EARACHE

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Presenter Disclosure

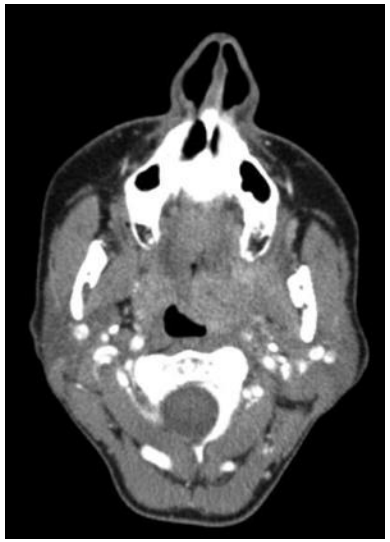
- **Presenter:** Hassan Abdelmotleb, Hassan
- **Relationships with commercial interests:**
  Grants/Research Support:
  NOAMA grant PI for the clinical research: nasopharyngeal bacteriology in children
  Speakers Bureau/Honoraria: None
  Consulting Fees: None
  I will mention some off label use of medications - surgical equipment and instruments in this presentation for which I received no financial or in-kind support from anyone

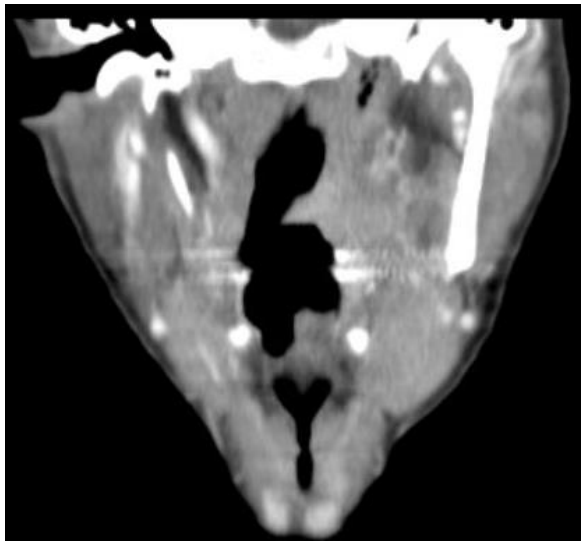
Case HC [Feb.2013]

- Referral "persistent S.O.M."
- 51 years female, smoker, otherwise healthy, no family Doc
- Ranked as regular consult
- Left earache [Gradual onset neck discomfort since Dec. 2012]
- No significant nasal symptoms
- Three months of nasal steroids with no relief
- Symptoms exclusively unilateral
- Unremarkable otoscopy – non-occluding wax
- Painless neck swelling

Examination

- Ulcerative lesion left palatine tonsil
- Tender neck node
- Bx: !





T3 N2, squamous cell carcinoma of the left tonsil.

Chemoradiation therapy, 70 Gy in 35 fractions, completed August 2013.

Objectives

- ***Primary or secondary Otalgia?***
- ***Anatomy of ear pain***

Diagnostic challenges

Clinical – Otoscopic – Radiological

Otitis Externa/media/effusion

Guidelines to treat otitis externa – media - effusion

Management of certain pathologic entities

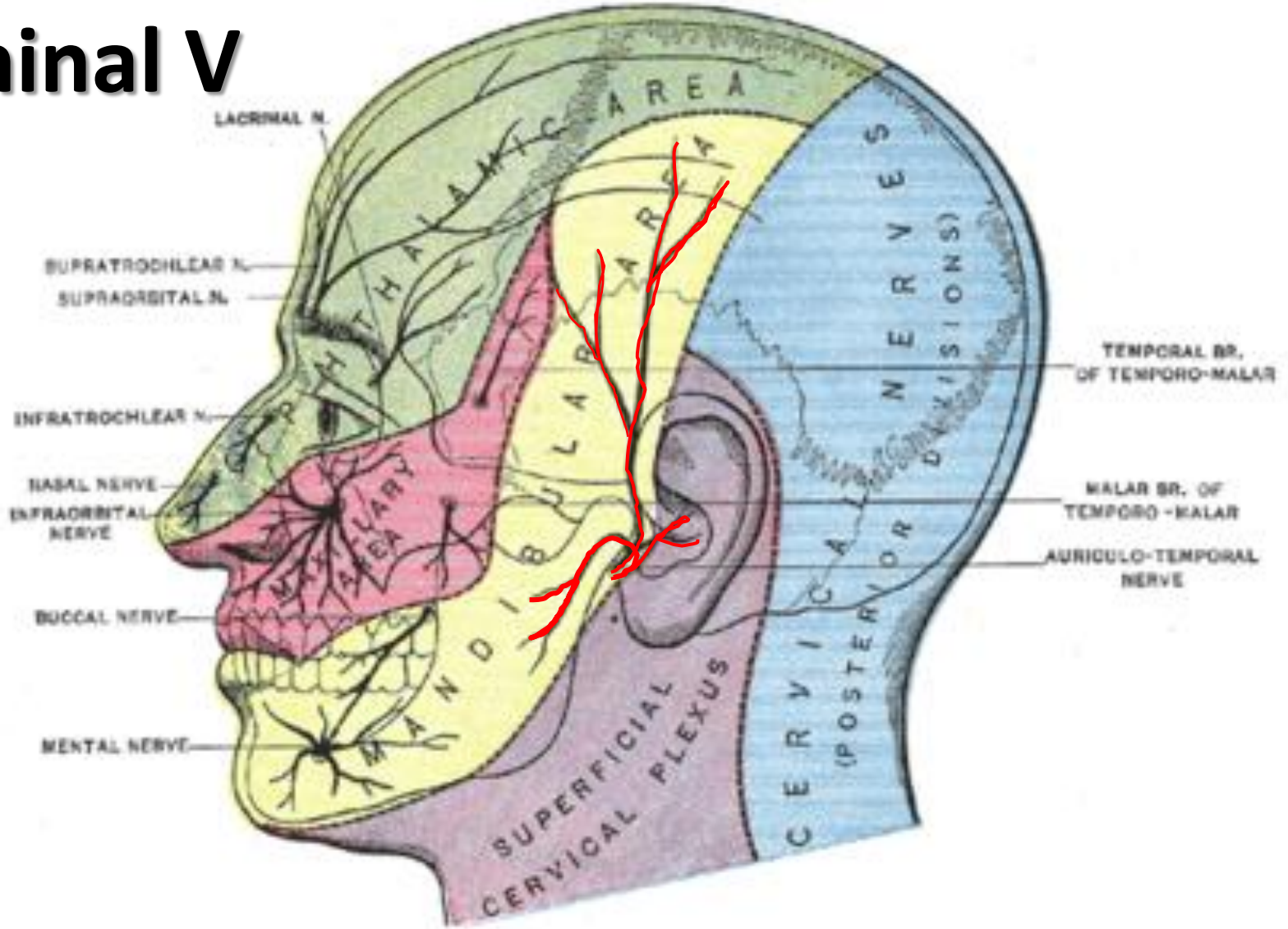
cholesteatoma and malignant otitis externa

Sensory Innervation

- ***Four cranial nerves***
- ***Upper cervical plexus***
- ***Cervical sympathetic fibers***

Cranial Nerves

Trigeminal V

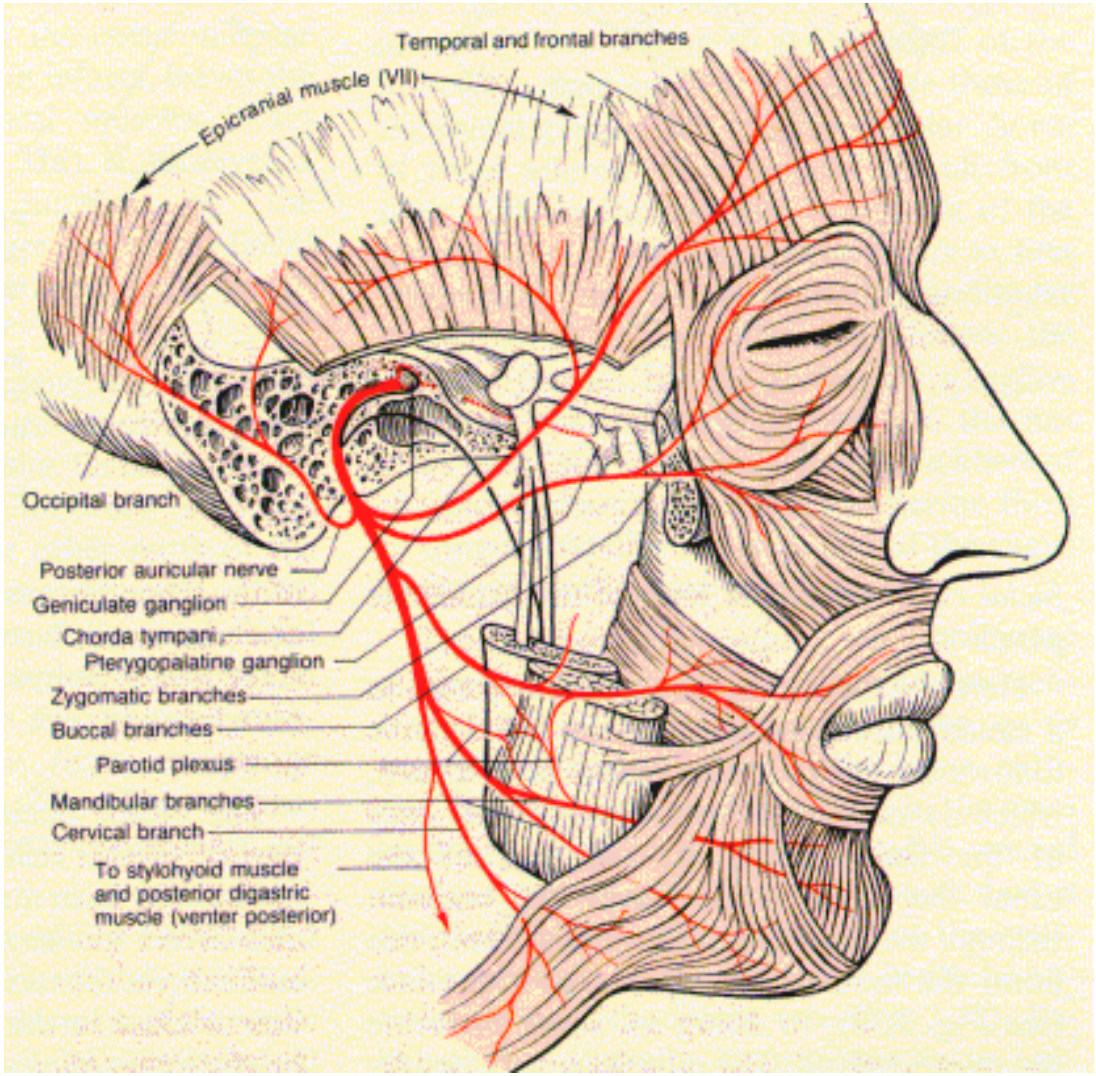


Cranial Nerves

Facial VII

- Mainly motor

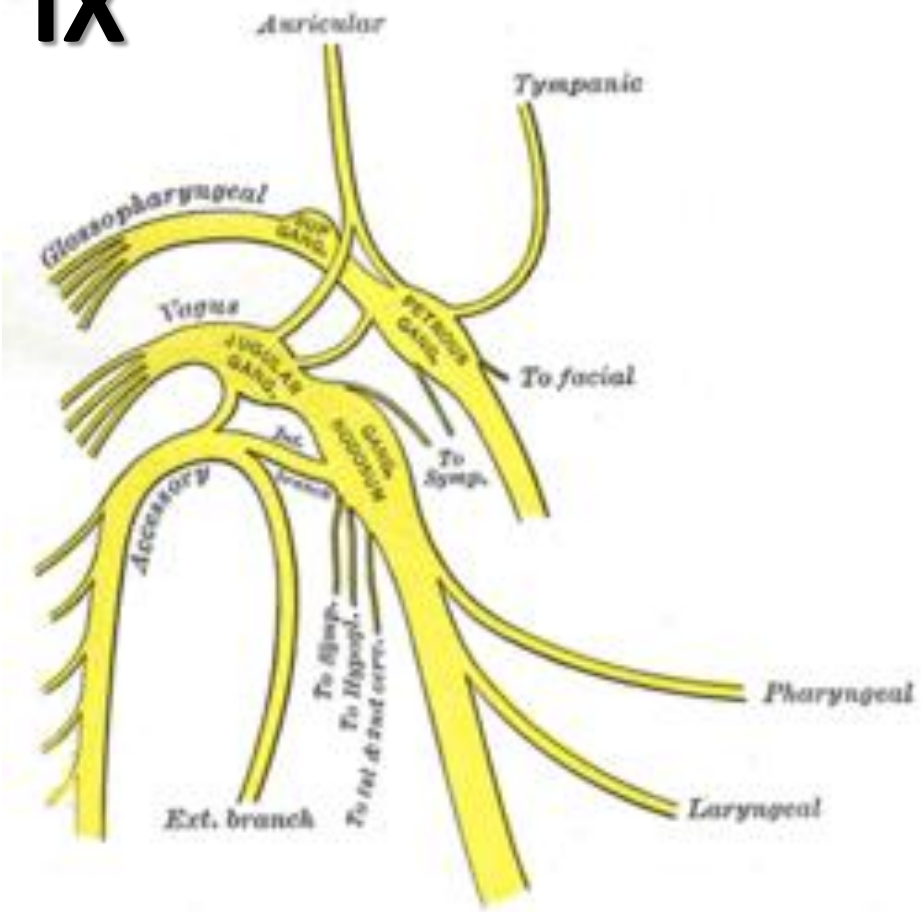
Sensory !!



Cranial Nerves

Glossopharyngeal IX

Vagus X

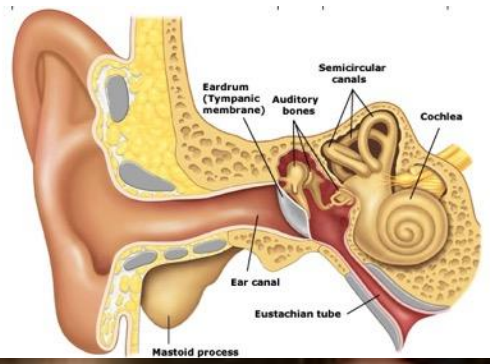


Sensory Innervation

Nerve root	Branches	Parts of ear innervated
C2, C3	Great auricular	Lower half of pinna
C3	Lesser occipital	Upper medial half of pinna
		Skin over mastoid region
V	Auriculotemporal	Upper lateral half of pinna
	(branch of the mandibular division	External auditory meatus
	of the trigeminal nerve)	Tympanic membrane
	Meningeal	Mastoid air cells
	(branch of the maxillary division	
	of the trigeminal nerve)	
VII	Un-named branch	Pinna, external auditory meatus
	Tympanic plexus	Tympanic membrane, middle ear
	Chorda tympani branch	Tympanic membrane
IX	Tympanic (Jacobsen's nerve)	Tympanic membrane
	Tympanic plexus	Middle ear, eustachian tube
X	Auricular (Arnold's nerve)	Concha, external auditory meatus

Primary Otalgia

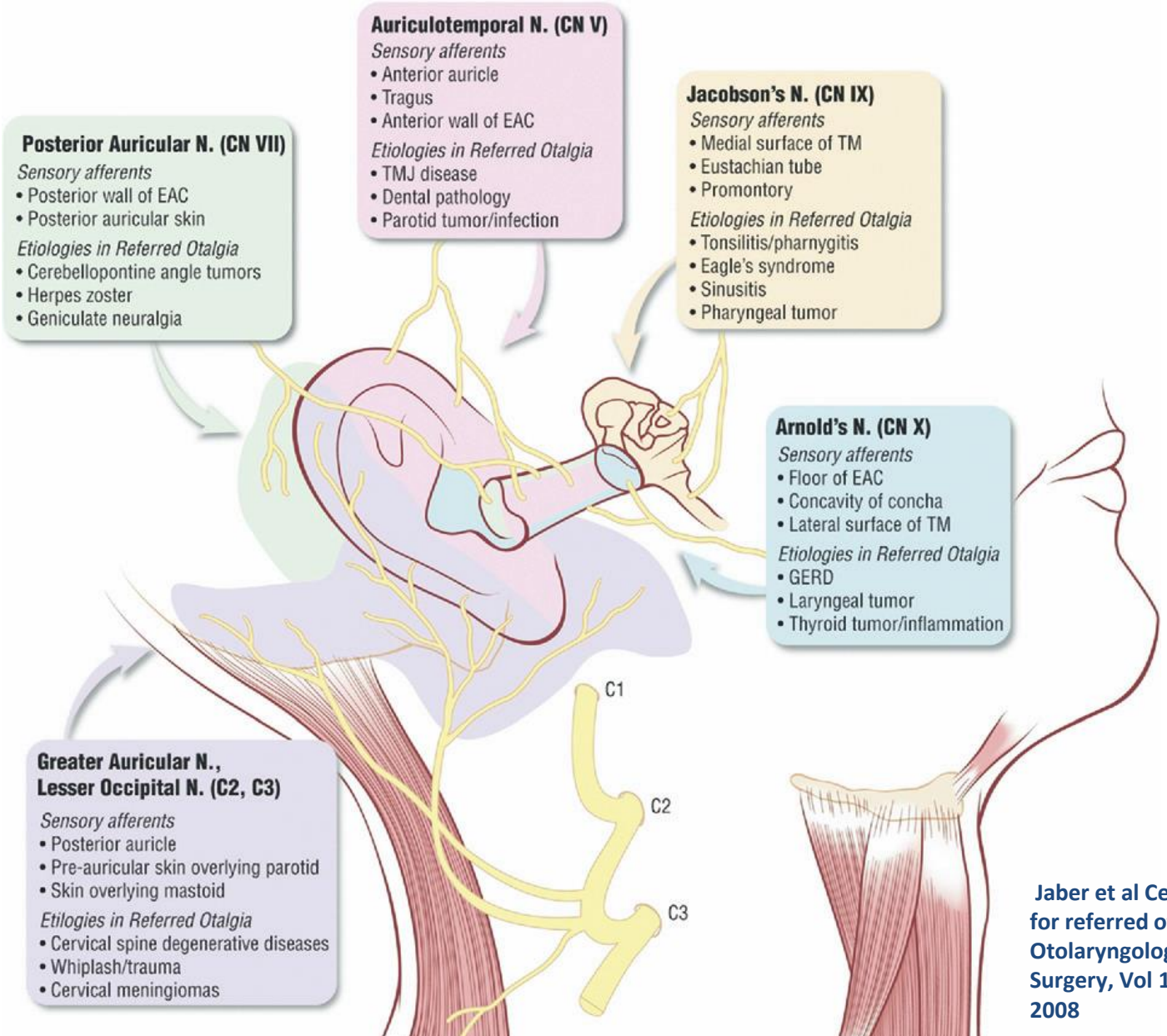
- **Pain from the ear and adjacent structures :**
  - **Auricle [Pinna]**
  - **Tragus**
  - **Preauricular area**
  - **Postauricular [Mastoid]**
  - **Ext. auditory canal**
  - **Tympanic membrane**
  - **Middle ear**
  - **Eustachian tube [upper part]**



Secondary Otalgia

- ***Referred otalgia***
- ***Patients presenting with otalgia in the absence of local pathology***
- ***Non-otological disease***
- ***It occurs in up to 50% of adult patients who consult a general physician for ear pain***
- ***Head, neck and thoracic structures that share a common sensory pathway with the ear***

Innervation and Etiology



Jaber et al Cervical spine causes for referred otalgia Otolaryngology–Head and Neck Surgery, Vol 138, No 4, April 2008

Clinical Evaluation

- **History:**
  - Patient's age
  - Location of pain [Point it with one finger]
  - Pain, discomfort or Tinnitus and Deafness !!!
  - Associated symptoms
  - Radiation of pain
  - Aggravating factors [chewing]

Clinical Evaluation

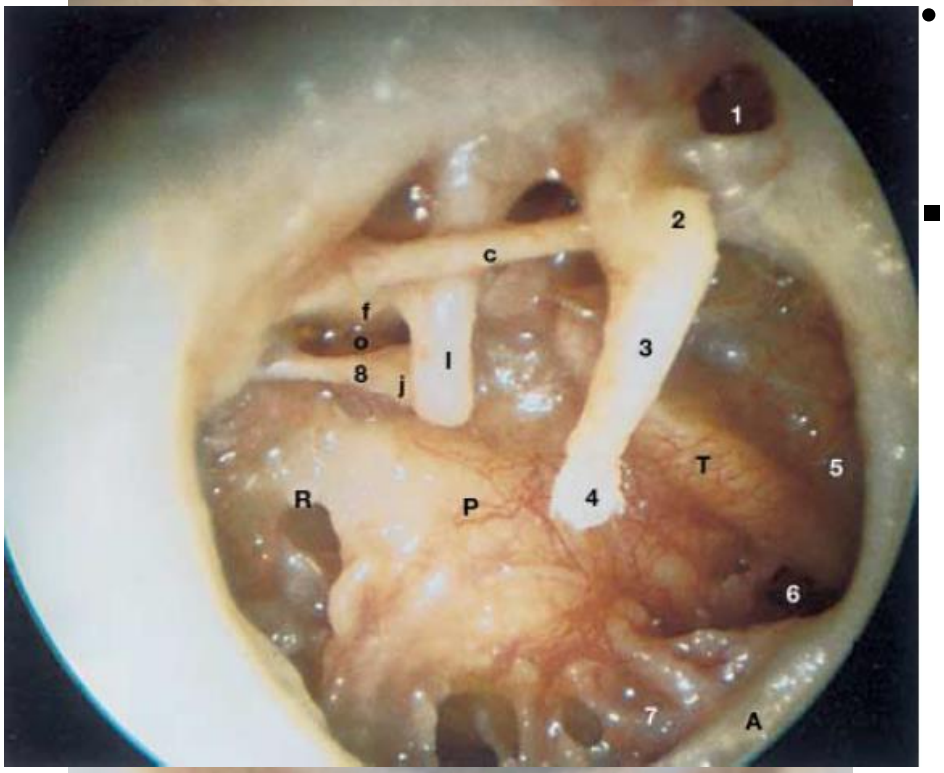
- **Examination:**
  - Otoscopy
  - Nose , TMJ
  - Oropharynx [floor of the mouth, tongue, tonsils]
  - Neck for masses

OTOSCOPIC EXAMINATIONS

Tips and Tricks

- **Only a portion of the membrane will be visible at one time, you must move the otoscope around to obtain a composite view of the entire TM**
- **Don’t be satisfied with partial view**
- **If properly conducted, there should be NO discomfort**
- **Your goal: TM is WNL or abnormal.**

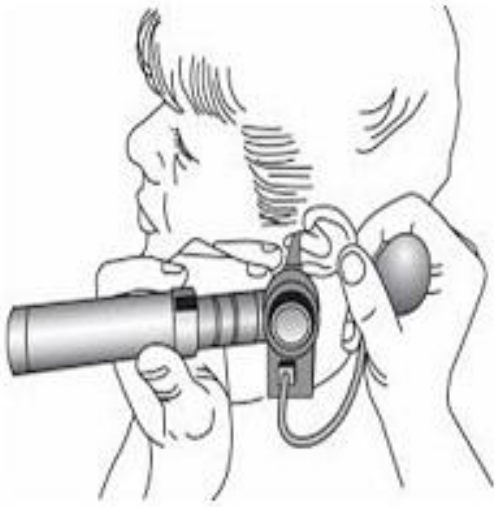
Normal Findings



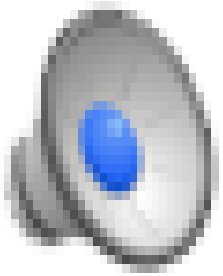
- Canals clear, although some cerumen normal. However, cerumen should not be occlude more than 50% of TM
- Tympanic membrane landmarks
  - TM translucent, healthy appearance
  - Cone of light spreading from the center of tympanic membrane outward to the edge of the membrane
  - Lower end of the manubrium of the malleus attached to TM at umbo

OTOSCOPIC EXAMINATIONS (Cont.)

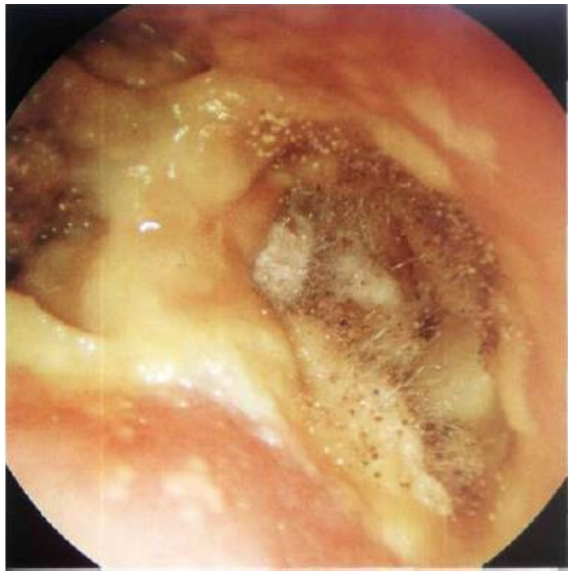
Examination Method

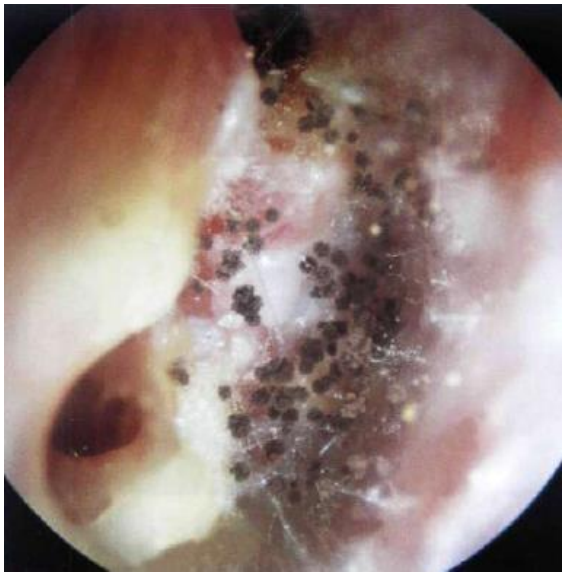


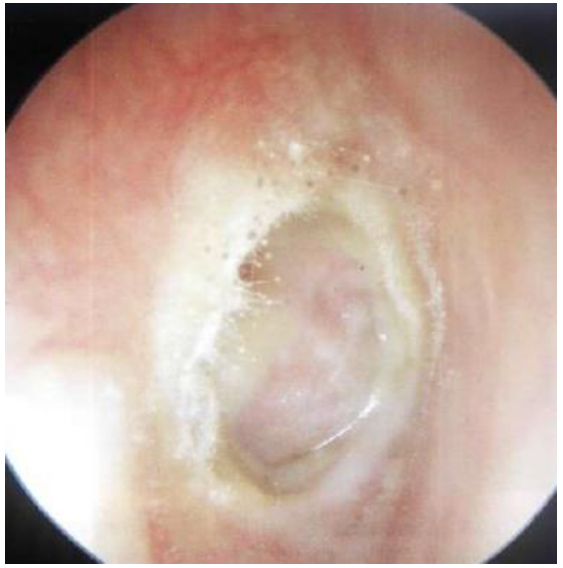
- Pneumatic Otoscopy allows determination of the mobility of a patient's tympanic membrane in response to pressure changes
- Pneumatic otoscopy has been found to have a high sensitivity and specificity for diagnosing middle ear effusion

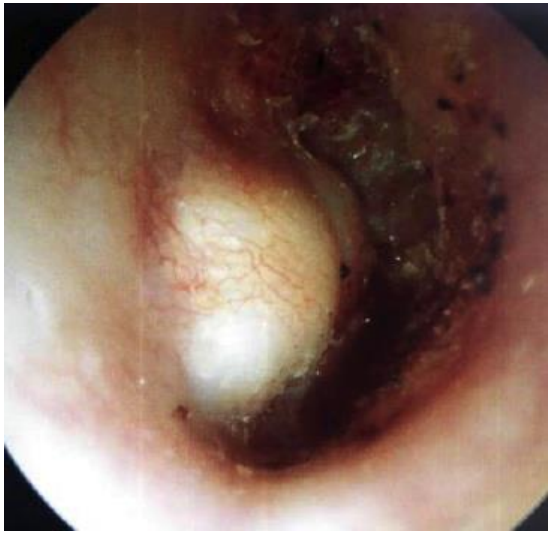


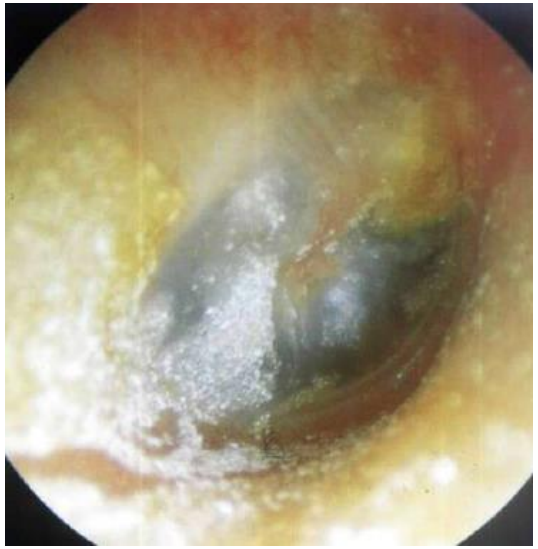
Abnormal Findings

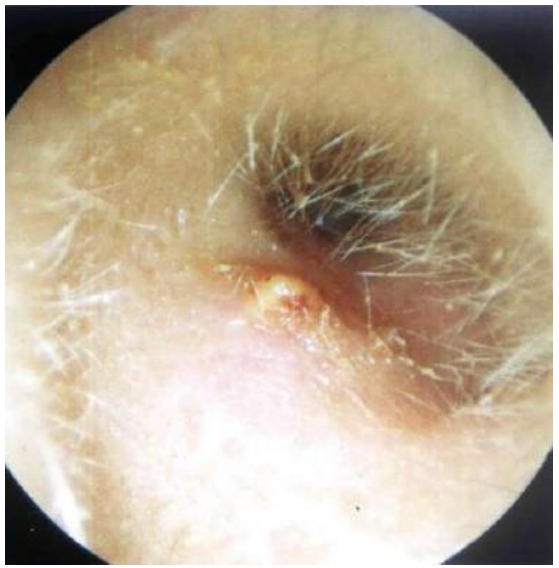












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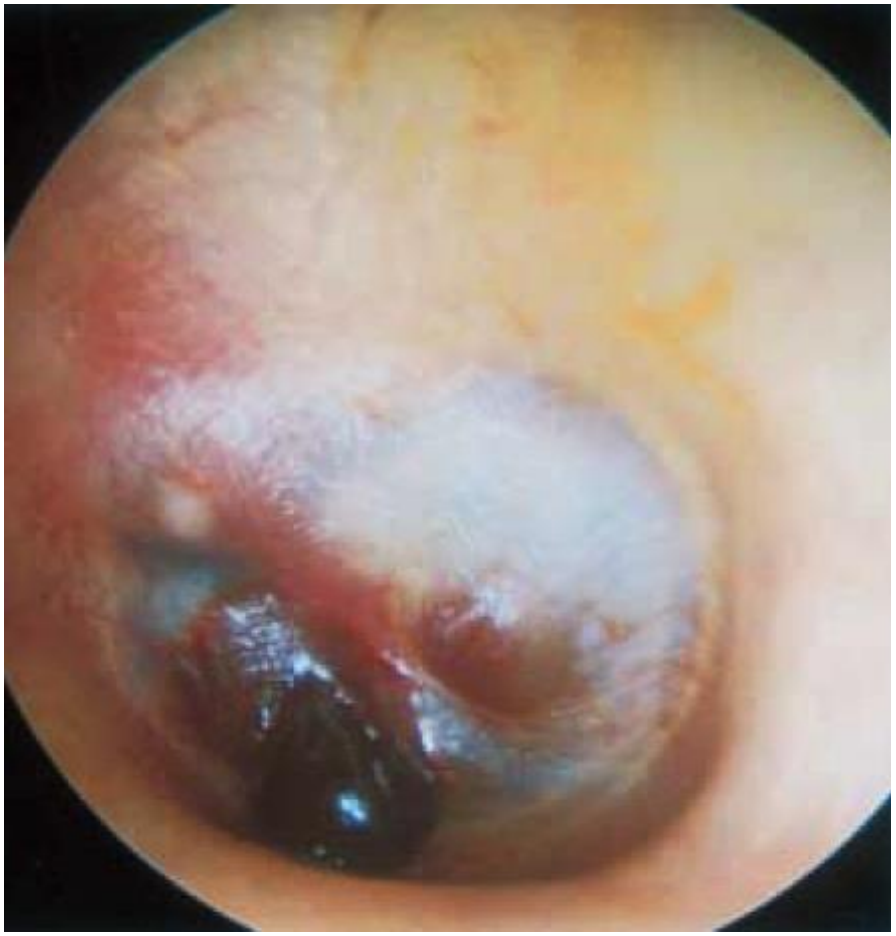

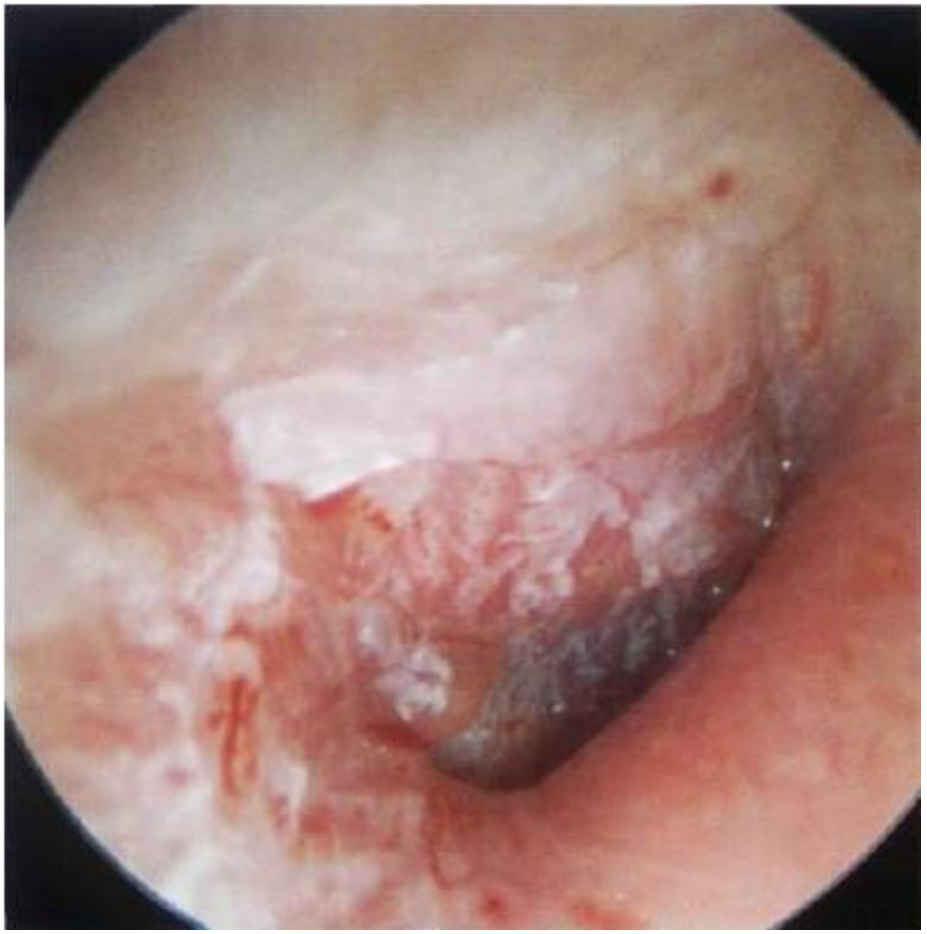

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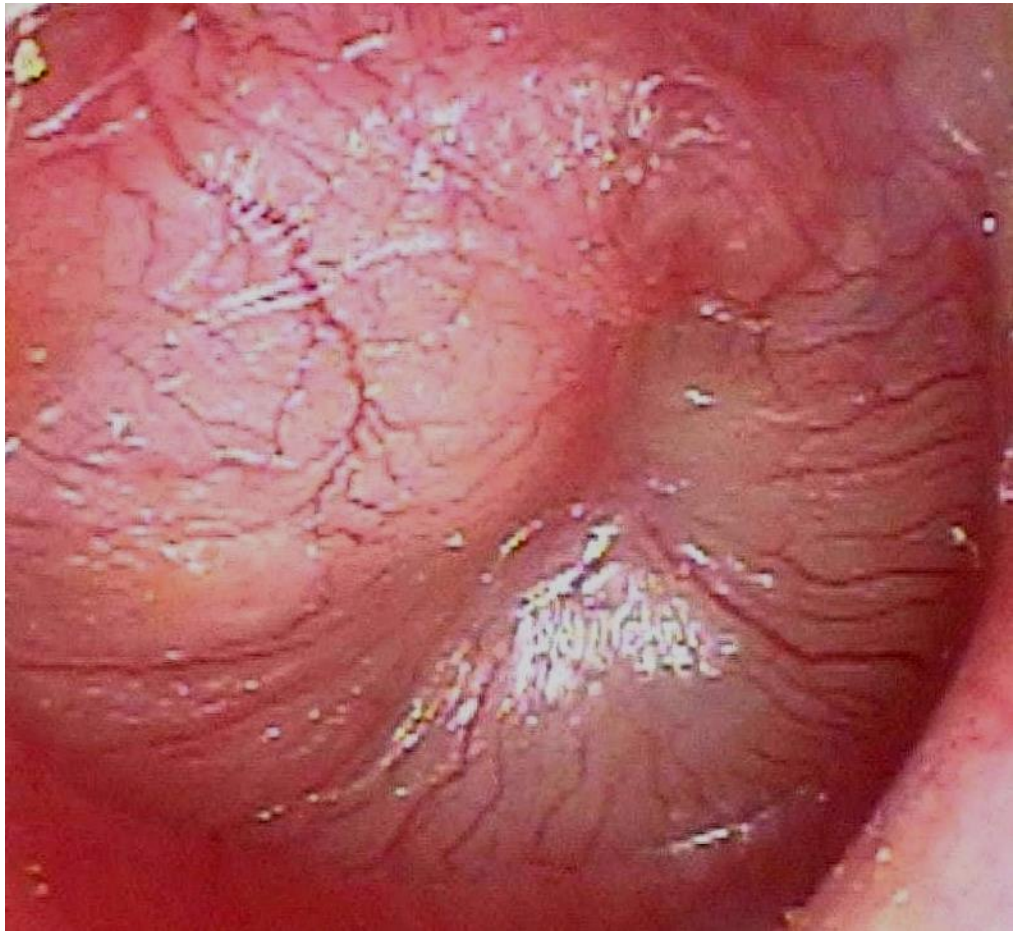

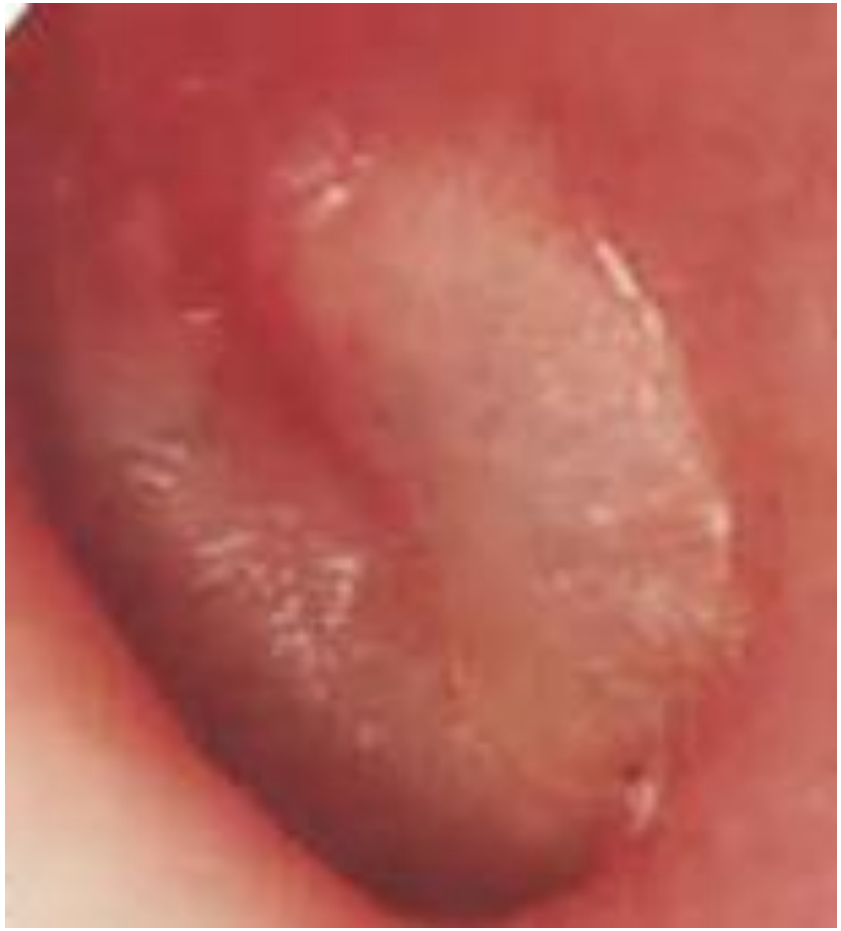

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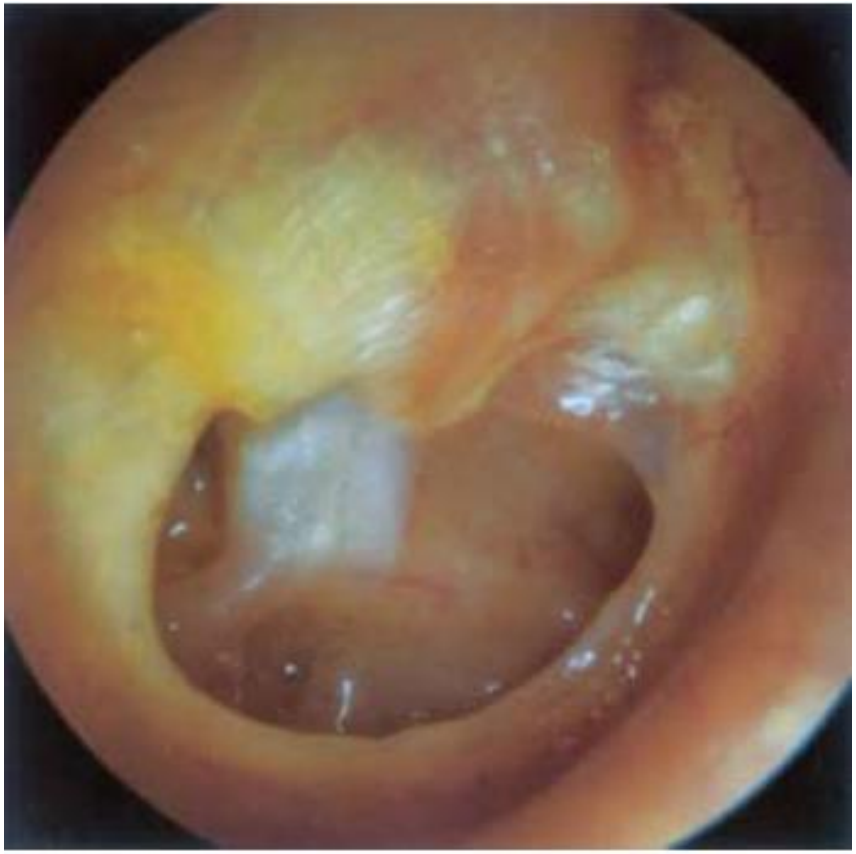

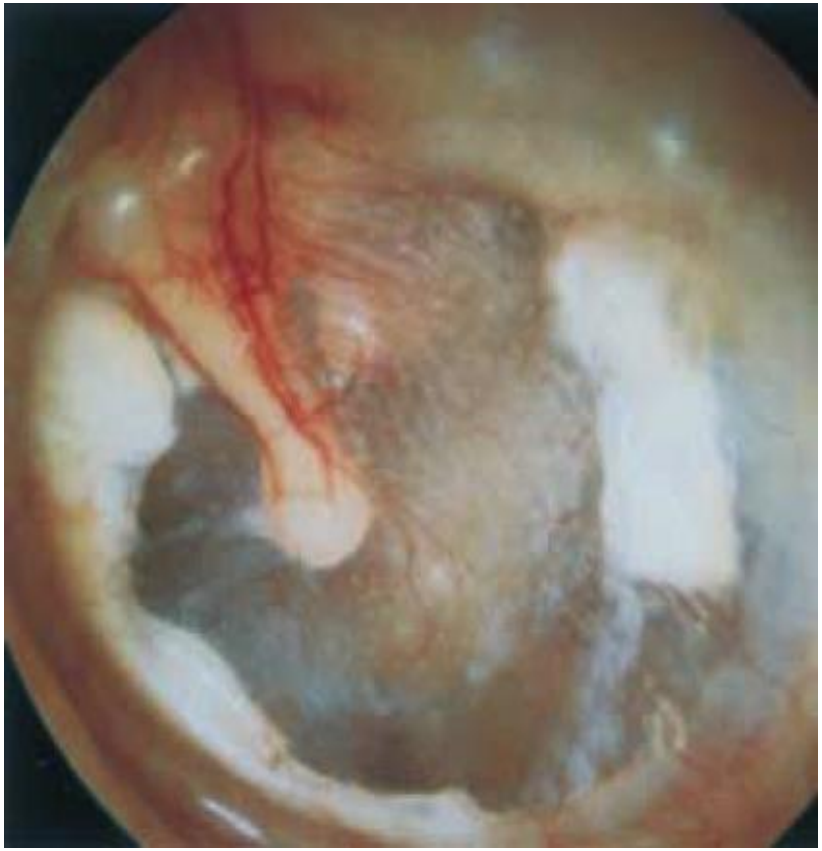

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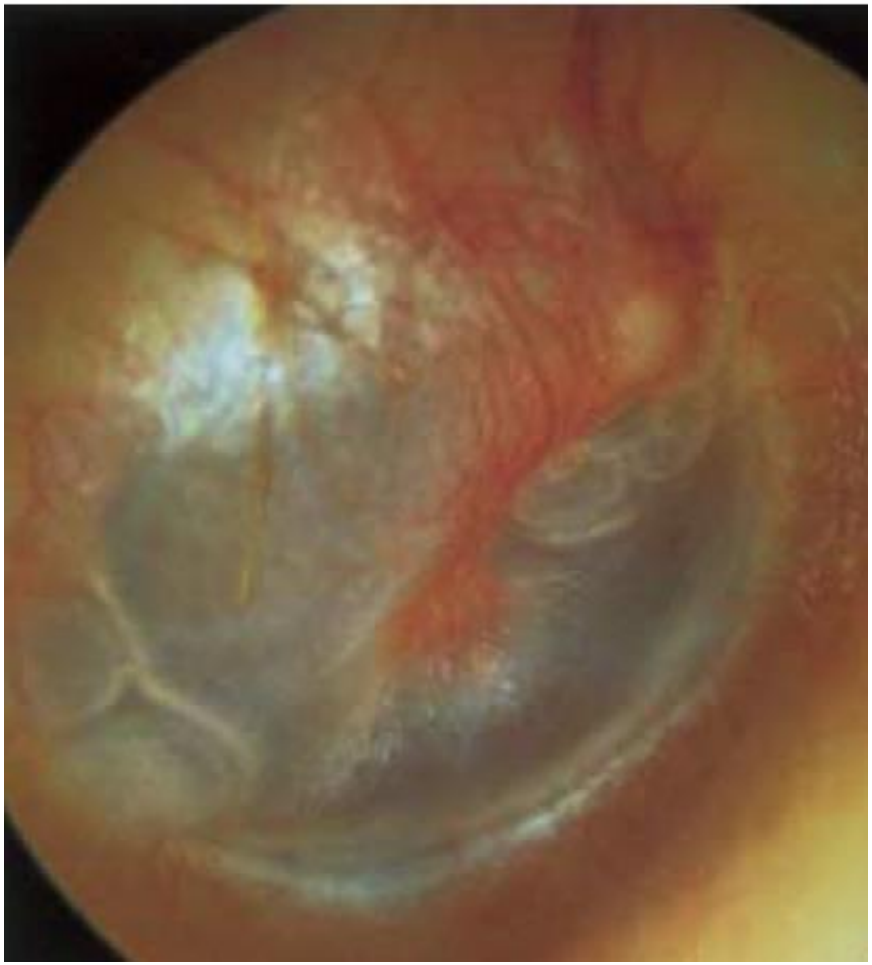

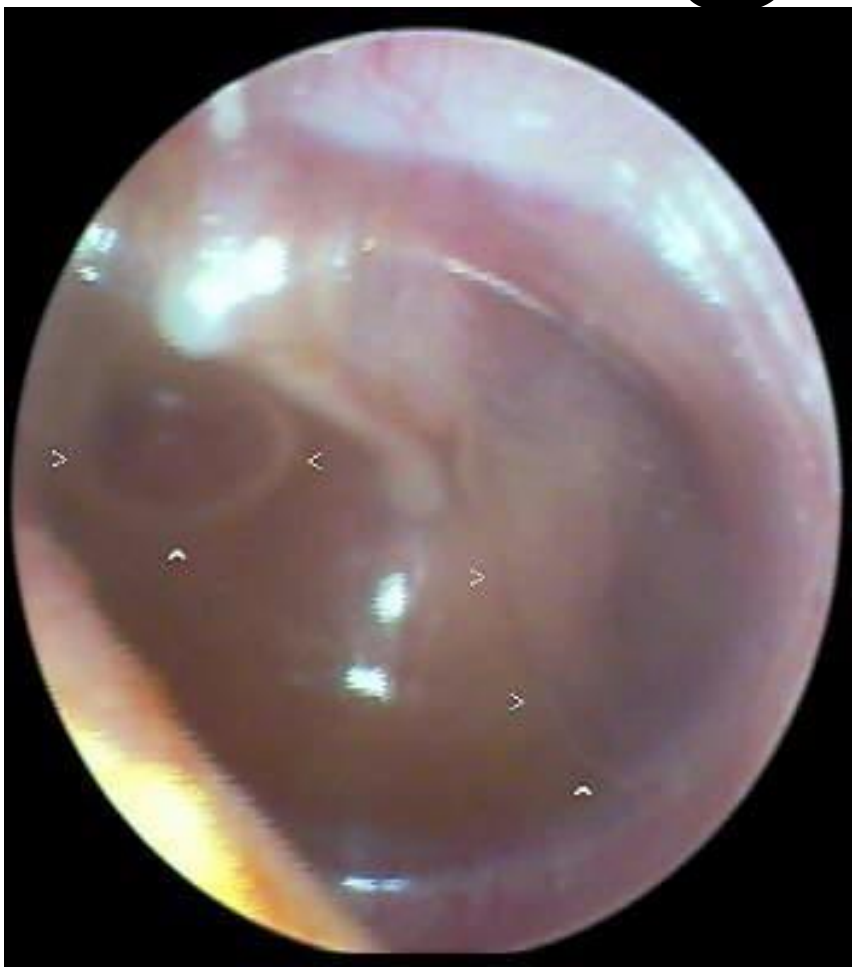

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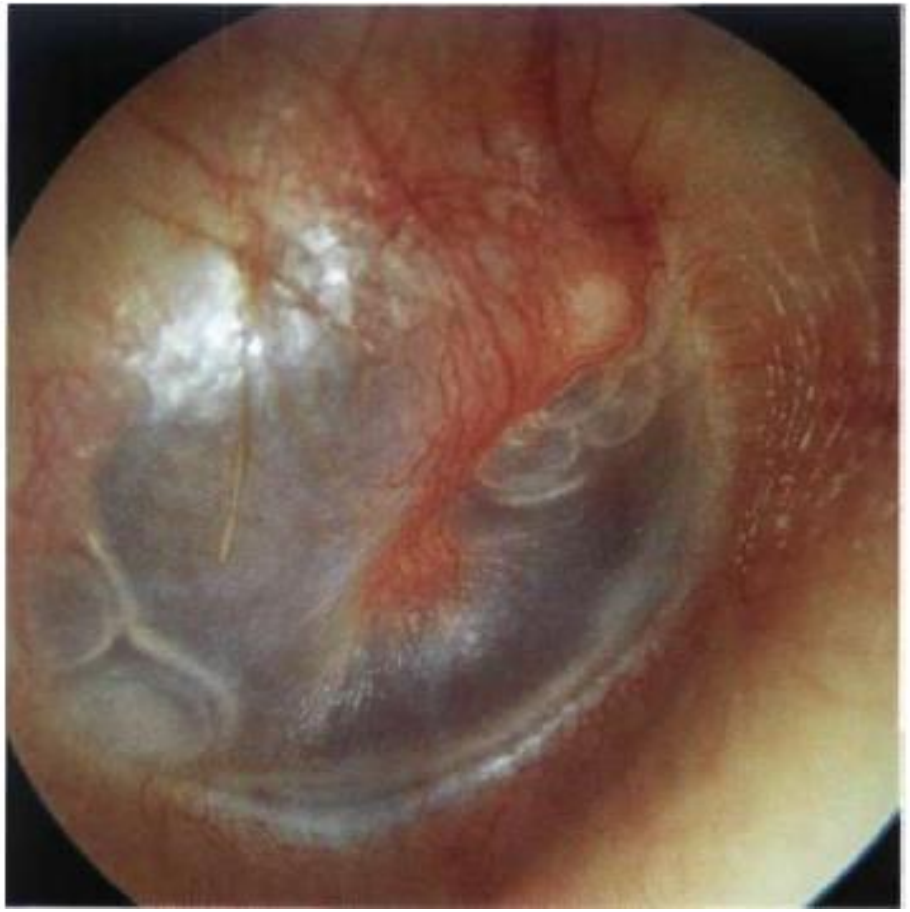

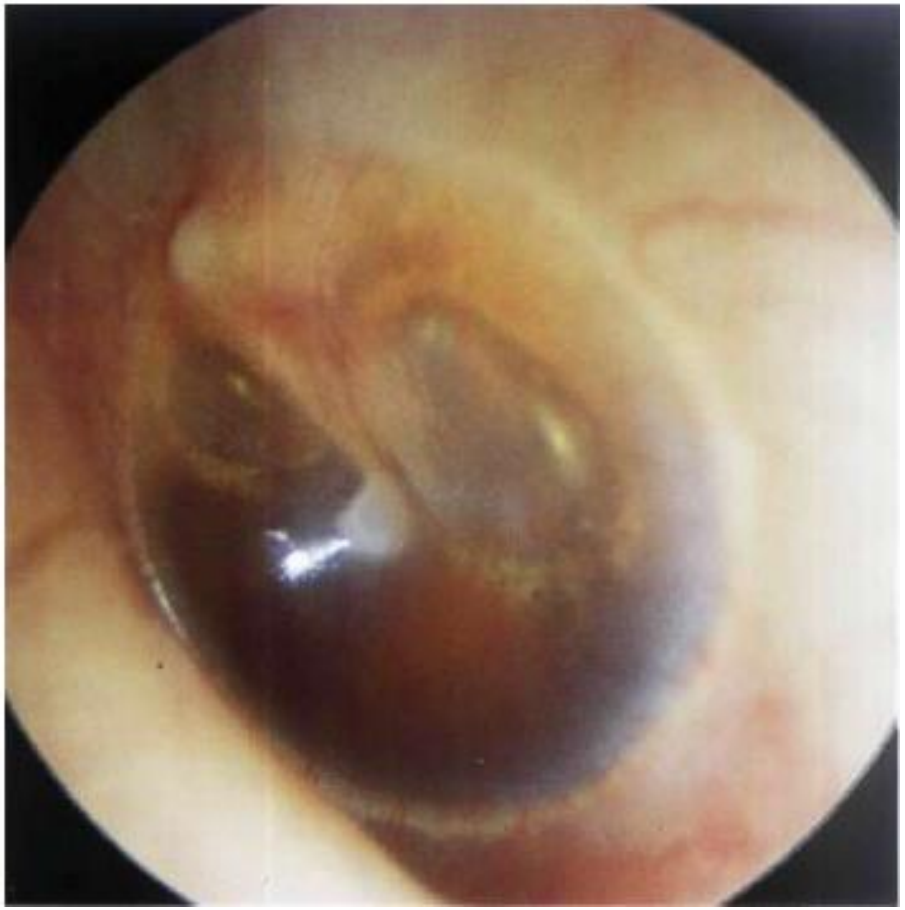

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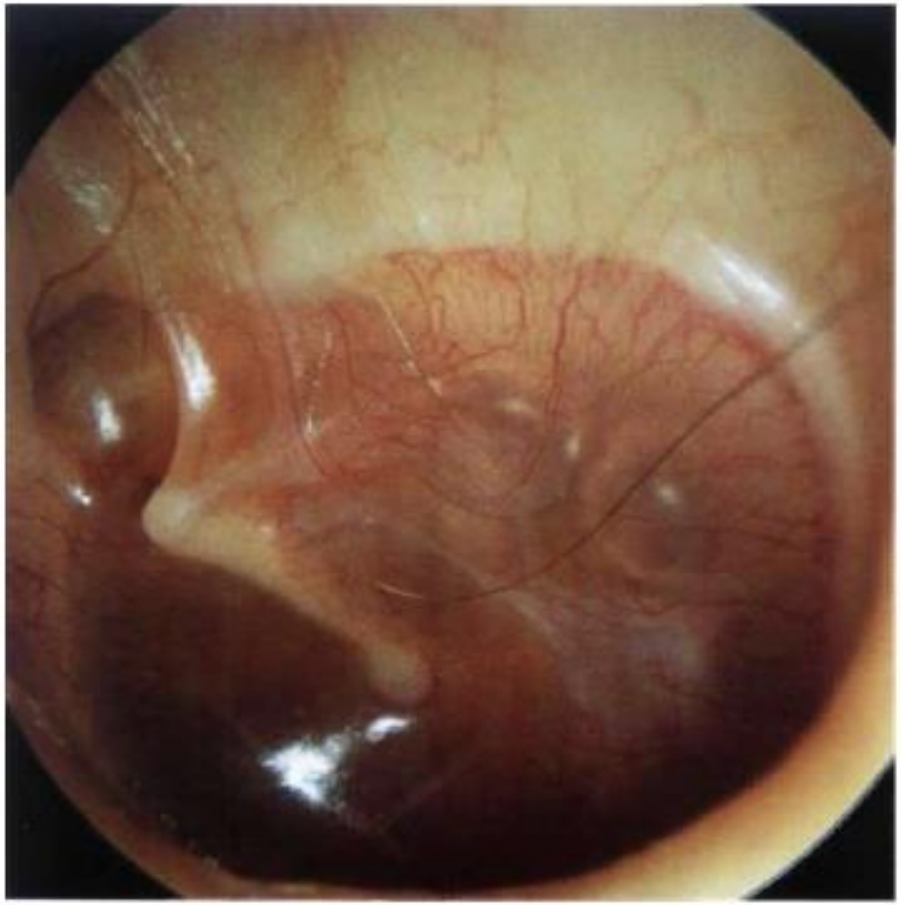

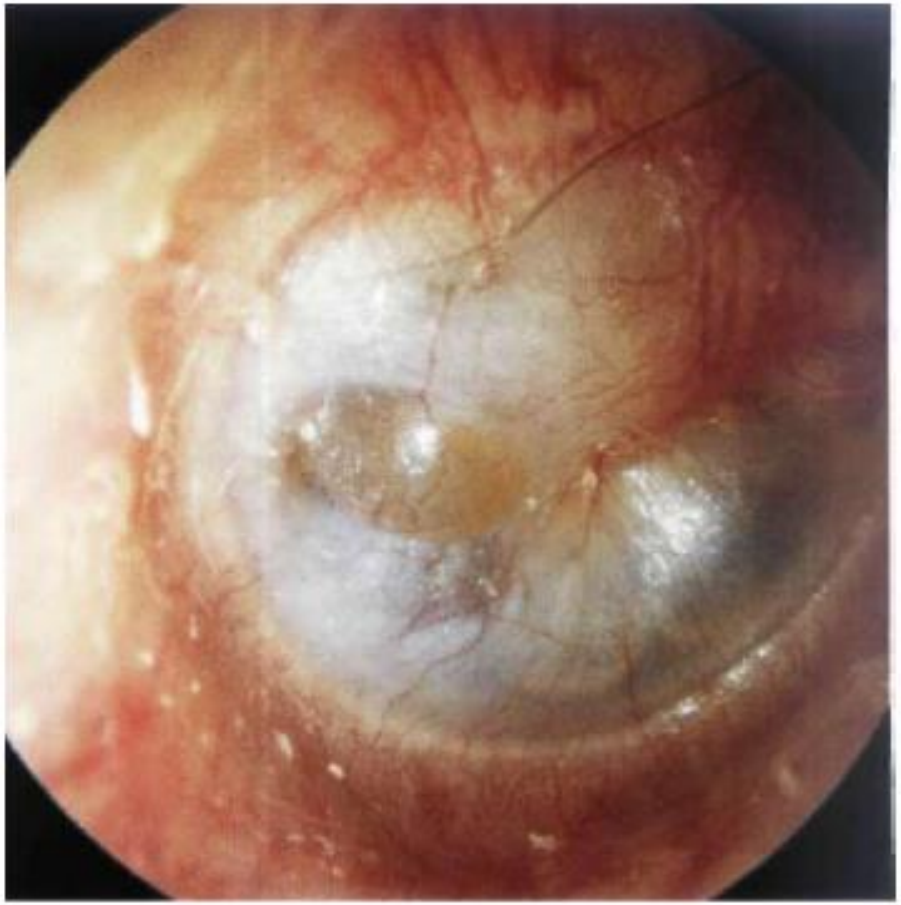

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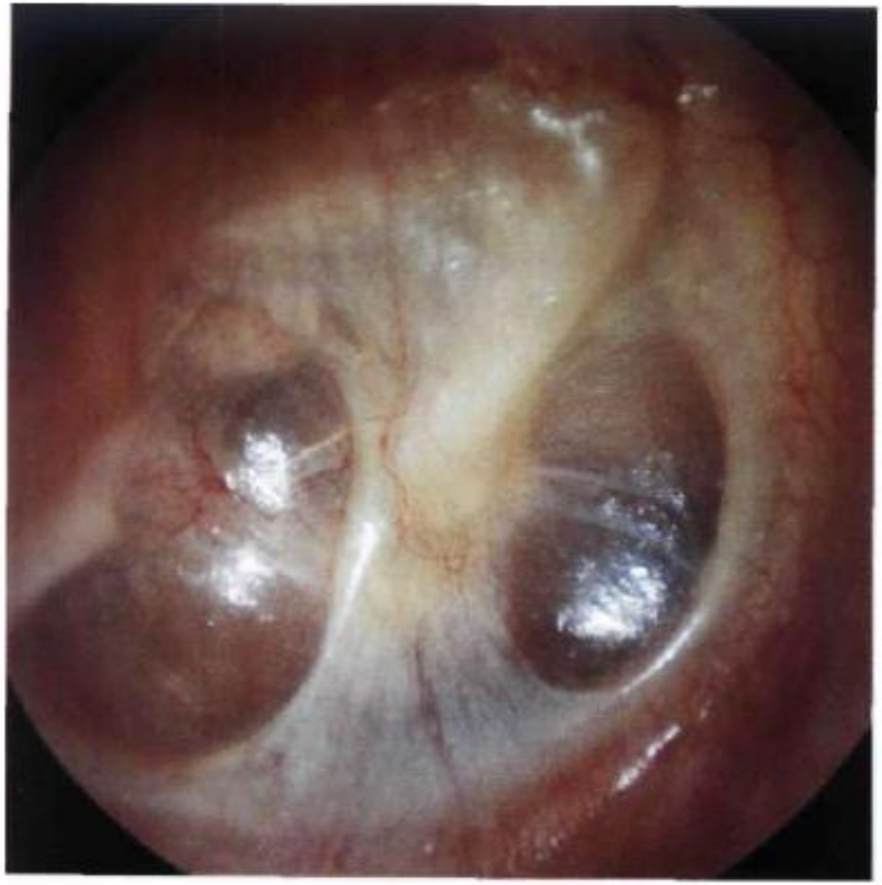

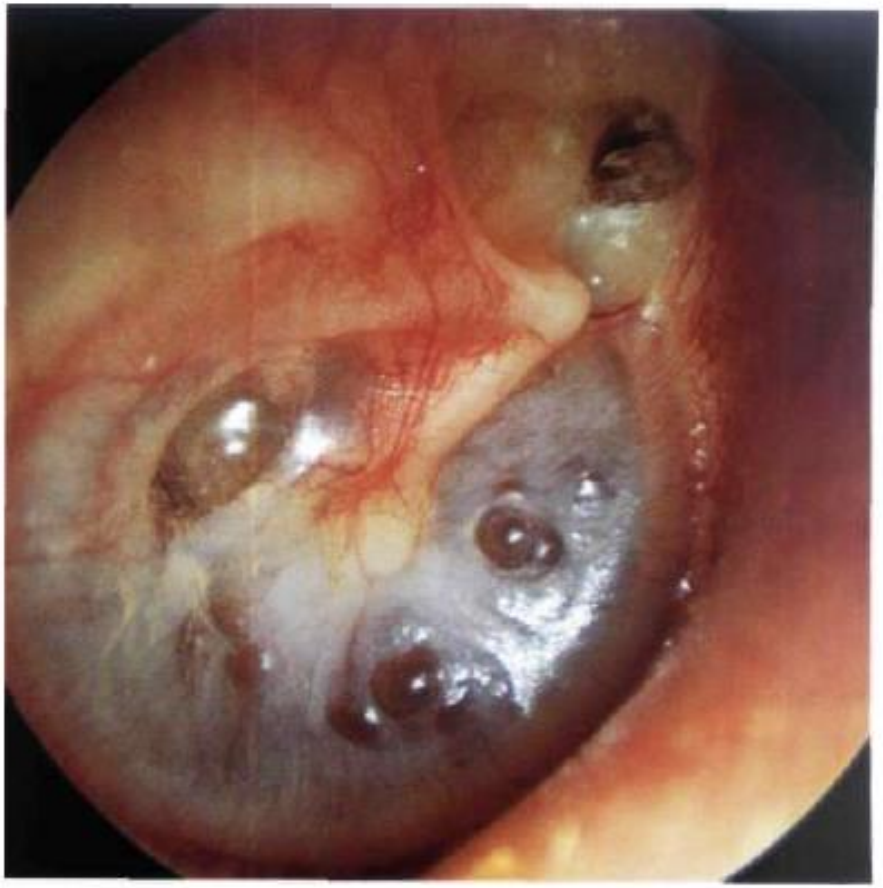

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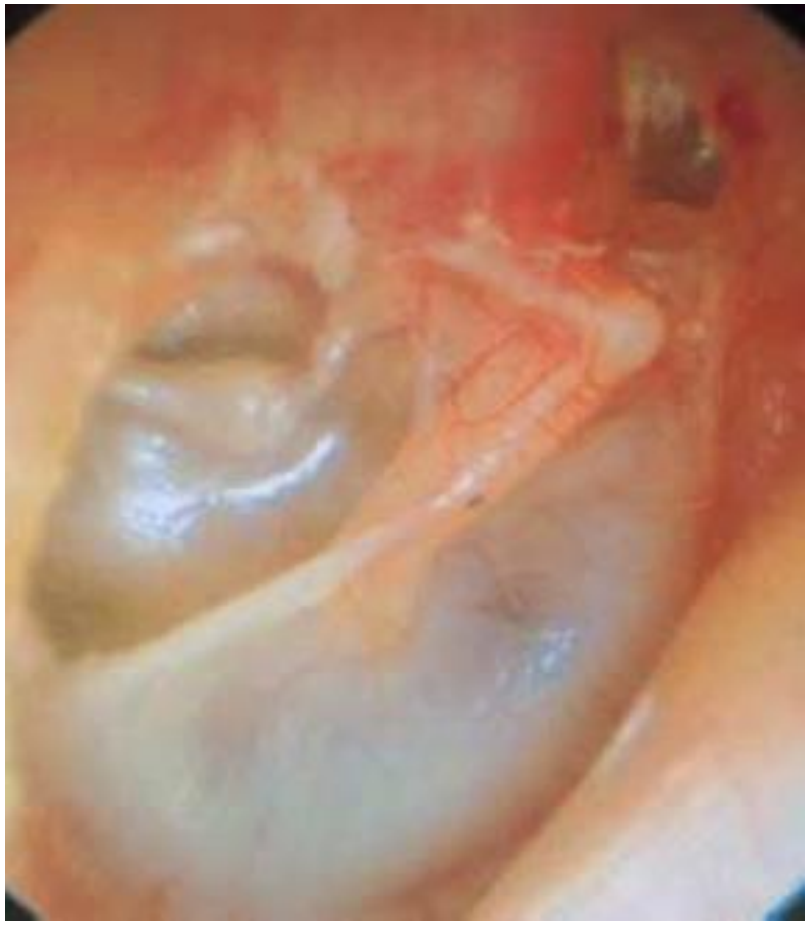
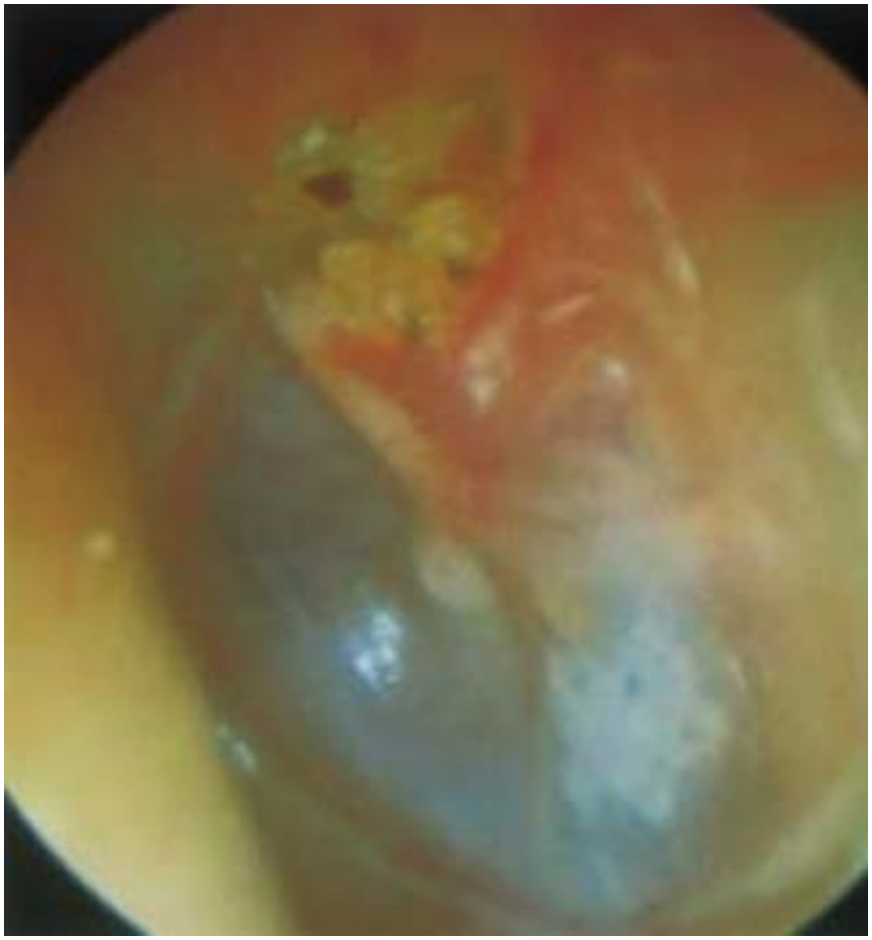




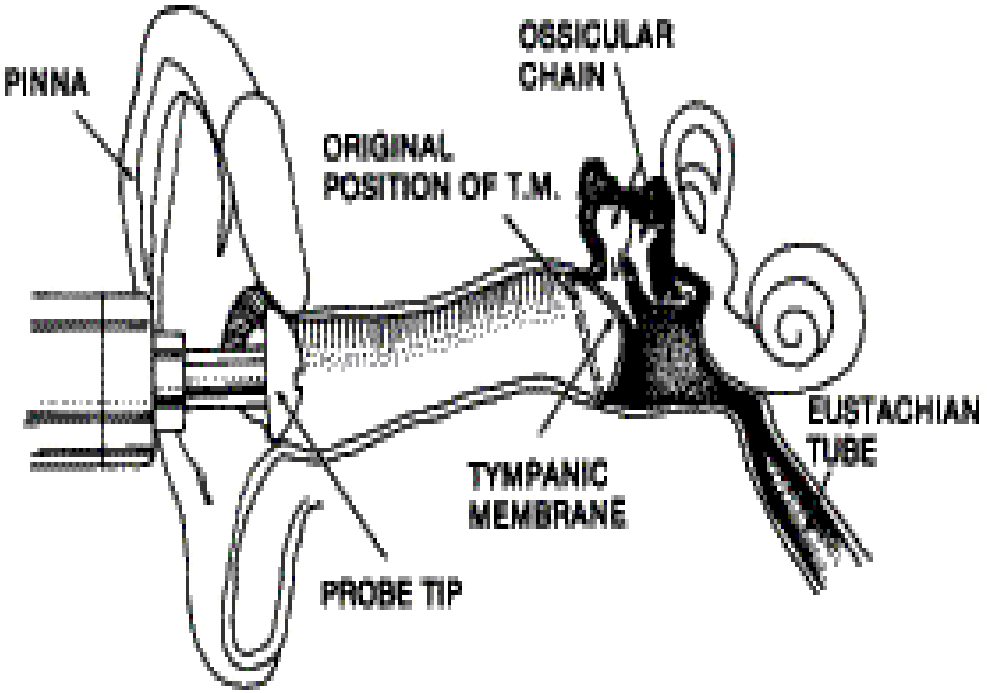
Tuning Forks

- Rinne
- Weber
  - –False negative?

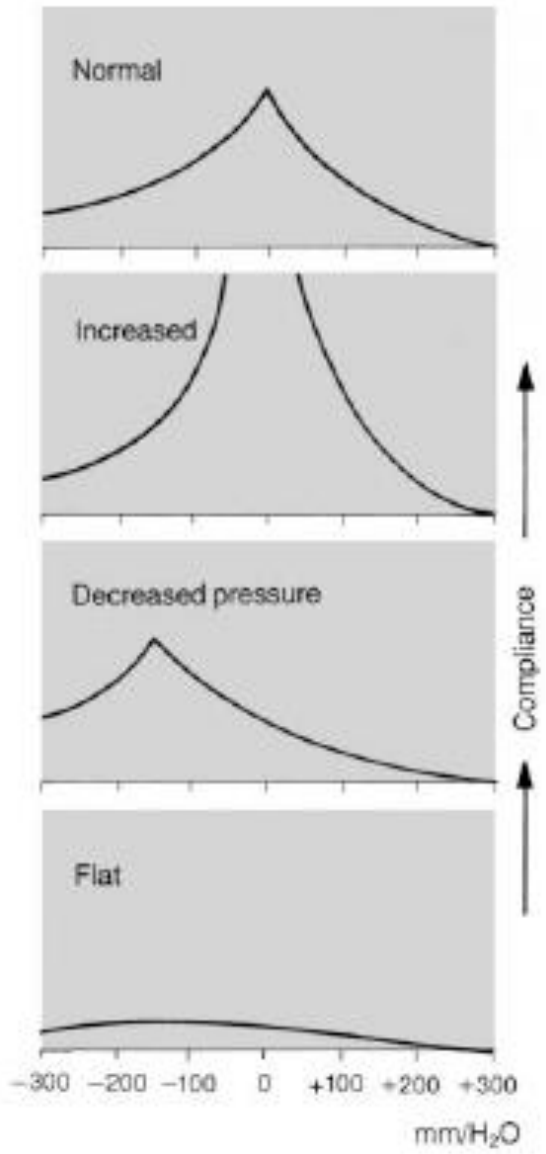
Tympanometry

Introduces a pure tone into ear canal through 3-function probe tip

- **<u>Manometer</u> (pump) varies air pressure against TM (controls mobility)**
- **<u>Speaker</u> introduces 220Hz probe tone**
- **<u>Microphone</u> measures loudness in ear canal**



Technician Limitations of Interpretation

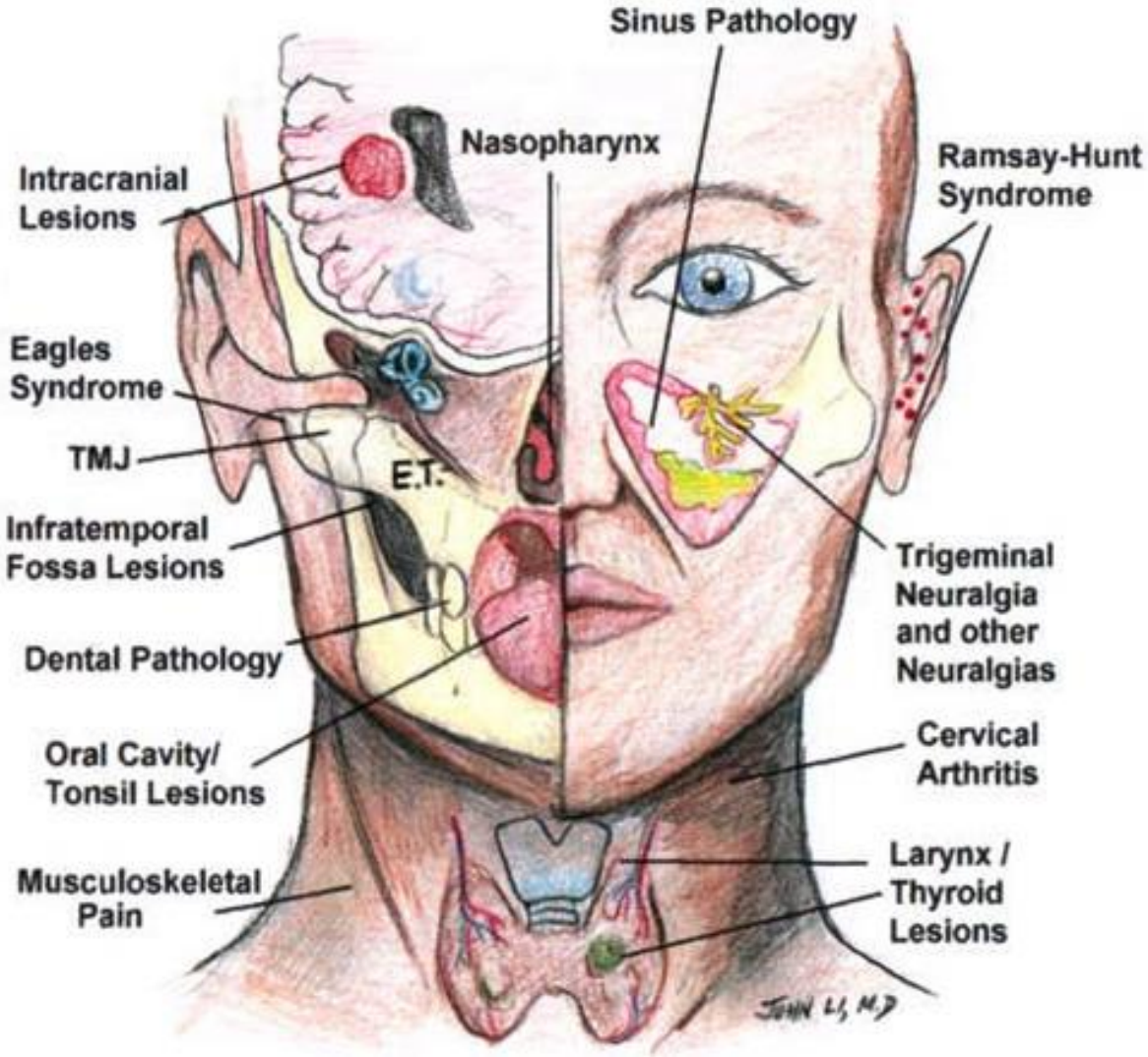


- **Tympanograms, acoustic reflex testing, otoscopy, patient complaints, and audiograms should be considered**

Clinical Evaluation

- **Endoscopy:**
  - **Nasopharynx**
  - **Larynx**
  - **LPR disease**

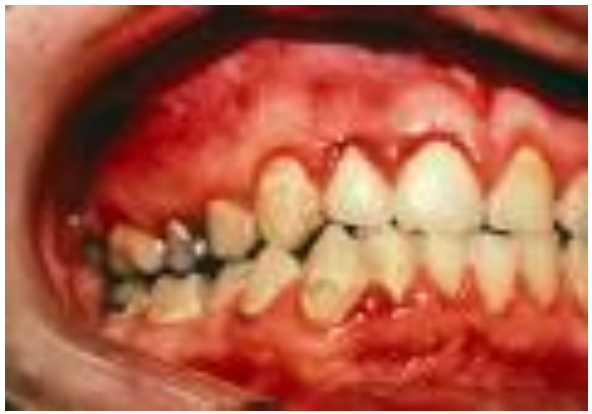
Secondary Otalgia



Sources of referred otalgia

ORAL CAVITY

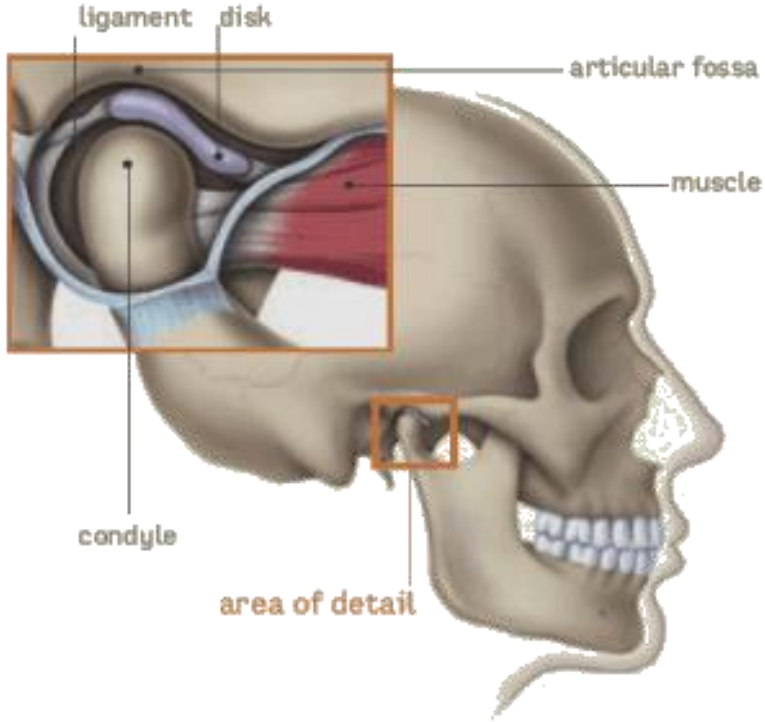
- **Dental pain**
  - **Through the stimulation of the auriculotemporal**
  - **The mandibular molars are the offending teeth**
  - **Oral ulcers**
  - **Gingivitis**



Sources of referred otalgia

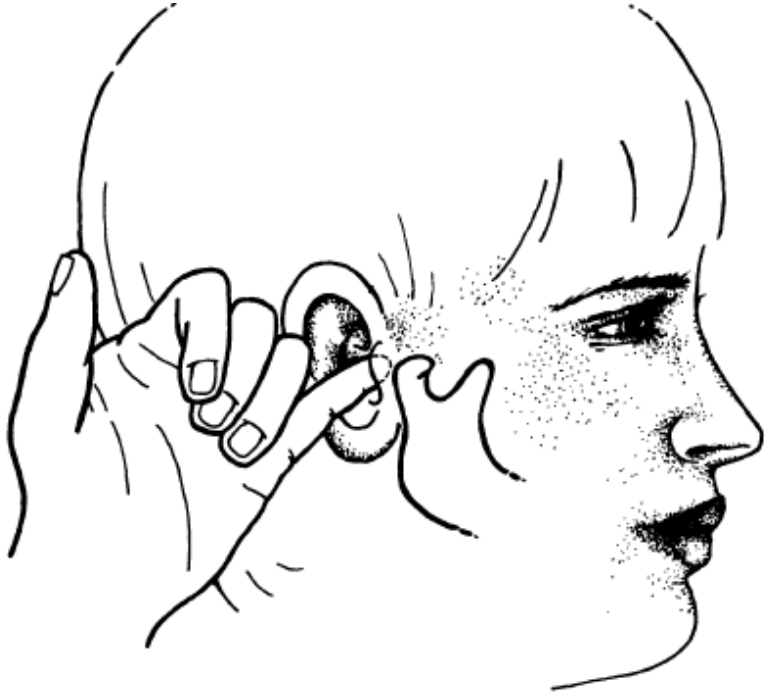
Temporomandibular Joint

- **Myogenous**
  - **Bruxism**
  - **Daytime jaw clenching**
- **Arthrogenous**
  - **Disk displacement disorder**
  - **Systemic arthritic conditions**
  - **Ankylosis**
  - **Infections**
  - **Neoplastic**



TMJ assessment

- Pain / stiffening
- Sounds
- Jaw opening/locking
- Headache
- Otalgia in 17%

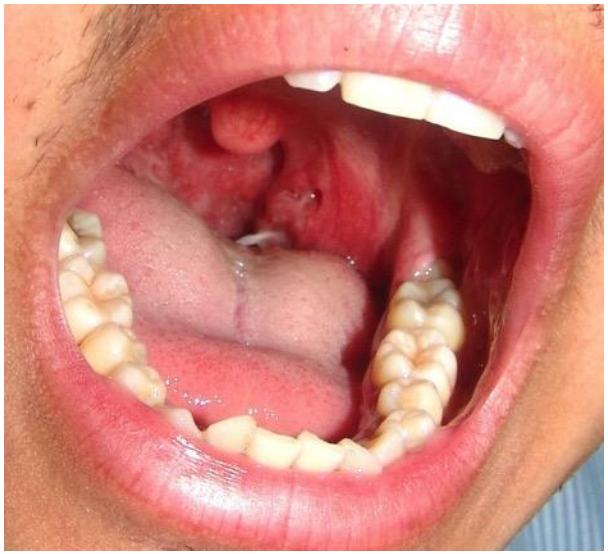


- Asymmetry
- Malocclusion
- Jaw opening (between incisors): 5 cm
- Protrusive/lateral jaw movement: 1 cm
- Muscle spasm
- Joint sounds

Sources of referred otalgia

Upper Airway

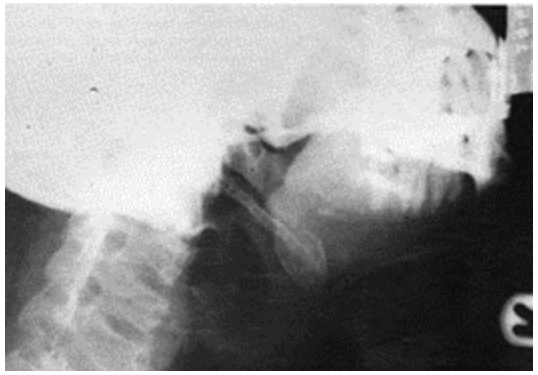
- Neoplasia.
- Infections
- Foreign body
- Laryngopharyngeal reflux

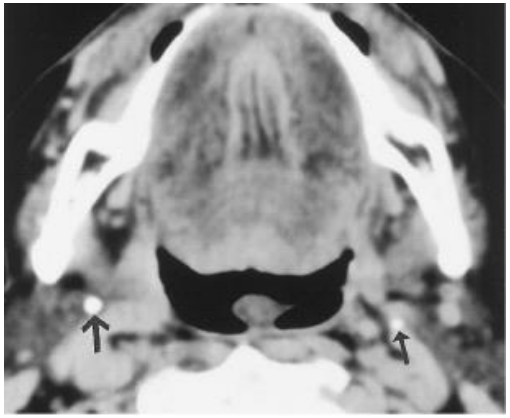


Referred otalgia

Styloid Process

- **Eagle's syndrome:**
  - **Congenital elongation and post-traumatic overgrowth of the styloid process, and ossification and degenerative changes of the stylohyoid ligament**
- **More common in women**
- **Palpation of a tender bony spicule through the tonsillar fossa**
- **Pain relief on local anaesthetic infiltration confirm diagnosis**
- **Surgical excision via a transoral or external approach is an accepted treatment**





Sources of referred otalgia

Myofascial Pain Syndromes

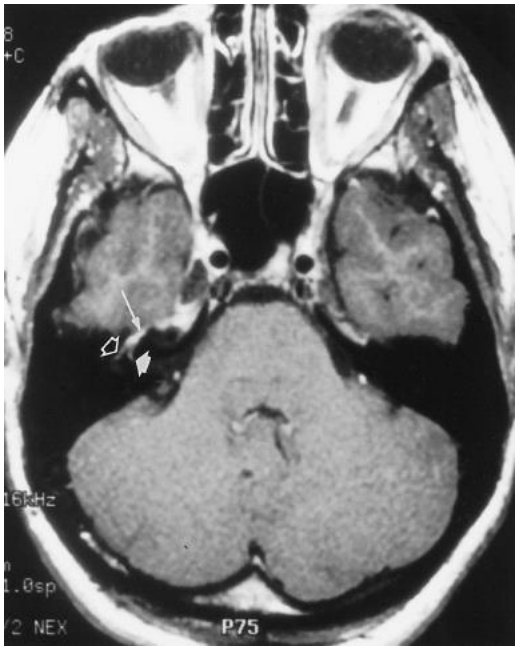
Pain of Spinal Nerve Origin

- **Sensory fibres from C2 and C3**
  - **Nerve root irritation causes pain over the mastoid and pinna**

Sources of referred otalgia

Neurological disorders

- ❑ Neuralgias
  - – Trigeminal
  - – Glossopharyngeal
- Intermittent, superficial, lancinating
- unilateral sensory distribution
- Trigger zones



- ❑ Varicella zoster of lateral geniculate ganglion
  - ✓ Ramsy Hunt syndrome

Sources of referred otalgia

THYROID

- Mediated through the vagus nerve
- Usually inflammatory pathology
- CT , US or isotope imaging will confirm diagnosis

Chest

Myocardial ischaemia producing pain radiating solely to the ear has been reported
Other symptoms are typical of angina

Acute Otitis externa [2014]

AMERICAN ACADEMY OF OTOLARYNGOLOGY–HEAD AND NECK SURGERY FOUNDATION

Guideline

Clinical Practice Guideline: Acute Otitis Externa

Otolaryngology–Head and Neck Surgery 2014,Vol. 150(1S) S1–S24

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http://otojournal.org
SAGE

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Interventions for acute otitis externa (Review)

Kaushik V, Malik T, Saeed SR

THE COCHRANE COLLABORATION®

Kaushik V, Malik T, Saeed SR. Interventions for acute otitis externa. *Cochrane Database of Systematic Reviews* 2010, Issue 1.

Acute Otitis Externa

- **Caused by**
  - **Unnecessary clean**
  - **Hearing aid**
  - **Dermatologic condition**
  - **Sweating, allergy, sweating**
- **Diffuse cellulitis of the ear canal skin**
- **Mostly bact. [98%]**
  - **Polymicrobial**
  - ***Pseudomonas aeruginosa* (20%-60%**
  - ***Staphylococcus aureus* (10%-70%)**
- **Swimmers ears in warm humid climates and swimming pools**
- **Rapid onset, severe earache, with or without hearing loss**
- **The oral antibiotics selected are usually inactive against *P aeruginosa* and *S aureus***

Painful Draining Ear

- Acute diffuse otitis externa
- Chronic otitis externa
- Malignant otitis externa
- Middle ear disease
- Cholesteatoma

Acute Otitis externa guidelines [2014]

- Distinguish diffuse AOE from other causes of otalgia, otorrhea, and inflammation of the external ear canal
- Factors that modify management (nonintact tympanic membrane, tympanostomy tube, diabetes, immunocompromised state, prior radiotherapy)
- Topical preparations for initial therapy of diffuse, uncomplicated AOE
- Enhance the delivery of topical drops by informing the patient how to administer topical drops and by performing aural toilet, placing a wick

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Acute Otitis externa guidelines [2014]

- **Prescribe a non-ototoxic preparation when the patient has a known or suspected perforation of the tympanic membrane, including a tympanostomy tube**
- **Reassess the patient who fails to respond to the initial therapeutic option within 48 to 72 hours to confirm the diagnosis of diffuse AOE and to exclude other causes of illness**

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Topical Therapy

When topical therapy is prescribed, confusion exists about whether to use an

- **antiseptic (eg, acetic acid),**
- **antibiotic,**
- **corticosteroid, or a**
- **combination product.**
  - **Antibiotic choice is controversial, particularly regarding the role of newer quinolone drops.**
  - **Lastly, the optimal methods for cleaning the ear canal (aural toilet) and drug delivery**

Correct Application

- **“If possible, get someone to put the drops in the ear canal”**
- **“Put enough drops in the ear canal to fill it up”**
- **“drops are in place, stay in this position for 3 to 5 minutes”**
- **“ A gentle to-and-fro movement of the ear”**
- **“Keeping the ear dry – Try not to clean the ear”**
- **“Canal should be kept open”**
- **“If a wick falls, it is a good sign”**

Definitions of Otitis Media

Otitis Media with Effusion (OME)	**Inflammation** of the middle ear with a collection of **liquid** in the middle ear space. Signs and symptoms of **acute infection are absent** ***Serous**, **secretory or non-suppurative** otitis media are terms that are no longer recommended*
Acute Otitis Media (AOM)	**Inflammation** of the middle ear that is of rapid and short onset in association with signs and symptoms indicating **acute infection**. The tympanic membrane is **full or bulging**, opaque, and has limited mobility. Erythema is an inconsistent finding one or more local or systemic signs are present: otalgia, otorrhea, fever, irritability, anorexia, vomiting or diarrhea
Otorrhea	Discharge from: external auditory canal / middle ear / mastoid / inner ear or intracranial cavity
Eustachian Tube Dysfunction	Middle ear disorder that can have symptoms similar to otitis media, such as hearing loss, otalgia, and tinnitus, but middle ear effusion is usually absent

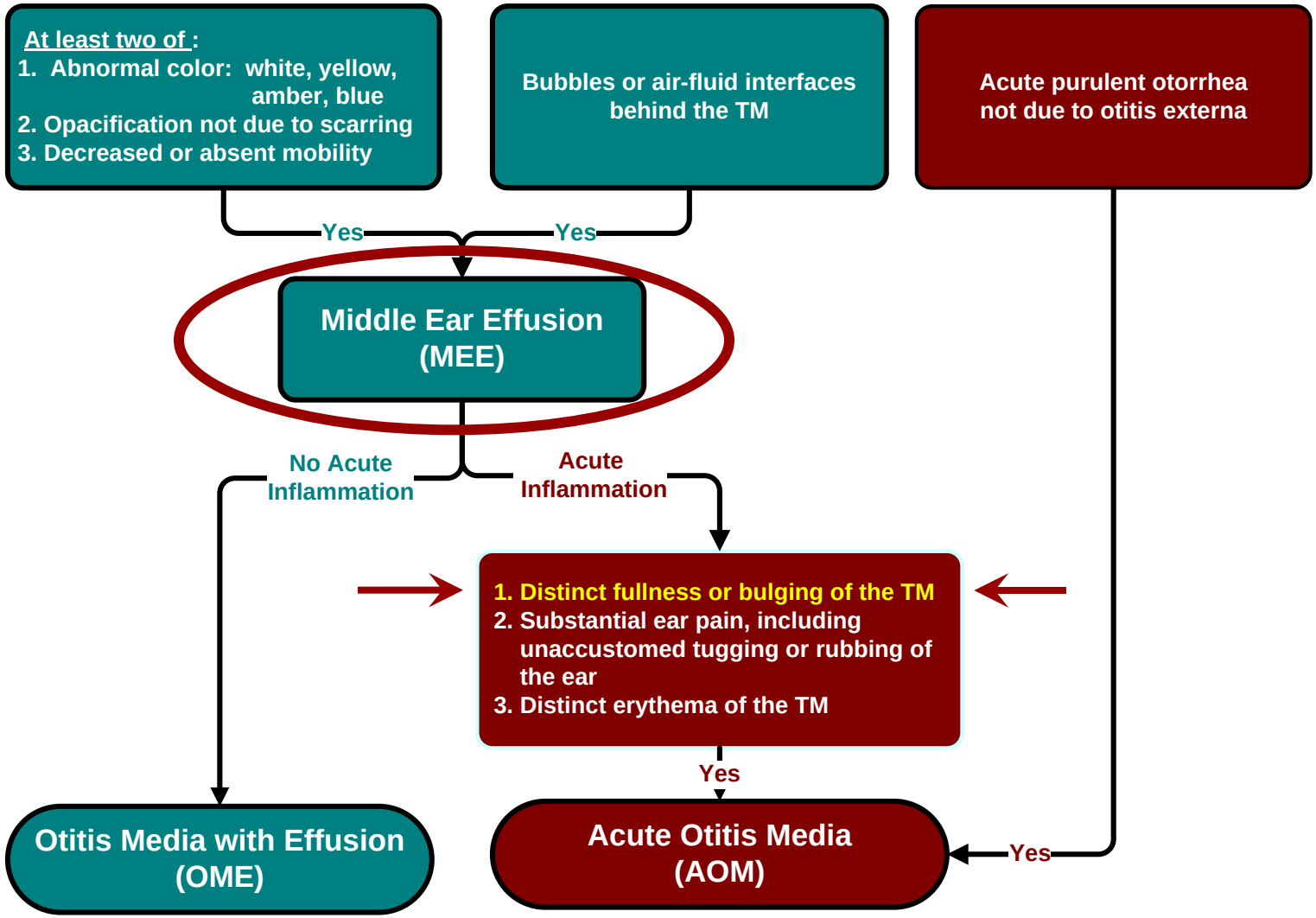
1999 7th International Symposium on Recent Advances in Otitis Media

Definitions of Otitis Media

Otitis Media (OM)	**Inflammation** of the middle ear without reference to cause or pathogenesis
Middle Ear Effusion (MEE)	**Liquid** in the middle ear but not the etiology, pathogenesis, or duration (recent onset, acute, subacute or chronic) ▪ **Serous**: thin, watery liquid ▪ **Mucoid**: a thick, viscid mucus-like liquid ▪ **Purulent:** a pus-like liquid ▪ A **combination** of these

1999 7th International Symposium on Recent Advances in Otitis Media

Distinguishing AOM from OME



Hoberman A. Clinical Pdiatr 2002;41:373-390

Otitis Media in Children
RCT(3938OM) of low risk of bias [2015]

- Within 24 hours of treatment 60% of children will

Improve with or without antibiotics

- Pain was not reduced by antibiotics at 24 hours but fewer on the second and third day
- Reduce abnormal tympanometry at two and four weeks
- Reduce the number of tympanic membrane perforations
- Reduced contralateral otitis and recurrence
  - ➢ Recurrence otitis media
  - ➢ Severe complications with no difference
  - ➢ Adverse events of treatment with antibiotics

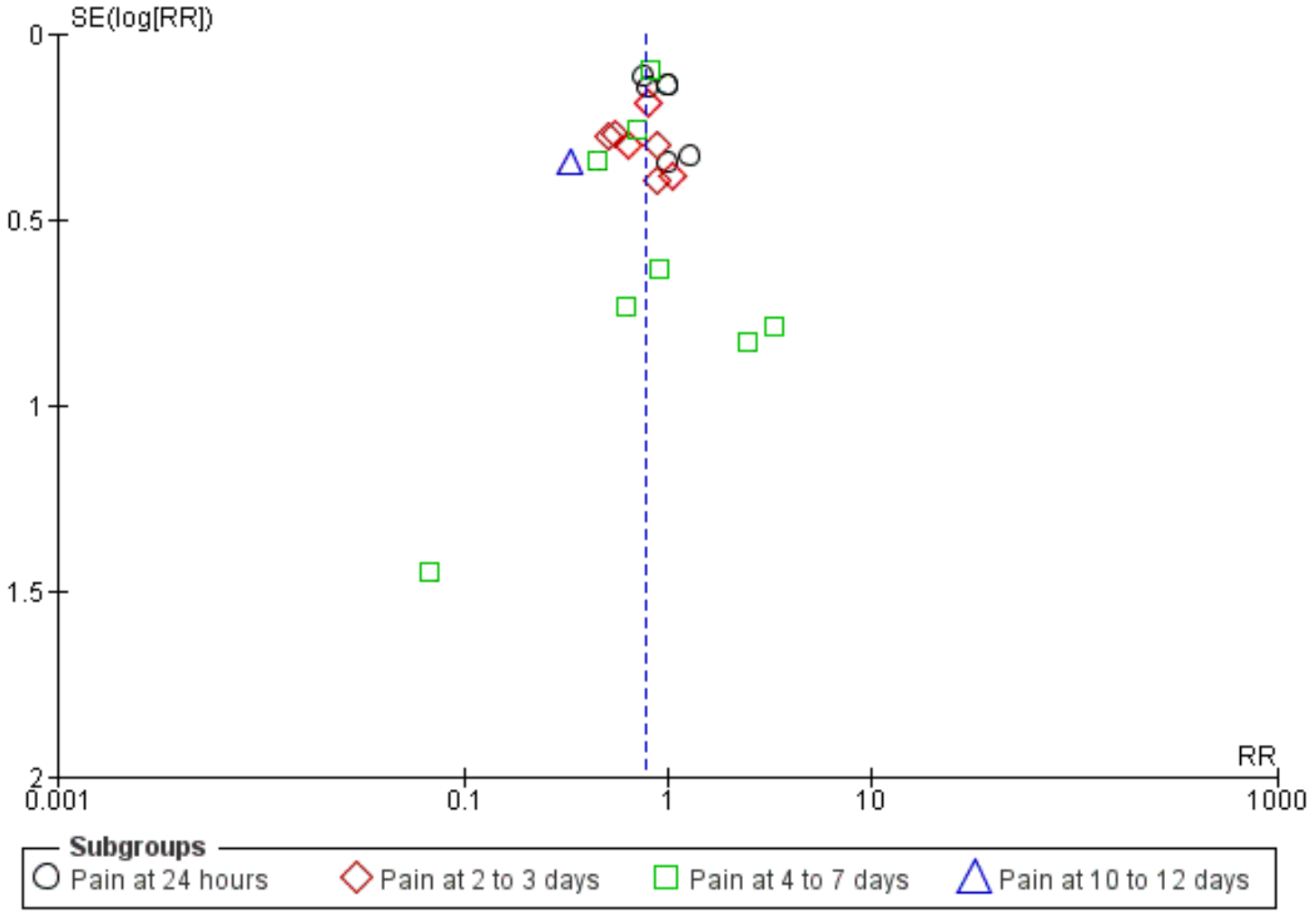
Antibiotics for acute otitis media in children (Review)

Venekamp RP, Sanders SL, Glasziou PP, Del Mar CB, Rovers MM

THE COCHRANE COLLABORATION®

Venekamp RP, Sanders SL, Glasziou PP, Del Mar CB, Rovers MM. Antibiotics for acute otitis media in children. *Cochrane Database of Systematic Reviews* 2015, Issue 6

Antibiotics Vs Placebo
Plot of comparison - Outcome Pain



Implications for practice

Antibiotics are most useful in children under two years of age with bilateral AOM, or with both AOM and otorrhea.

For most other children with mild disease, an expectant observational approach seems justified.

- **Less pain on day 2-3 [NNTB 20]**
  - » **on day 4-7 [NNTB 16]**
- **Contralateral otitis [NNTB 11]**
- **Abnormal tympanometry 4 & 6-8 weeks [NNTB 11 &16]**
- **Tympanic membrane perforation [NNTB 33]**

❖ **Adverse events 1 in every 14**

CASE I

- 72 ♀ with 8 weeks severe left earache
- Sharp, shooting more a night
- Scanty yellowish ear discharge
- Hearing loss
- No Trauma or family history of ear disease
- No vertigo, no tinnitus
- IDDM

Examination

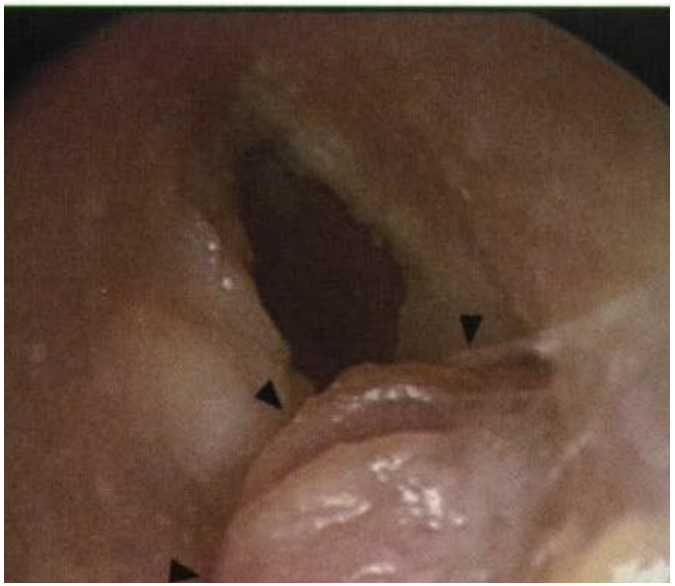
- Otoscopy
- Tuning Fork
- Audio

Imaging

CT Mastoid

What's next?

n, BS; Robert W. Jyung, MD



Malignant Otitis Externa

- **Suspected in:**
  - **Immunosuppressed**
  - **++ Pain disproportionate to findings**
  - **Tenderness, scanty discharge and granulations toward the hypotympanum**
  - **Pseudomonas aeroginosa is encountered**
  - **Skull base osteomyelitis – facial nerve!**
- **MRI is superior to CT but gold standard is technetium or gallium scan**

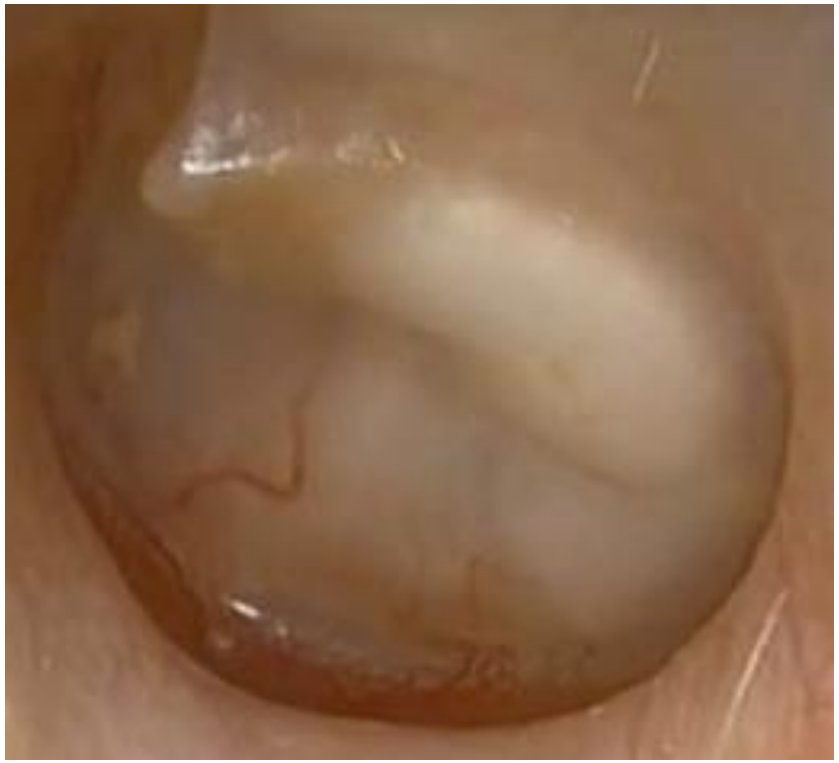
Grandis, Jennifer Rubin; Branstetter, Barton F, IV; Yu, Victor L. The Lancet Infectious Diseases4.1 (Jan 2004): 34-9.

CASE II

- 16 ♀ , dull left earache and fullness following URTI – competitive swimmer
- Initial assessment of flat tympanogram - Weber lateralized to left.
- Conductive hearing loss
- Lusterless tympanic membrane
- OR

Case II [cont.]

- **White mass behind an intact tympanic membrane**



Cholesteatoma

- **A cholesteatoma represents an abnormal migration or implantation of epithelium behind the tympanic membrane.**

Primary [congenital] cholesteatoma is seen in a patient who has never had any sort of trauma, perforation, or surgery

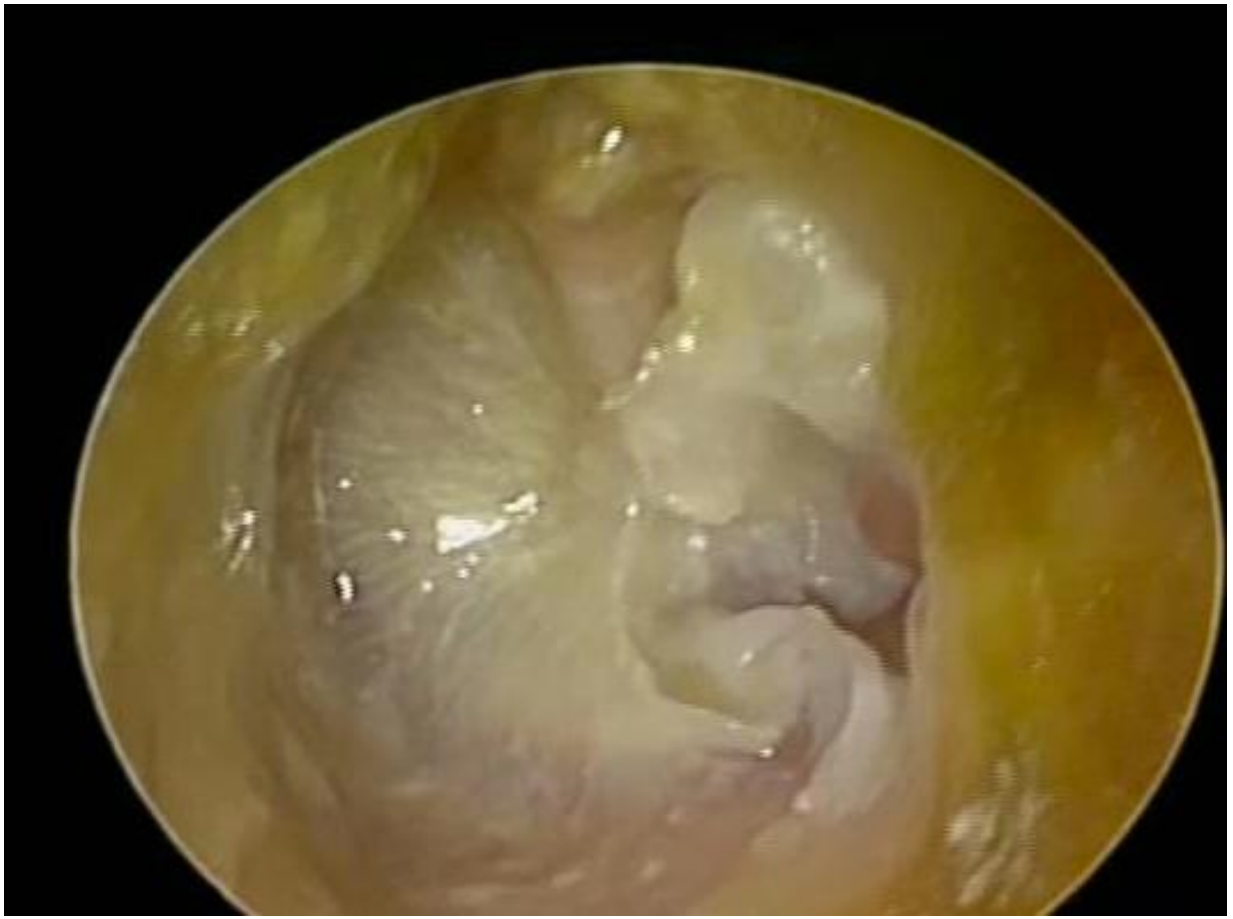
CASE III

12 y ♂ presented with earache and discharge
Described earache as dull discomfort
Denies hearing loss, tinnitus or vertigo

No tenderness, intact facial symmetry

Non-occluding cerumen obscures complete view of tympanic membrane
Micro debridement revealed

CASEIII (cont.)



Cholesteatoma

- Primary Vs secondary
- Atticoantral unsafe ear
- Feculent odor discharge [scanty – keratinous]
- Complications:
  - Cranial [mastoiditis – labryinthitis – VII n.]
  - Extra [subperiosteal abscess – Thrombophlebitis]
  - Intra [lat.sinus – meningitis – subdural - brain abscess]
- Surgery is the usual call

Summary

- Earache Anatomy
- Otoscopy – pneumatic otoscopy - tuning fork
- Guidelines of otitis externa
- Guidelines of Otitis media
- Malignant otitis externa
- Cholesteatoma