The picture on the right shows an ear canal completely shut. It is best to insert an antibiotic cream on the ribbon gauze in ears like this.



Three examples of fungal OE. Typiccally, one can see hyphae or the “wet newspaper” debris.

Videos:
Boric acid - https://youtube.com/shorts/fGeZzGU8oQA
Ear mopping - https://youtube.com/shorts/SNXWIkNz0jE

How to use ear drops?

- Shake the bottle
- Warm it in your hands
- Clean the ear of secretions (ear toilet / mopping)
- Lie on your side, and insert the required number of drops, in the uppermost ear
    - Pull the ear up and out in an adult
    - Pull the ear down and out in a child
- Apply a pumping action on the tragus
- Lie for 2-3 minutes with the ear facing upwards
- If you want to, put a cotton wool in the ear, but only temporarily

Prevention of OE

- Keep ear dry
    - Avoid water
    - Plugs
        - Various

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        - Can sometimes cause OE
    - Hair dryer
- Avoid ear buds – trauma
- Drops
    - After exposure
        - Acetic acid, Swimmers drops
    - Before exposure
        - Swim seal, Oily drops

Treatment of other EAC infections / conditions

- Furuncle
    - Local or oral antibiotics
    - Open if abscess
- Viral
    - Supportive – PAIN relief
    - Prevent secondary infection
- Cellulitis
    - Oral anti-biotics
- Chondritis
    - Oral anti-biotics
- Malignant OE
    - Extreme pain
    - Purulent otorrhoea
    - Granulation tissue and / or exposed bone
    - NVII palsy
    - Other lower cranial nerve palsies
    - **Always in the background of**
        - **immune suppression**
    - **REFER ASAP**

Wax

- Varies from easy to impossible
- Different types
    - Soft / Flaky / Sticky / Hard
- Options
    - Syringing – blind
    - Drops
        - Cerumol / Waxsol / Oily drops
    - Under vision – two hands
        - Suction
        - Curette
- Instrumentation
- Refer
- See syringing an ear

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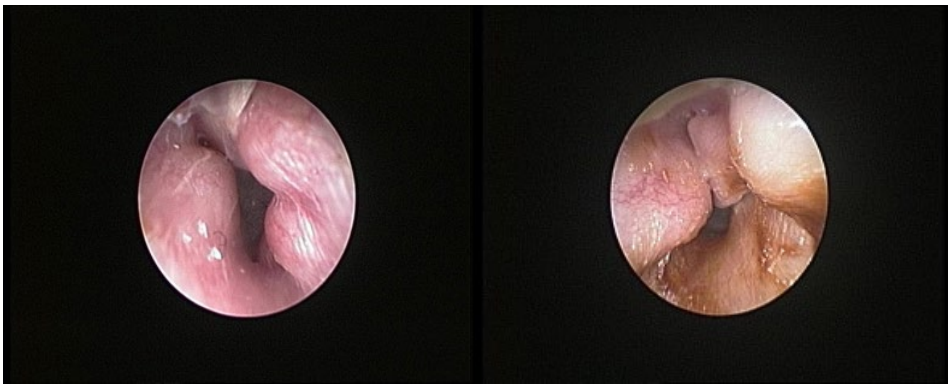
Wax in the external ear canal. Note that was can completely obstruct the ear canal.

Exostosis

- Bony overgrowths
- When to refer
    - Repeated infections
    - Hearing loss
    - Wax
    - Progressing to complete closure
- Extremely common in areas with cold water exposure


Two pictures both demonstrating severe exostosis.

FB

- You only have one go!!
- There is no need to risk injuring the ear to remove the FB
- Oily solution / Lignocaine 1% for insects
- Instrumentation and Headlight
- Decide beforehand
    - **To grab FB**
    - **Pass an instrument behind it**
    - **Syringing**
    - **Suction**
- Restrain?
- Refer

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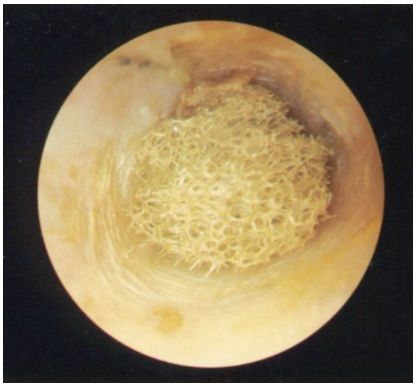
Sponge in the ear canal.

Pinna

- Infections
    - Mostly streptococcus
    - Anti-biotics
        - Penicillin / Quinolones
- Haematoma
    - Small
        - Aspiration with pressure bandage
    - Other
        - Refer
- Treatment
    - Aspirate x2
    - N.B. Sterile conditions & use a large bore needle
    - Compression bandage
    - Review in 24 hours
    - Consider re-aspiration
- If re-accumulates again:
    - Proceed to formal drainage
    - Quilting stitch
- Cover with antibiotic conditions to prevent infection

Tumours of the EAC

- Rare
- Squamous cell carcinomas, Basal cell carcinomas, Melanomas
- Presents with
    - Skin changes
    - Bleeding
    - Ulceration

Middle Ear

Conditions

- Tympanic membrane
    - Bullous myringitis

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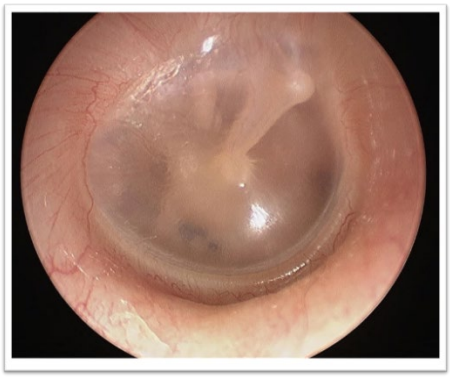
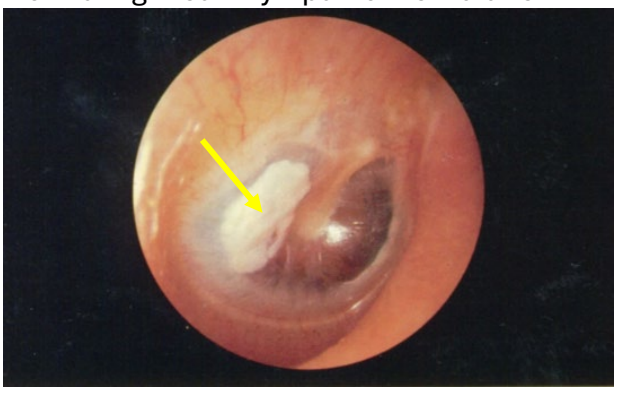
    - Granular myringitis
- Middle ear
    - Otitis media with effusion (OME)
    - Acute otitis media (AOM)
    - Chronic otitis media (COM)
- Various
    - Trauma
    - HIV / TB
    - Other

Normal TM

- Variation
    - Child
    - Adult
- Factors influencing the appearance of a TM
    - Previous infections
    - Previous grommets
    - Previous operation
    - Screaming child
    - External ear canal
        - Wax
        - Exostosis
        - Foreign bodies



Normal right ear / tympanic membrane.



Right ear with myringosclerosis in posterior part (yellow arrow).

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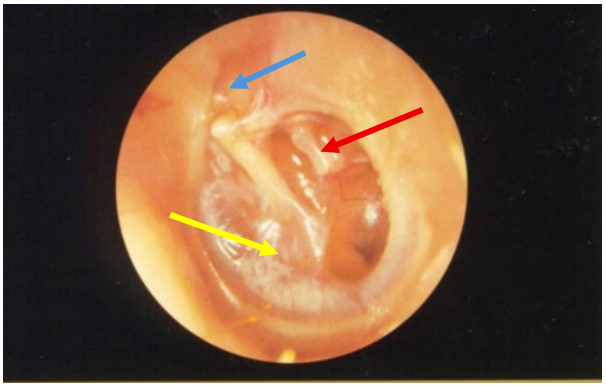
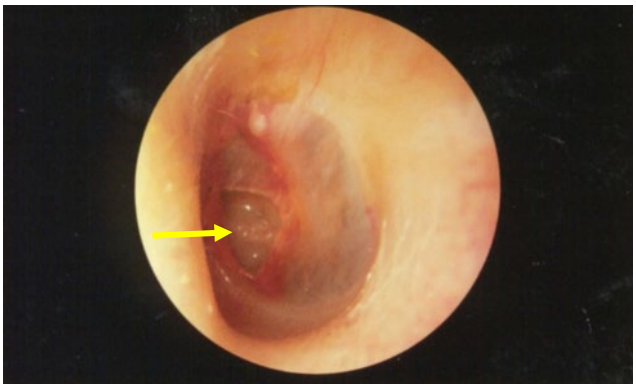


Left ear with retraction of pars flaccida (blue arrow) and pars tensa (yellow arrow). Also, incudo-stapedeopexy (red arrow) with retraction of TM onto incus / stapes.

Dull right TM. May be due to previous ear disease.



Left ear with pars tensa central perforation (yellow arrow).

Tympanic membrane conditions

Bullous myringitis

- Acute pain
  - 11/10
- Mostly unilateral
- Bloody discharge
  - Pain improves
- Aetiology
  - Previously thought to be Mycoplasma / Viral
  - Now bacterial
- Treatment
  - PAIN RELIEF

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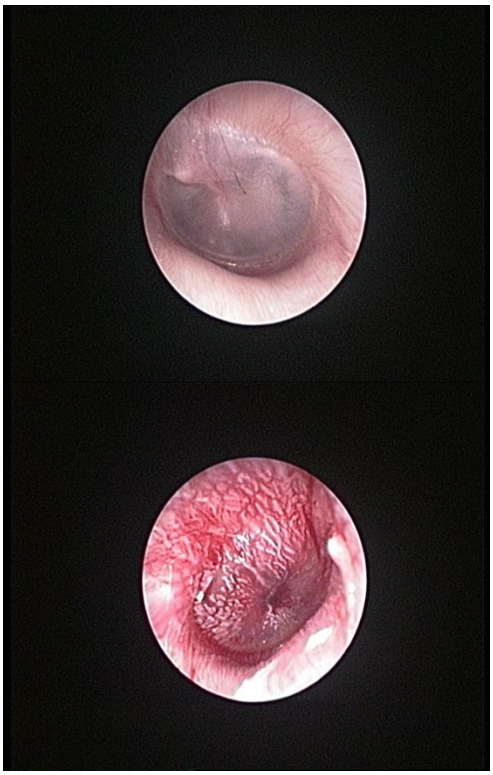
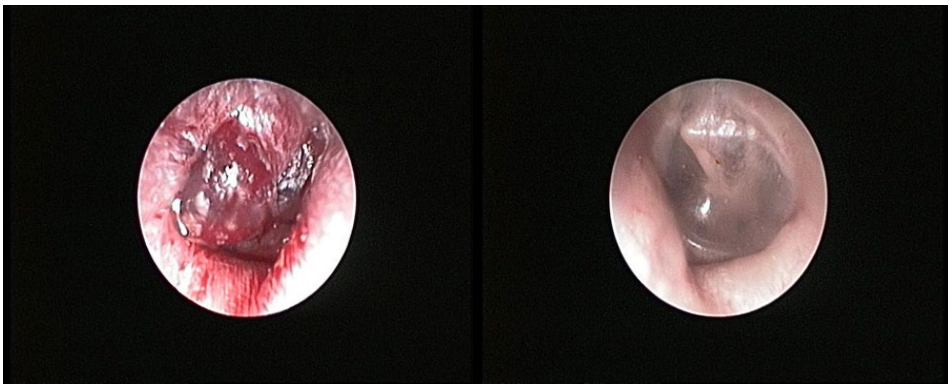
    - Oral quinolone
    - Topical ofloxacin / steroids
- Can have a middle ear effusion afterwards
    - Clears up over weeks



Same patient with a normal left ear (top picture) and a haemorrhagic bulging right TM.



Pictures demonstrating a bigger haemorrhagic bulla on right TM and a normal left TM.

Granular myringitis

- Aetiology poorly understood
- Presents with
    - Itching
    - Otalgia
    - Aural fullness
    - Otorrhoea
- Treatment

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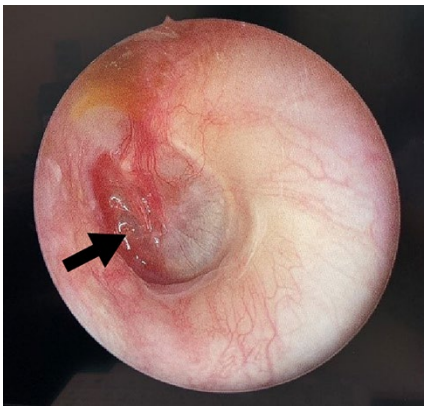
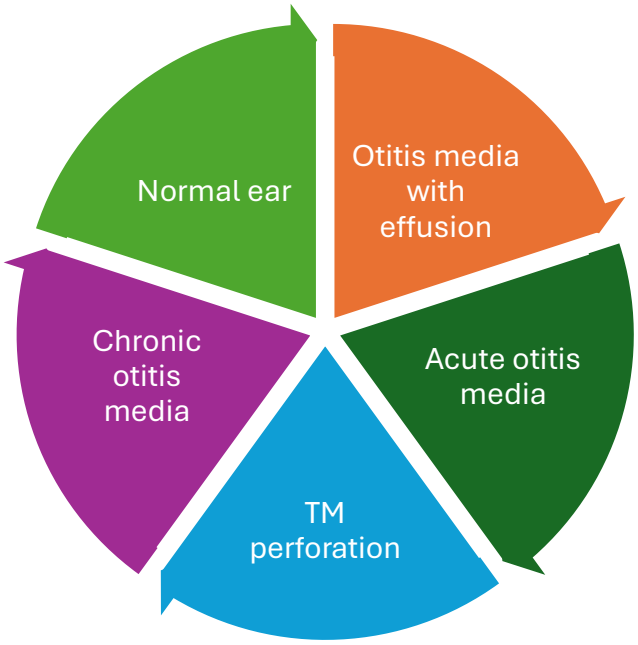
- Acetic drops / Boric acid
- Cauterise with silver nitrate
- Resection of affected TM and repair with graft



Picture demonstrating a left TM with the black arrow showing the myringitis.

Middle ear disease



Incidence

- Extremely common – bimodal peak
  - **6/12 to 2 years**
  - **4 to 7 years**
- Risk factors
  - Passive smoking
  - Repeated AB use
  - Day care
  - Adenoid hypertrophy
  - Eustachian tube dysfunction
  - Ciliary diseases
  - Family history

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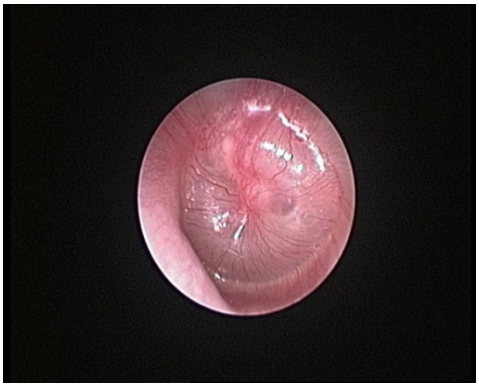
    - Winter months
    - Boys
    - Skull base abnormalities – includes conditions such as Down syndrome
- Protective factors
    - Strep pneumonia vaccine
    - ?? Probiotics / Prebiotics
- EXTREMELY UNCOMMON IN ADULTS!!
    - If an adult presents with middle ear disease for the first time, nasopharyngeal pathology should be excluded

Otitis media with effusion (OME)

- Can arise de novo or follow after acute otitis media (AOM)
- Can cause AOM
- Difficult to diagnose
    - **Under diagnosed**
    - Tympanometry
- Can present with
    - Irritable child
    - Disturbed sleeping pattern
    - Pulling on ear / chewing finger
    - Hearing loss / Poor speech development
    - Minimal symptoms




Both pictures are of the left ear. The picture on the left demonstrates a bulging TM with thick (glue) OME behind (medial) to the TM. The picture on the right show bubbles and fluid behind the TM.

- Treatment
    - Medical
        - Steroids
            - Intra-nasal
        - Nasal sprays
            - Saline / Sea water
        - Antibiotics – not advised!
        - Wait and see
    - *Grommets / Ventilation tube*
        - Effusion that's not clearing up
            - 8-12 weeks
        - Hearing loss / Poor speech development

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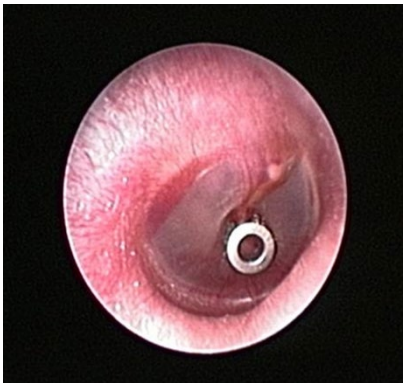
- Associated with repeated AOM episodes
    - ≥3 in 6 months
- Handicapped child
    - Learning disabilities
    - Already a hearing loss



Right ear with a grommet in place.

Acute otitis media (AOM)

- Easier to diagnose
    - **Unfortunately, commonly over / missed diagnosed**
- Usually, a normal child which develop severe pain and high fever in a short period
- Common symptoms include
    - Otalgia (holding, tugging, rubbing of ear)
        - The very young can't localize the pain
    - Mostly unilateral
    - Hearing loss
    - Fever, nausea, and dizziness
    - Rarely children present with otorrhea without any other symptoms
- You need to visualize the tympanic membrane
    - Red / Puss
    - Oedematous
    - Immobile
    - Bulging

Right ear with a bulging TM and obvious pus (yellow) behind the TM.

- It is estimated that 75% of children will have at least one episode of AOM by the age of three
- Mostly due to viruses, and bacterial AOM has a high spontaneous resolution rate

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- Therefore, anti-biotics are deferred for 48 hours except for
    - Bulging tympanic membrane and fever > 38^0C (controversial)
    - The very young (< 2 years)
    - Immunocompromised
    - Recurrent AOM
    - Symptoms and signs of complicated AOM
    - Pain > 48 hours
    - Limited access / follow up capability (controversial)
- It has been proven in large meta-analysis that pain relief is the most important aspect in the treatment of AOM

AB guidelines for AOM

- High incidence of β-lactamase producing *Haemophilus influenza*
- Therefore, consider Amoxicillin-clavulanate as first choice in stead of amoxicillin
- No β-lactam allergy
    - Children
        - (Amoxicillin 80-90 mg/kd/d in two divided dosages x 5-7/7)
        - Amoxicillin-clavulanate 90 mg/kg/d in two divided dosages x 5-7/7
        - Cefuroxime 30 mg/kg/d in two divided dosages x 5-7/7
        - Cefpodoxime 16 mg/kg/d in two divided dosages x 5-7/7
    - Adults
        - (Amoxicillin 1 gr q8h po x 5/7)
        - Amoxicillin-clavulanate 1-2gr bd po x 5/7
        - Cefuroxime 1000 mg q12h po x 5/7
        - Cefpodoxime 400 mg q12h po x 5/7
        - Rarely Ceftriaxone 50 mg/kg OD IM/IV x 3/7
- B-lactam allergy
    - Children
        - Azithromycin 10 mg/kg OD po x 3/7
        - Clarithromycin 15-30 mg/kg/d in two divided dosages x 5/7
        - Erythromycin 40 mg/kg/d in four divided dosages x 5/7
        - Rarely Levofloxacin 20 mg/kg/d in two divided dosages x 5/7
    - Adults
        - Levofloxacin 500 mg q12h po x 5/7
        - Moxifloxacin 400mg OD po x 5/7

Complications

- Infective
    - Treatment failure
        - 48 hours
        - Change antibiotic
        - Grommets – drainage
    - Mastoiditis ± abscess formation
    - Other Abscesses – soft tissue / brain
    - Brain – meningitis / sigmoid sinus thrombosis
    - Skull base – petrositis
    - CHRONIC OTITIS MEDIA
- Non-infective

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- 1/3 can develop an ear drum perforation despite antibiotics
  - Puss draining with immediate relief of pain
  - Clean ear canal and use topical drops
- Damage in middle ear cavity
  - Ossicles, NVII, Labyrinth, Sclerosis, Adhesions, Adhesive ME
- Sensori-neural hearing loss and conductive hearing loss

Differential diagnosis between diffuse OE and AOM

	Otitis externa	**Acute otitis media**
Prodrome	Local risk factor	Upper airway infections
Pain	Extremely painful	Moderate to severe pain
Localization	Painful when pressing on tragus	Can be painful over mastoid process with skin changes
Otorrhoea	Rarely otorrhoea Minimal if present	Can have otorrhoea only if tympanic membrane ruptures Puss / mucoid
Tympanic membrane	External ear canal swollen - can't visualize TM	Can see tympanic membrane but it's abnormal

Mastoiditis

- Complication of AOM
- Can develop a subperiosteal abscess the presents with
  - Skin changes
  - Tenderness over mastoid
  - Loss of skin crease
  - Pinna displaced down and out
  - Fluctuation
- Start with antibiotics and refer to your ENT colleague

Picture of a left ear with signs of a subperiosteal abscess.

Chronic otitis media (COM)

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Classification (simplified)

- Chronic suppurative otitis media (CSOM)
- CSOM with a cholesteatoma
- CSOM due to tuberculosis
- Healed COM
    - Tympanosclerosis
    - Healed perforation
        - Thinning and/or local or generalized opacification of the pars tensa without perforation or retraction

Classification (more complex)

- Inactive mucosal COM = **Dry perforation**
    - Permanent perforation of the pars tensa but the middle ear mucosa is not inflamed
- Active mucosal COM = **Chronic suppurative OM**
    - Permanent defect of the pars tensa with an inflamed middle ear mucosa which produces mucopus that may discharge
- Inactive squamous COM = **Retraction pockets**
    - Retraction of the pars flaccida or pars tensa (usually posterosuperior) which has the potential to become active with retained debris
- Active squamous COM = **Cholesteatoma**
    - Tympanic membrane perforation with skin that has grown into the middle ear cavity (cholesteatoma)
        - This is mostly due to retraction pockets, but can be due to perforations, operations, metaplasia, or congenital
    - There is retained squamous epithelial debris (keratin) and is associated with inflammation and the production of foul smelling mucopus, and often a granuloma / granulation tissue

	Inactive	**Active**
Mucosal	Perforation	Chronic suppurative otitis media
Squamous	Retraction pockets	Cholesteatoma

Inactive mucosal COM = Dry perforation

- Presents with
    - Conductive hearing loss
    - Mostly dry
        - Can have episodic discharge
    - Asymptomatic
- Refer
- Surgical repair preferred in most cases
    - Tympanic membrane reconstruction
    - Depends on
        - Age
        - Hearing loss
        - Status of opposite ear

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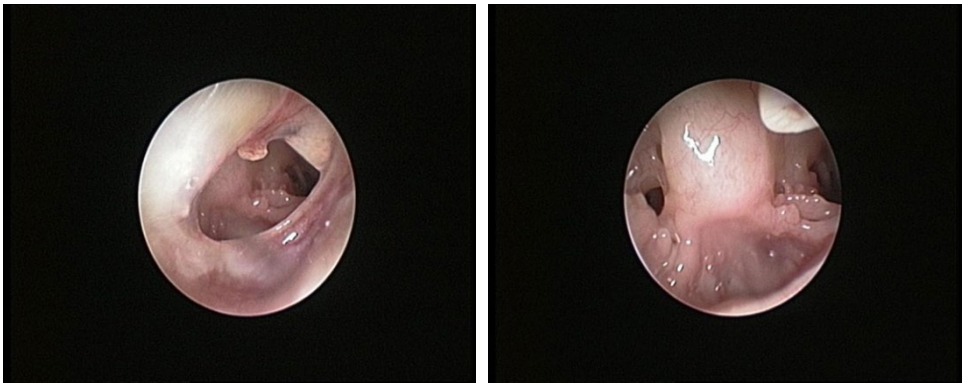
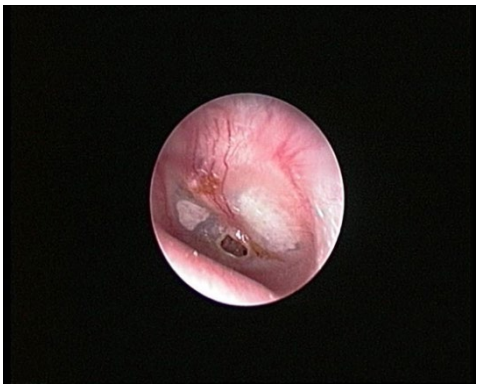


Same ear demonstrating a perforation in the left TM and a close up through the perforation with the promontory and floor of the middle ear.



Small (pinhole) perforation anterior to the malleus in the left ear.

Inactive squamous COM = Retraction pockets

Retraction of most of the pars tensa.

Active mucosal COM / CSOM

Left ear with a central perforation and pus draining.

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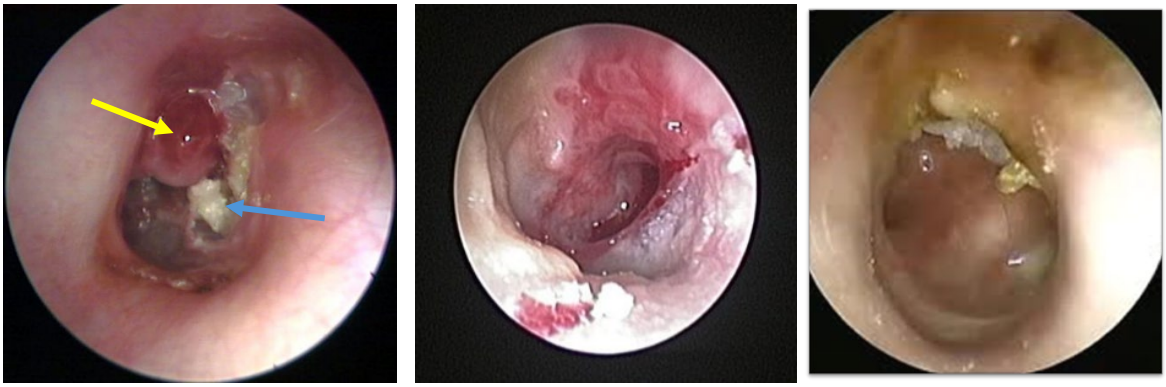
Active squamous COM / CSOM with Cholesteatoma



Three pictures of CSOM with cholesteatoma. The left picture shows the classical sentinel polyp (yellow arrow) and keratin (blue arrow).

Symptoms and signs of CSOM / Cholesteatoma

- Chronic otorrhoea
- Hearing loss
- Vertigo
- NVII paralysis
- Granulation in EAC
- Foul smelling otorrhoea
- Keratin visible (looks like dandruff)
- Not responding to treatment

Treatment of COM

- **CSOM**
  - Ear toilet
  - Topical ofloxacin / steroids or boric acid
  - Targeted anti-biotics according to MCS
  - Surgery
  - Optional for CSOM
- **Cholesteatoma**
  - As for CSOM, except always for surgery

Reasons being that the cholesteatoma sac keeps on expanding and will erode through adjacent structures like

- Ossicles with CHL
- Tegmen with brain problems
- NVII
- Otic capsule with vertigo

Traumatic perforation

- History
  - Trauma history
  - Bloody discharge
  - Hearing loss
  - Minimal balance problems

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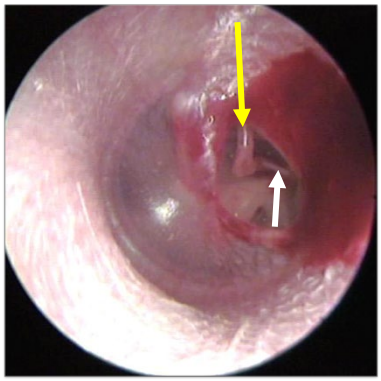
- Treatment
    - Conservative
    - Majority will close within 4 weeks
    - Assault case
        - Photo documentation
        - Hearing test



Traumatic perforation of the right TM and blood in the external ear canal. Incus (yellow arrow) and stapes tendon (white arrow) are visible through the perforation.

Hemotympanum

- Follow trauma
- Treatment
    - Wait
    - Grommet

Left ear with blood (old) behind TM.

TB

- Multiple perforations
- Exposed bone
- NVII palsy / paralysis
- Not responding to treatment
- Gene Xpert on discharge

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Left ear with two perforations in the tympanic membrane.

HIV and the ear

- External ear canal
  - Otitis externa
  - Seborrhoea dermatitis
- Middle ear
  - Otitis media with effusion
  - Acute otitis media
  - Chronic otitis media
- Inner ear
  - Sensorineural hearing loss
  - NVII

Inner ear

Pathologies include

- Cochlea
  - Nerve deafness
  - Acute idiopathic nerve deafness (AIND)
  - Tinnitus
- Vestibulum
  - Vertigo
  - BPPV
  - Meniere's disease
  - Vestibular neuritis
- Other
  - NVII palsies / Paralysis
  - Trauma

Deafness

- Conductive
  - External ear canal
  - Tympanic membrane
  - Ossicles
  - Middle ear

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- Nerve / Sensori-neural
    - Cochlea
    - Nerve
    - Brain
- Mixed
    - Tuning fork
- Rattle test
- Hearing test

Deafness in children (see hearing loss chapter)

- Can be classified as congenital or acquired
- Incidence of congenital hearing loss
    - 3/1000
- Screening – Otoacoustic emissions **(OAE)**
- Neonatal hearing screening may not identify children with progressive hearing loss, which accounts for 15–20% of preschool children with sensorineural hearing loss
- When these children and those with late onset hearing loss are taken into account, the overall incidence of pediatric SNHL is probably 50% higher than the figures quoted above

Hearing loss in adults

- Extremely common
- As a general rule one will lose 1 dB per year after the age of 35
- Causes
    - Age related
    - Noise exposure
    - Medications
- Refer semi-urgently if
    - **Unilateral with no other reasons to explain it**
    - **Associated with balance problems**
    - **Fluctuating**
    - **Associate with pulsatile tinnitus**
- Audiologist or ENT
    - Both

Acute idiopathic nerve deafness (AIND)

- Definition
    - 30 dB loss in three consecutive frequencies in less than 3 days
- How does it present?
    - Sudden “blocked” feeling in one ear
    - THE PATIENT DOES NOT TELL YOU THAT HE / SHE CAN’T HEAR
    - Patient tries to open ear by
        - Fiddling with finger in the ear canal
        - Valsalva / popping the ear
- Commonly missed diagnosed with “middle ear effusion” or “acute otitis media”

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    - Exclude middle ear effusions in your practice by asking the patient to Valsalva and seeing the movement of the tympanic membrane (or pneumo-otoscopy)
        - Examination of the ear will be normal
- Caused by a decrease in the blood supply to the inner ear or viral attack
- Needs urgent treatment
    - Oral steroids – 1 mg/kg for 7-10 days and then taper it over next 7-14 days
    - Anti-viral only if early in the disease (48 hours)
    - Refer to ENT. They might consider
        - Intra-tympanic steroids
        - MRI scan

Tinnitus

- Extremely common
- Can be divided into
    - Subjective / Objective
    - Constant / Episodic
        - If episodic
            - Pulsatile or non-pulsatile
    - Pitch
        - High / Middle / Low
    - Side
        - Unilateral / Bilateral / Whole head
    - Aetiology
        - Idiopathic versus definite cause
- In general
    - Mostly subjective
    - Mostly idiopathic
        - Implies cochlea / nerve / brain
- Can arise from external or middle ear pathologies like wax or middle ear effusions
    - ENT examination can exclude external or middle ear as a cause in the majority of patients
- Refer if
    - **Unilateral**
    - **Pulsating**
    - **Associate with other inner ear symptoms such as hearing loss and / or balance problems**
    - **Other central nervous symptoms**

Vertigo

See separate chapter

NVII palsies / paralysis (see NVII chapter)

- Most common pathologies are
    - Viral

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    - Traumatic
- Always try to differentiate between
    - UMN vs LMN
    - Degree of involvement
    - Complete vs Incomplete vs Single affected branch
    - Other CN involvement or neurological fallout
- Always also examine
    - Middle ear status
    - Parotid status
- Always provide eye protection
- Document progression or resolution

Bell's palsy

- Etiology = Idiopathic
    - Theories
        - Viral (Herpes simplex)
        - Ischemia
        - Auto-immune
- Pathophysiology = Entrapment Neuropathy
- Prognosis = very good
    - Complete paralysis= 75% will fully recover
    - Incomplete paralysis = 99% will fully recover
- Symptoms
    - LMN Affecting all branches
    - No other CNS diagnosis
    - No other cerebro-pontine angle lesions
    - No other ear or parotid lesions
    - Sudden onset (within 3/7)
    - Maximal weakness by 3/52
    - Improvement by 3/12
- Variable
    - Viral prodrome
    - Facial / Retro-ocular pain
    - Hyperacusis
    - Facial numbness
    - Dysgeusia
- Management
    - Eye care
    - Steroids
        - 1mg/kg for 10 days and taper up to 3 weeks
    - Addition of an antiviral
        - No evidence to support this
    - Surgery
        - In general, no role
- Follow up
    - Document degree (House Brackmann scale)
- Referral
    - If not improving at 4 weeks despite steroids

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- If fluctuating

Ramsey Hunt Syndrome

- A.K.A Herpes zoster oticus
- Definition
  - Herpetic vesicular rash of concha, EAC, Pinna
  - Ipsi-lateral CN7 LMN paralysis
- Pathology
  - Reactivated VZV ganglionitis
    - Geniculate ganglion
- Prognosis much poorer than Bell's palsy
  - Complete Palsies = 10% will fully recover
  - Incomplete Palsies = 66% will fully recover
- Clinical picture
  - Deep seated otalgia
  - Vesicular rash
  - Poly cranial nerve neuropathy
    - CN7, CN8, CN5
- Treatment
  - Acyclovir
  - Prednisone
  - Analgesia
  - Hearing and Vertigo rehabilitation

Traumatic CN7 injury

- Blunt vs Penetrating vs Iatrogenic
- Rarely isolated due to force needed to injure
- Big Question = Immediate vs Delayed onset
- Treatment
  - Life threatening injuries get preference
  - Immediate onset
    - Warrant early ENT referral for assessment
      - We will consider HRCT of temporal bone
      - Nerve decompression
  - Delayed onset
    - Steroids

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