

Management of OME

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Normal anatomy – lateral view

Normal anatomy

Normal anatomy – lateral view



Normal anatomy – chalk patch



Normal anatomy – crescentic scar

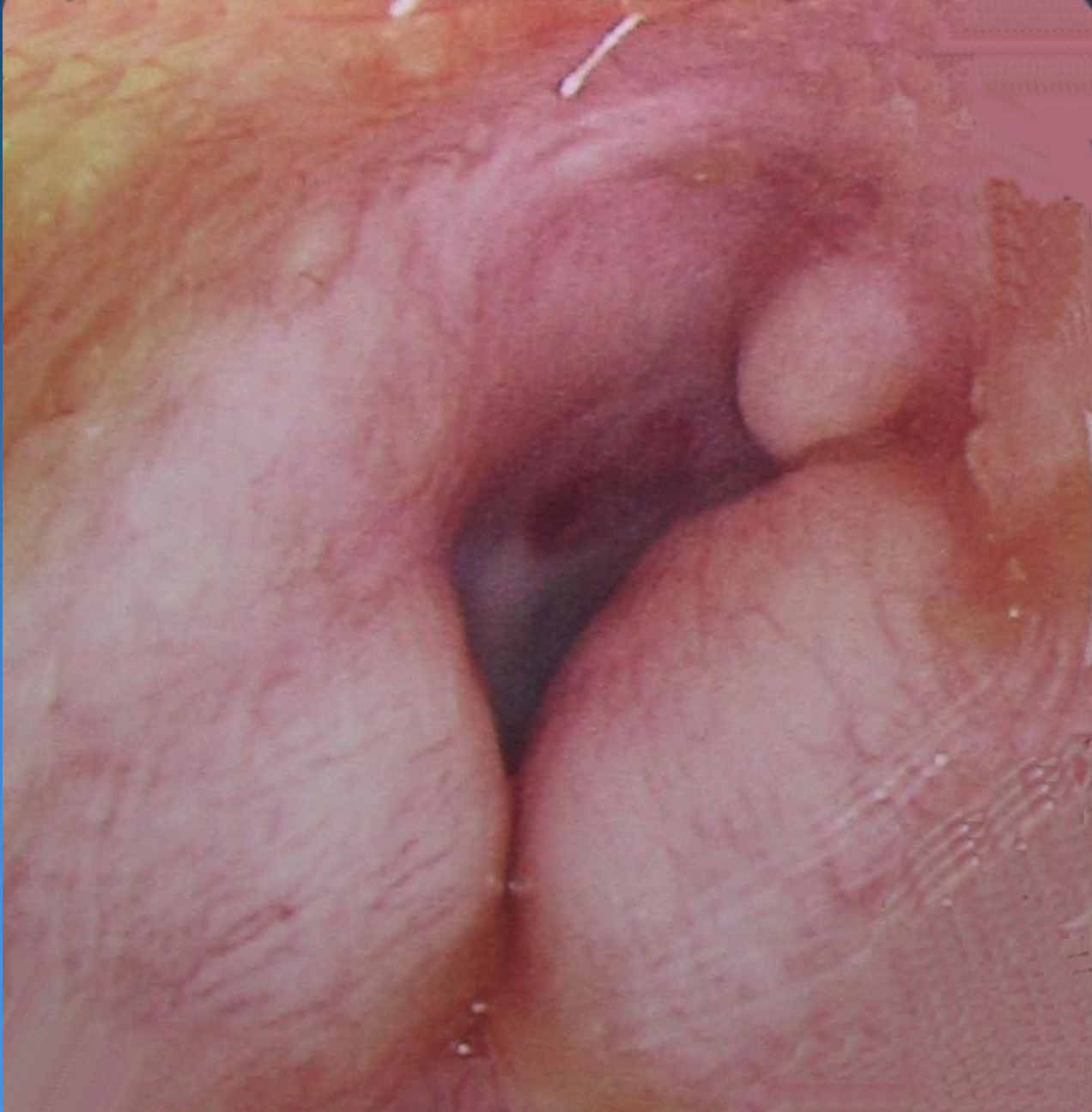
Crescentic scars are of no significance but easily confused with the edges of perforations



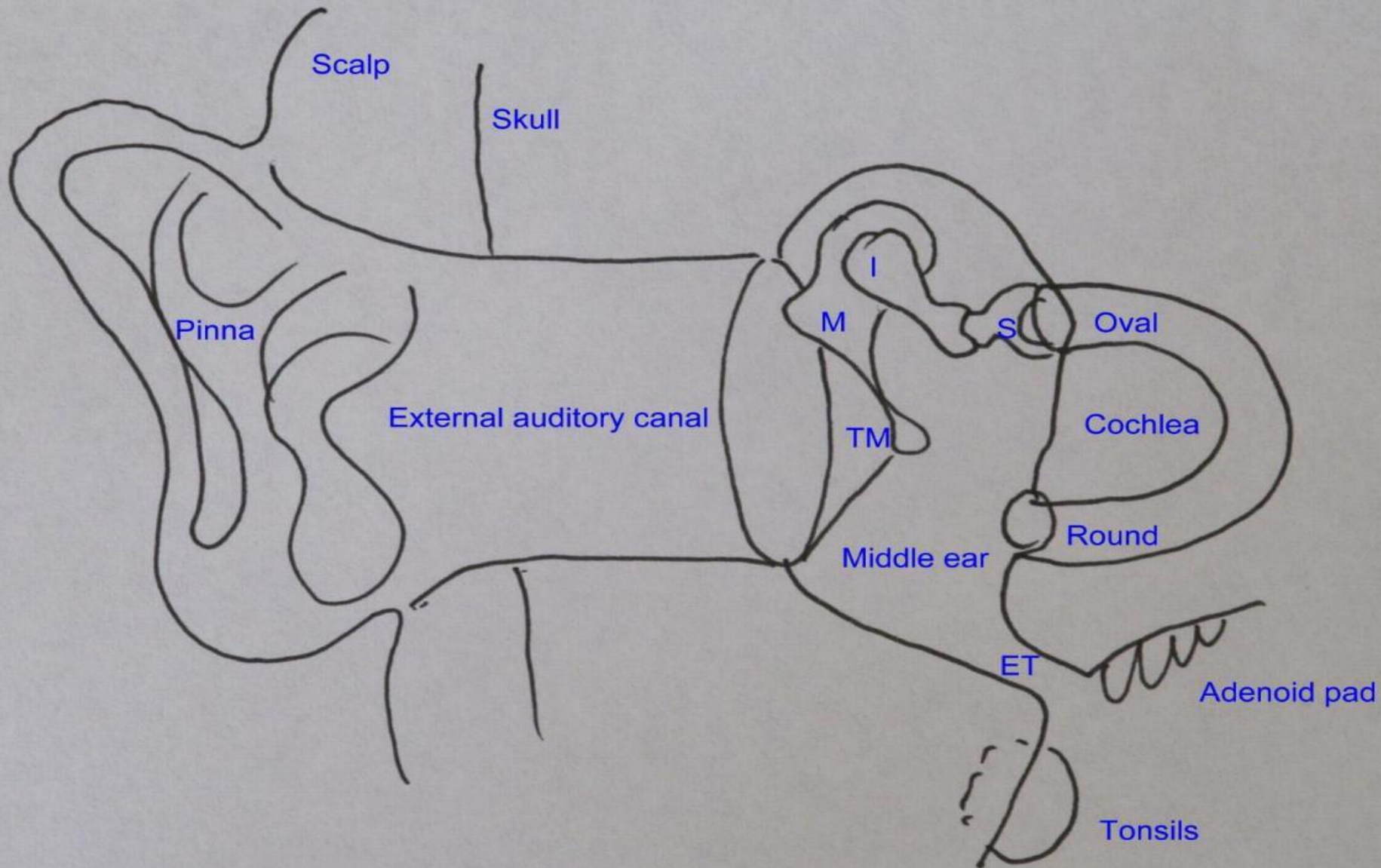
Normal anatomy – solitary exostosis



Normal anatomy – multiple exostosis

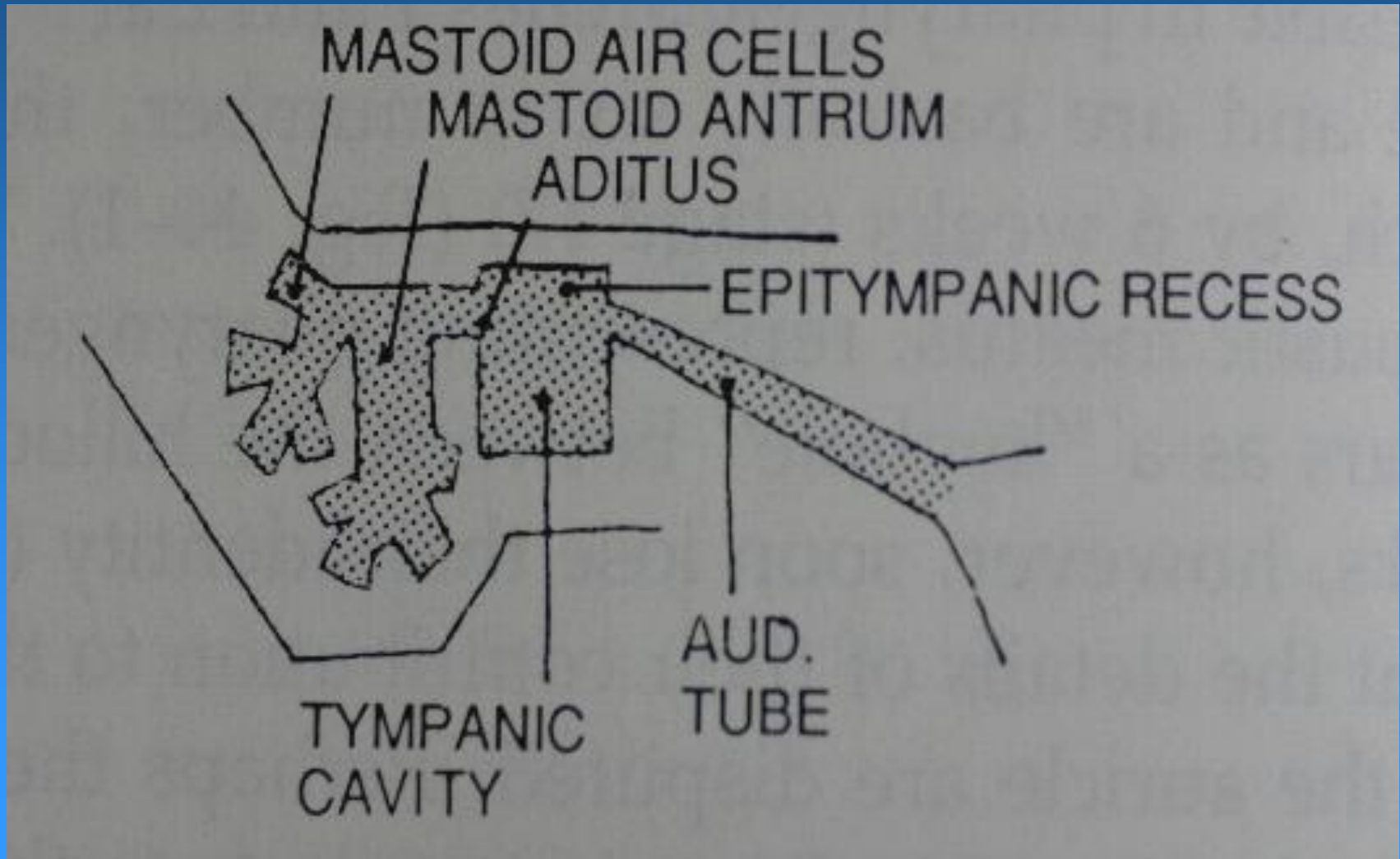


Normal anatomy – AP view

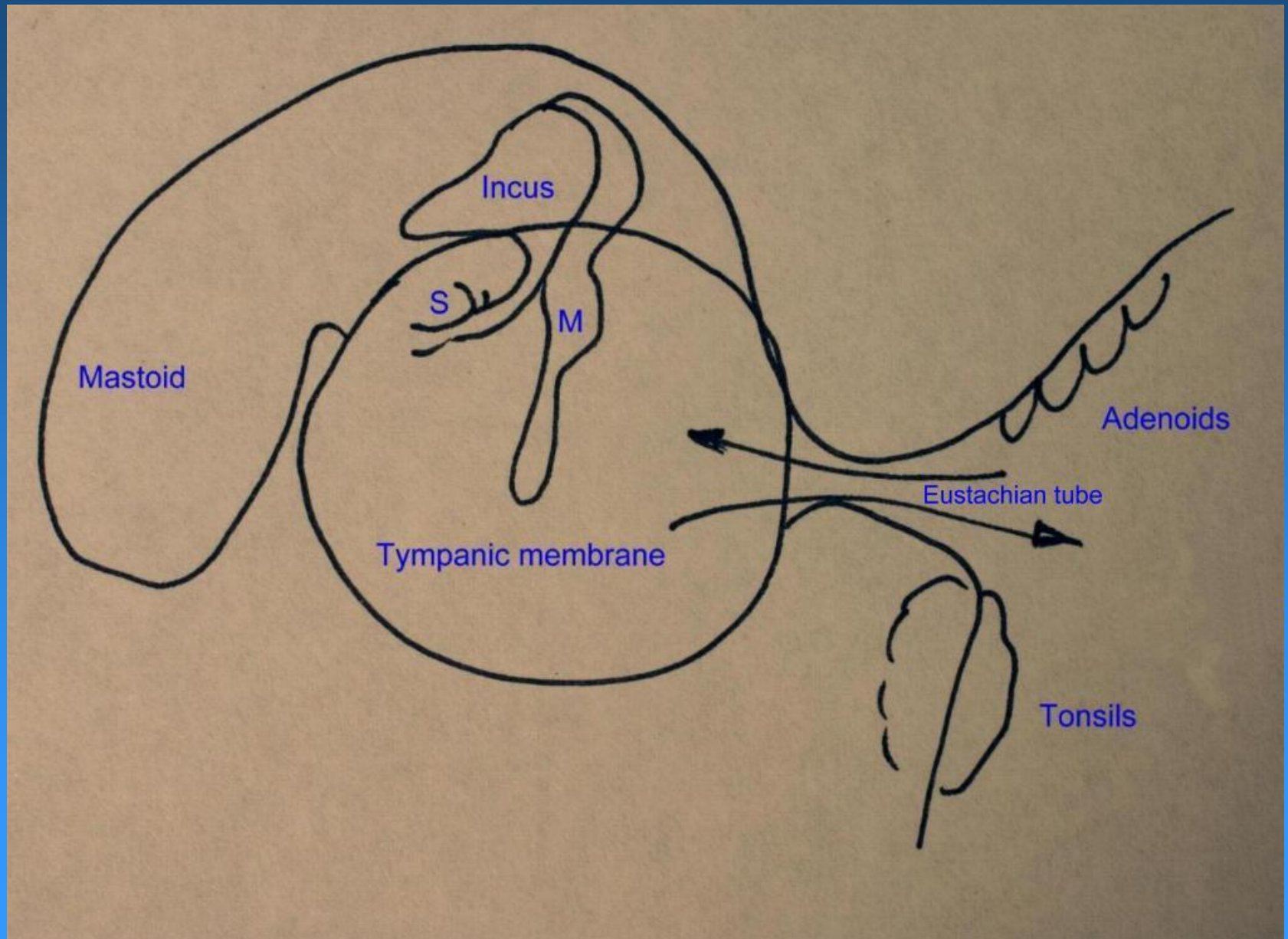


Anatomy

- The ear is part of the respiratory system



Normal anatomy – lateral view

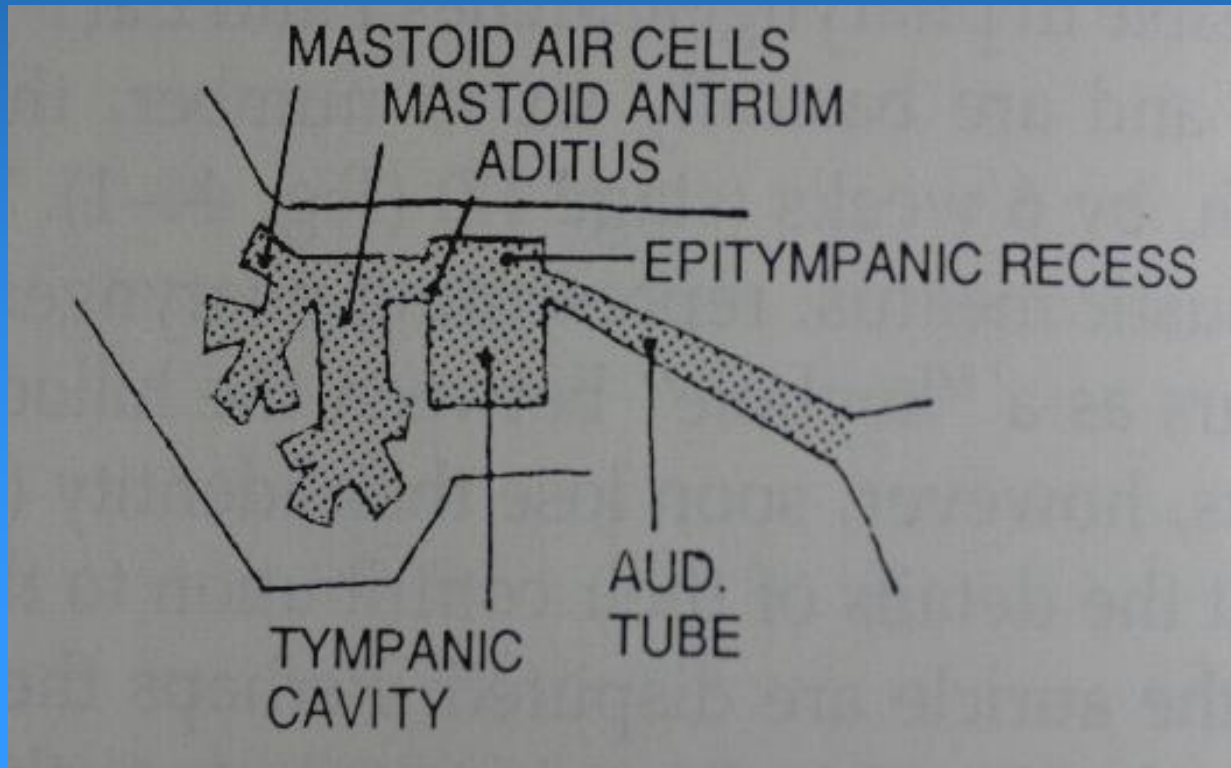


Otitis media

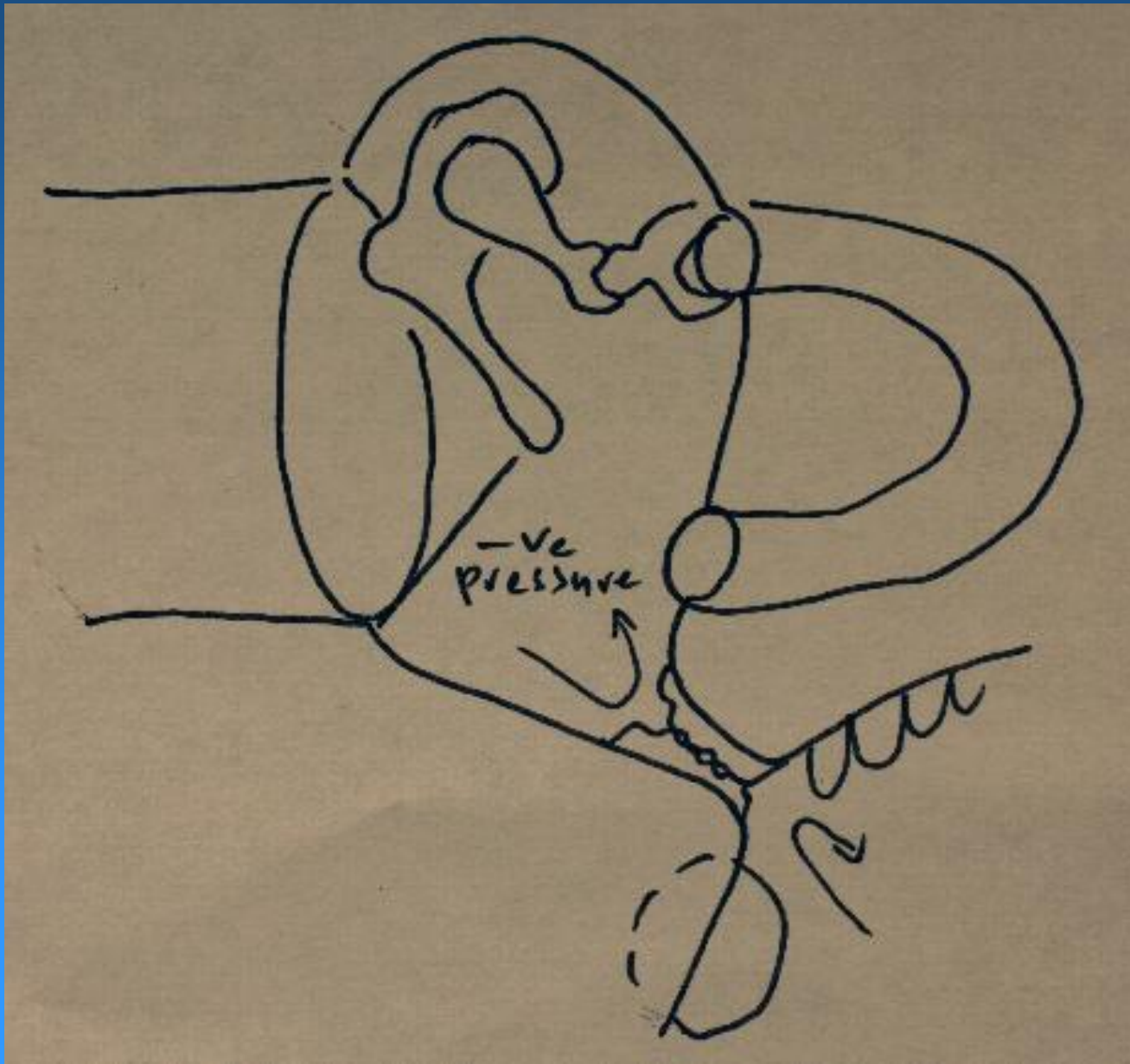
- Primarily viral
 - 10 day duration
 - antibiotics not helpful
 - symptomatic treatment
- Secondarily bacterial
 - duration past 10 days
 - high rate of beta lactamase resistance
 - augmentin, Bactrim
 - not erythromycin, doxycycline

Respiratory tract infection

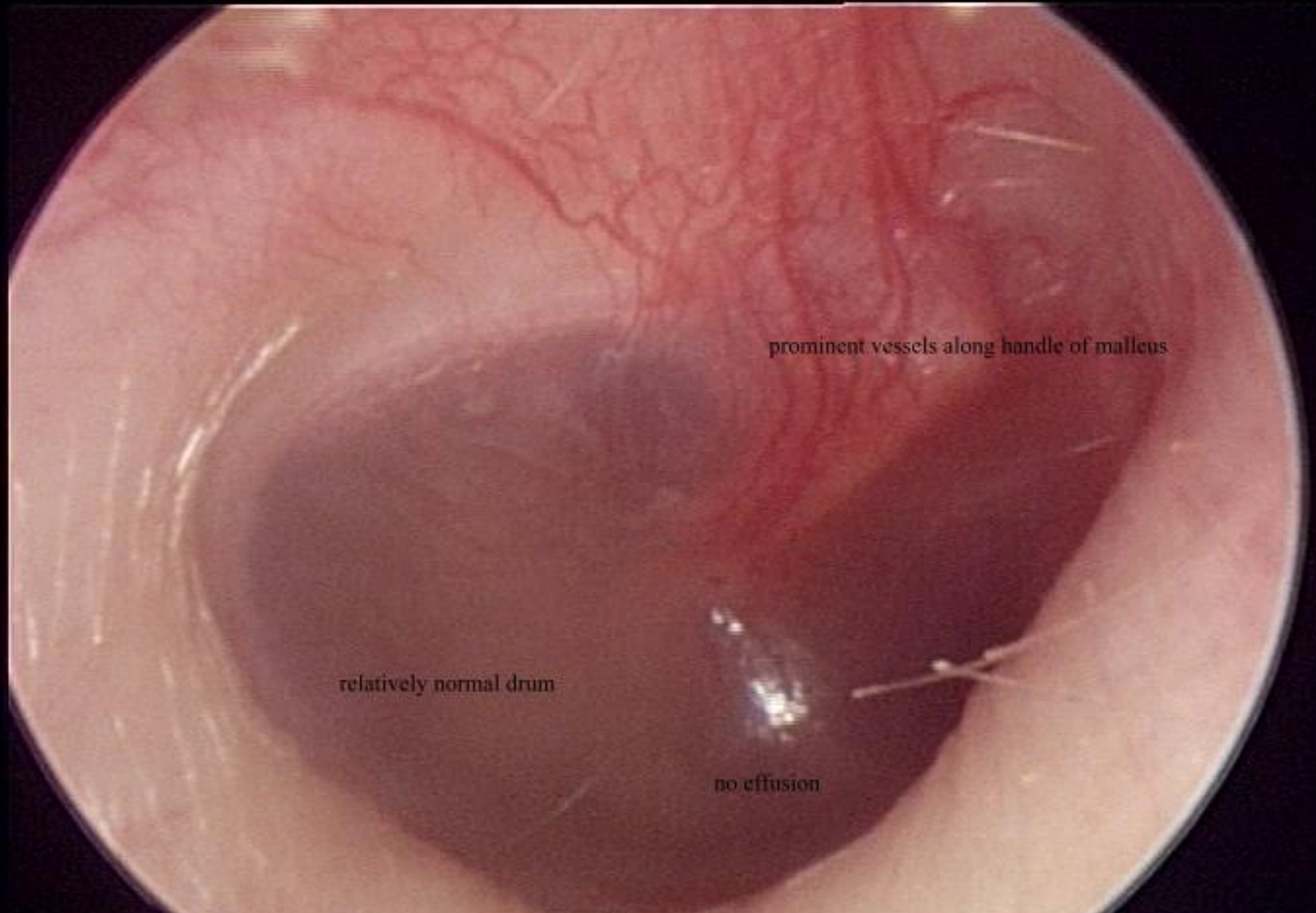
- Primarily viral
 - rhinotracheobronchitis
 - tubotympanomastoiditis – otitis media



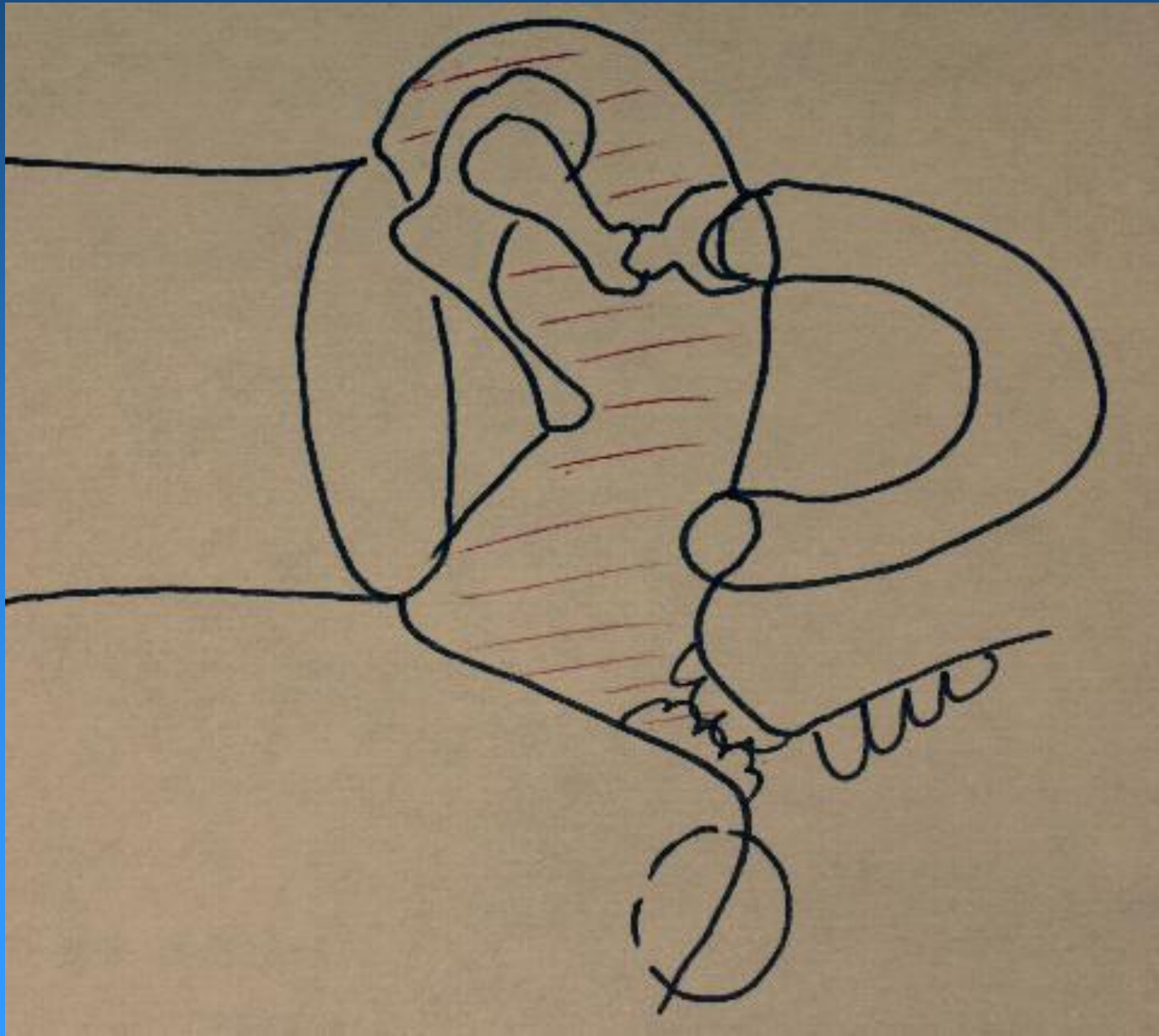
Eustachian tube obstruction



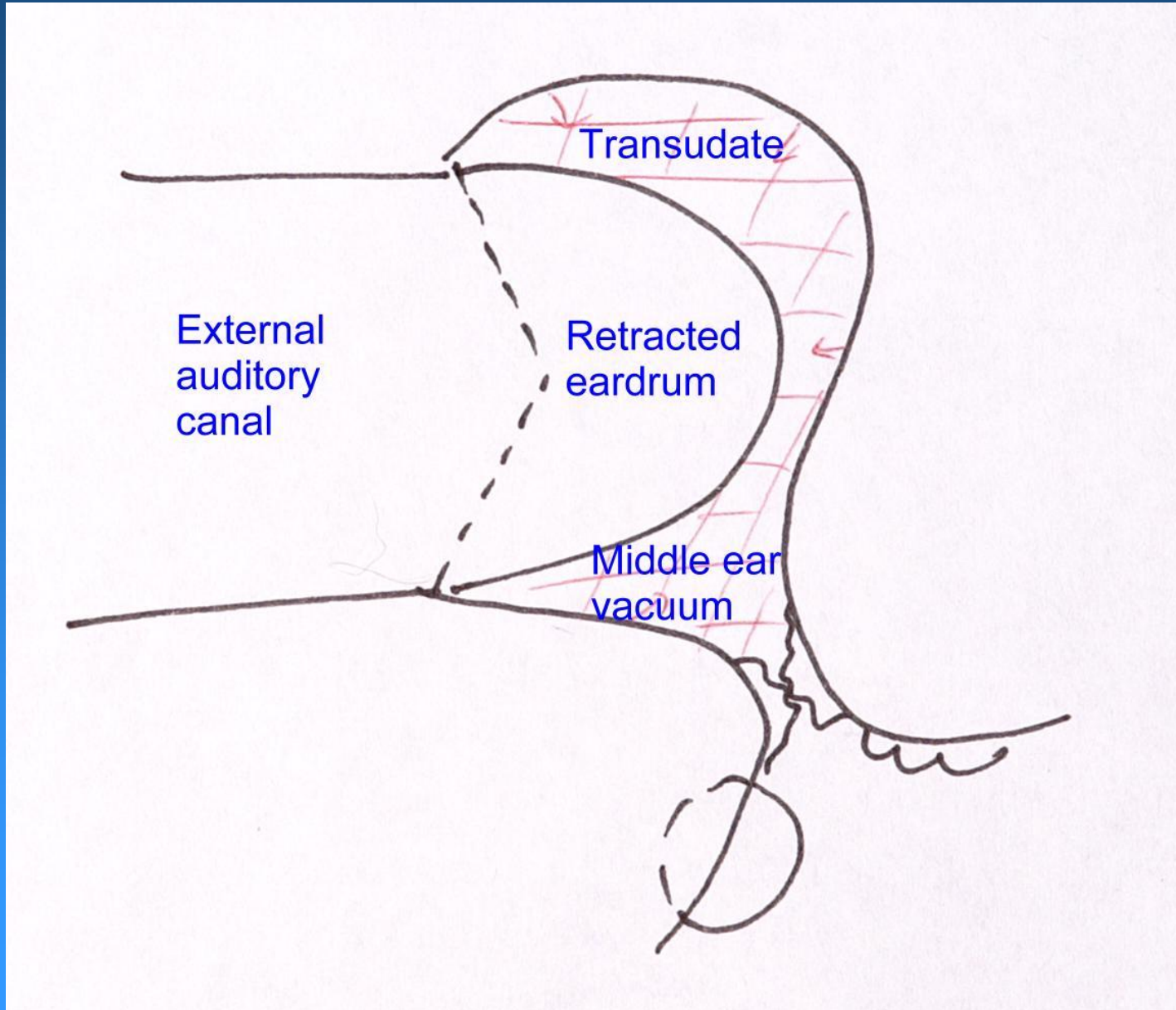
Otitis media - early



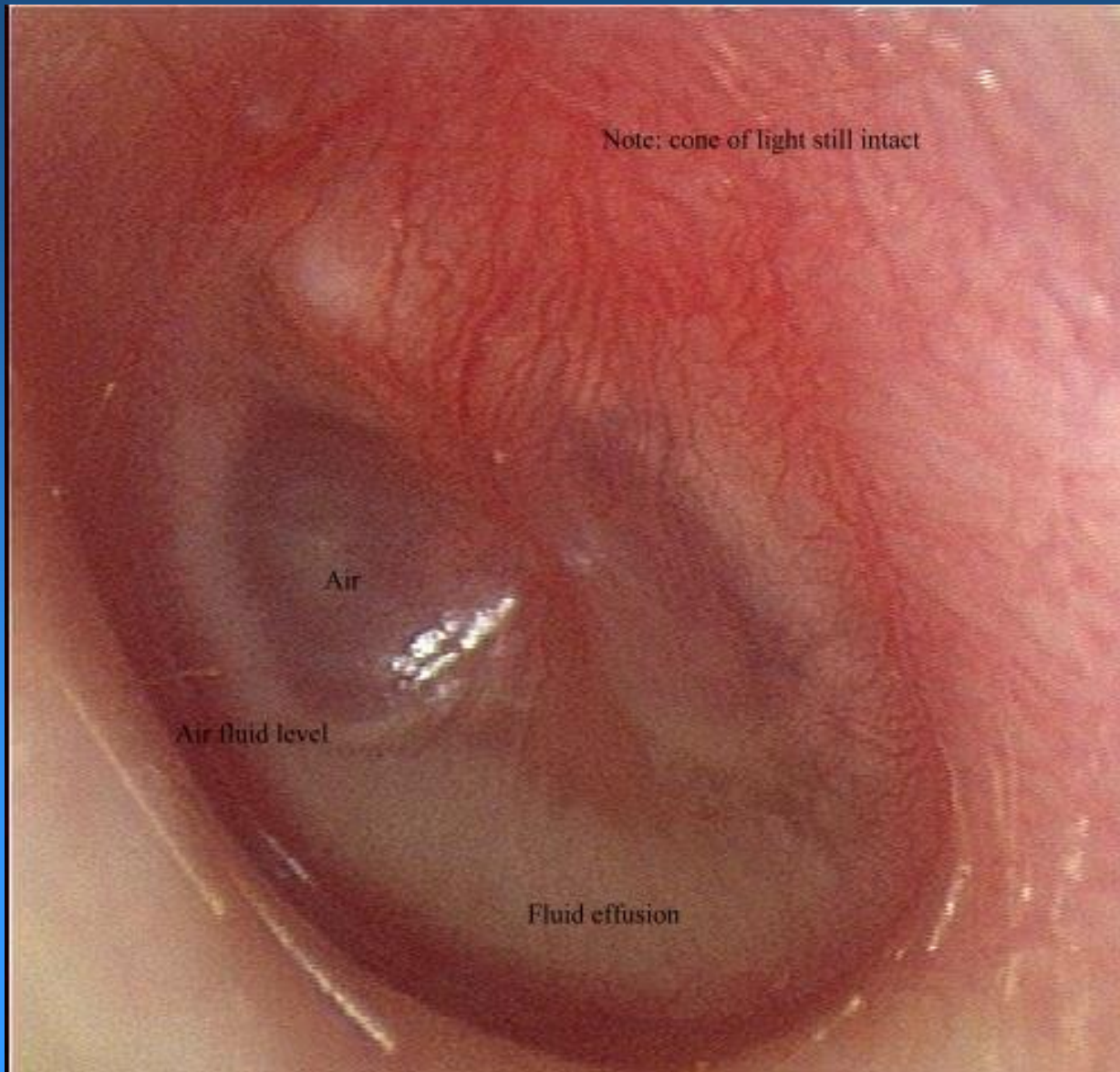
Middle Ear Effusion



Middle Ear Transudate

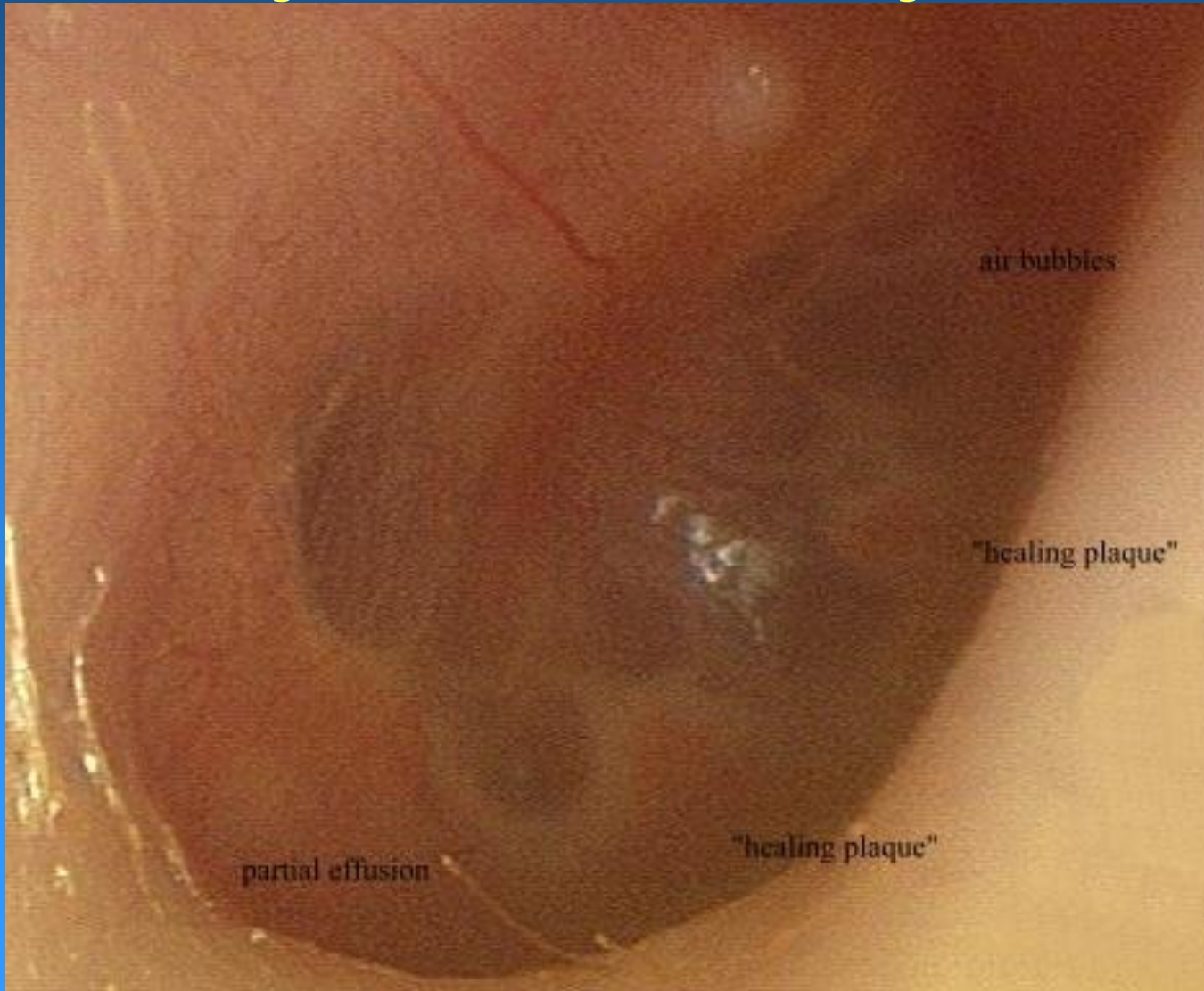


Middle Ear Effusion



Acute Otitis Media

- Primarily viral - 10 day duration



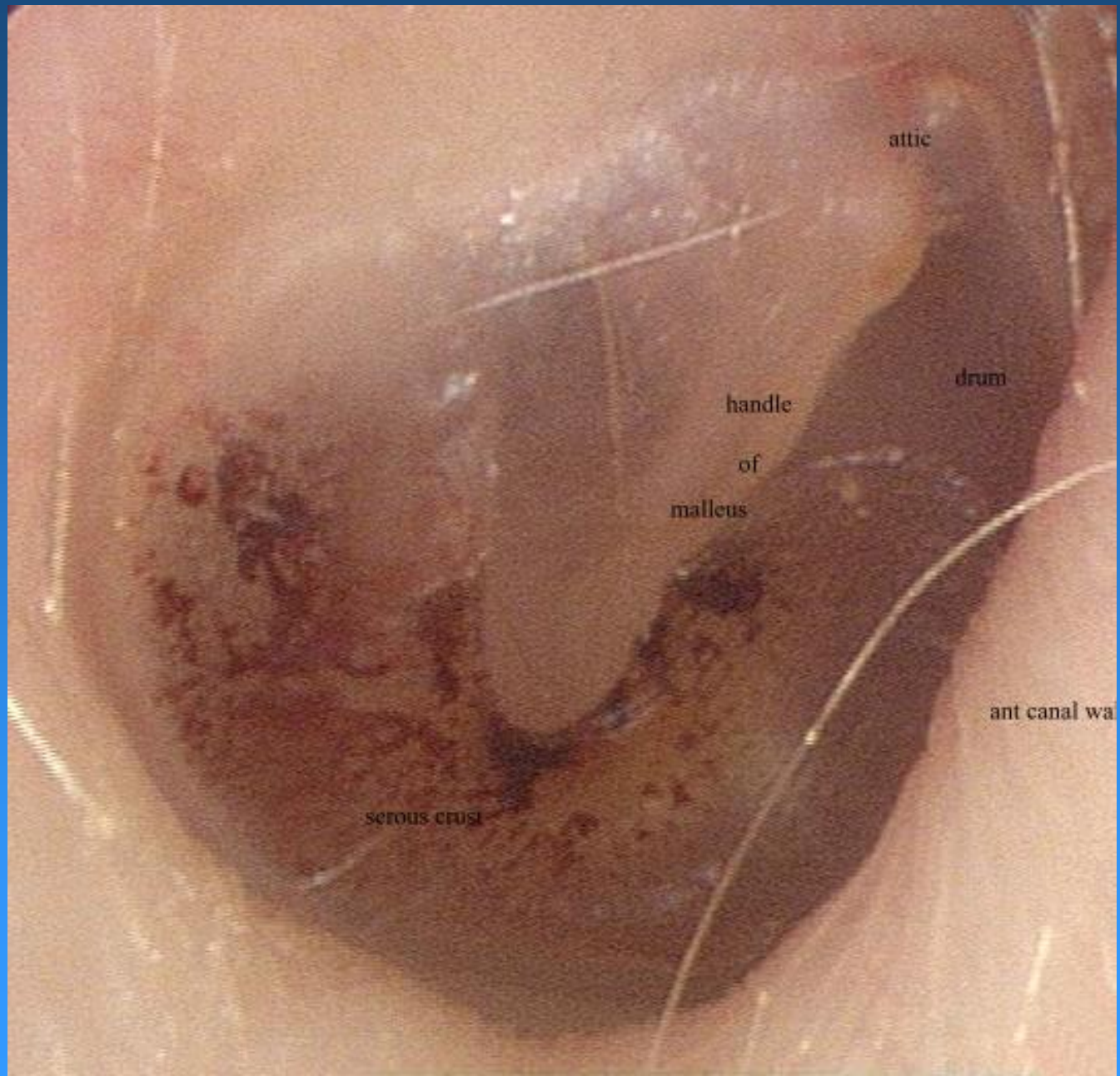
Resolving Acute Otitis Media



Resolving Acute Otitis Media

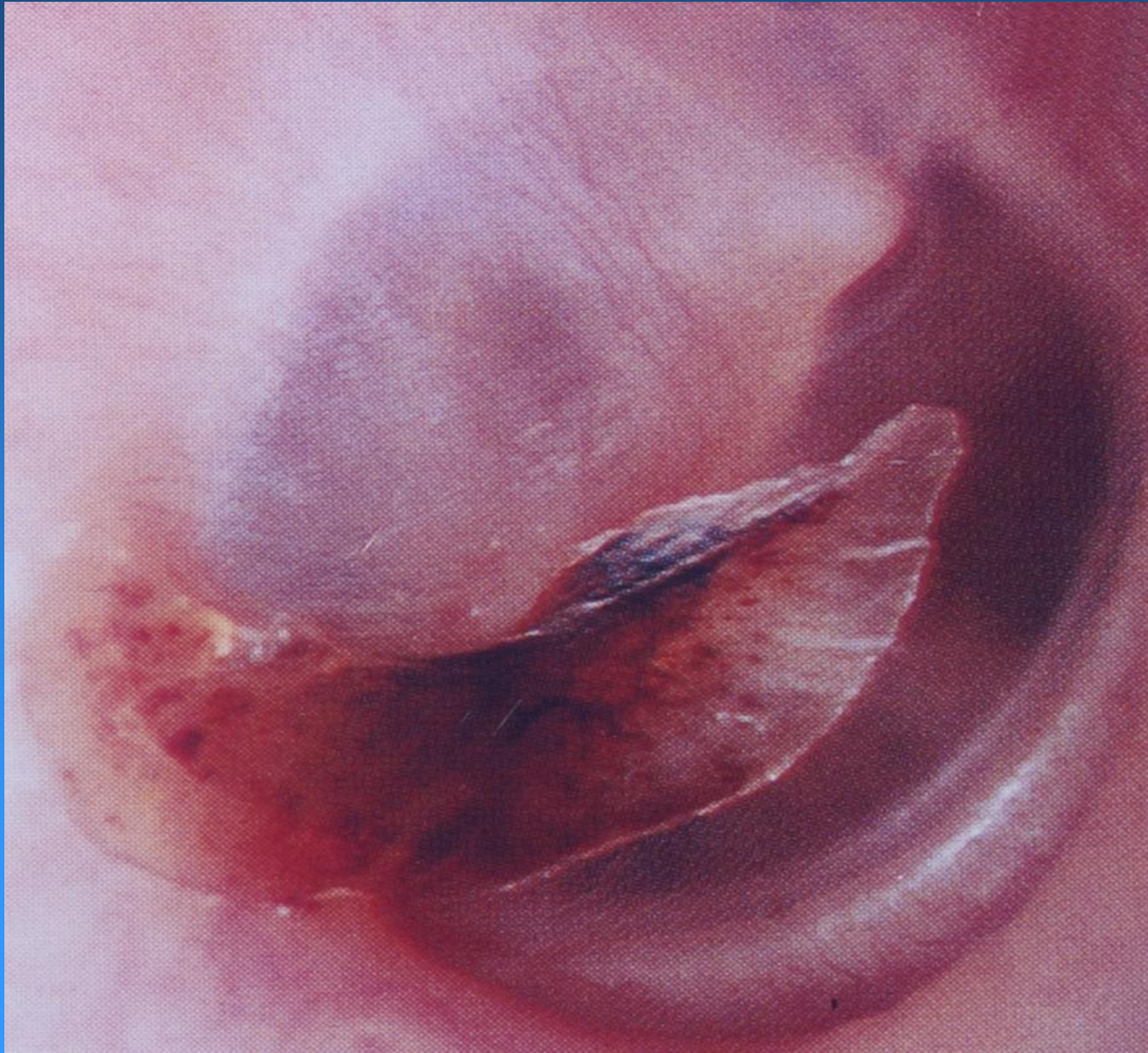


Serous crust

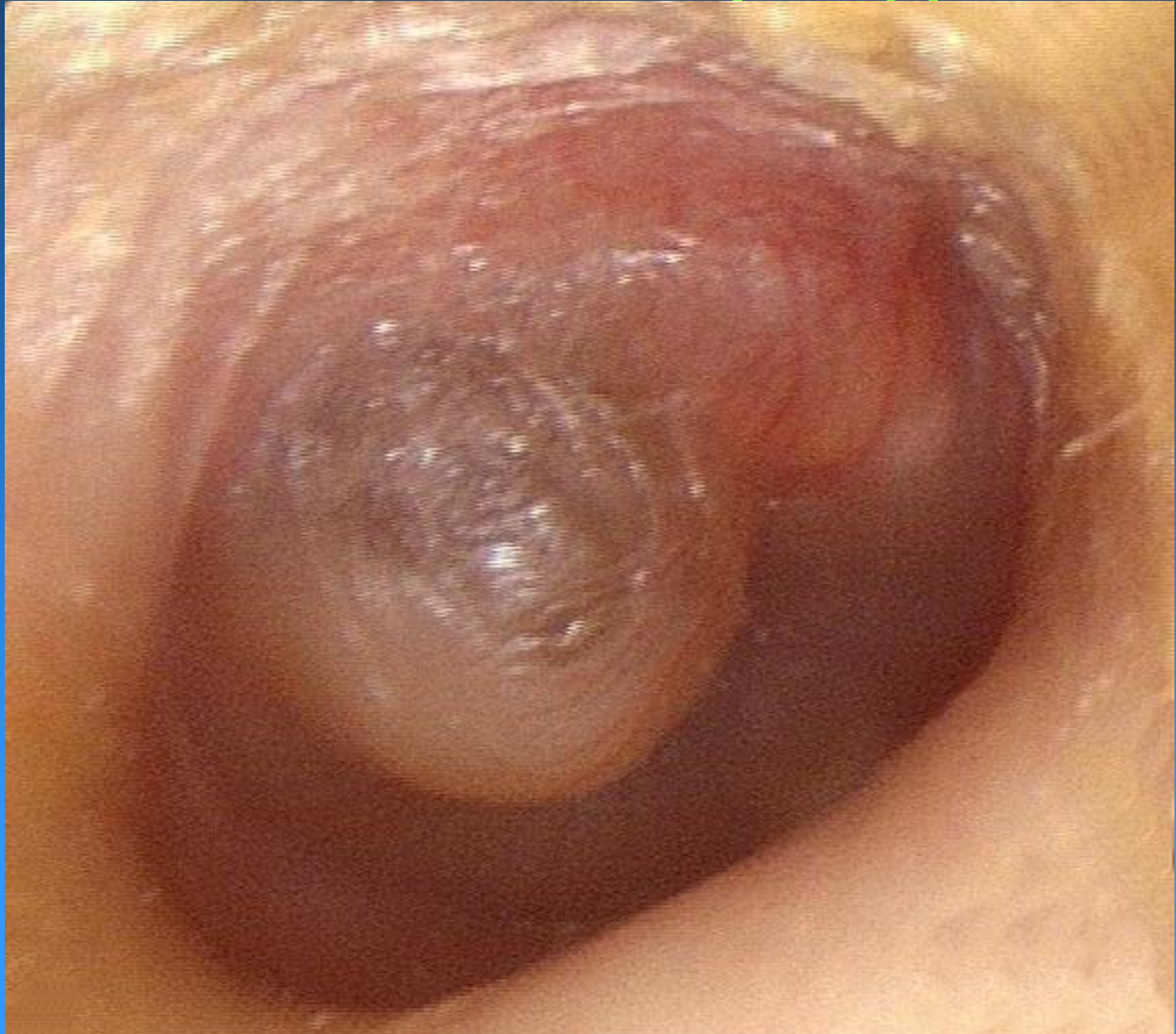


Resolving Acute Otitis Media

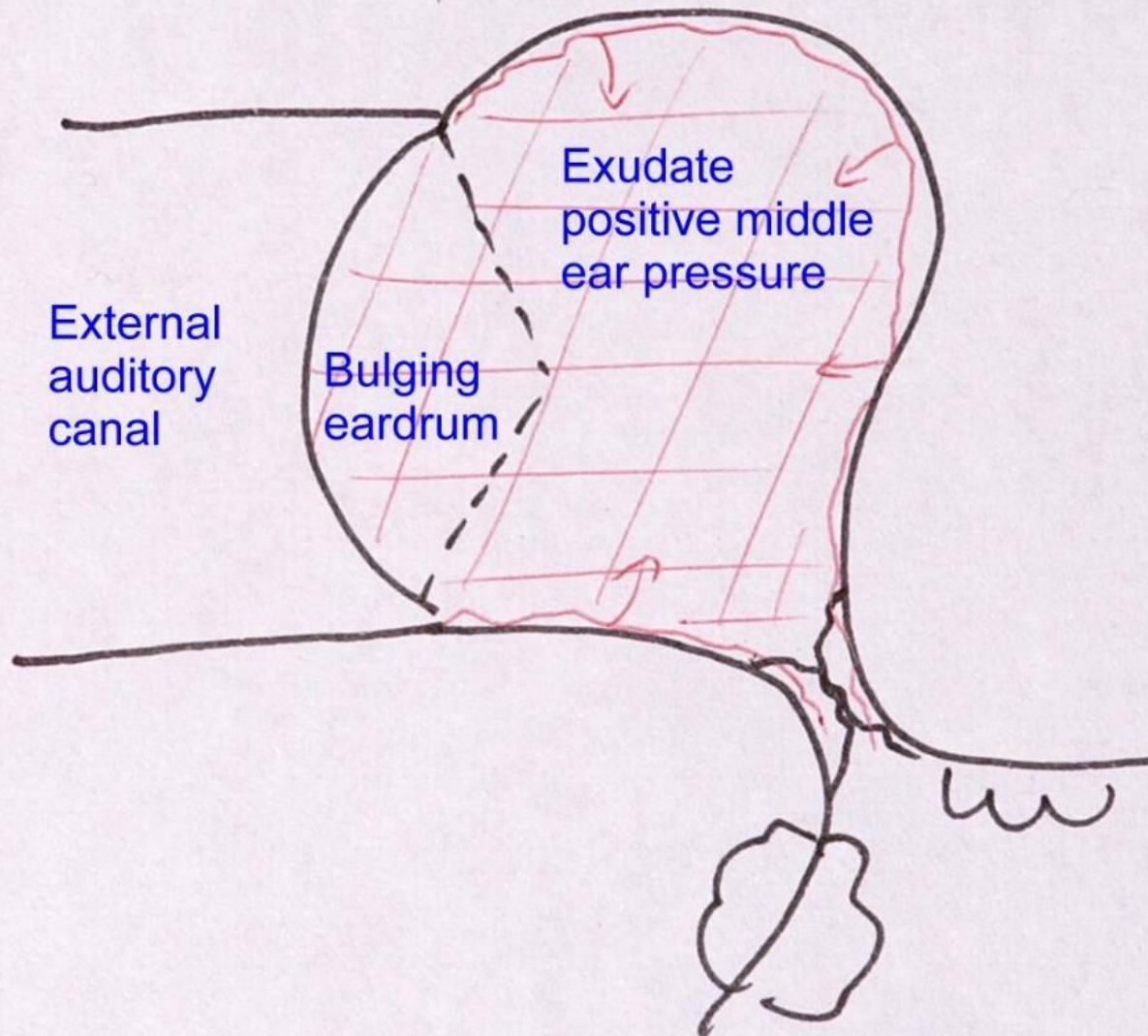
Serous crust



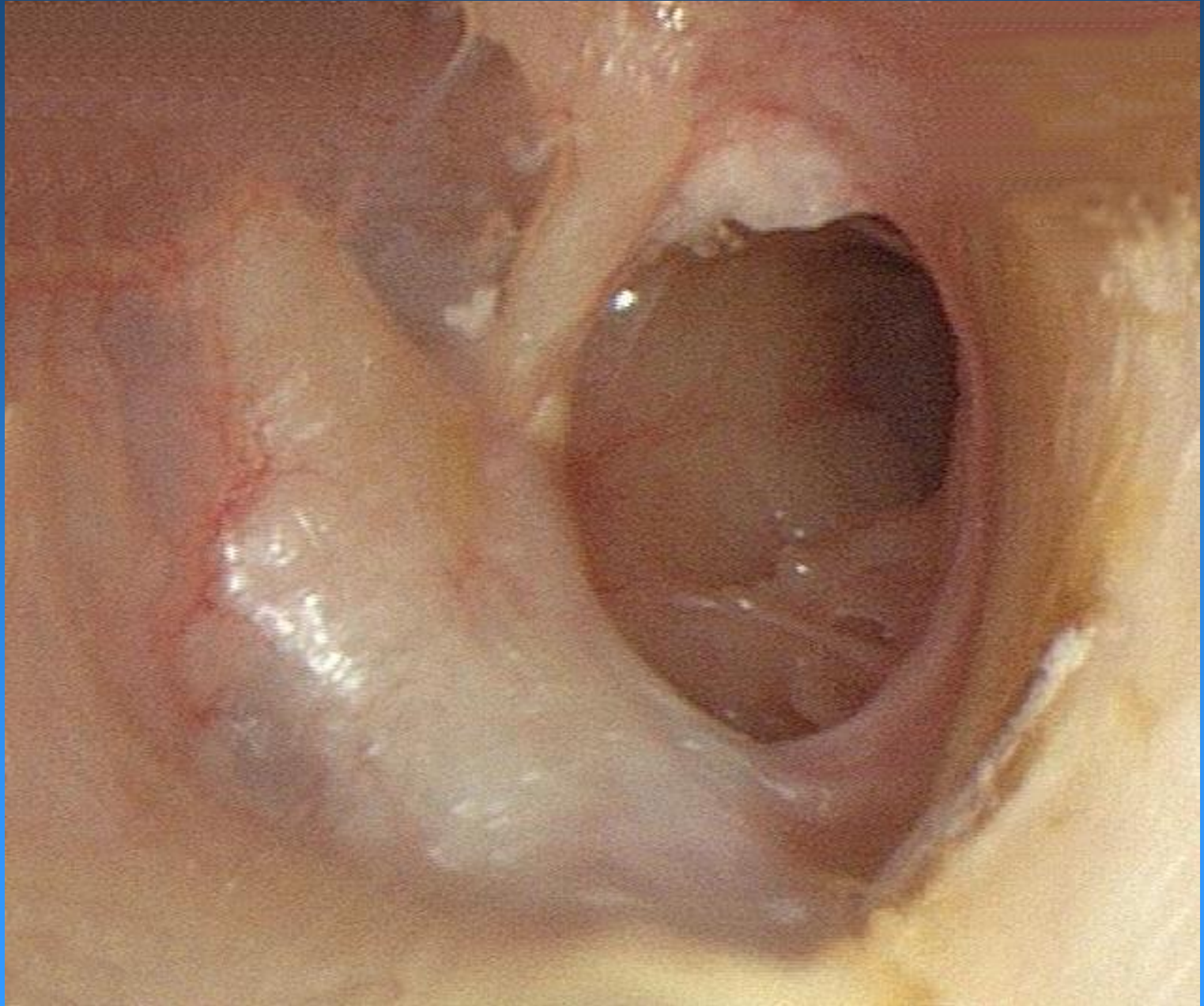
More severe progress



Middle ear exudate



A view of the Eustachian tube



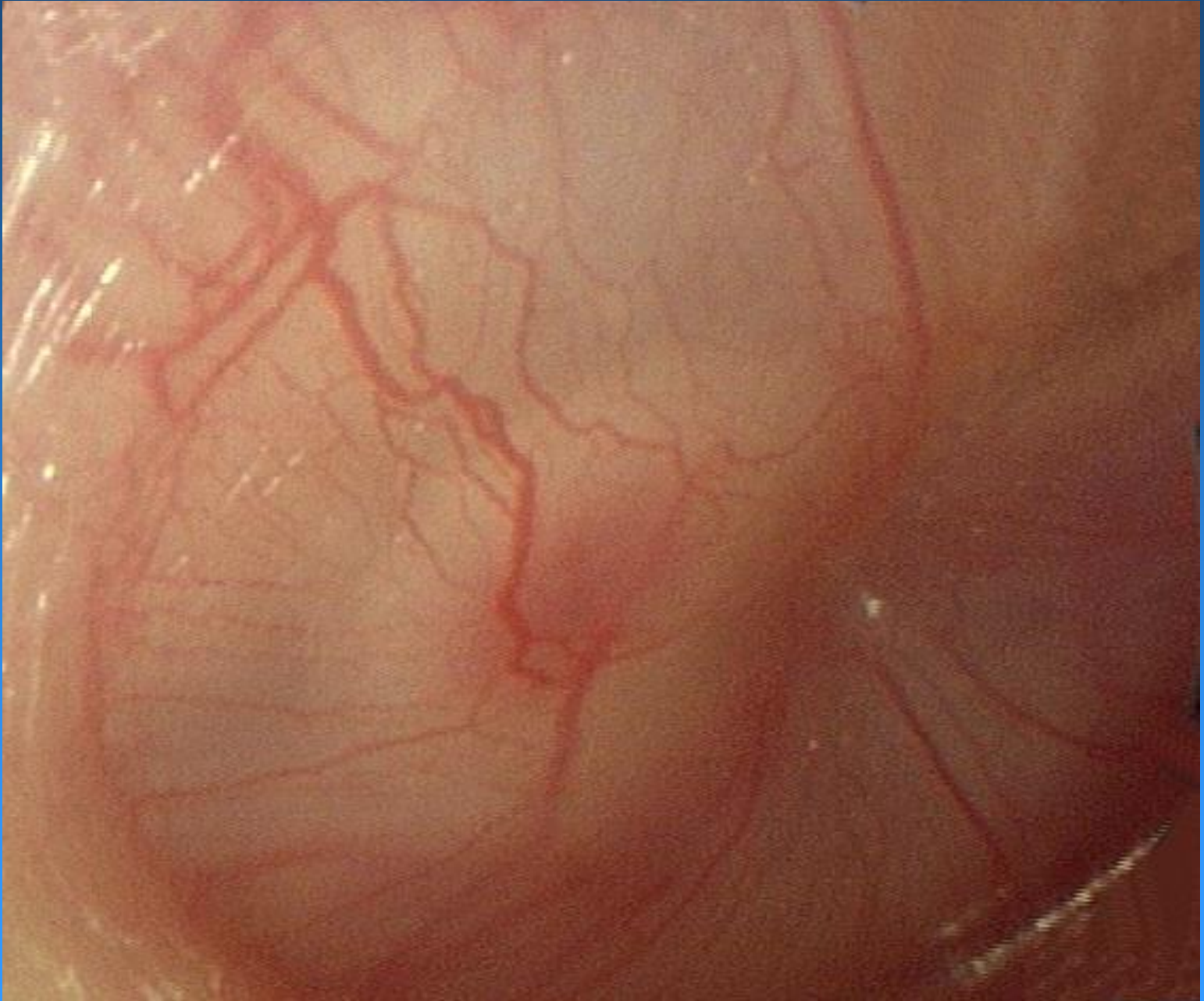
Eardrum perforation

- Discharge
 - profuse
 - mucoid
- Hearing loss

Chronic middle ear effusion

- **Maturation of the immune system**
- **Build up of immunity to common pathogens**
- **Presence of prolonging factors**
 - asthma/hayfever
- **Persistence of effusion**
- **No infection**
- **Few symptoms**
- **Silent damage to eardrum**

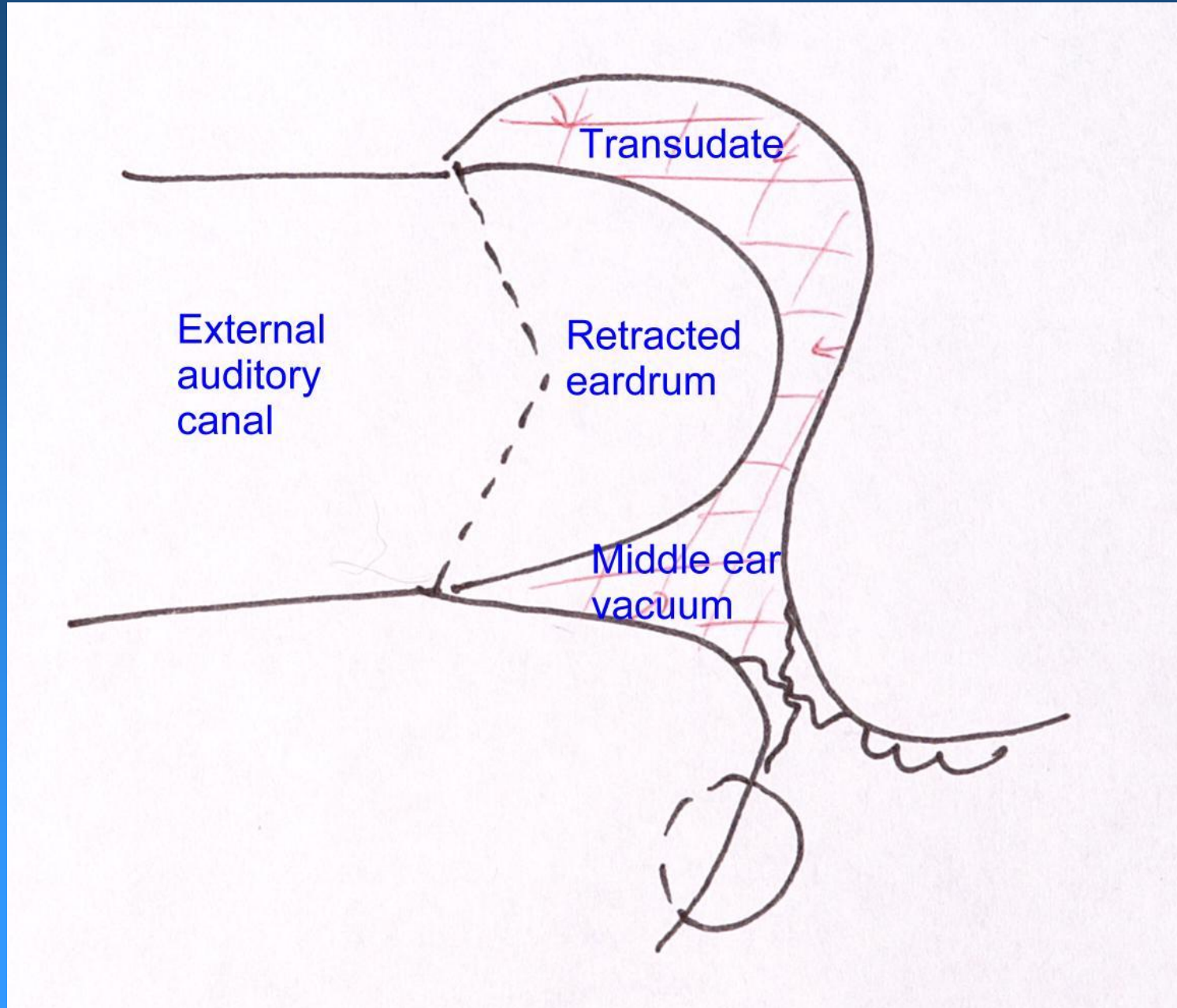
Chronic OME



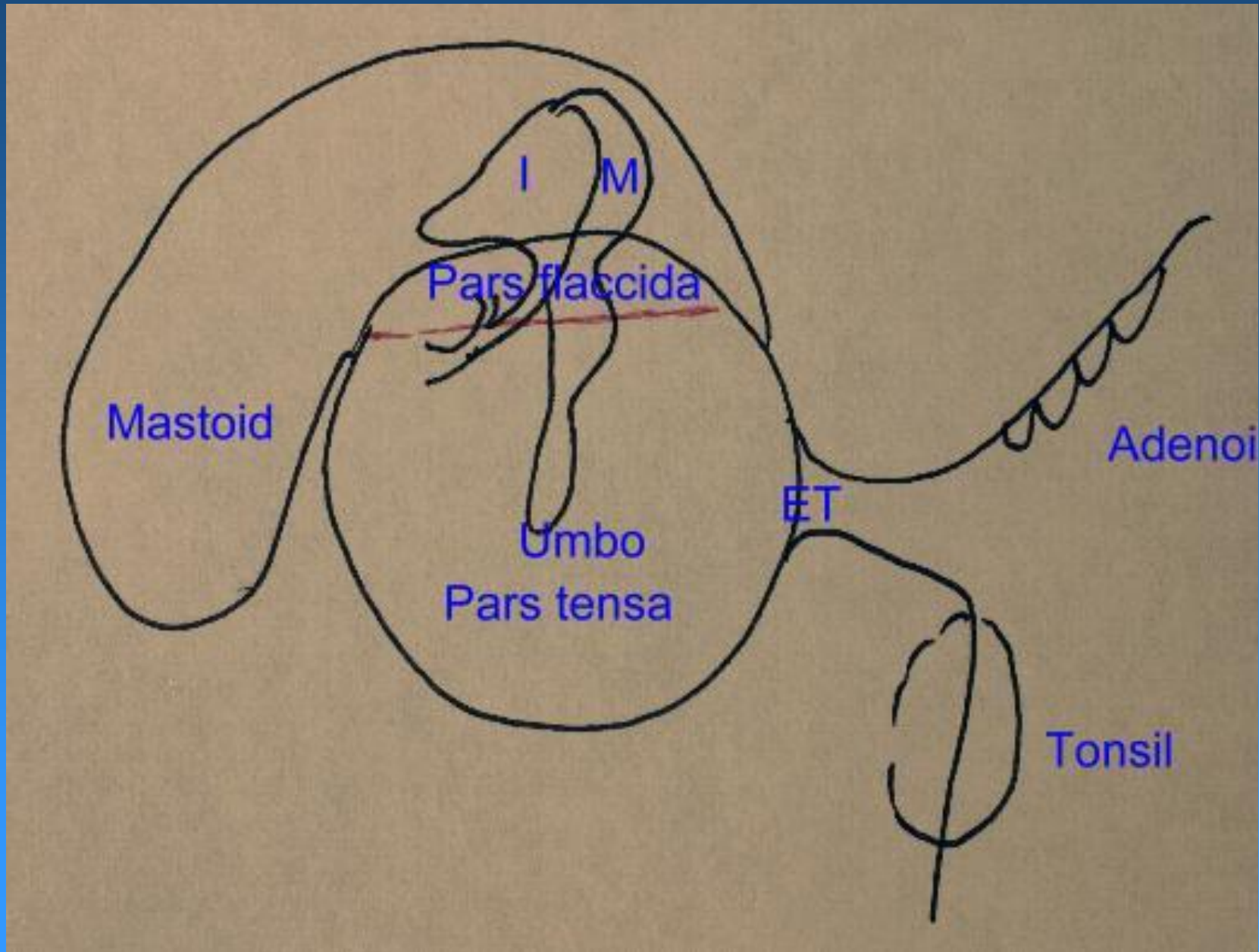
Chronic middle ear effusion

- effusions contain collagenase
- eardrum basement membrane damage
- drum atrophy
- drum retraction and atelectasis
- pocketing
- squamous epithelium drawn into cleft of middle ear
- desquamated keratin accumulation
- formation of cholesteatoma

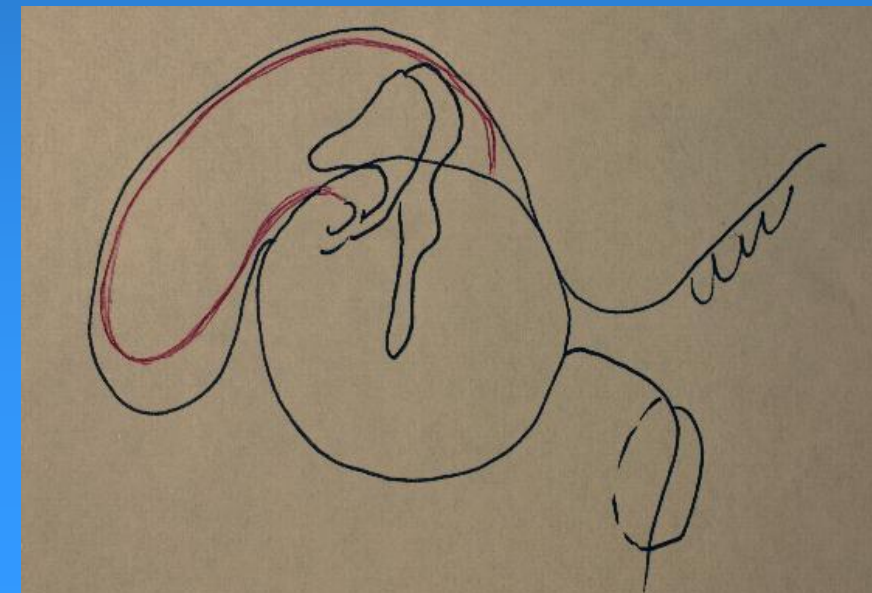
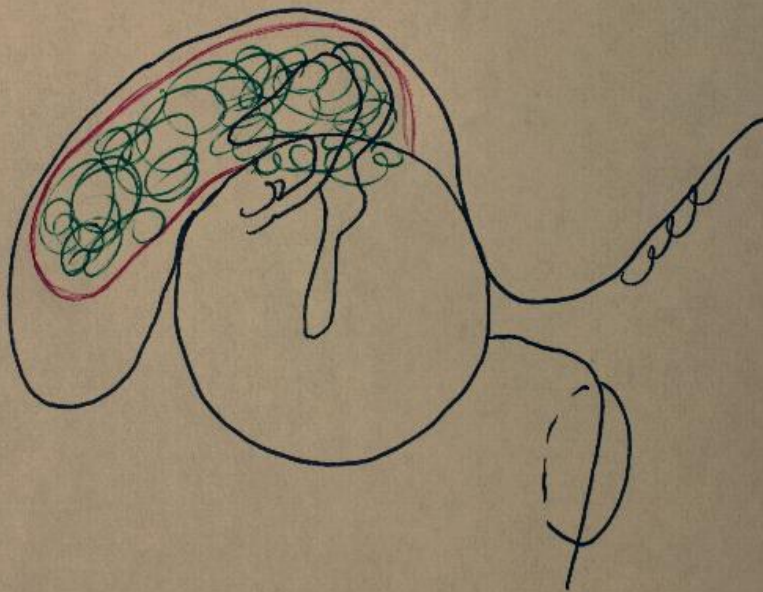
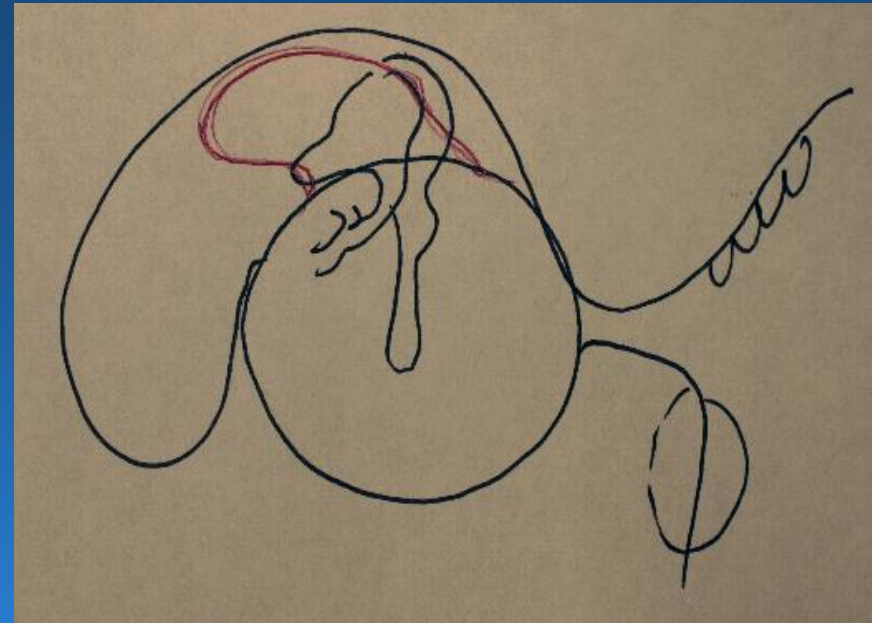
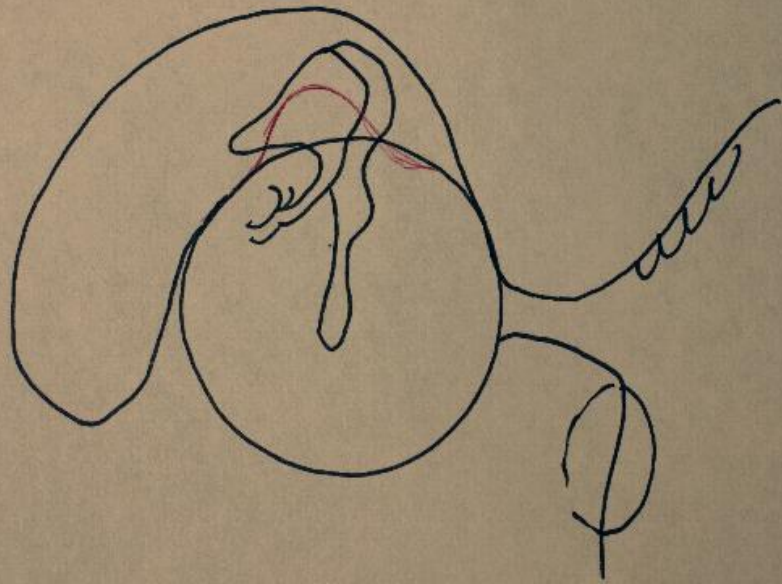
Chronic middle ear vacuum



Chronic middle ear vacuum



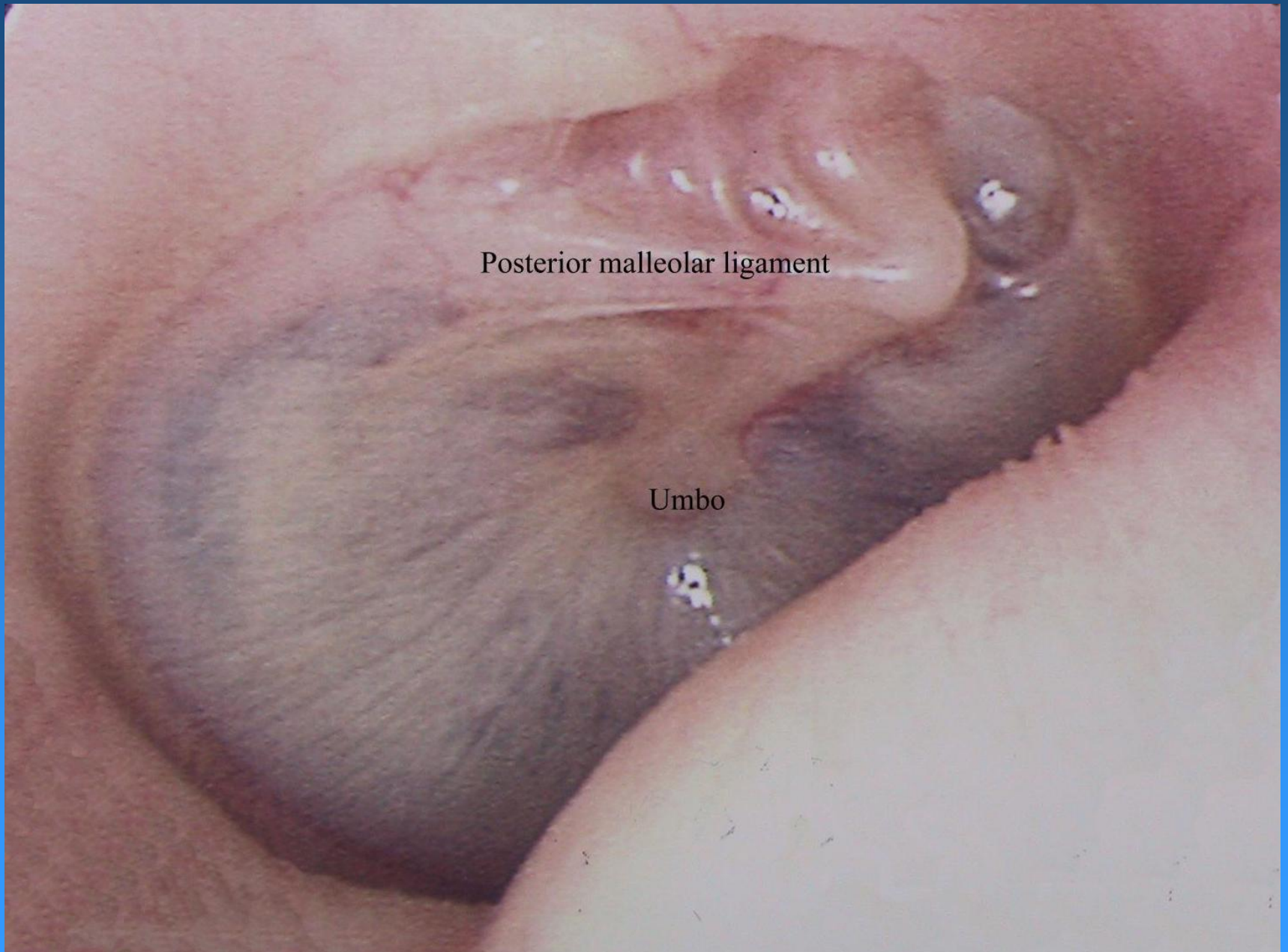
Chronic middle ear vacuum



Atelectasis – Grade I



Atelectasis – attic



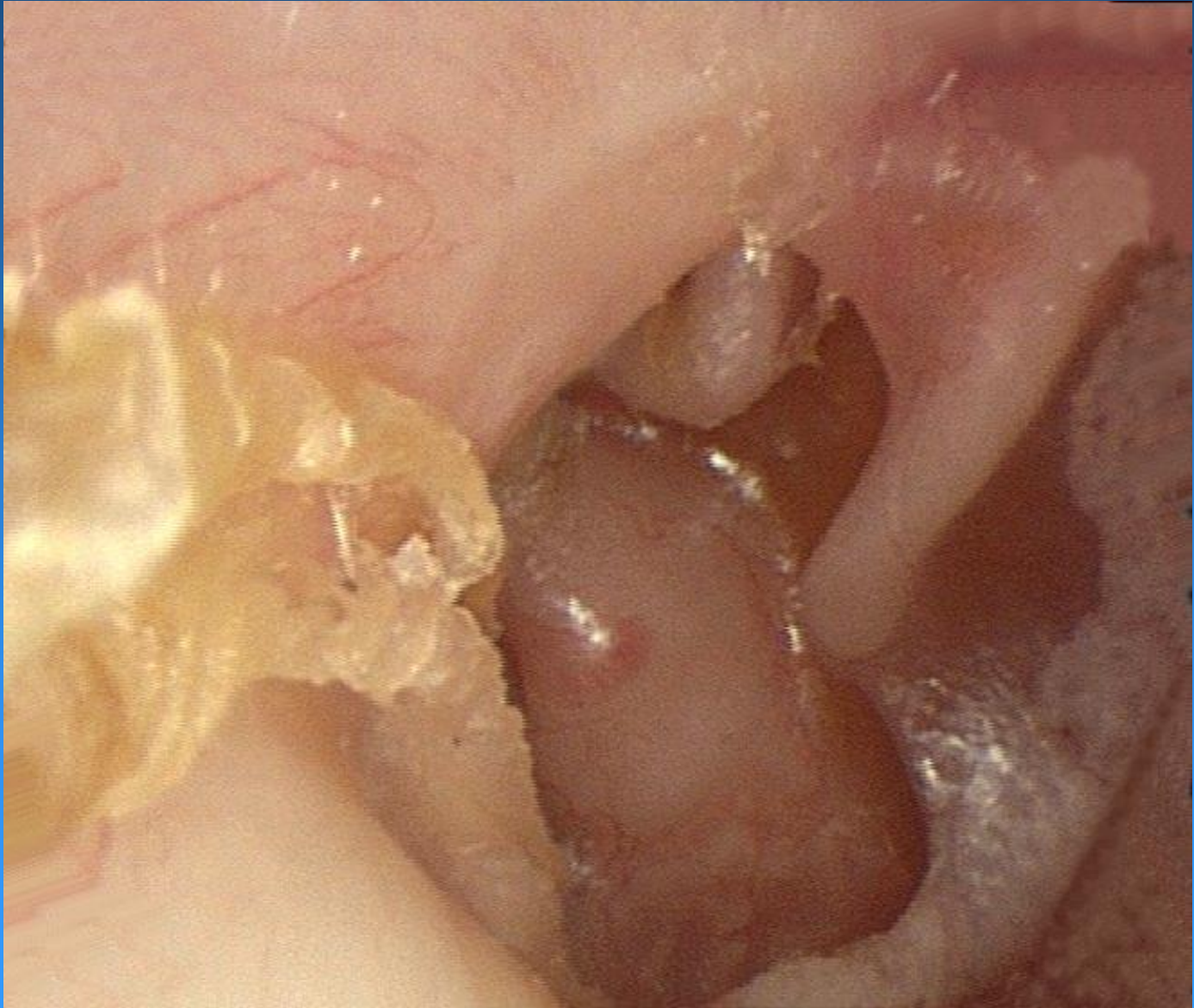
Attic cholesteatoma



Attic cholesteatoma



Grade III atelectasis and mesotympanic cholesteatoma



Cholesteatoma

- Squamous epithelium in the middle ear cleft
- Sequestered keratin – food for bugs
- Increased prostaglandins
- Osteoclast stimulation
- Bone erosion
 - hearing sequelae
 - infectious sequelae (life threatening)
(infection tracking to vital structures)

Cholesteatoma

- Discharge
 - scanty
 - smelly
 - blood (granulation tissue)
- Hearing loss
- Catastrophic infection
 - CNS
 - local soft tissue

This is not cholesteatoma

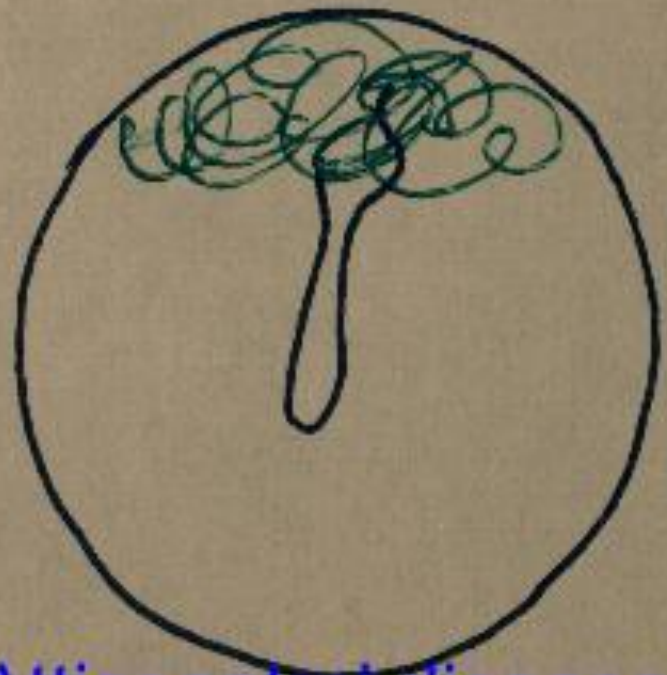
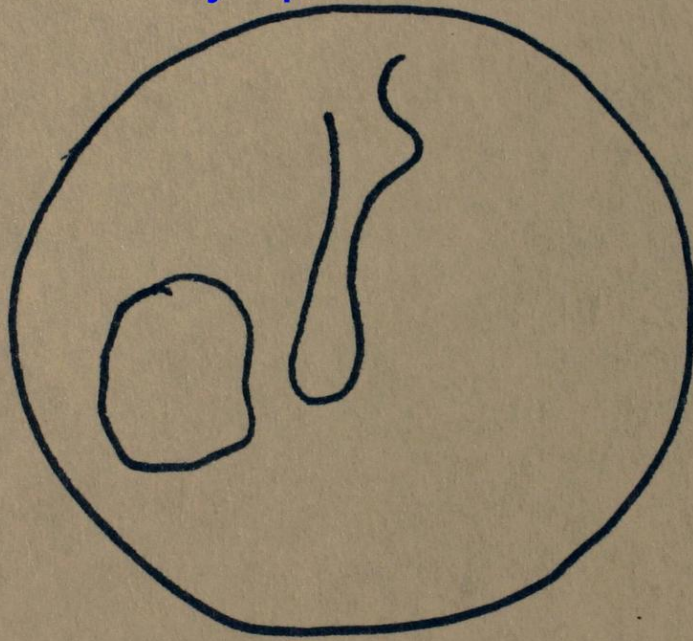


Chronic middle ear disease

- Tubotympanic disease
 - central eardrum perforation
 - profuse mucoid, non-smelly discharge
- Attico antral disease
 - attic “perforation”
 - scanty, smelly, blood stained discharge

Chronic middle ear disease

Tubotympanic disease



Atticotympanic disease

Nomenclature

- Otitis media non specific OM
- Acute otitis media AOM
- Recurrent acute otitis media RAOM
- Otitis media with effusion OME
 - acute
 - chronic
- Suppurative otitis media SOM
- Secretory/serous otitis media SOM
- Chronic suppurative otitis media CSOM
 - tubotympanic subtype
 - atticotympanic subtype

Otitis media

- Epidemiology

- early age – immune naivety
- socioeconomic status
 - housing
 - childcare
 - nutritional status
- racial factors
- respiratory irritants – cigarette smoking
 - allergy facilitators

Otitis media

- Prolonging factors
 - socioeconomic status
 - housing/childcare/nutritional status
 - respiratory irritants – cigarette smoking
 - allergy facilitators
 - allergy
 - hayfever/asthma
 - adenoid hypertrophy
 - protein calorie malnutrition
 - racial factors

Otitis media - AOM

- **Symptoms** (remember it is a viral infection)
 - pain (ear batting)
 - clumsy/off balance
 - systemic symptoms (acute)
 - fever/malaise/vomiting/diarrhoea
- Later
 - hearing loss (TV volume up “what”)
(always trust Mum’s assessment)

RAOM - assessment

- History
 - duration
 - frequency
 - prolonging features
 - nasal allergy/hayfever/asthma
 - snoring (adenoid hypertrophy)
 - childcare
 - parental smoking

Otitis media - assessment

- Examination
 - adenoid facies
 - mouth breathing
 - postnasal drip
 - snotty nose(allergy/adenoids)

Otitis media management

- AOM Acute otitis media
- RAOM Recurrent acute otitis media
- OME Otitis media with effusion
- CSOM Chronic suppurative otitis media
 - tubotympanic
 - attico antral

AOM management

- Symptomatic treatment
 - analgesia
 - antipyretic
 - warmth (bed rest)
 - re-examination
- Antibiotic if persistent > 7-10 days from onset
- - beta lactamase resistant essential
 - augmentin/Bactrim/cephalosporin (beware allergic rxns to cephalosporins)

Clinical practice guideline: Otitis media with effusion

- **SUPPLEMENT TO Otolaryngology – Head and Neck Surgery**
- **MAY 2004 VOLUME 130 NUMBER 5**
- **In contrast to the earlier guideline, which was limited to children aged 1 to 3 years with no craniofacial or neurologic abnormalities or sensory deficits, the updated guideline applies to children aged 2 months through 12 years with or without developmental disabilities or underlying conditions that predispose to OME and its sequelae.**

Clinical practice guideline: Otitis media with effusion

- Otitis media with effusion (OME) defined:
- Presence of fluid in the middle ear without acute ear infection.
- OME distinct from acute otitis media (AOM)
 - acute onset of middle-ear effusion with inflammation.

Clinical practice guideline: Otitis media with effusion

- **Recommendations:**
- **1) document the laterality, duration of effusion, and presence and severity of associated symptoms at each assessment**
- **2) distinguish the child who is at risk for speech, language, or learning problems from other children with OME**
- **3) manage the low risk child with OME with watchful waiting for 3 months**

AOM and antibiotics

- Err towards antibiotics in:
 - the very young (<18/12 of age)
 - very severe symptoms
 - *may* reduce suppurative complications in these
- Antibiotics used early on
 - recovery of antibiotic resistant organisms in subsequent cultures

OME management

- > 3 attacks in 6 months RAOM
- > 4 attacks in 12 months RAOM
- Persistent beyond 3 months (persistent OME)
- Grommets
 - Sheehy for 1st and 2nd sets
 - t-tube for 3rd and subsequent
 - t-tube for already damaged ear

Clinical practice guideline: Otitis media with effusion

- **When a child becomes a surgical candidate, tympanostomy tube insertion is the preferred initial procedure.**
- **Adenoidectomy should not be performed unless a distinct indication exists (nasal obstruction, chronic adenoiditis);**
- **Repeat surgery consists of adenoidectomy plus myringotomy, with or without tube insertion.**

Clinical practice guideline: Otitis media with effusion

- **Tonsillectomy alone or myringotomy alone should not be used to treat OME.**
- **Antihistamines and decongestants are ineffective for OME and should not be used for treatment**
- **Antimicrobials and corticosteroids do not have long-term efficacy and should not be used for routine management.**

Clinical practice guideline: Otitis media with effusion

- The subcommittee made no recommendations for
- 1) complementary and alternative medicine as a treatment for OME - lack of scientific evidence
- 2) *allergy management* as a treatment for OME - insufficient evidence of therapeutic efficacy or a causal relationship between allergy and OME

Clinical practice guideline: Otitis media with effusion

- The guideline may not apply to children older than 12 years because OME is uncommon and the natural history is likely to differ from younger children who experience rapid developmental change.
- The primary outcomes considered in the guideline include hearing loss; effects on speech, language, and learning; physiologic sequelae; health care utilization (medical, surgical); and quality of life

Clinical practice guideline: Otitis media with effusion - benefits

- for grommets in first 6/12
(untreated ears improved after 6/12)
- hearing improved
4 decibels (dB) at 6 - 9/12
no difference at 12 - 18/12
- trials with only 1 ear treated, hearing improvements of
10 dB at 4 - 6/12
6 dB at 7 - 12/12 and
5 dB at 18 to 24 mo

Clinical practice guideline: Otitis media with effusion - benefits

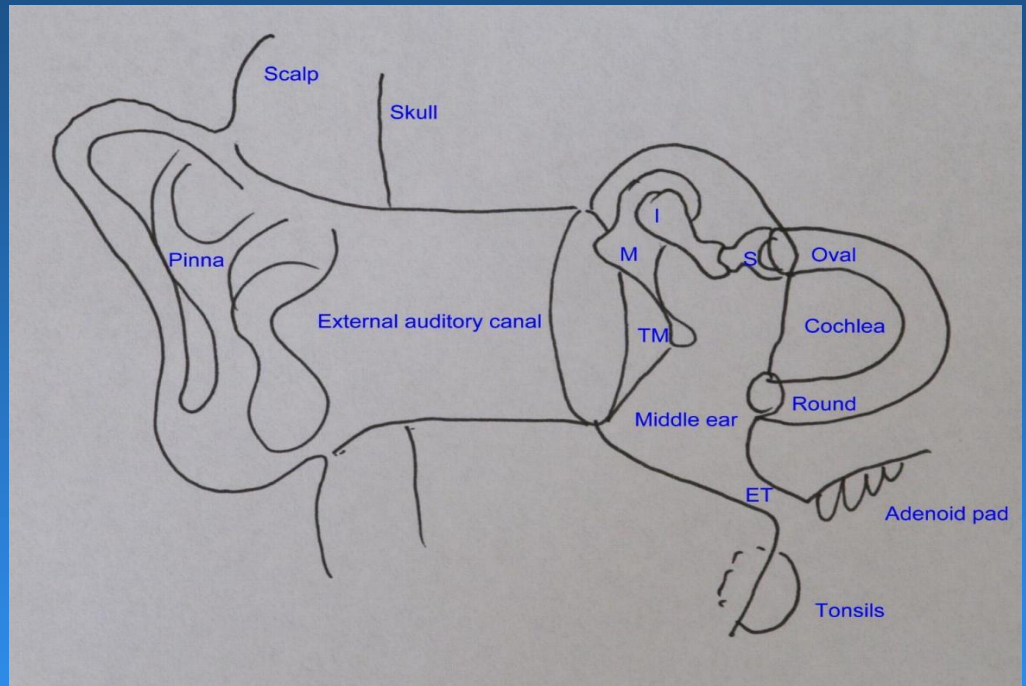
- No lasting effects on speech, language, cognition, behavior or quality of life

Clinical practice guideline: Recurrent AOM - benefits

- No consensus on recommending surgery for this indication
- older study of 95 children:
tubes prevented 1.5 episodes over first 6/12
- data from 5 hospitals showed children who received tubes averaged 4yrs of age,
<4 infections in 1yr and
OME for <30 consecutive days
30% concordance with expert panel and
7.5% with 1994 guidelines

Grommet insertion – indications

- Remember the nose!
- Snotty nose
- Snoring
- Hayfever/ecsema/wheeze/asthma
- = Poor prognosis



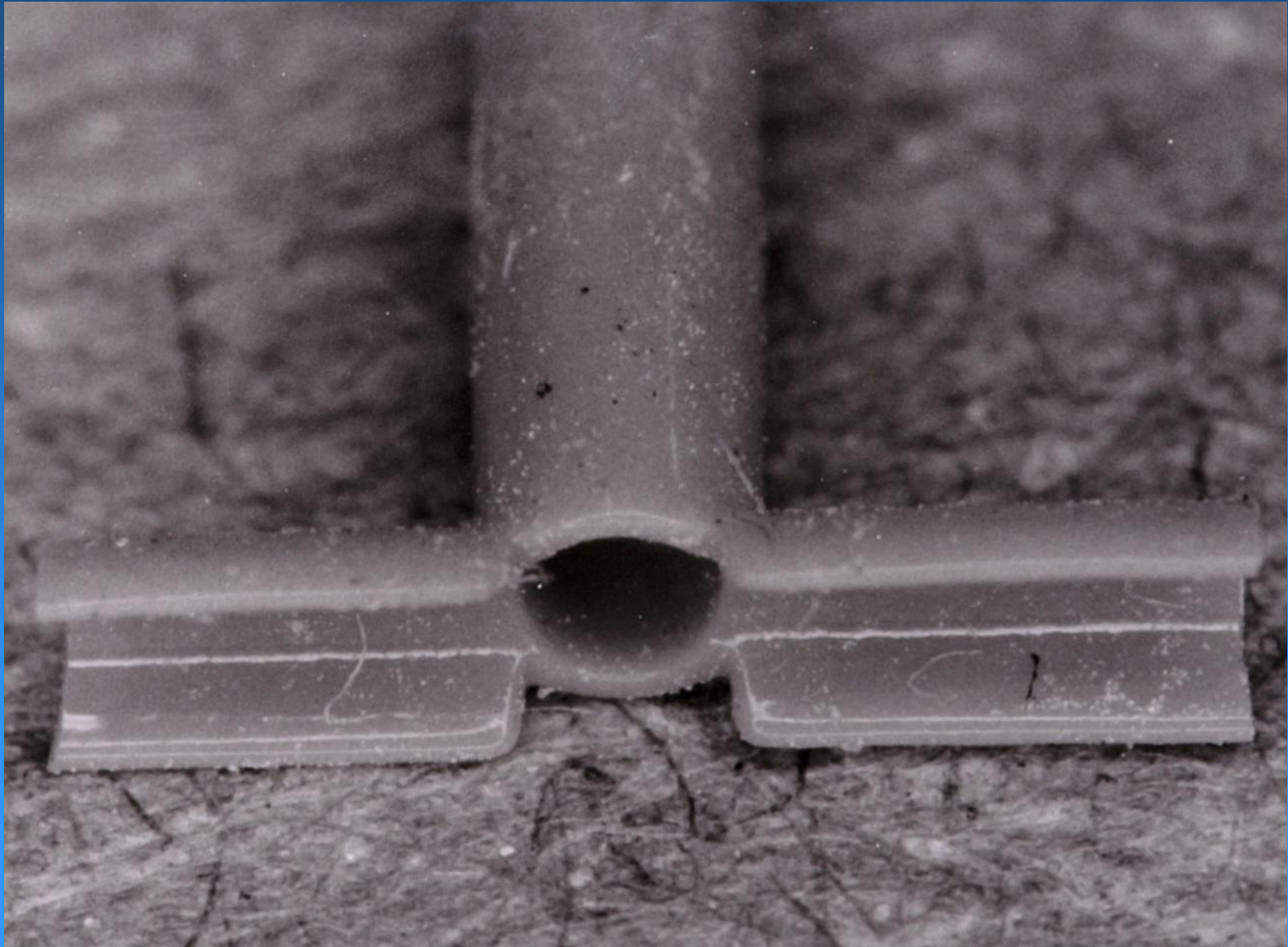
Grommets

- Babysit the Eustachian tube until function returns
- Reduce drum damage induced by effusion
- Reduce general ill health from RAOM
- Reduce need for medical intervention
- Reduce parental time off work
- Improve hearing while in
- Require close monitoring

Ventilation tubes/grommets



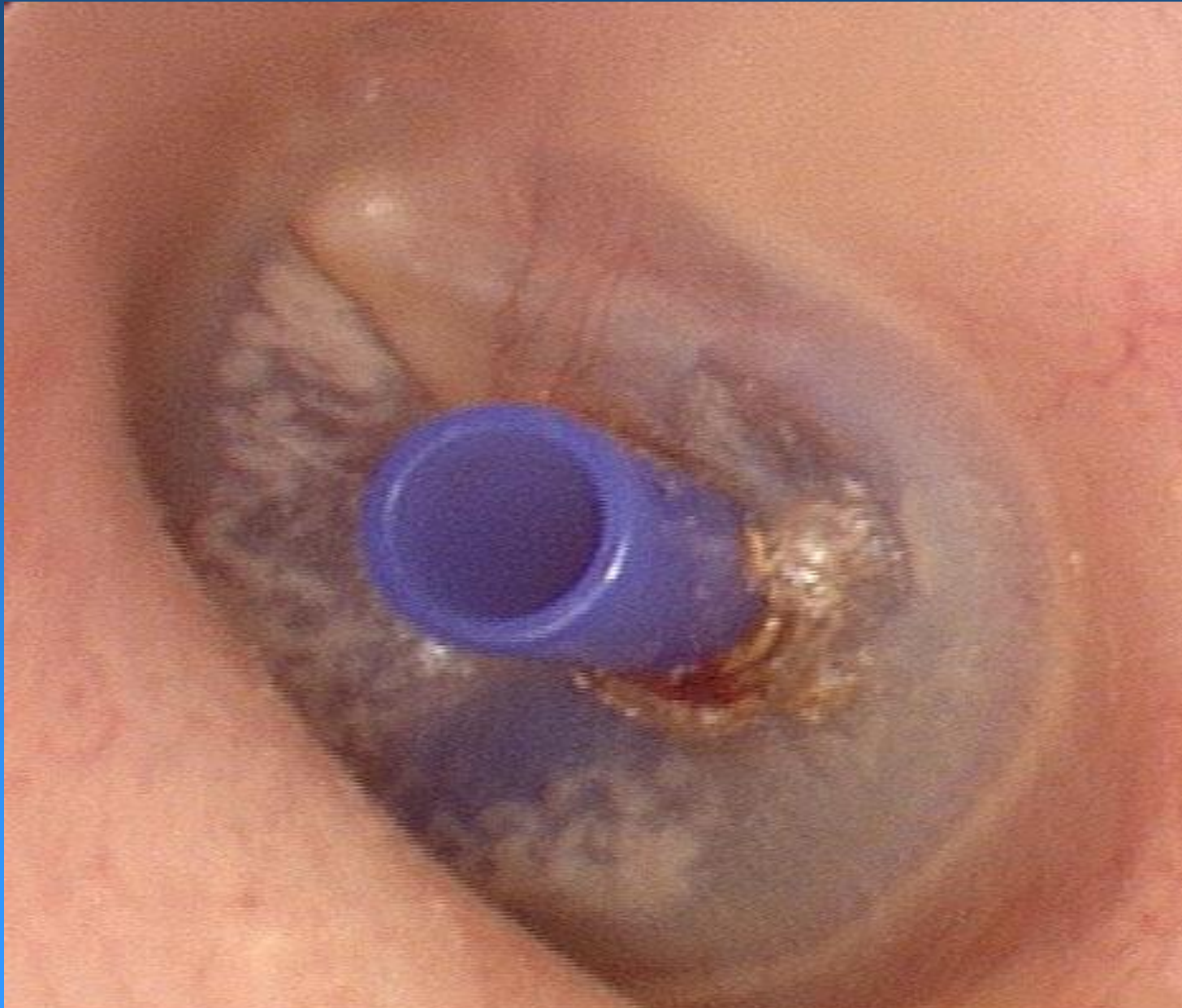
Ventilation tubes/T-tube



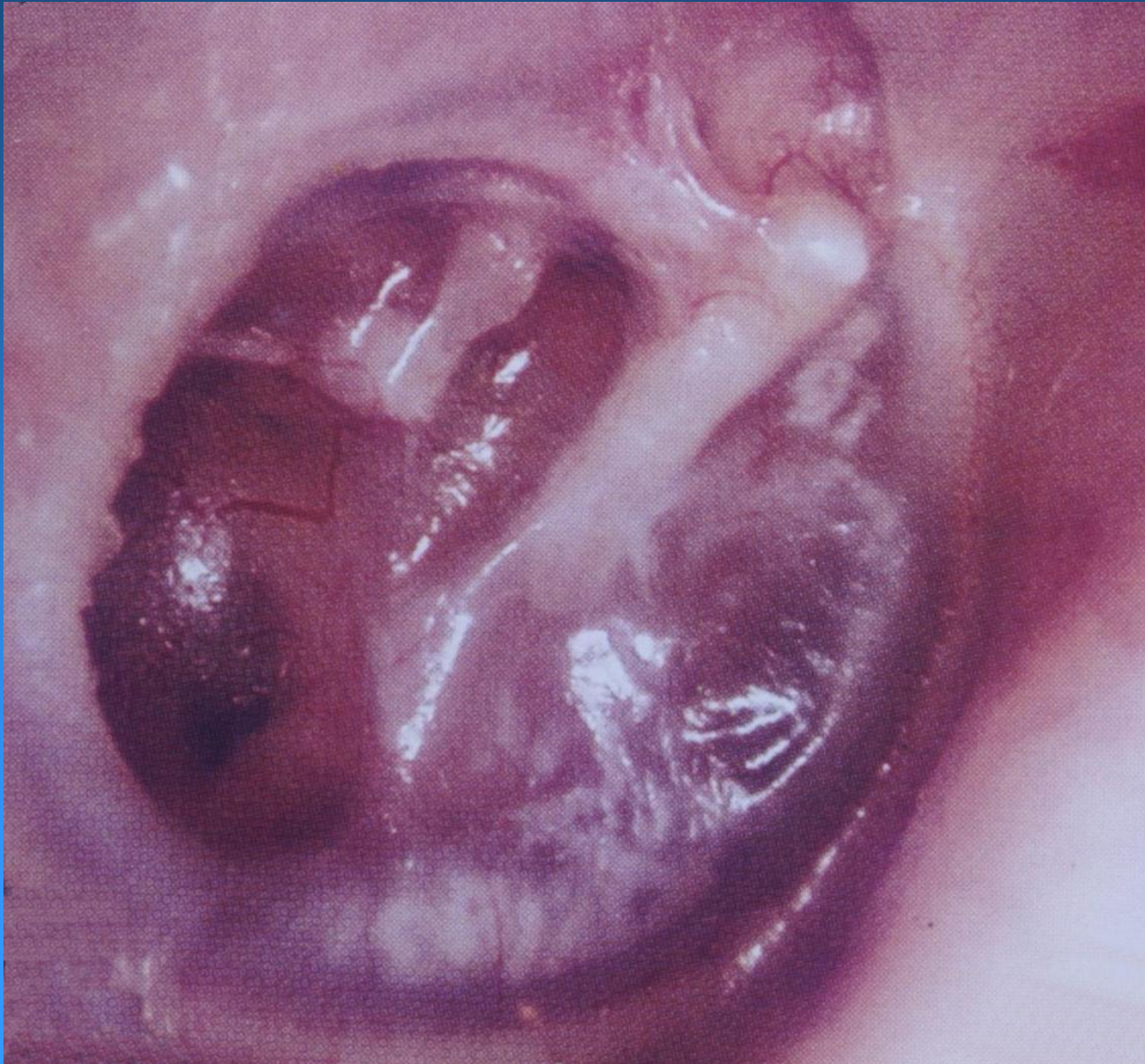
Grommet in situ



T-tube in situ



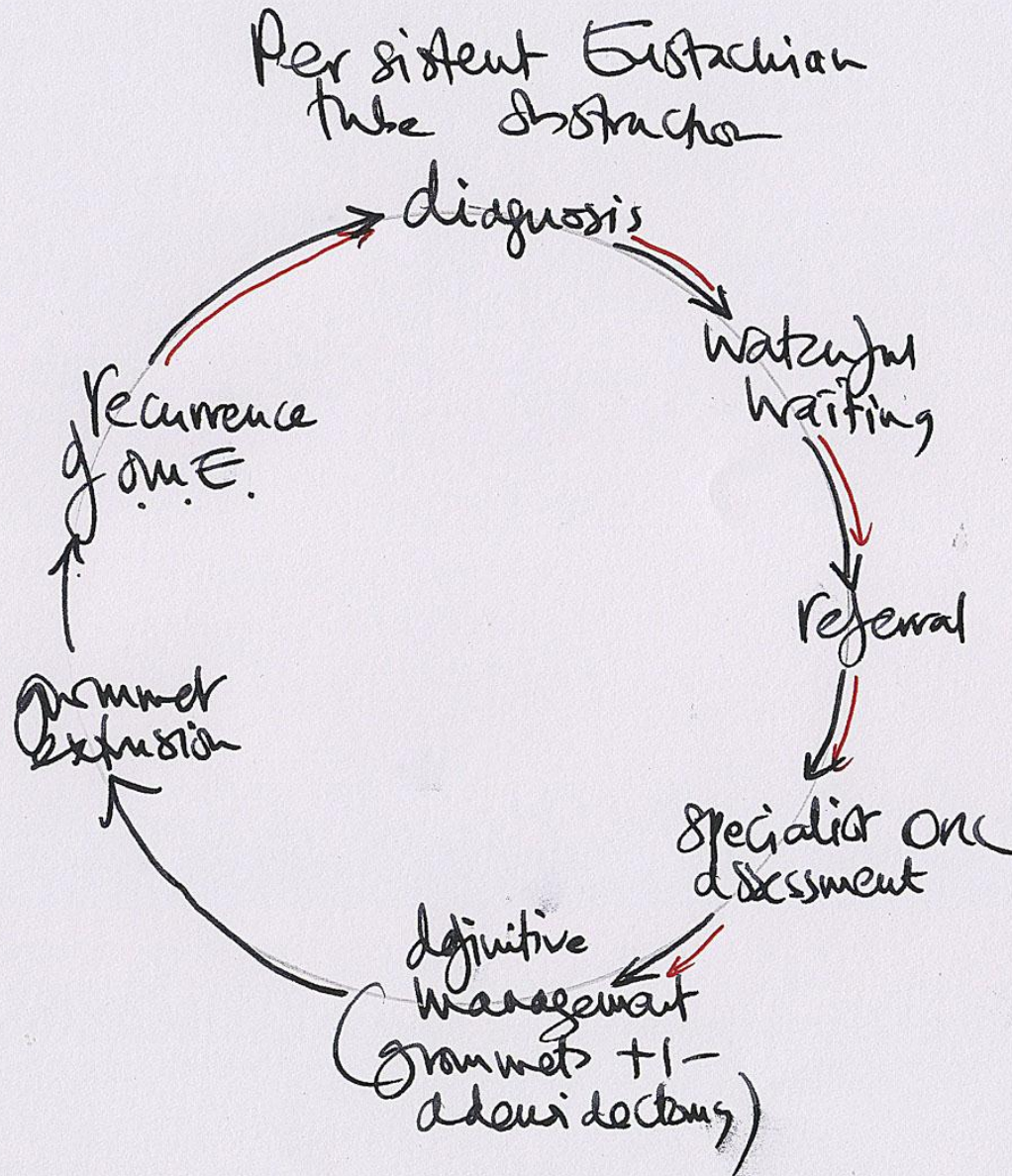
Prevention of ossicle and drum damage



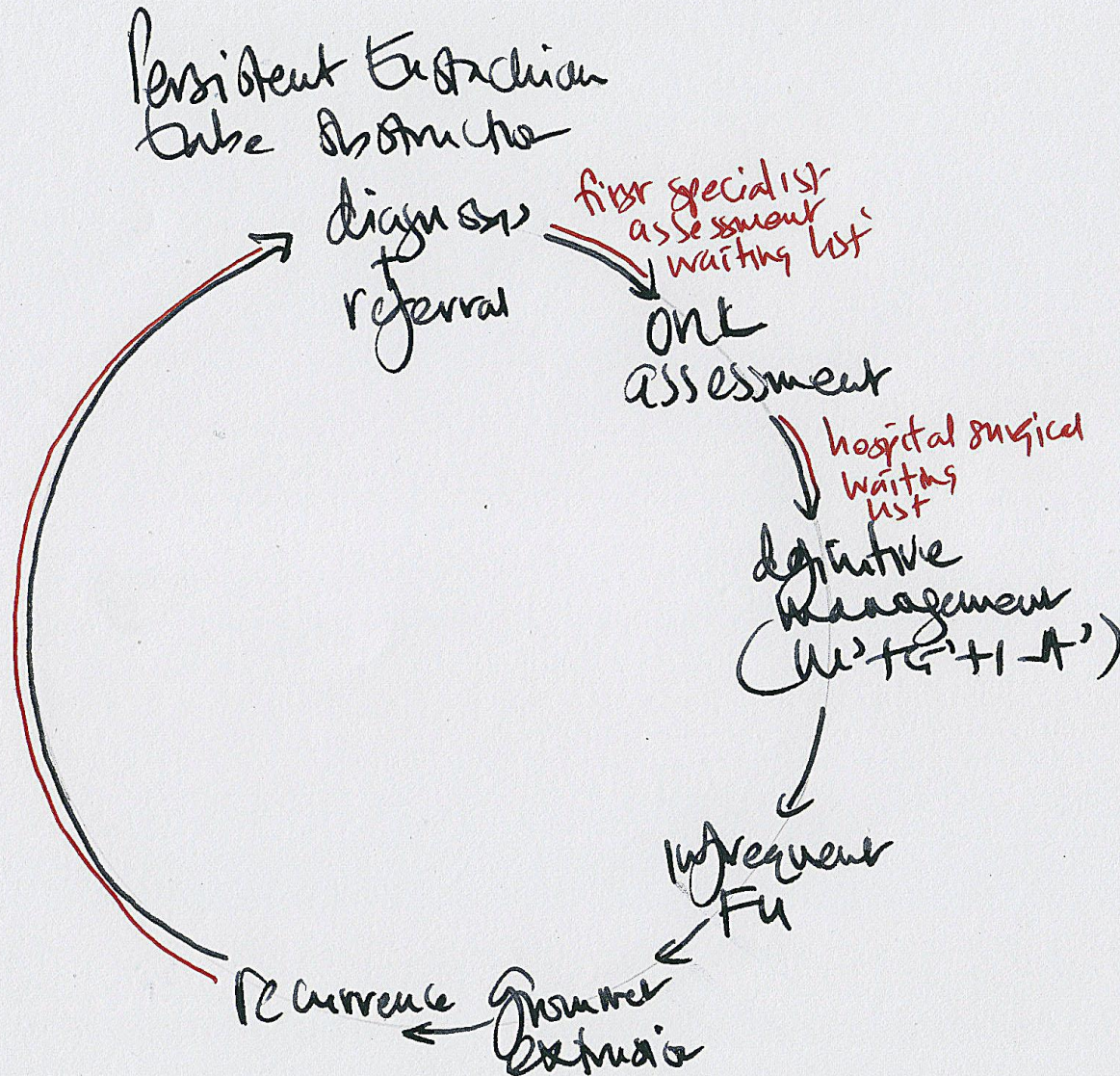
Grommets

- Efficacy proven in randomised clinical trials
- Do not cause drum damage but prevent it
 - (perf excepted - 2% rate)
- Do not cause hearing loss but prevent it
 - prevent drum atrophy
 - prevent ossicular erosion from atelectasis
- Prevent cholesteatoma if used in time
 - more ears are damaged by untreated effusions than grommet complications
- Must be monitored – may need to be replaced

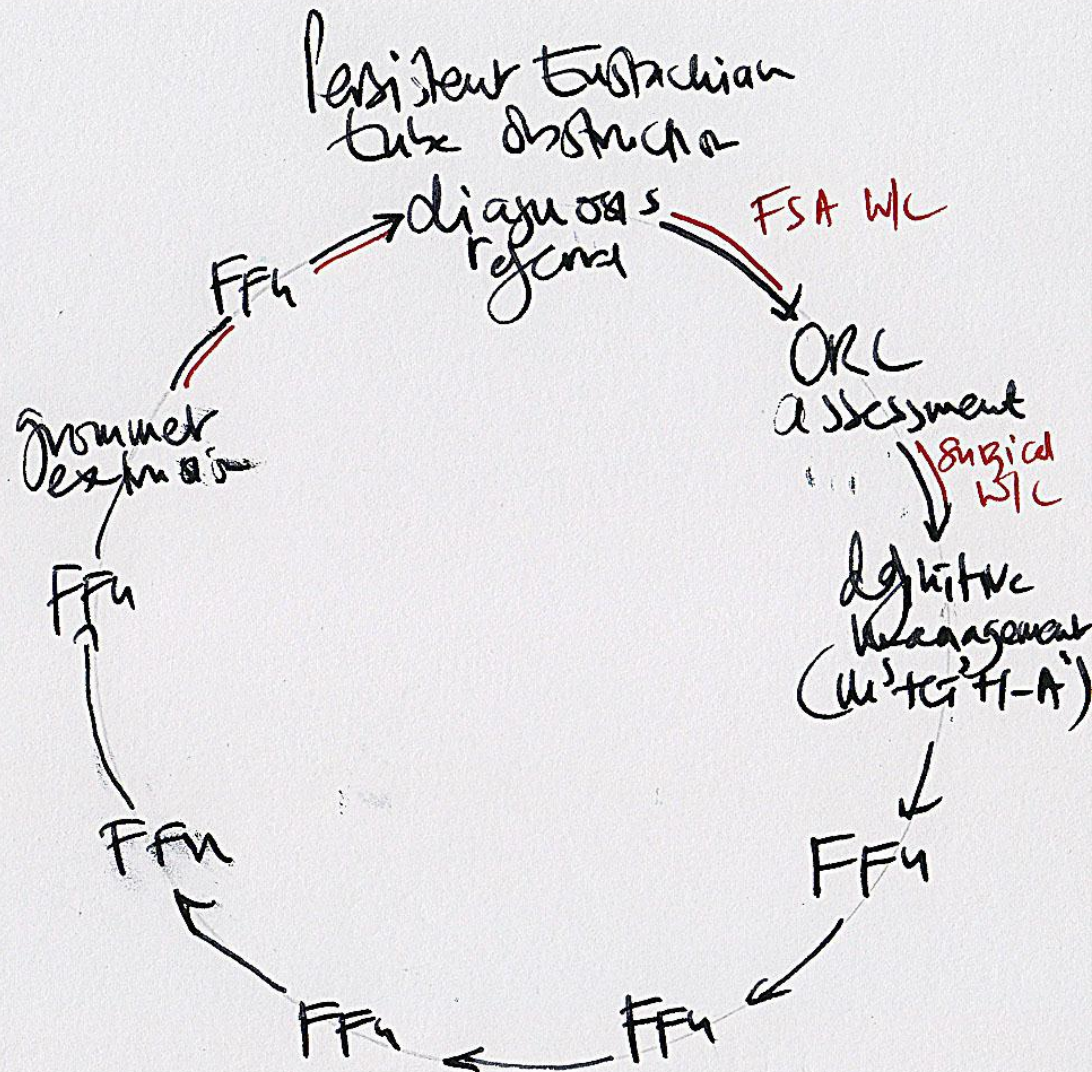
Referral algorithm



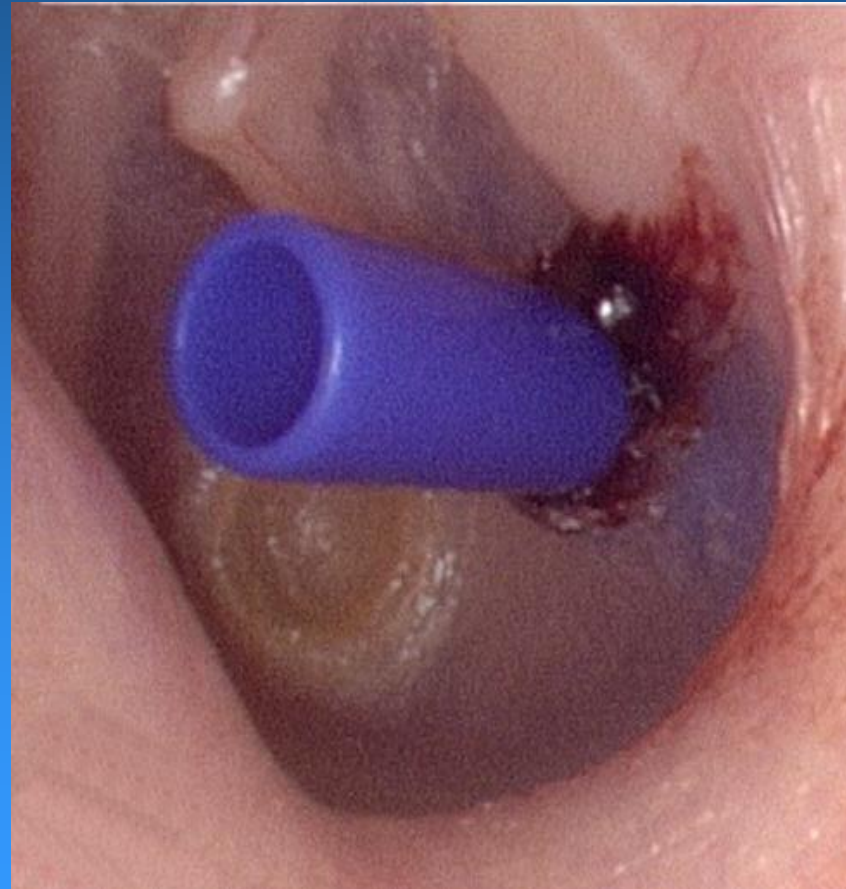
Referral algorithm



Referral algorithm



Reversal of mesotympanic retraction



Grommets

- Check at any time if symptomatic
- Promptly treat any discharge
- If blocked use q2h saline drops
- Remove if retained >18/12 and nose healthy
 - needs an 18/12 check even if asymptomatic
- Blood stained discharge is not a cause for concern – granulation tissue from infection
 - steroid containing antibiotic drops

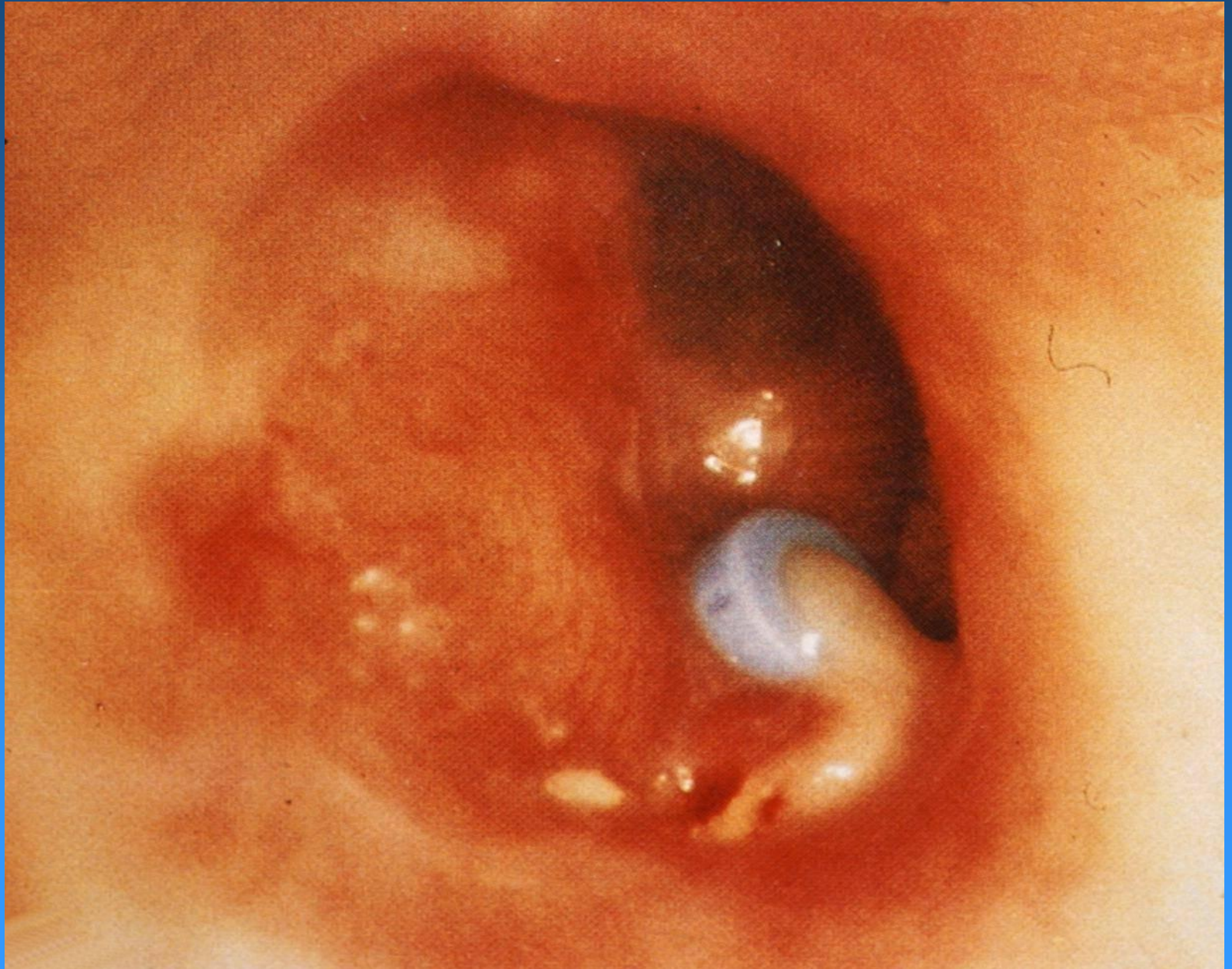
Grommet problems

- Infection with discharge – 20%
 - failed water precautions
 - ascending from nose – URTI
 - snotty nose = snotty grommet
- Perforation
 - 2% with Sheehy
 - 20% with T-tube
- Intratympanic cholesteatoma <<1%

Grommet problems



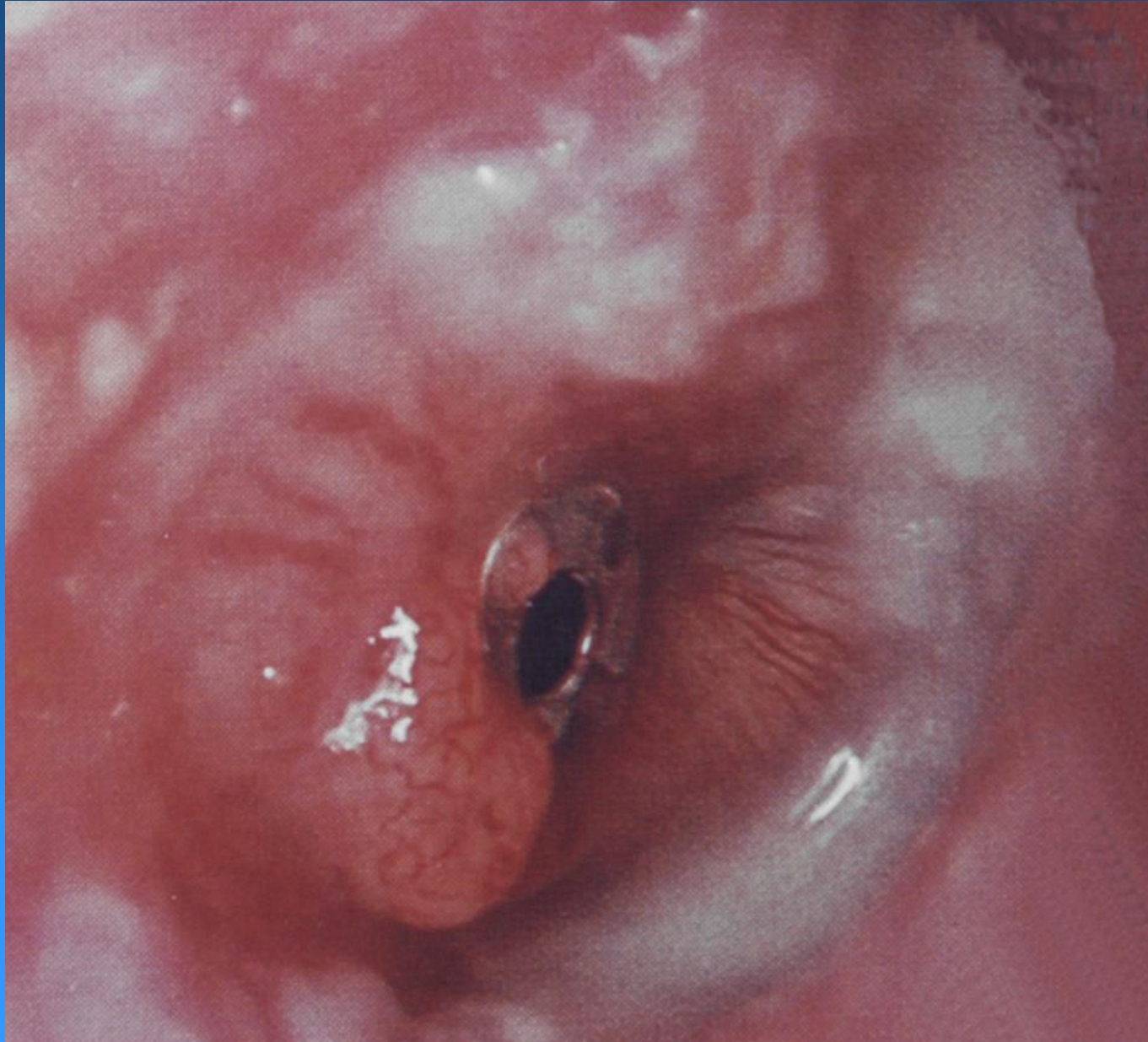
Grommet problems - suppuration



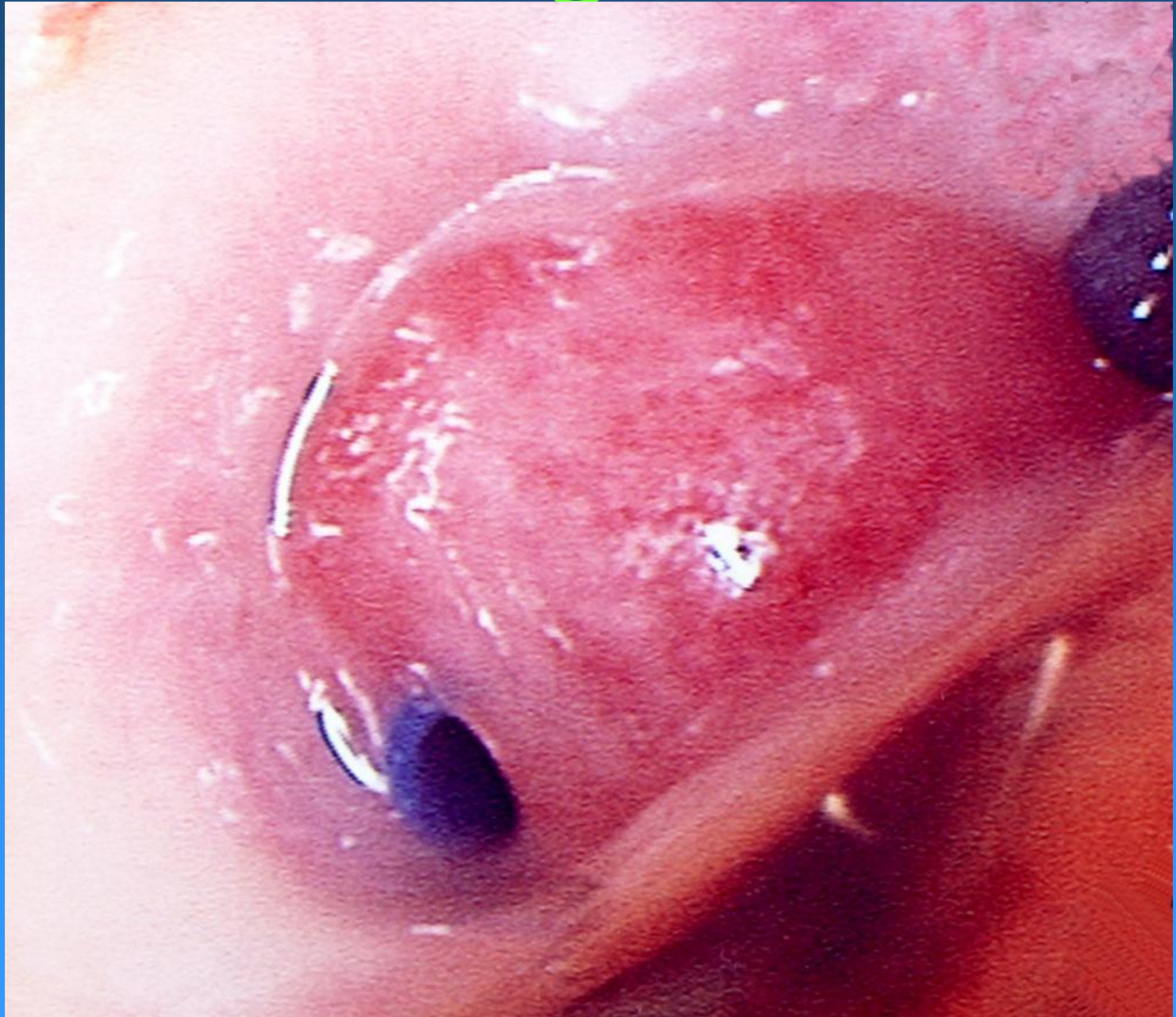
Granuloma



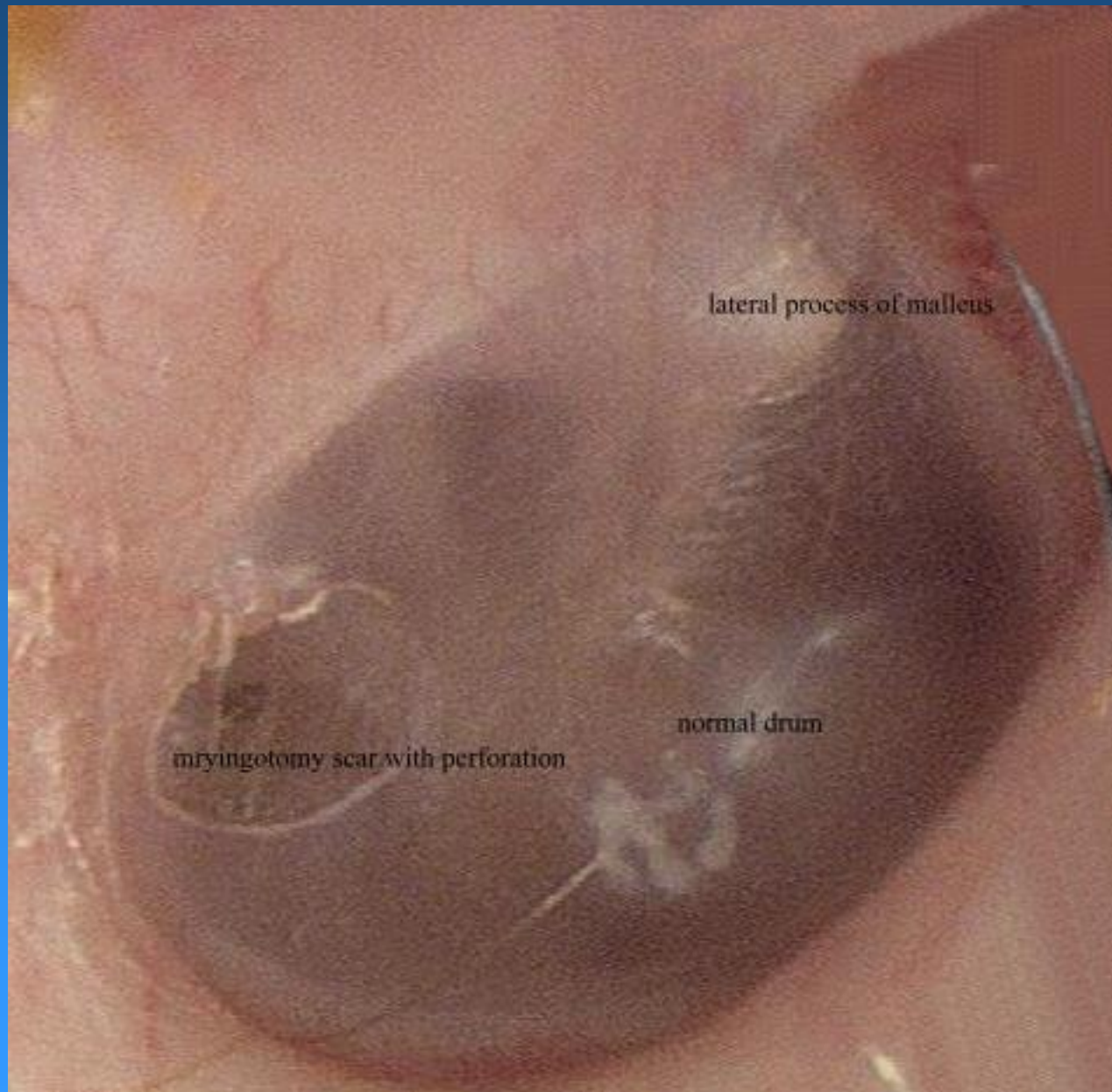
Granuloma



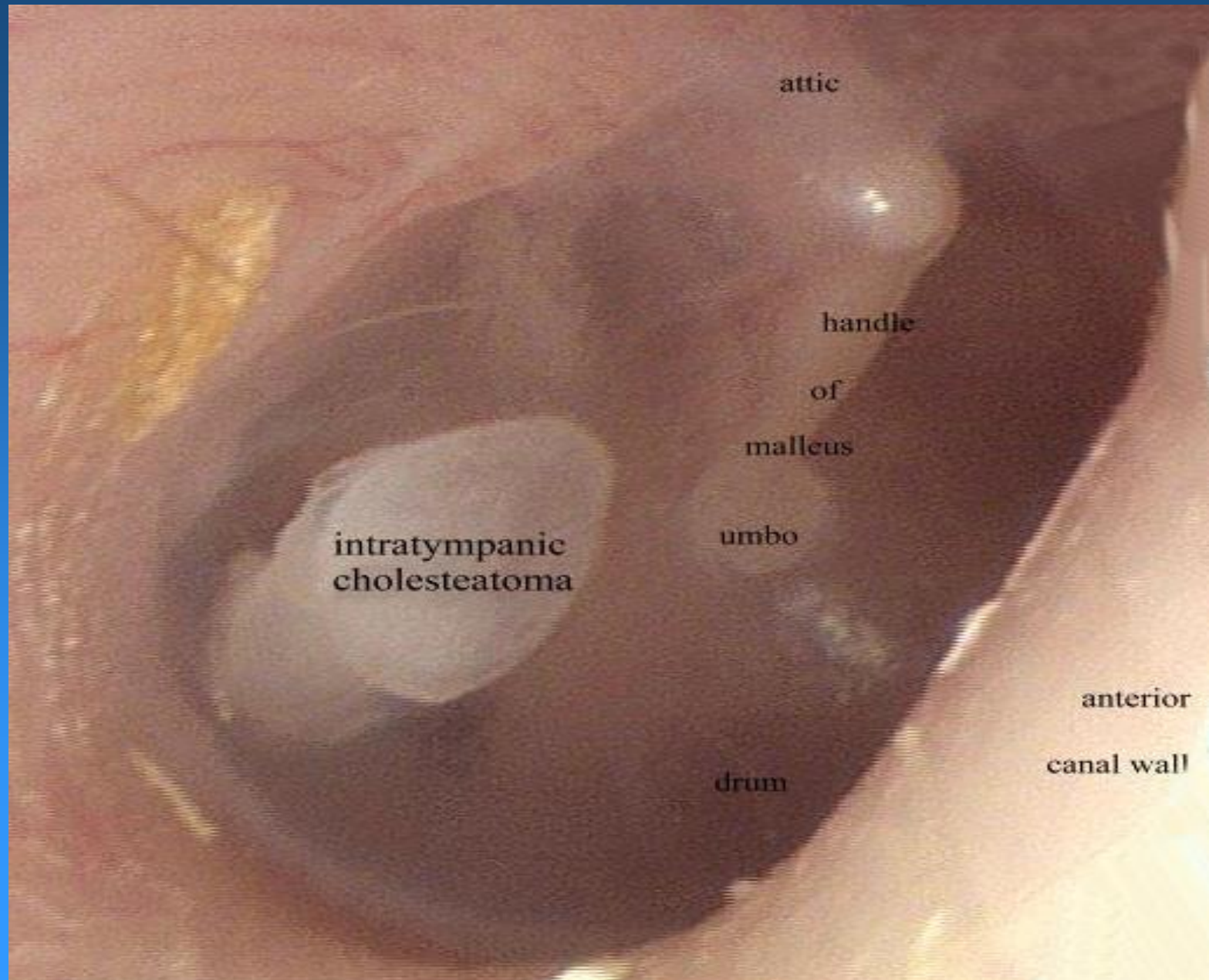
T-tube granuloma



Post grommet perforation



Intratympanic cholesteatoma



Grommets complications

- Otorrhoea common,
 - Tympanosclerosis, and
 - Perforation (up to 16% with long-term use)
-
- Otorrhoea: study showed
75% of children had >1 episode
lasting median of 10/7 within 12/12
of insertion
3.5% required removal of tubes and/or intravenous
antibiotics

Grommets and water precautions

- Water precautions usually not required (blocked ET helps stop water entry)
- Are required
 - if discomfort on water exposure
 - if ears discharges on exposure
- Surface swimming only – no diving
- T-tubes probably less trouble than Sheehy

Discharging grommets

- Grommets are NOT supposed to discharge!
- NOT GOOD “because letting the infection out”
- Discharge needs TOPICAL treatment
 - flush the ear – NOT just 1 or 2 drops
 - tragal massage
 - non toxic drops only (Ciproxin HC/Ciloxan)
 - not Sofradex
- Antibiotics are of LITTLE value except if UTRI

Sofradex

- Cheap
- Easily available
- Used with impunity for decades
- However – potentially ototoxic
- Growing medicolegal issues re ototoxicity
- More vestibulo than cochleotoxic
so ototoxicity may be masked
- Modern teaching is to avoid Sofradex
when eardrum is open (perf/grommet)

Ciproxin HC/Ciloxan

- Very effective
- Very expensive
 - may not be purchased even when prescribed
- Ciloxan (is an EYE drop) requires ophthalmologic specialist endorsement
- Ciproxin HC can be used even in an open eardrum despite what the package insert states
- Are the only non-ototoxic medications available to use in an open ear (grommet/perforation)

Ciproxin vs Sofradex dilemma

- Expensive drops may not be obtained so the patient may not receive any treatment at all
- Sofradex ototoxicity diminished in presence of inflammation and discharge
- One has to weigh up the risk – benefit ratio
- Advise to use only if ear is discharging
- Avoid prolonged/unmonitored use
- Discuss risk of ototoxicity with parents up front so that they are party to the decision

Tubotympanic CSOM management

- Vigorously treat discharge with topical treatment and close monitoring
 - discharge means inflammation
 - means scarring and hearing loss
 - means toxic damage to inner ear
- Delay repair until 15 years (senior school – water activities – kayaking etc)
- State of nose to prognosticate
 - snotty nose = Eustachian tube malfunction

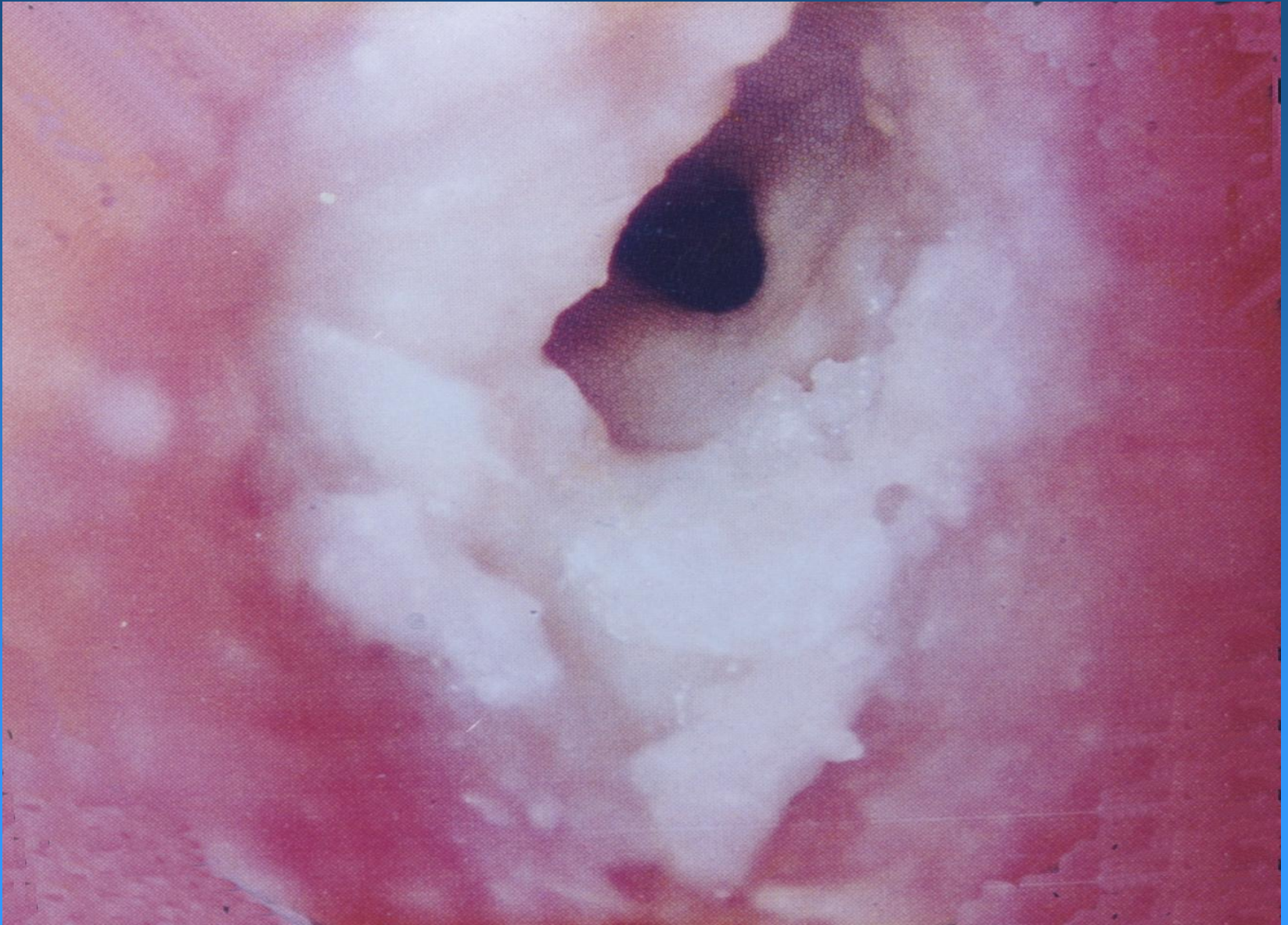
Attico antral CSOM

- Cholesteatoma needs surgery
- Refer to a specialist
- Especially if discharging – urgent
 - esp if discharge smelly
 - blood stained
- Surgery may well deteriorate hearing
- Multiple operations may be necessary
- Requires close monitoring post op
 - annual checks at least for otomicrotoilet with suction

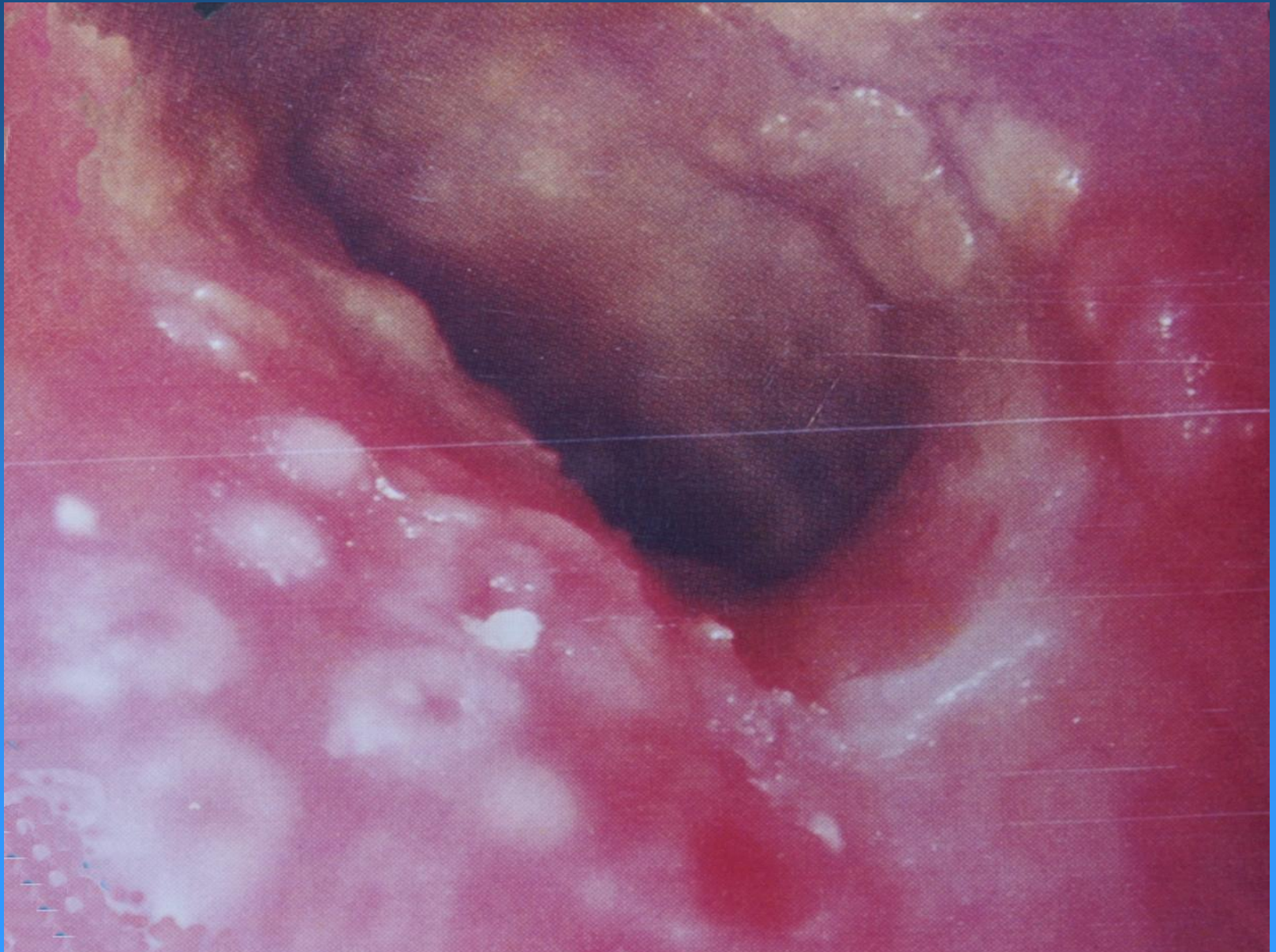
Otitis externa

- Painful (compare to discharge of middle ear origin – that is painless)
- Pinna tenderness
- External canal swelling
- Often engendered by cotton buds
- May be induced by syringeing
- Requires proper cleaning (otomicroscopic suction) before control can be expected
- tenderness means antibiotics required (Ciproxin)

Otitis externa



Otitis externa



Ear syringeing

- Effective if done correctly
- Often left to junior staff to perform
- May induce otitis externa
 - best to flush afterwards with antibiotic drops
- Should not be painful – stop if it is
- **AVOID STRICTLY** if eardrum open
 - suspect if discharge ever
 - history of perforation

Assessment of hearing

- History
- Examination
- Clinical tests
- Investigations

Assessment of hearing

- History
- Examination
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History of hearing

- age-appropriate
- speech development
- pronunciation
- response to small sounds
- always believe the mother

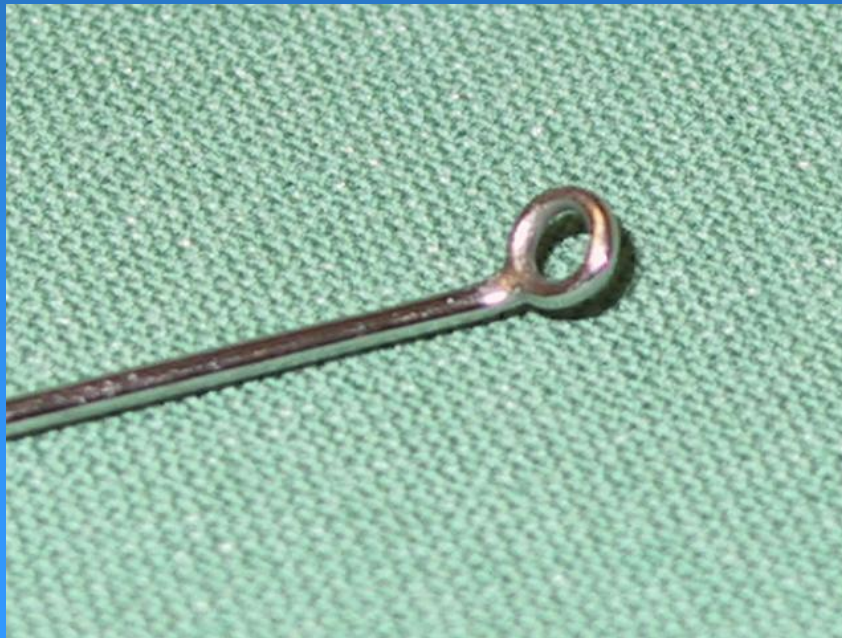
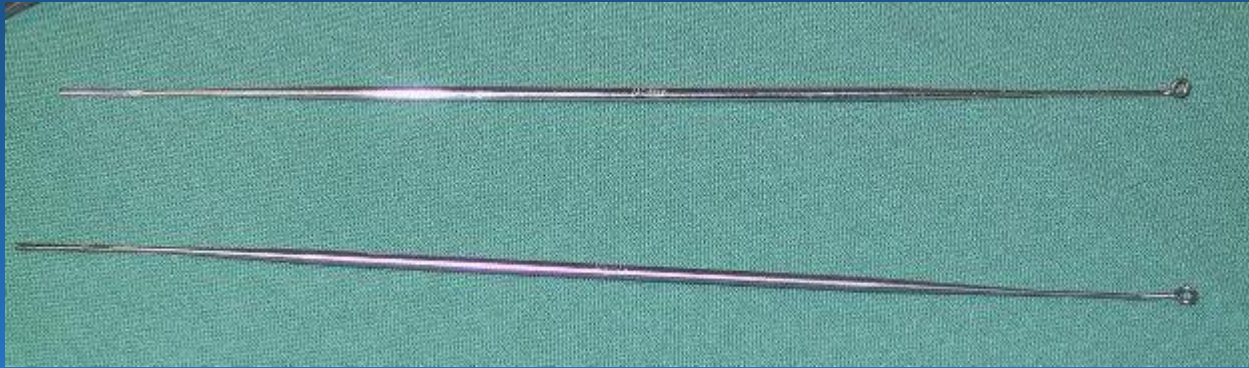
History of hearing

- unilateral vs bilateral
- stable/fluctuating/gradually deteriorating
- background noise
- loudness intolerance
- tinnitus
- dysequilibrium
- secondary gain

Examination

- nose (?Eustachian tube malfunction)
- pharynx (post-nasal drip - ? ET malfunction)
- canal (wax/debris)
- eardrum (effusion/atrophy/perforation)
- attic (? cholesteatoma)
- hearing behaviour
 - “what did you say” - 60dB
 - cupping/getting up closer - > 60dB
 - having to shout > 80dB

Ensure canal is clear



Hold the otoscope correctly



Don't hold it like this!



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Otomicroscopy



Videoendoscopy



Assessment of hearing -tuning fork tests

- Tuning fork tests
 - bilateral air conduction
 - Weber
 - very sensitive - 5dB
 - Rinne
 - 90% $b > a$ at 40 dB
 - Bing
 - louder open/occluded

Air conduction



Weber



Rinne

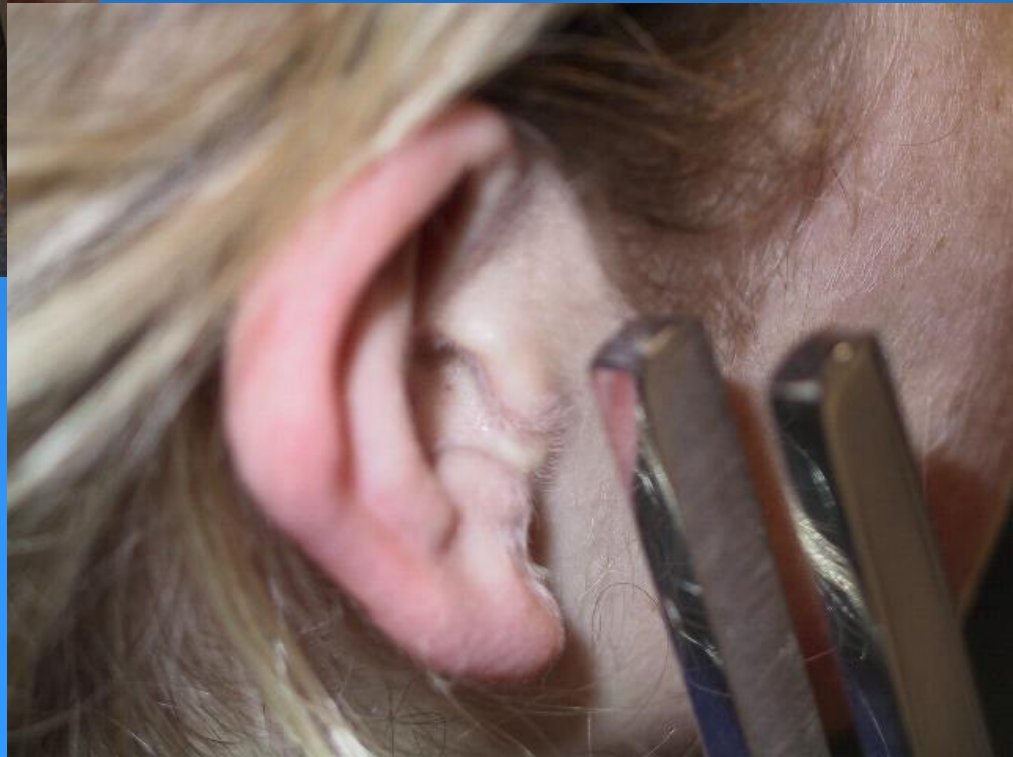


The correct tyne position for air conduction



<- Incorrect

Correct ->



Assessment of hearing

- Clinical speech assessment
 - mask non-test ear
 - prevent lip reading
 - commonly used words
 - speech and whisper at arms length ($>/< 60\text{dB}$)
 - speech and whisper close up ($>/< 20\text{dB}$)

Clinical speech audiometry



Tympanometry

COMPLIANCE in cc:

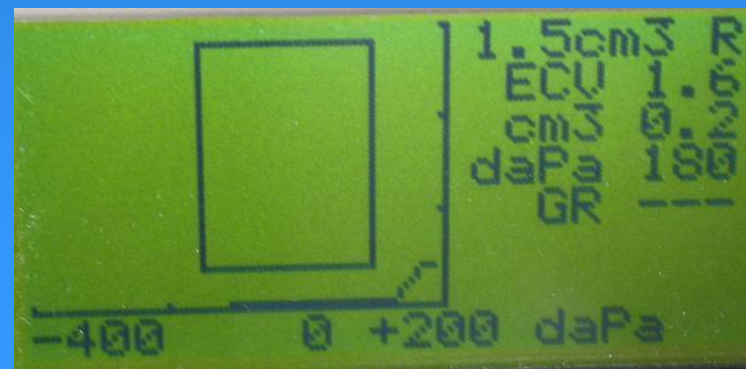
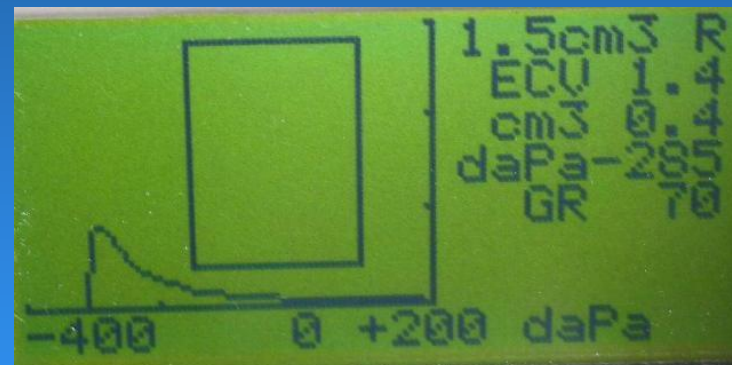
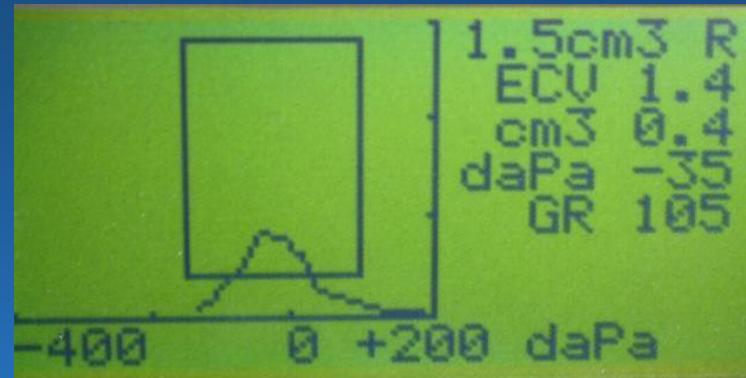
	R	L
C_{+200}	2.0	1.1
C_{TM}	0	0.5

MEP	70	-50
TYPE	B	A

Assessment of hearing -tympanometry

- Tympanometry

- A
- As
- Ad
- C
- C1
- C2
- Toynbee
- B
- Valsalva

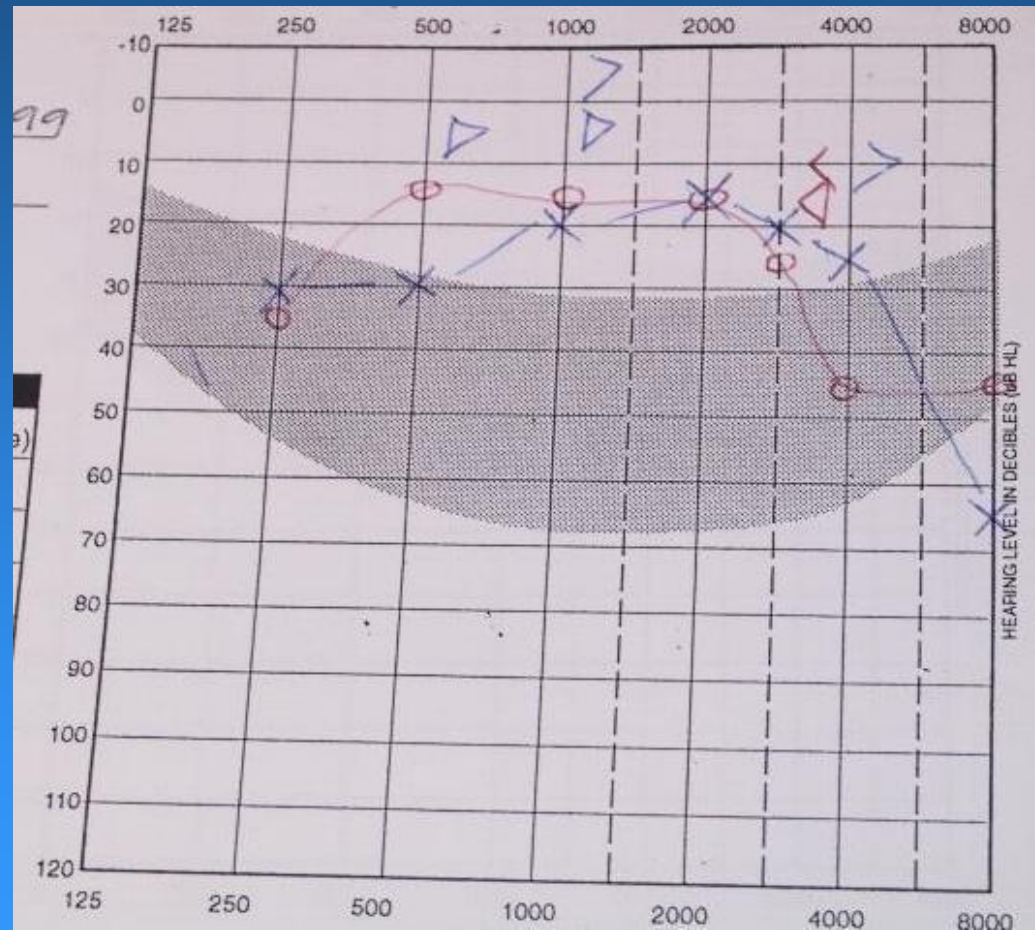


Audiometry



Assessment of hearing

- Audiometry
 - air conduction
 - bone conduction
 - masking

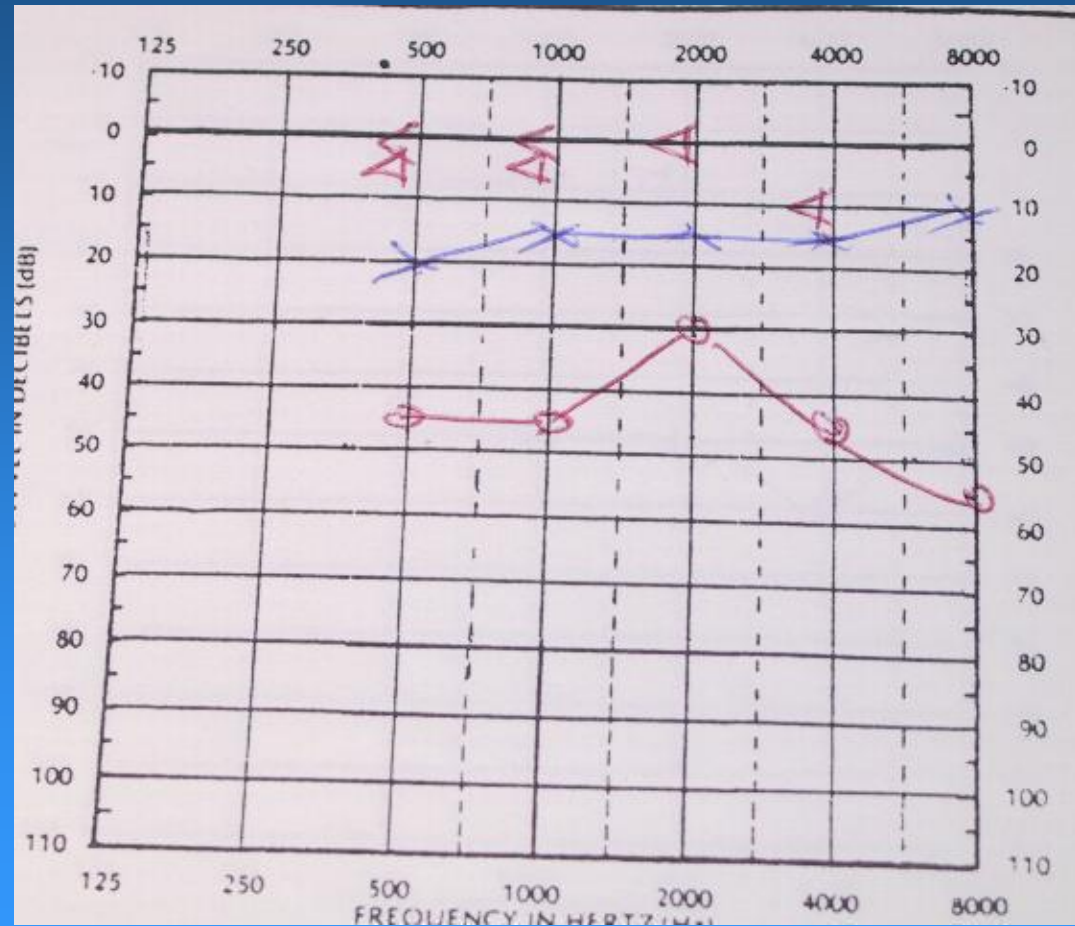


Audiometry - bone conduction



Assessment of hearing

- Audiometry
 - air conduction
 - bone conduction
 - masking



Balance disorders

AR Currie

**Tangmere Balance Disorders Clinic
and Waikato Hospital**

Hamilton

New Zealand

Geospatial equilibrium = good balance

integration of multiple sensory systems

- vestibular apparatus
 - central
 - peripheral
- vision
- somatosensory
 - joint proprioception
 - touch/pressure sensation
 - muscle proprioception esp cervical

the three legs of a tripod

Geospatial equilibrium

depends on:

- motor function and joints**
- cardiac rhythm and output**
- cerebral perfusion**
- intact neural circuitry**

Dysequilibrium/balance disturbance

impaired central integratory function

faulty peripheral sensors

impaired motor function

Impaired balance function - assessment

understand the sensors

- **normal physiology**
- **neural connections**
- **nystagmus**
- **pathology**

listen to the history

a few basic tests

diagnostic grouping

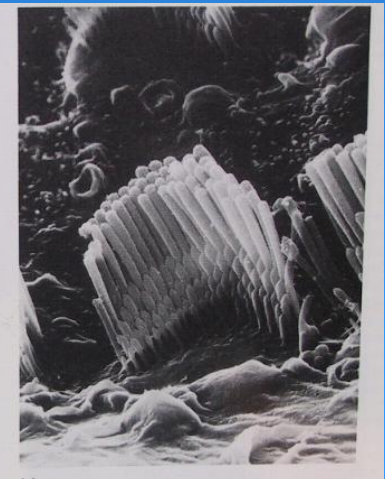
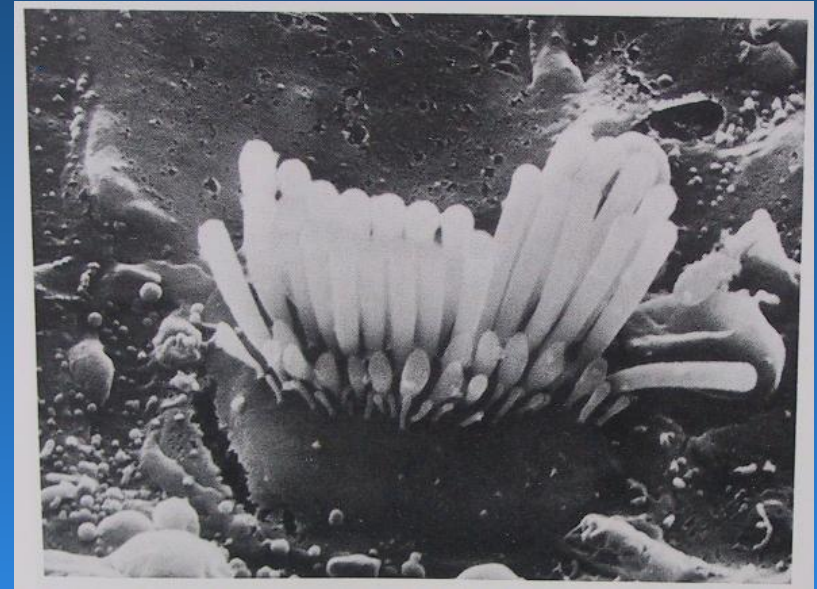
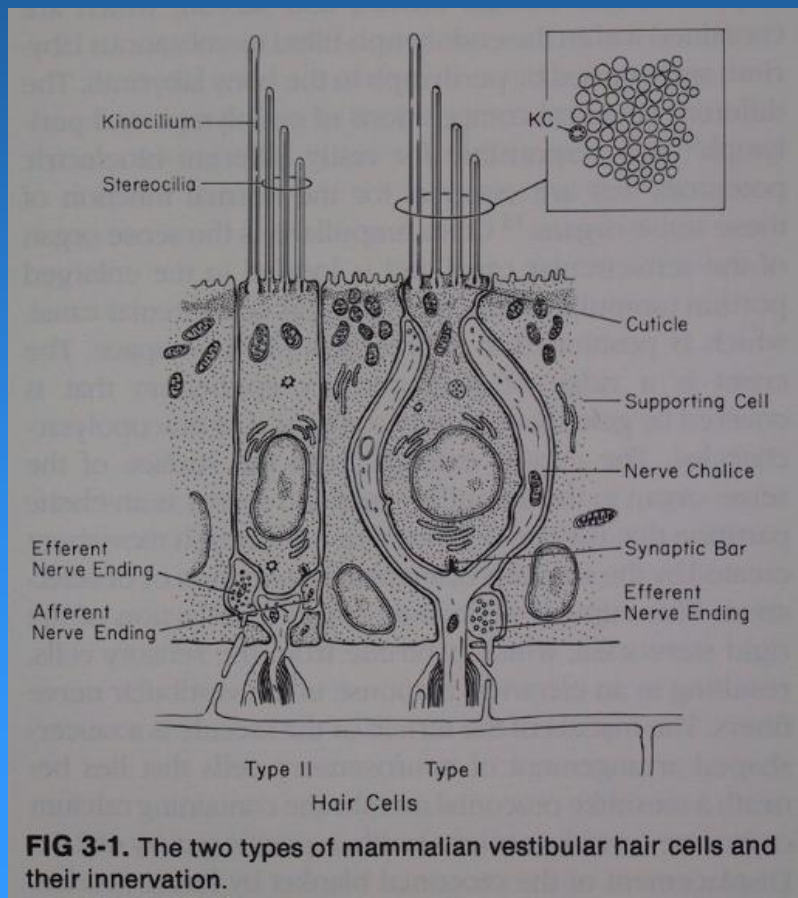
The peripheral vestibular apparatus

accelerometers

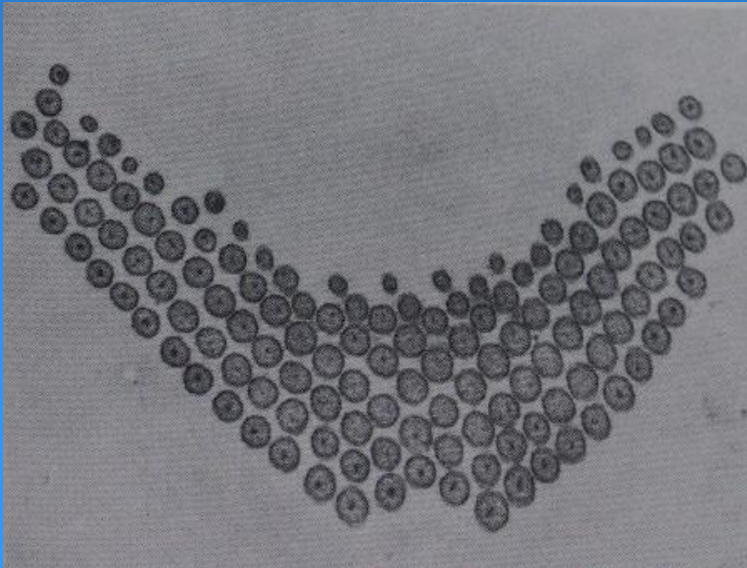
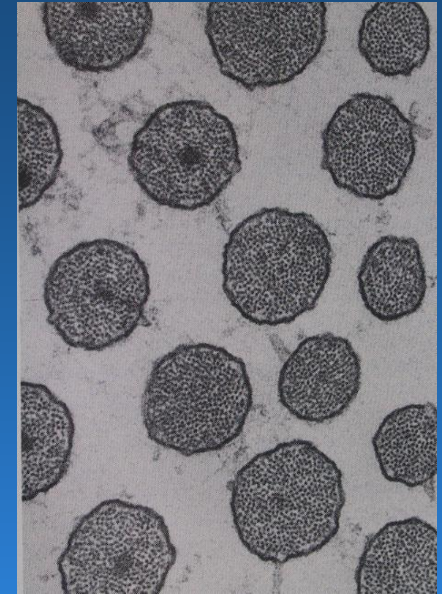
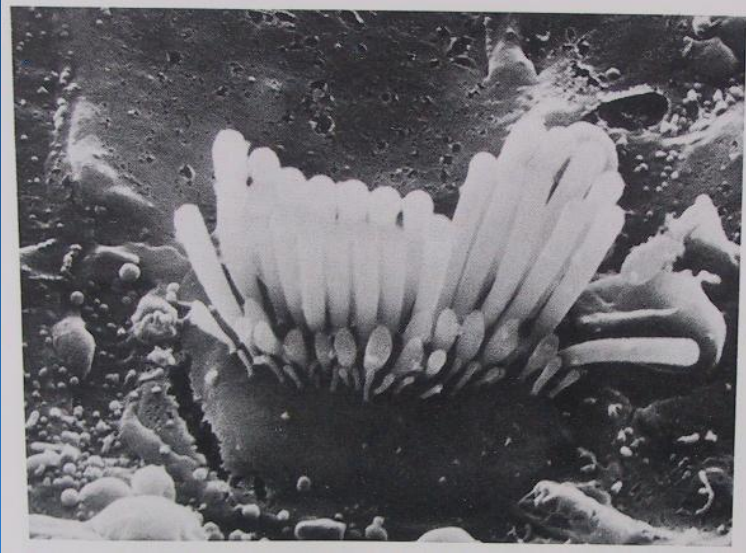
- **linear** - maculae of saccule and utricle
 - vertical (gravity included)
 - horizontal AP
 - horizontal lateral
- **angular** - semicircular canals
 - pitch
 - roll
 - yaw

The hair cell - physical-neural transducer

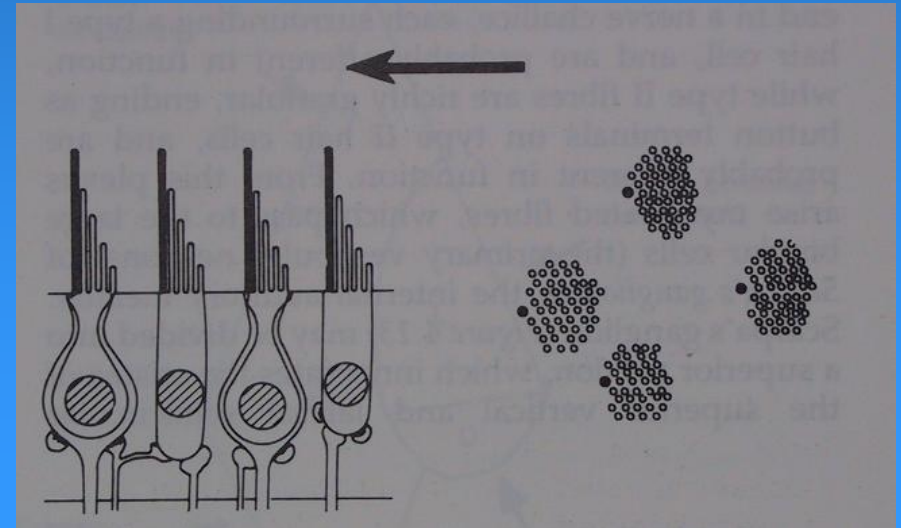
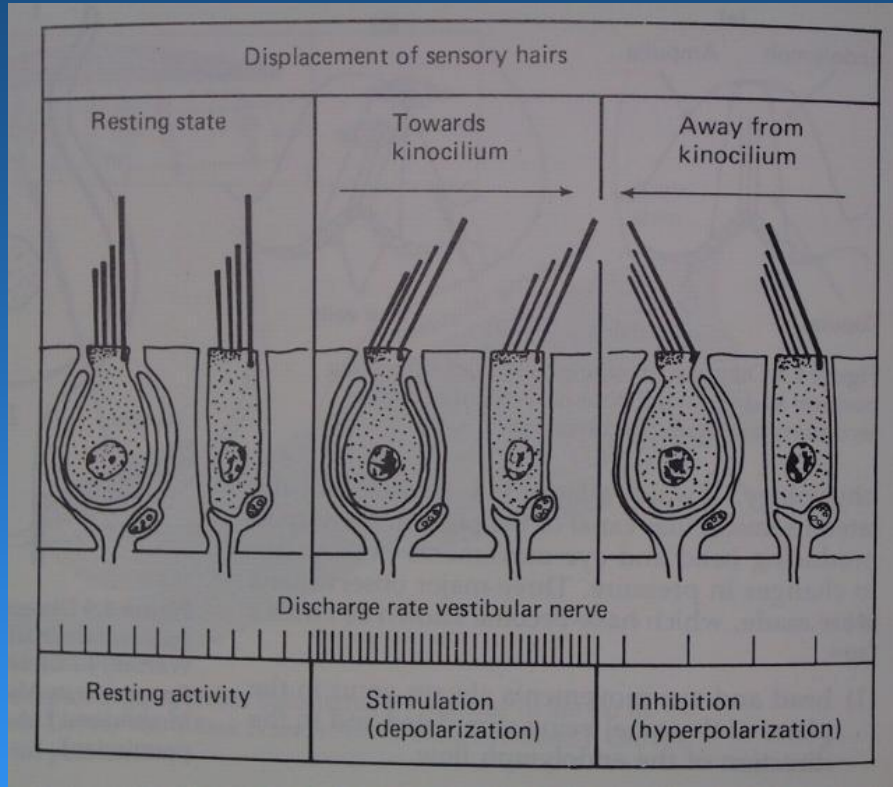
- cochlea
- semicircular canals
- maculae



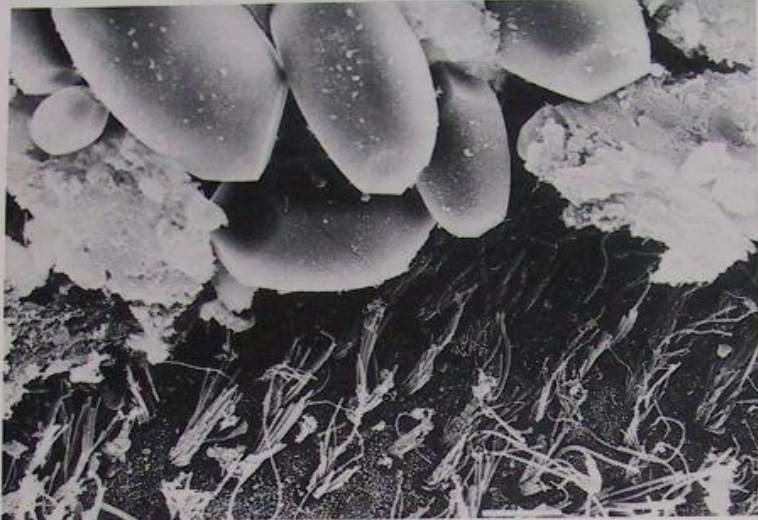
Hair cells



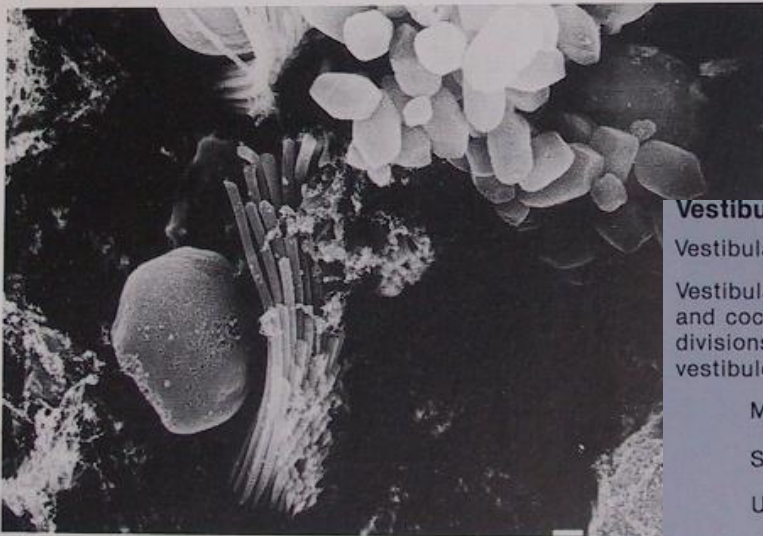
Hair cell polarisation



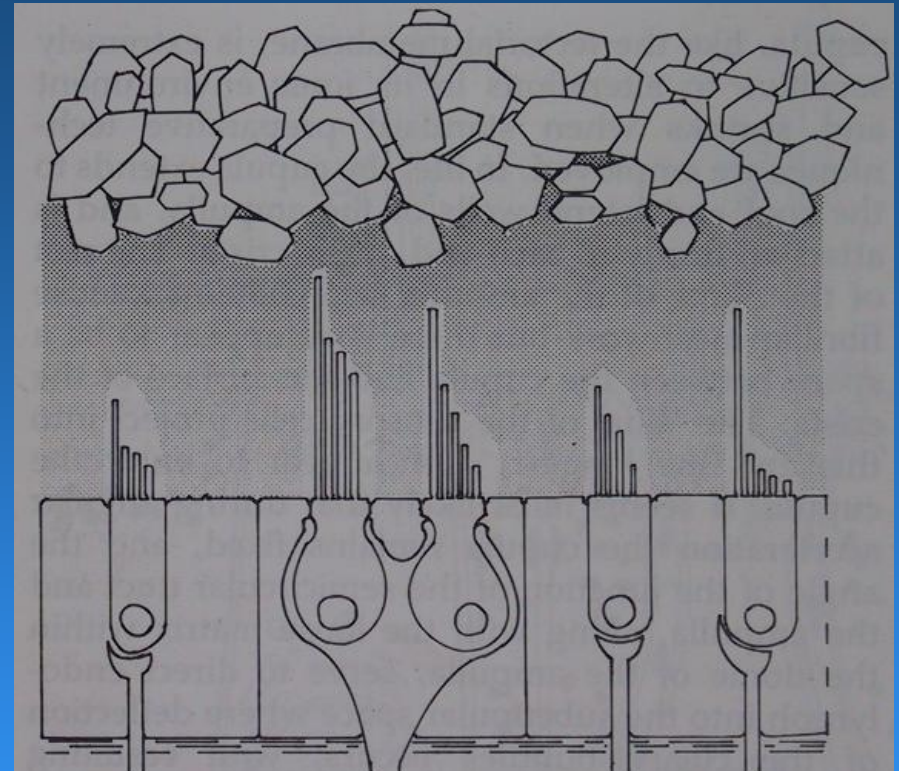
Maculae of saccule and utricle



(b)



(c)



Vestibular Receptors

Vestibular ganglion

Vestibular and cochlear divisions of vestibulocochlear n.

Maculae

Saccule

Utricle

Cochlear duct (scala media)

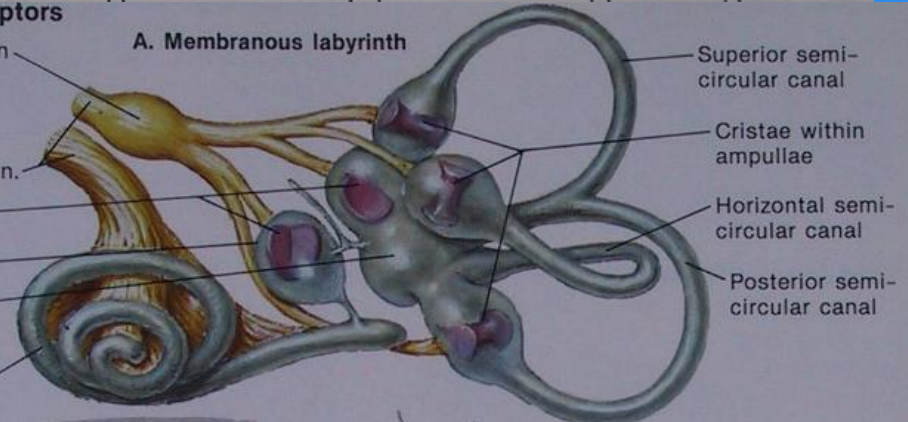
A. Membranous labyrinth

Superior semi-circular canal

Cristae within ampullae

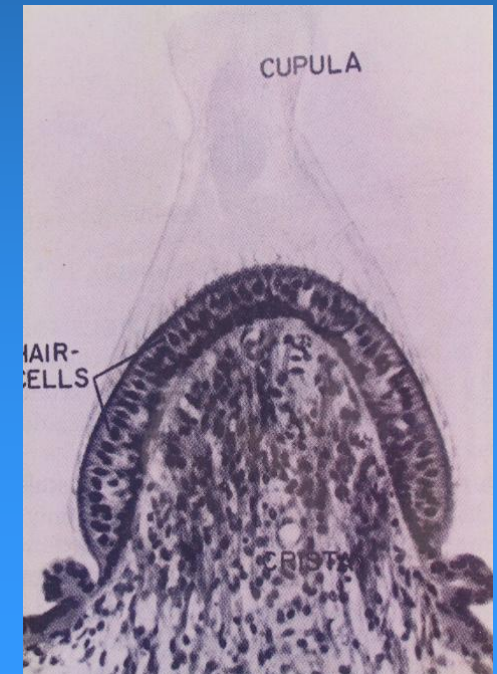
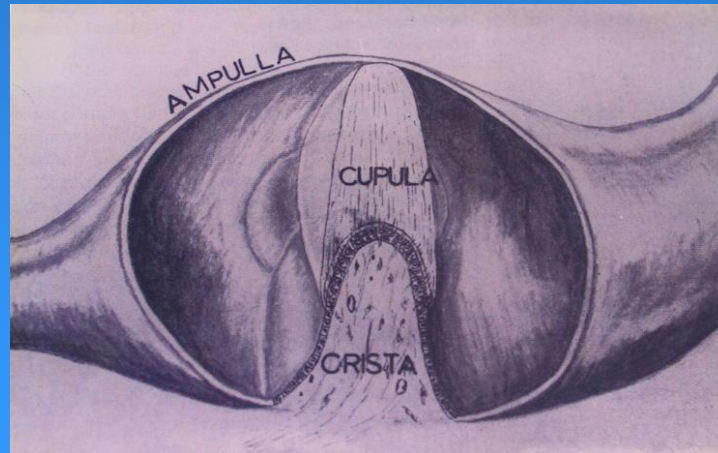
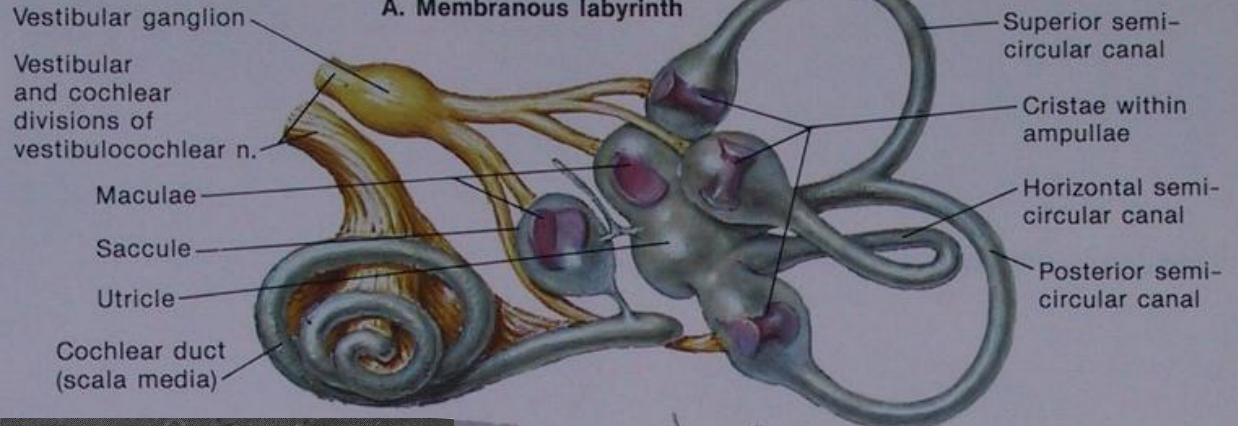
Horizontal semi-circular canal

Posterior semi-circular canal

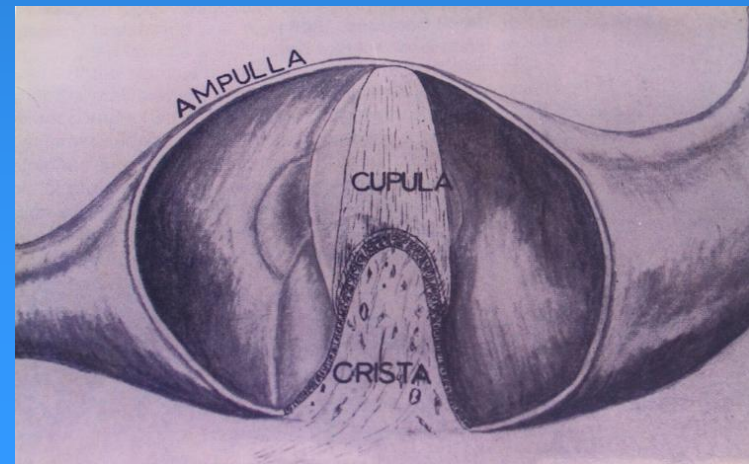
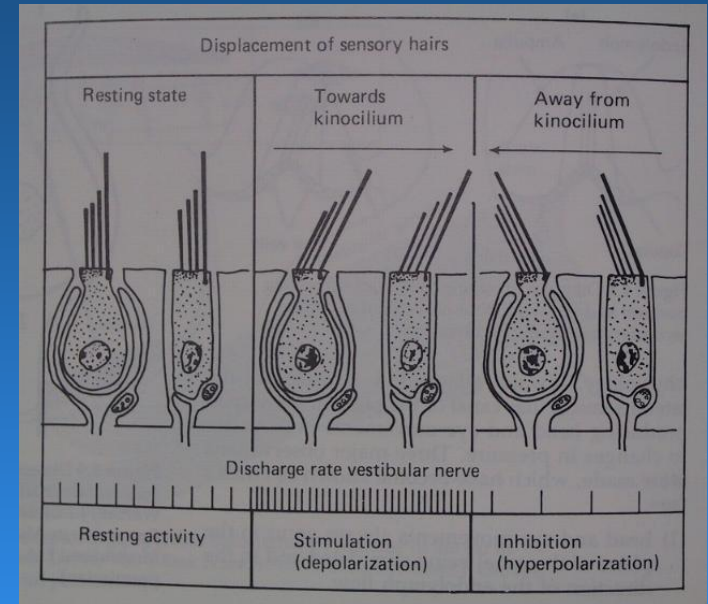
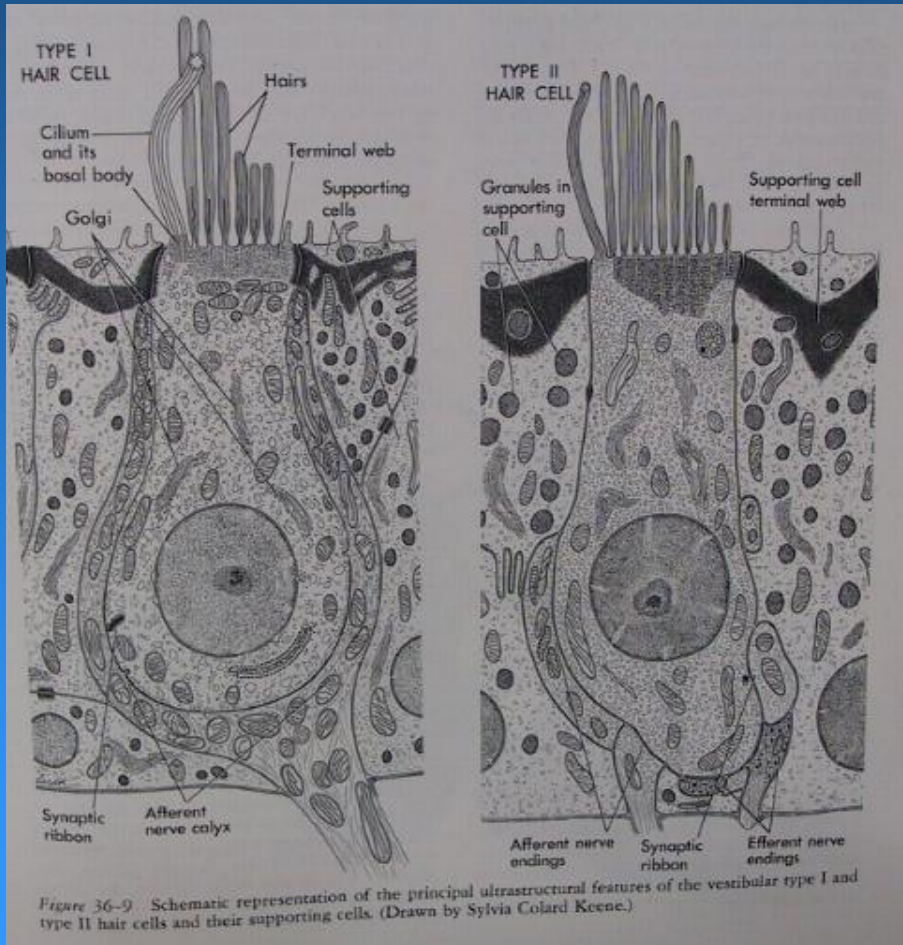


Semicircular canals

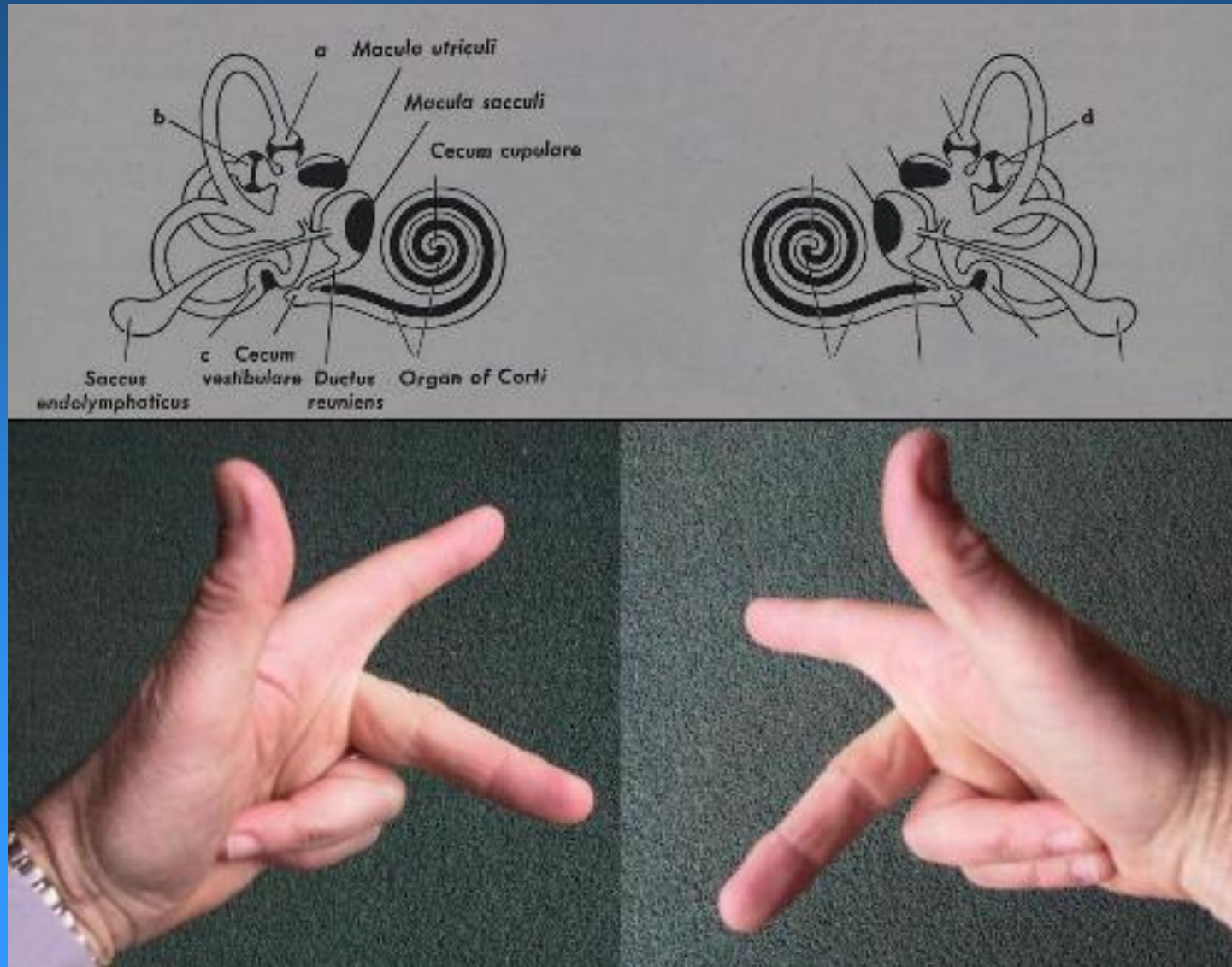
Vestibular Receptors



Ampulla and crista

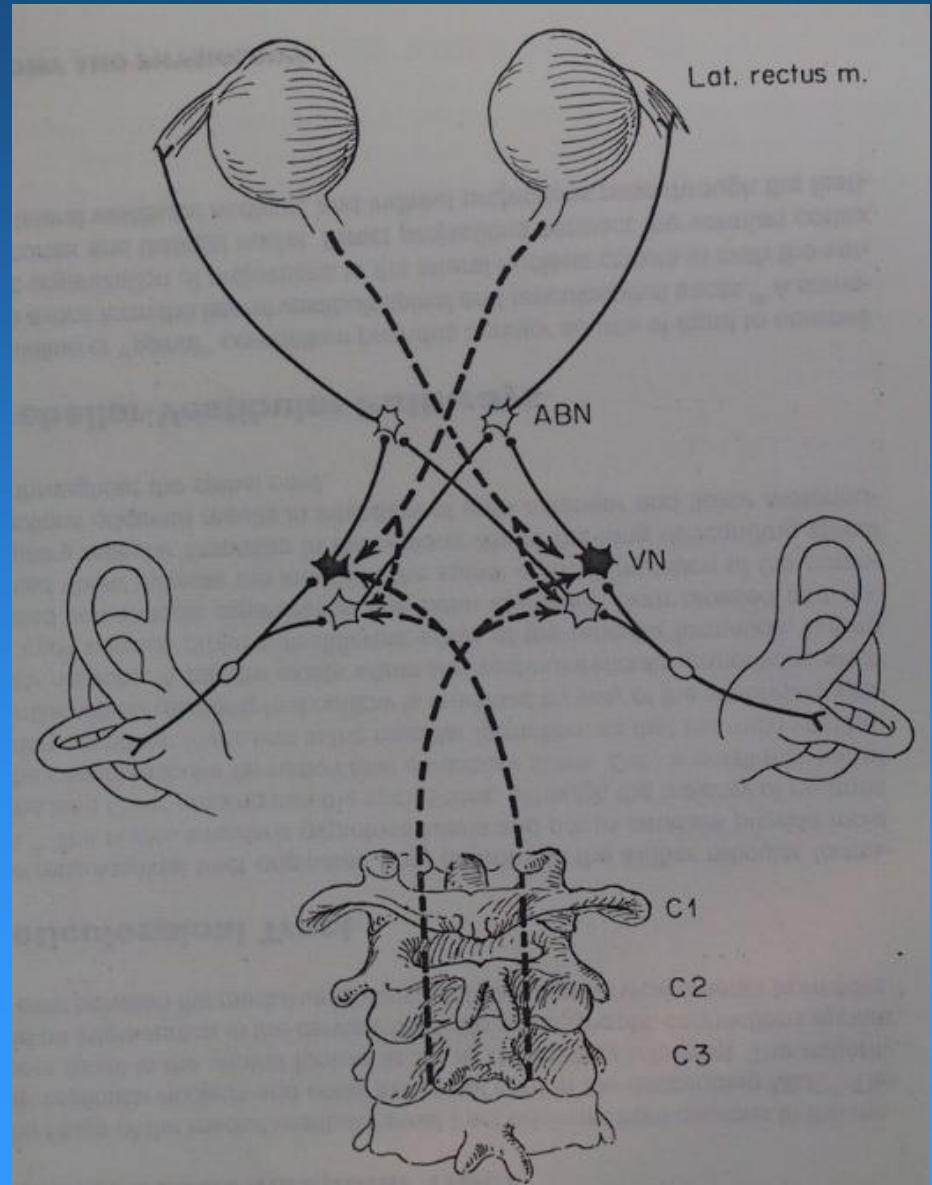
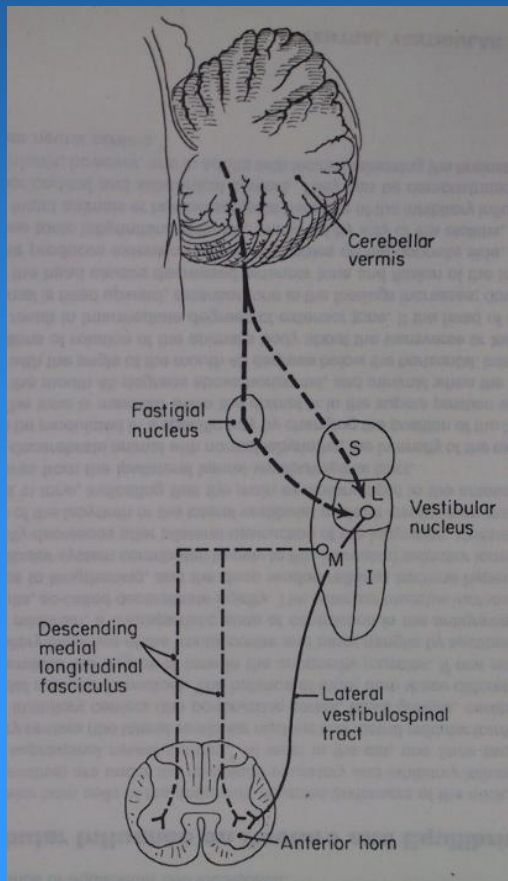


Angular accelerometers in three planes



Vestibulo-spinal connections

postural muscles
especially cervical muscles
tight cerebellar modulation



Vestibulo-spinal connections

allows for vestibular control of posture and balance

tight inhibitory modulation by cerebellum

vestibular abnormality -> posture/gait abnormality

postural abnormality -> vestibular symptoms
- especially in relation to the cervical spine

Vestibulo-cerebellar connections

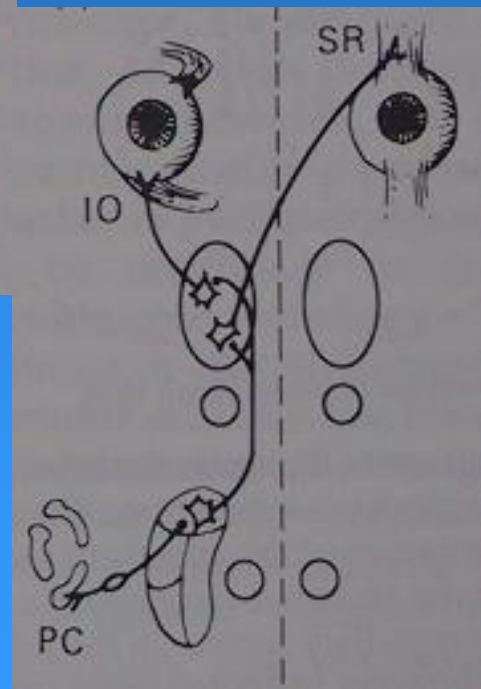
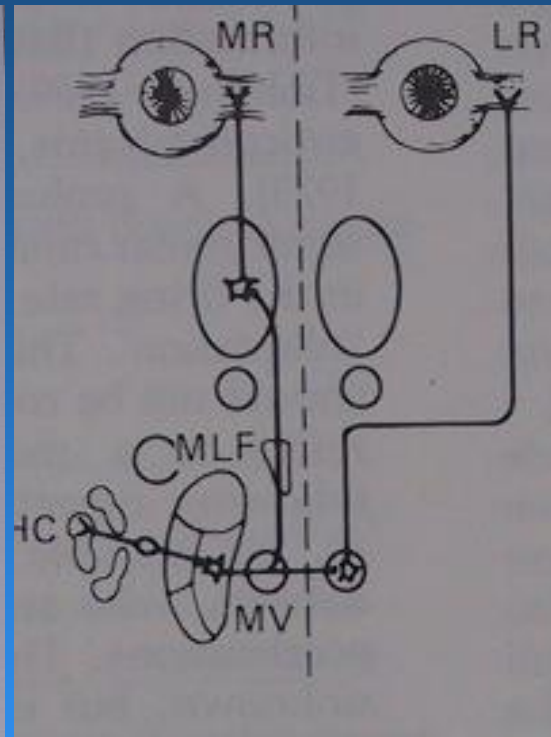
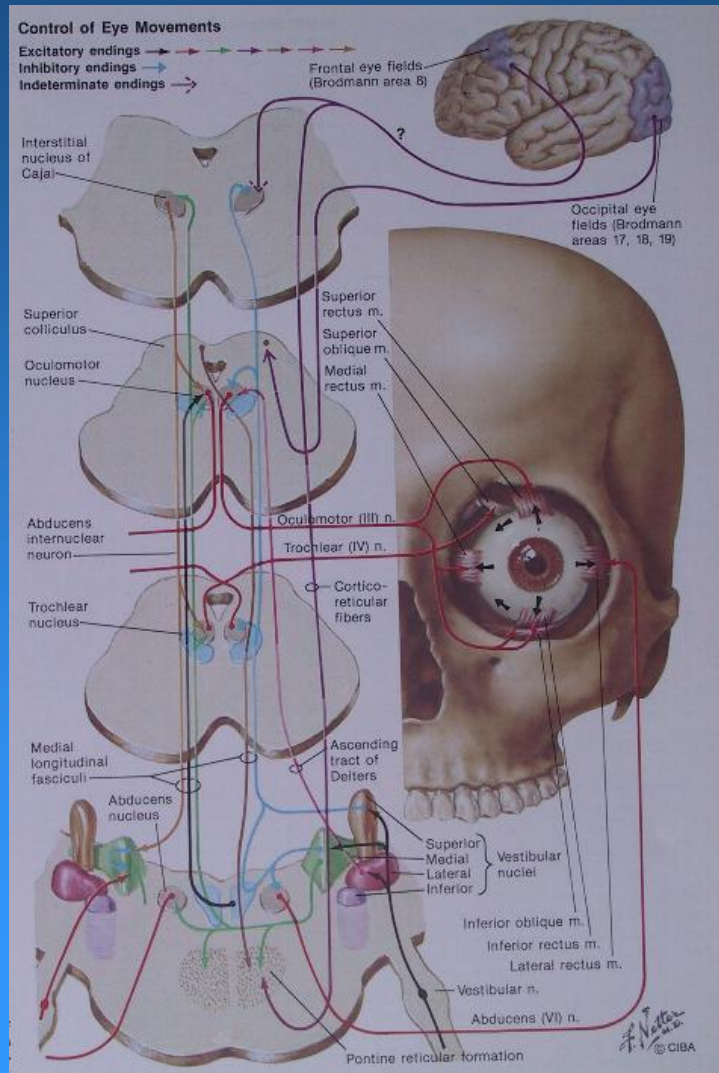
vestibular abnormality -> “cerebellar clamp phenomenon”

-> suppression of abnormal vestibular output

-> restoration of vestibular neuronal balance

-> symptomatic improvement within hours

Vestibulo-ocular connections



Nystagmus

a window in to the inner ear

detection (torsional nystagmus excepted!) requires

- the absence of visual fixation:

- Frenzel lenses - cheap

- videonystagmography - expensive

- electronystagmography - cumbersome

Nystagmus

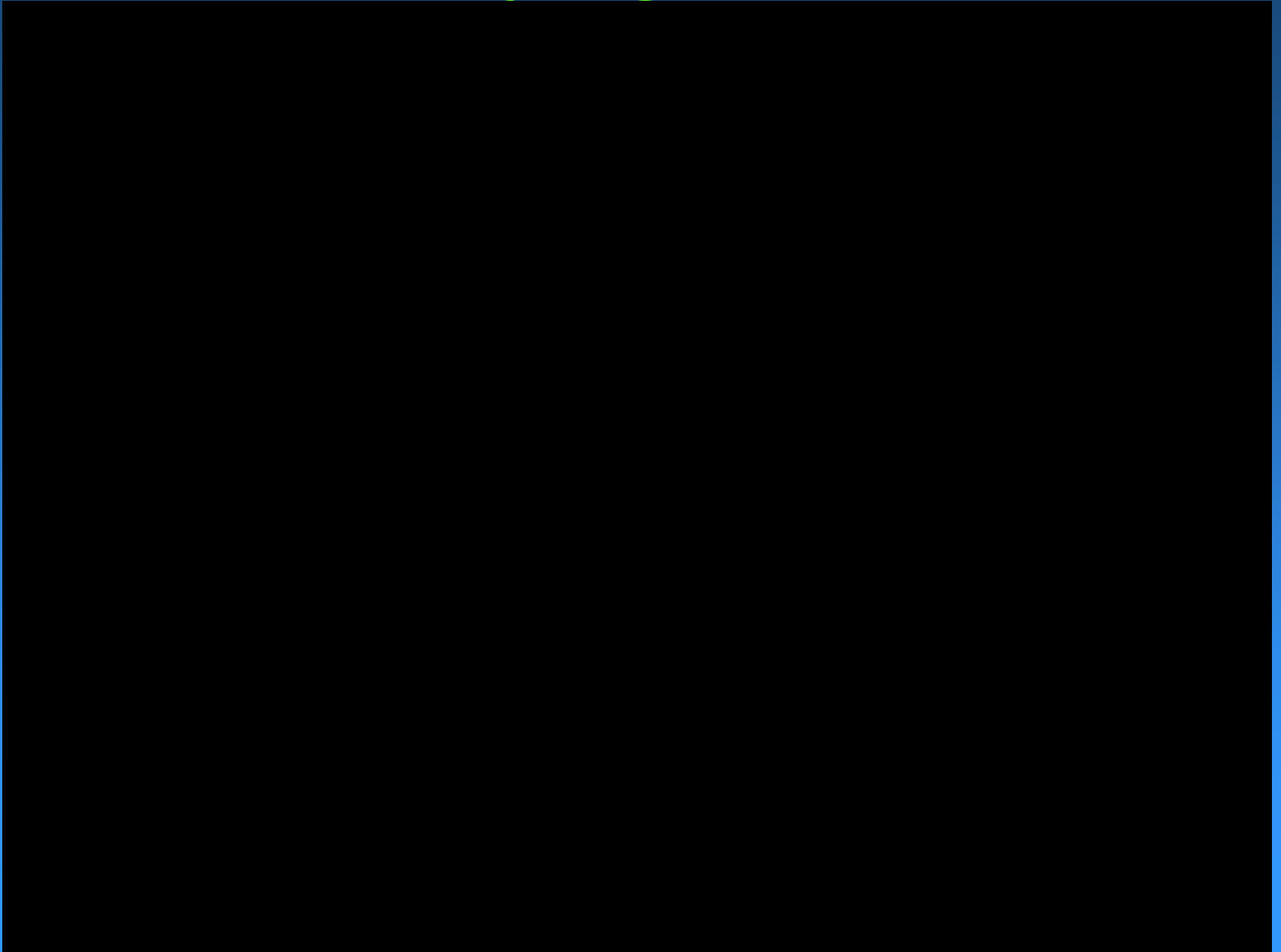
two components

- **slow phase - vestibular generated**
- **fast phase = saccade - CNS generated**
 - **retinal slip**
 - **ocular muscle proprioceptor afferents**

description refers to fast phase

slow phase more helpful diagnostically

Nystagmus



Nystagmus

vestibulo-ocular reflexes:

- hair cell afferent
- oculomotor efferent to both eyes
- leads to conjugate eye movements
 - both eyes “do the same thing”



Nystagmus

origin central/peripheral

peripheral origin

- **conjugate**
- **systemic symptoms**
- **more symptomatic with eyes open**
- **associated nausea and vomiting**
- **suppressed by visual fixation**

central origin:

- **may be dysconjugate**
- **may be asymptomatic**
- **balance symptoms less with eyes open**
- **not suppressed by visual fixation**

Assessment of the patient with balance disturbance

History of the complaint

- exact experience (avoid use of “dizzy/giddy”)
- duration
- timing
- relation to posture
- relation to movement
- movement hallucination?
- associated symptoms
 - nausea/vomiting
 - cochlear
 - visual/neurological
 - cardiac (arrythmia\SOB)

Medical history of the patient with balance disturbance

- **general**
- **cardiovascular symptoms**
- **neurological symptoms**

Especially

- **hypertension and its treatment**
- **diabetes**
- **hypercholesterolaemia**
- **medications**
- **previous head injury**
- **toxic damage - aminoglycosides/chemotherapy**

Examination of the patient with balance disturbance

- **general medical**
 - **especially orthostatic hypotension**
- **ENT**
- **neurological**
 - **cranial nerves and cerebellum**
 - **eye movements**
- **vestibular**
 - **vestibulo-ocular and vestibulo-spinal reflexes**
 - **clinical posturography - eyes closed on foam**

ENT Examination

- **exclude local ear pathology**
 - **suppuration**
 - **cholesteatoma**
- **hearing, especially asymmetry**

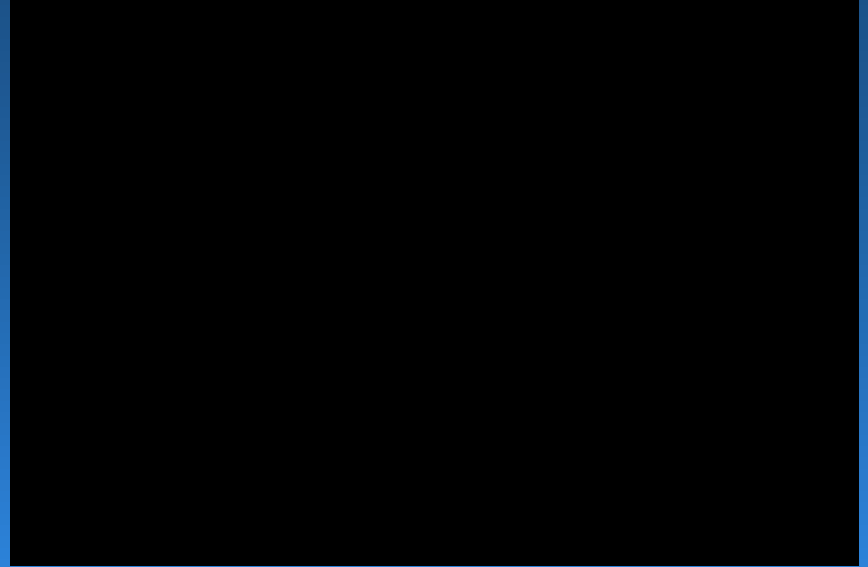
Bedside vestibular examination

- **vestibulo-ocular reflexes**
- **vestibulo-spinal reflexes**
- **clinical posturography**

Vestibulo-spinal reflexes

Unterberger's/Fukuda stepping test

- past pointing



Doll's eye movement

- slow
- dependent on visual fixation

[Doll's Eye Movement Video](#)

> 30 degrees/s =
Head thrust
- visual fixation
fails -> saccade/s



Halmagyi/head pulsion test - vestibulo-ocular reflex



Clinical eye movement examination

**Smooth pursuit
and
Oculomotor**



Optokinetic nystagmus

Smooth pursuit



Oculomotor

Cranial nerves 3, 4 and 6



Optokinetic nystagmus



Clinical posturography

- **remove visual input**
- **remove somatosensory information**
- **rely solely on vestibular input**

30 seconds without fall = normal

Clinical posturography



Diagnosis of the patient with balance disturbance

Acute loss of balance

- Meniere's syndrome - first attack
- vestibular neuronitis
- cerebellar stroke

Recurrent loss of balance

- benign paroxysmal positional vertigo
- migraine
- Meniere's syndrome

Chronic loss of balance - ataxia

Balance disturbance - prolonged history

Diagnostic dichotomy:

Recurrent/Episodic OR

Chronic/Non episodic

Balance disturbance - prolonged history

Episodic

- clearly defined bouts of imbalance
- limited duration - seconds to hours
- posture and movement related
- marked systemic symptoms
- prone to falling only during attack

Non episodic

- prone to it all the time
- unlimited duration
- minimal systemic symptoms
- prone to falling whenever up and about
 - ataxia

Non-episodic dysequilibrium

more likely to be of non-vestibular origin

diagnosis difficult

- history**
- careful physical exam esp neurologic**

may require physician/neurologist referral

Episodic dysequilibrium

more likely to be of peripheral vestibular origin

episodicity is due to the cerebellar clamp phenomenon

accurate diagnosis only if exam during attack

most common cause of recurrent vertigo is BPPV

- easily diagnosed**
- easily treated**

Acute dysequilibrium – 5 diagnostic categories

Benign paroxysmal positional vertigo
history, nystagmus on **positioning**

Migraine phenomenon
supportive hx – headache, MI, BF Fam hx

Meniere's – recurrent
related **cochlear symptoms**, **HP**

Vestibular neuronitis - single
HP, no cochlear symptoms

Neurological deficit – **eye movements**
CVA\CNS tumor\MS\??VBI

Benign Paroxysmal Positional Vertigo

common

easy to diagnose

easy to treat

Benign Paroxysmal Positional Vertigo

transient rotatory vertigo

distinctly positional

three cardinal positions

- turning over in bed**
- looking up steeply**
- looking into a low cupboard**

no related auditory symptoms

tends to resolve spontaneously

Benign Paroxysmal Positional Vertigo

very intense symptoms, especially first attack

- nausea and vomiting**
- anxiety/panic**

may seem to last for days but vertigo transient

subsequent attacks better tolerated

anxiety/fear of future attacks often predominates

- even when condition itself has resolved**

counterproductive in terms of compensation are:

- position avoidance phenomena**
- use of sedatives (e.g. Stemetil)**
- limitation of physical activity**

BPPV - diagnosis

the Epley maneuver

encourage patient to keep eyes open so you can see the eyes

- **elevate upper eyelid with finger to expose eye**
- **watch for rythmical eye movements - nystagmus**
- **typically rotatory movements (torsional nystagmus)**
- **few seconds delay before it starts**
- **lasts for up to half a minute then decays**
- **often associated with intense symptoms**

firmly encourage patient to continue

reassure and soothe throughout

BPPV - The Epley maneuver



BPPV - The Epley maneuver

Epley maneuver right movie

BPPV - The Epley maneuver

Epley maneuver from end of bed video

BPPV - The Epley maneuver



BPPV - The Epley maneuver

[Epley maneuver close up video](#)

BPPV - diagnosis and treatment

once diagnosis made move directly to treatment:

the Epley maneuver/Parnes modified

head must remain below level of body throughout

- keep undermost arm above head of bed**
- not to be turned under torso**

wait for initial nystagmus/symptoms to subside

quarter of a revolution at a time

wait thirty seconds before each turn

sit up with neck flexed until upright

beware of mass particle shift as attains upright position

BPPV - treatment

treat one side at each consultation

immediately after treatment check for success

- patient to lie on their side from sitting up**
- with head turned to look up at the ceiling**
- watch for nystagmus (usually intense)**
- if nystagmus seen, repeat Epley maneuver**
- take particular care of key points**

BPPV - post treatment

may feel “floaty” for two days

instruct to return promptly if:

- **still position intolerant after two days**
- **delayed recurrence**

refer to specialist if

- **not resolving as expected**
- **unusual features:**
 - + **no delay before onset of nystagmus**
 - + **no fatigue after some seconds**

The Ten Minute Exam for Dizzy Patients

Note gait (– part of cerebellar exam)

General ENT Exam (incl's some cranial nerves)

Exclude local ear pathology

Clinical VOR – head pulsion test of Halmagyi

Eye movements (– includes some cranial nerves)

- smooth pursuit/saccades/optokinetic nystagmus

Clinical posturography

Nystagmography

- spontaneous/head shake/positional

Asymmetric hearing loss

23 yrs female

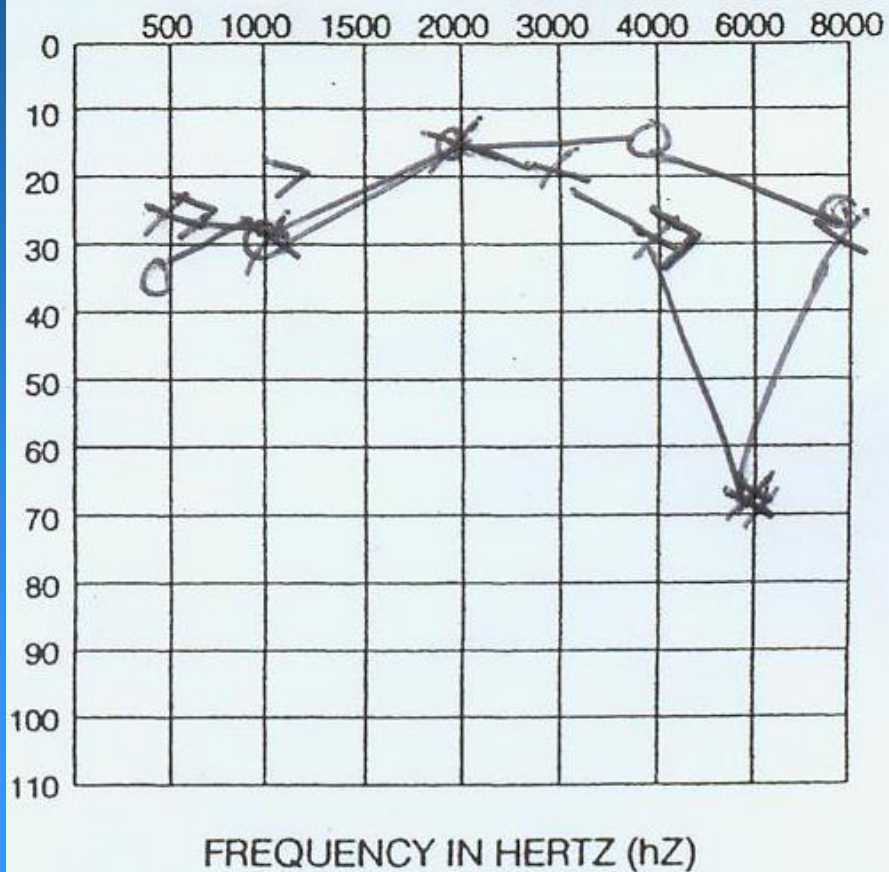
Physically active

Six months progressive left hearing loss

No dysequilibrium/imbalance

Audio

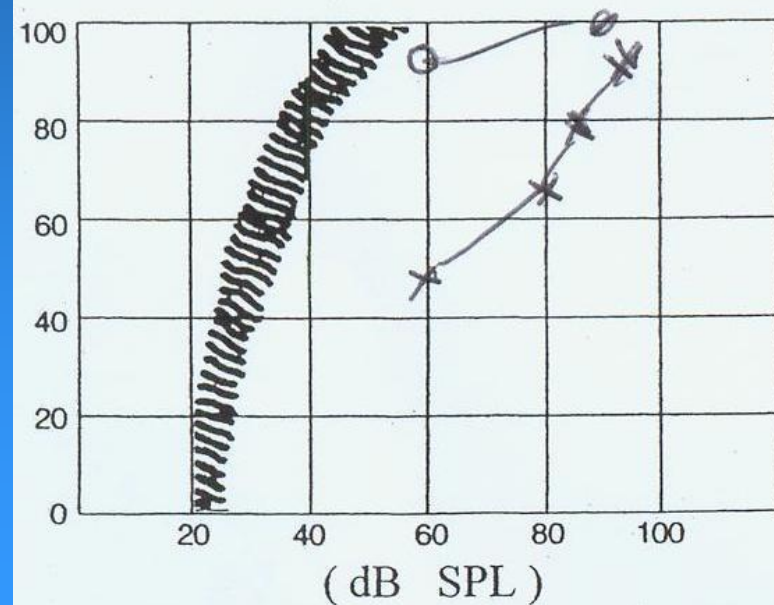
AUDIOGRAM



SPEECH AUDIOMETRY

Live voice tests (Normal Screening Intensity = 35dBA)

Material	Intensity	Performance
.....		
.....		



Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

Head pulsion test positive for left weakness

Doll's eye movement

Video

- **slow**
- **dependent on visual fixation**



> 30 degrees/s = head thrust
visual fixation fails -> saccade

Head pulsion test

Ask patient to fix vision on target behind examiner

Head tilted down 30 degrees

Instruct not to blink

Move head to side opposite to test ear

Flick/pulse head back across midline

>30 degrees per second (rapid)

Watch for saccade as patient re-finds visual target

Video normal

Video abnormal

Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

Head pulsion test positive for left weakness

Video

Gaze paretic nystagmus

Gaze paretic nystagmus on looking left

None on looking right

Video looking right

Video looking left

Saccadic smooth pursuit to left

Clinical evaluation of smooth pursuit:

Saccadic on following to left

Smooth on following to right

Smooth pursuit



Saccadic smooth pursuit to left

Clinical evaluation of smooth pursuit:

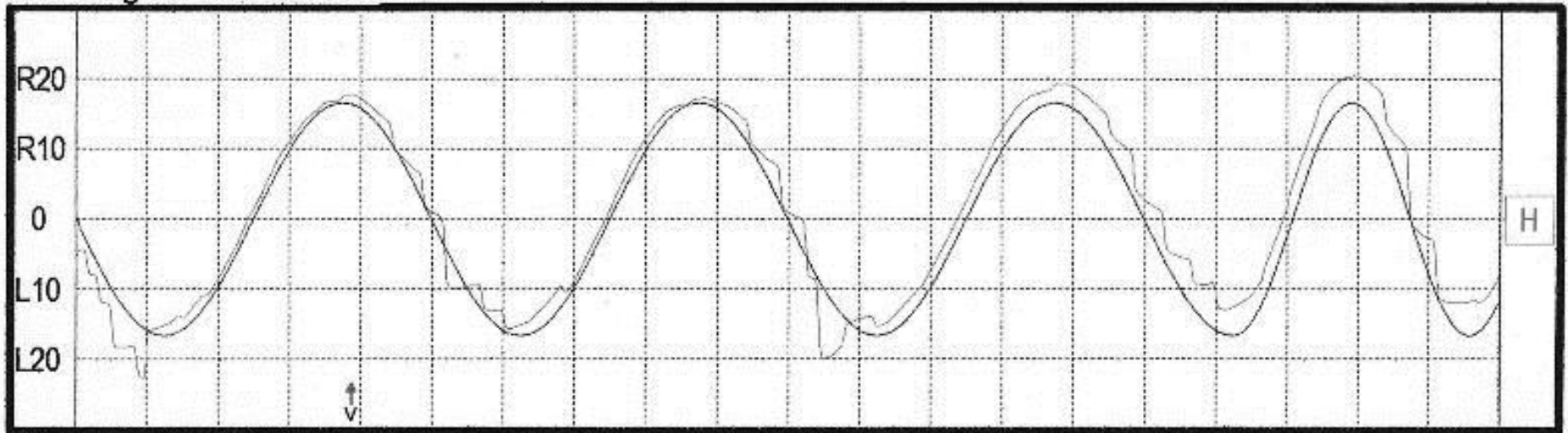
Saccadic on following to left

Smooth on following to right

Video

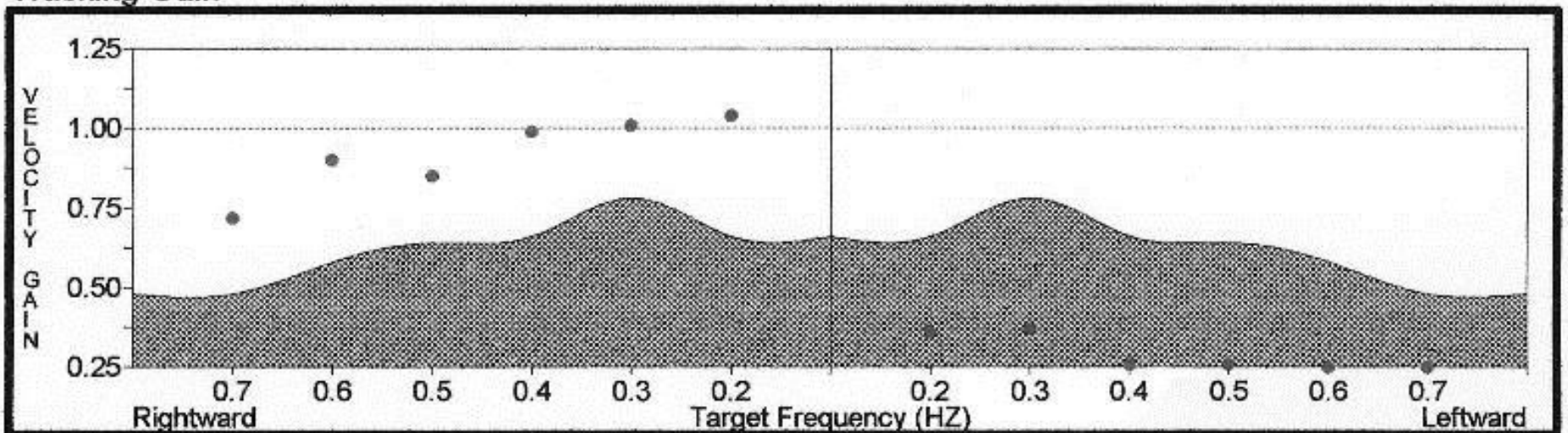
Saccadic smooth pursuit to left

Tracking Sine Horizontal



00:20

Tracking Gain



Clinical evaluation of saccades

Head still

Look at tip of finger (held horizontal)

Look at other tip of finger

Vary finger position

Look for accuracy, smoothness, speed

Saccades





Innaccurate saccades

Saccades innaccurate

Especially on seeking target to left

Overshoot on seeking target to left

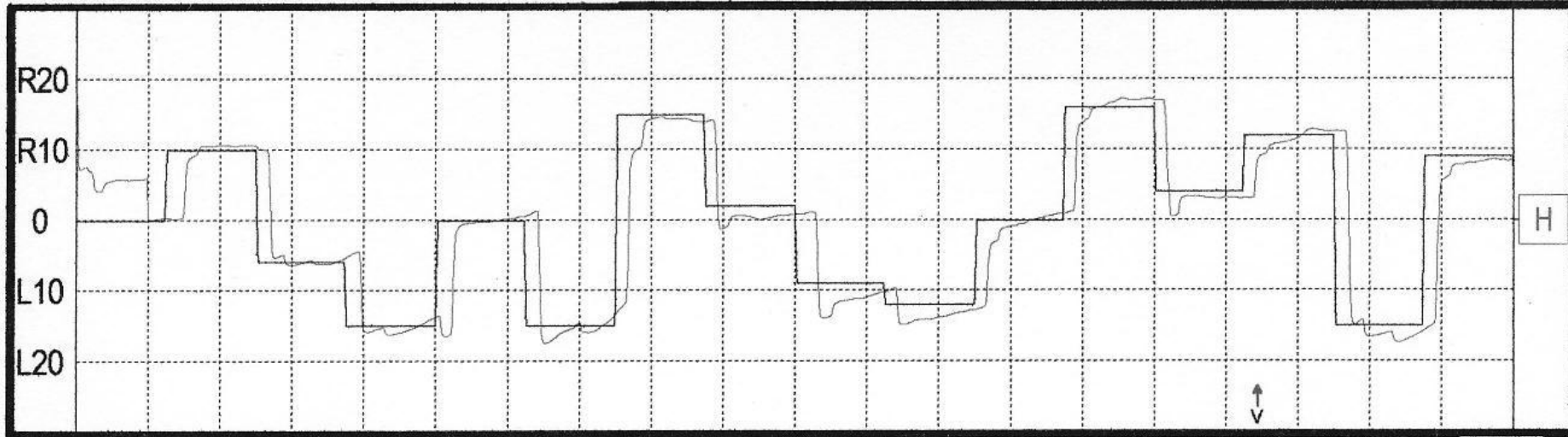
Especially if abducting to left

Video

Asymmetric saccades

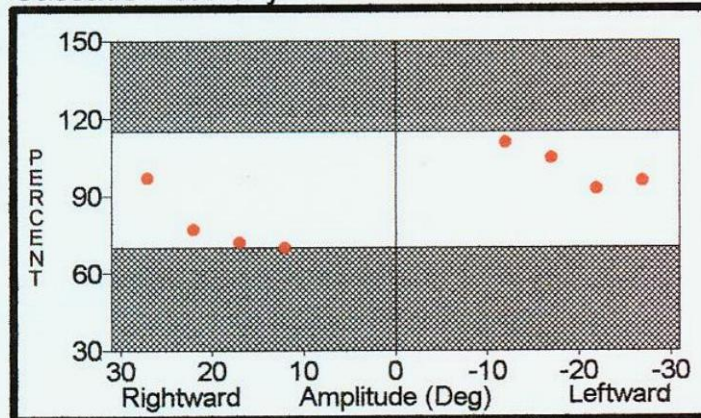
Saccade - Both Eyes

Horizontal Random Position - Horizontal



00:20

Saccade Accuracy



Clinical evaluation of optokinetic nystagmus (OKN)

Move a striped cloth in visual field

Instruct to keep watching straight ahead

**Watch for generation
horizontal and vertical**

Clinical evaluation of OKN



Optokinetic nystagmus

Present only with right moving target

None on left-moving target

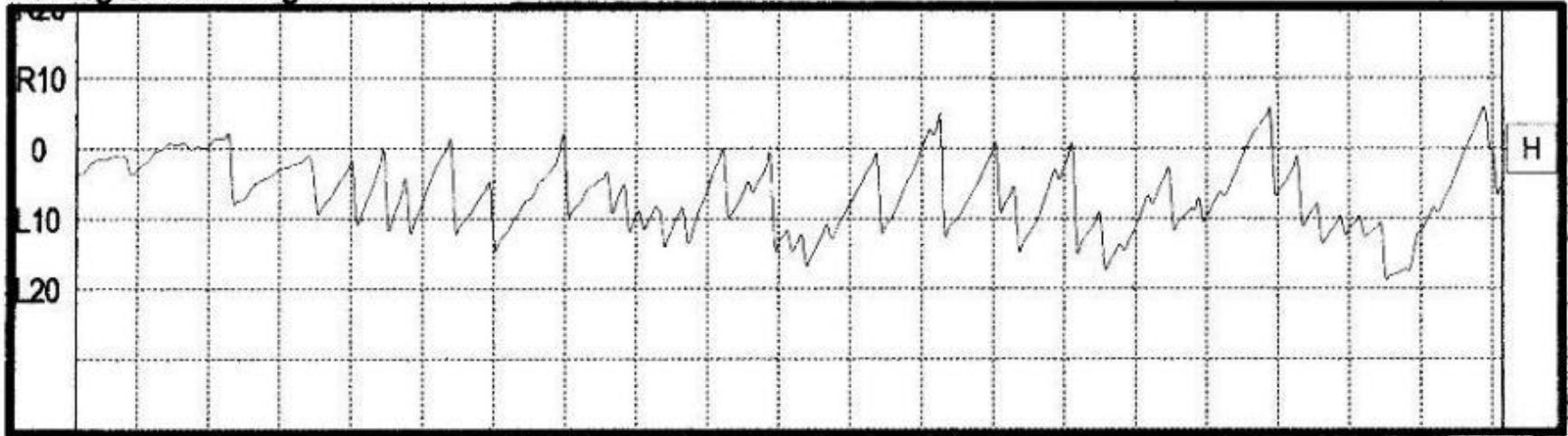
Video right moving target

Video left moving target

Optokinetic nystagmus

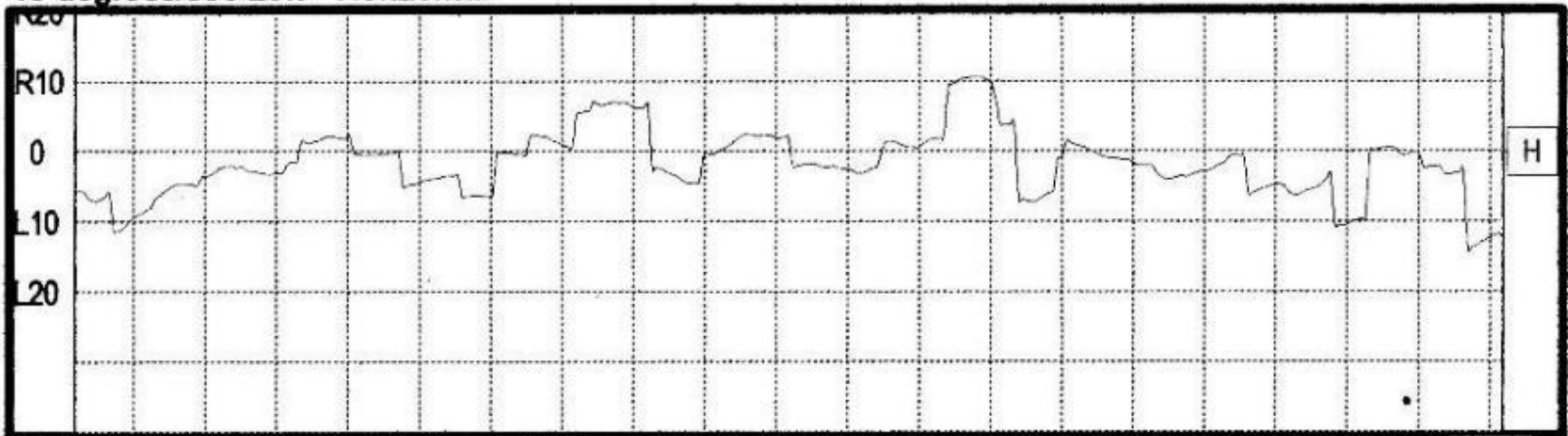
Optokinetic - Both Eyes

40 degrees/sec Right - Horizontal



00:46

40 degrees/sec Left - Horizontal



00:53

Clinical posturography

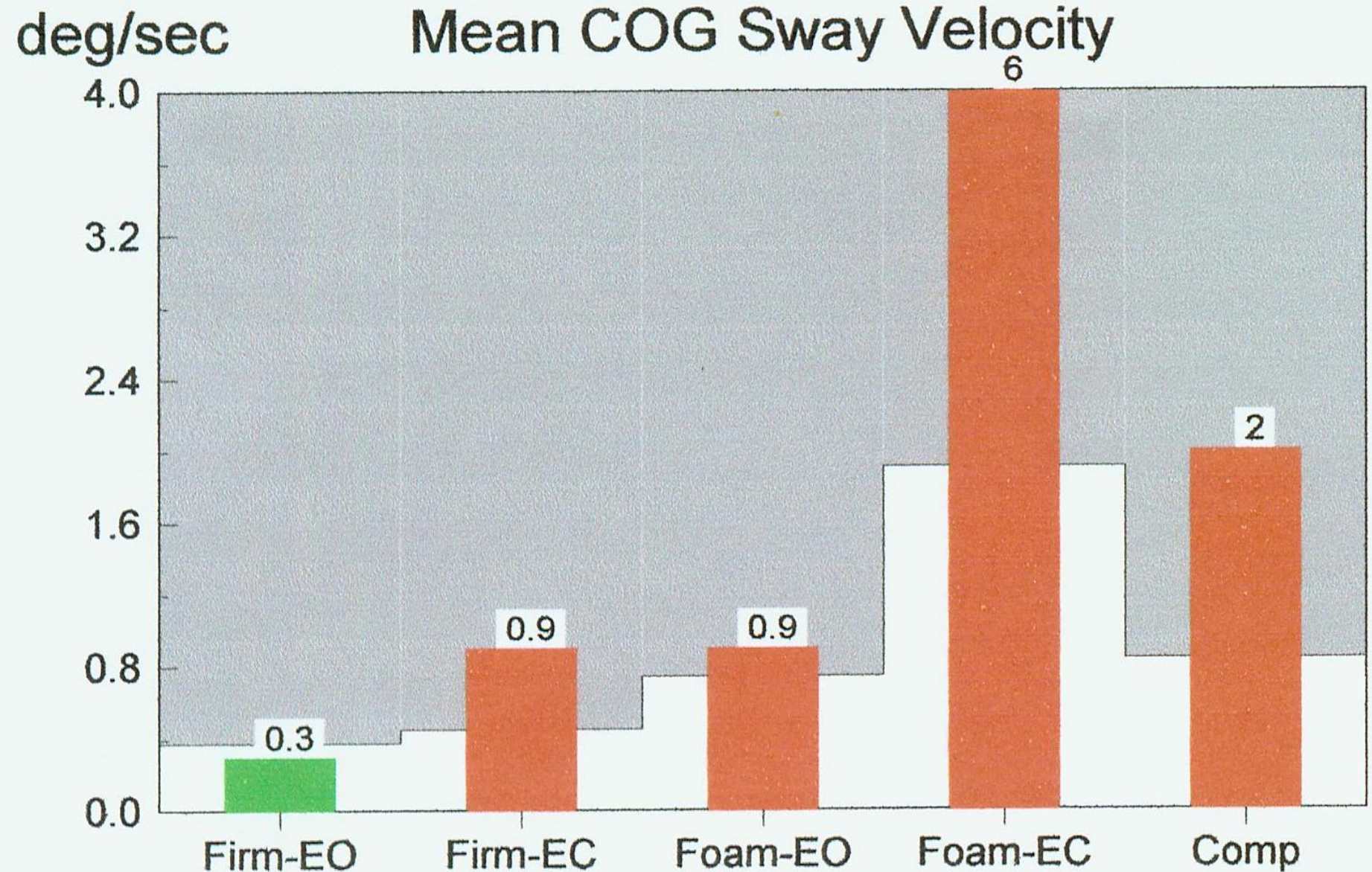


Clinical posturography

Duration of ability to stand

- **unsupported**
- **eyes closed**
- **on a compliant surface**
- **30 seconds requires**
 - **at least one intact vestibule**
 - **and static compensation of UVH**
- **this patient: less than 5s without fall**

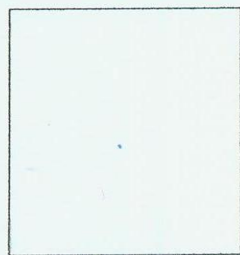
Computerised static posturography



Computerised static posturography

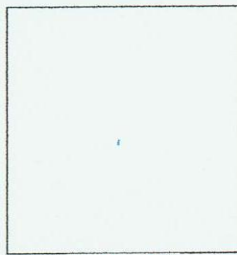
Modified CTSIB

1. Firm--Eyes Open (FIRM-EO)



(0.2, 10)

Trial 1



(0.2, 10)

Trial 2

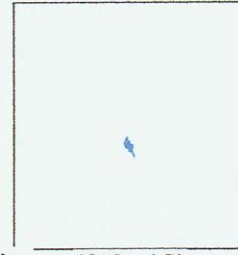


(0.4, 10)

Trial 3

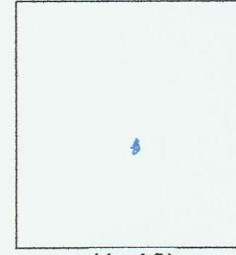
«(deg/sec)»

2. Firm--Eyes Closed (FIRM-EC)



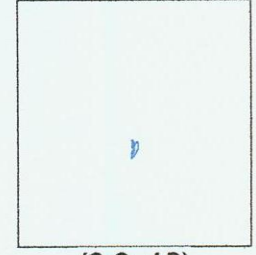
(0.9, 10)

Trial 1



(1, 10)

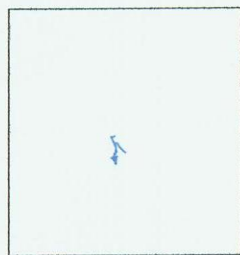
Trial 2



(0.9, 10)

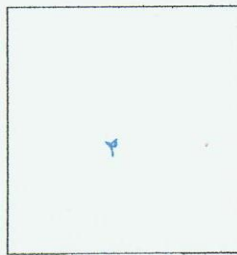
Trial 3

3. Foam--Eyes Open (FOAM-EO)



(1.1, 10)

Trial 1



(0.8, 10)

Trial 2

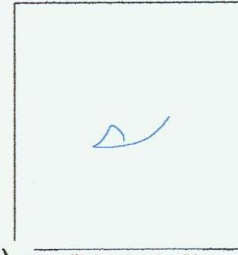


(0.8, 10)

Trial 3

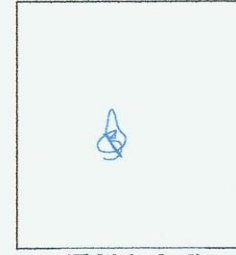
«(deg/sec)»

4. Foam--Eyes Closed (FOAM-EC)



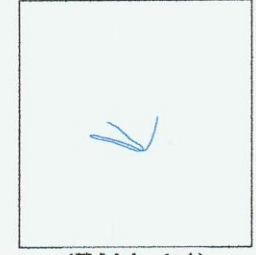
(FALL,2.6)

Trial 1



(FALL,8.4)

Trial 2

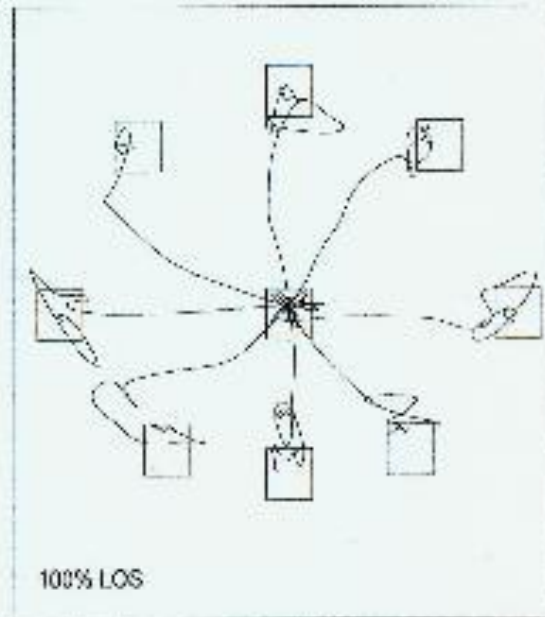


(FALL,4.1)

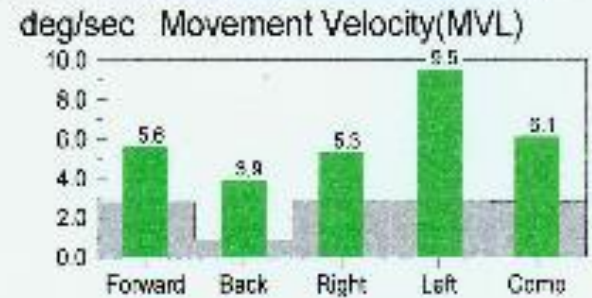
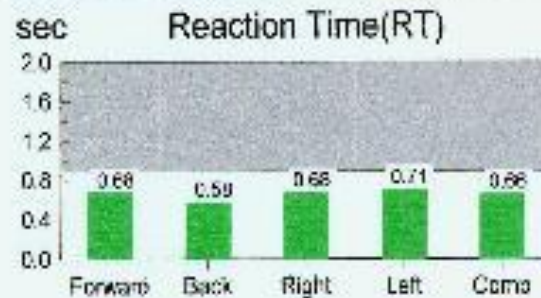
Trial 3

Computerised static posturography

Limits Of Stability



Transition	RT (sec)	MVL (deg/sec)	EPE (%)	MXE (%)	DCL (%)
1 (F)	0.73	5.5	95	102	80
2 (RF)	0.60	5.5	84	103	89
3 (R)	0.72	5.2	89	108	88
4 (RB)	0.67	5.0	105	105	79
5 (B)	0.42	3.9	96	99	88
6 (LB)	0.80	5.8	96	113	58
7 (L)	0.69	11.1	96	113	82
8 (LF)	0.65	7.7	95	109	79



Assessment

Asymmetric sensorineural hearing loss

No spontaneous nystagmus

Gaze paretic nystagmus esp to left

Head pulsion test positive for R UVH

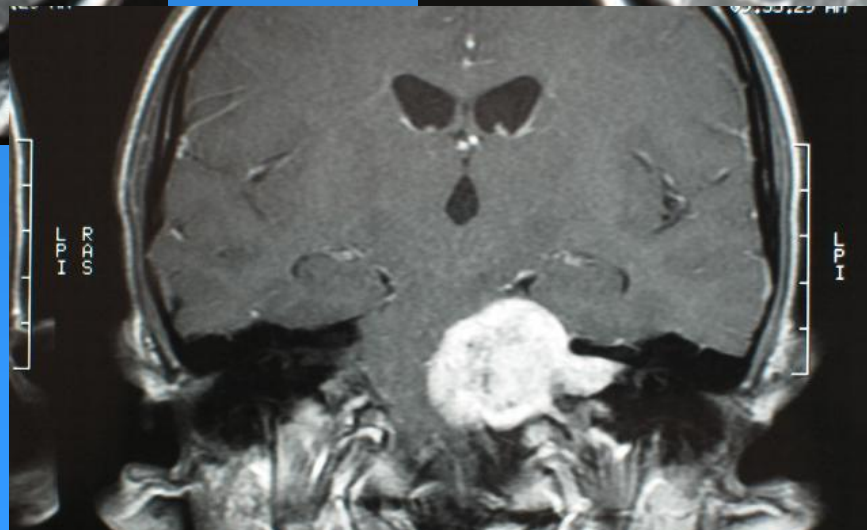
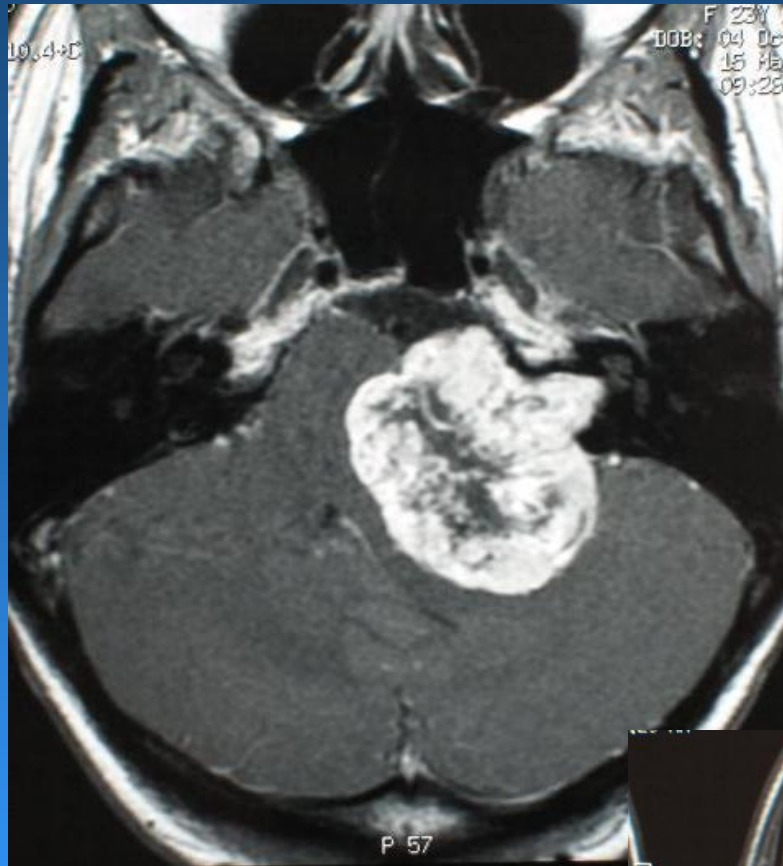
CNS signs on eye movement assessment

Diagnosis: ?

Diagnosis

Brainstem/root entry zone lesion

MRI scan



Diagnosis

Acoustic neuroma

Ataxia and vertigo

55 yrs male

Active horsehandler

Severe debilitating ataxia and vertigo

Began 3 weeks ago

Has had to stop work

Aggravated by movement

Associated nausea esp with movement

No cochlear symptoms

Examination

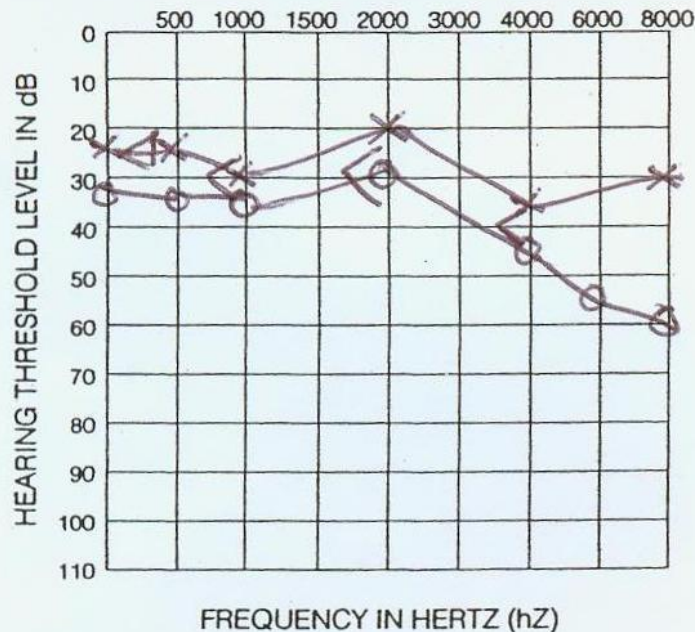
General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

Audio mild right asymmetric SNHL

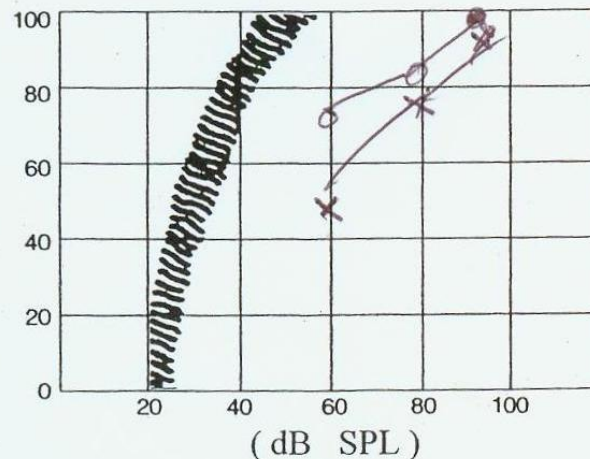
AUDIOGRAM



SPEECH AUDIOMETRY

Live voice tests (Normal Screening Intensity = 35dBA)

Material	Intensity	Performance
.....		
.....		



Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

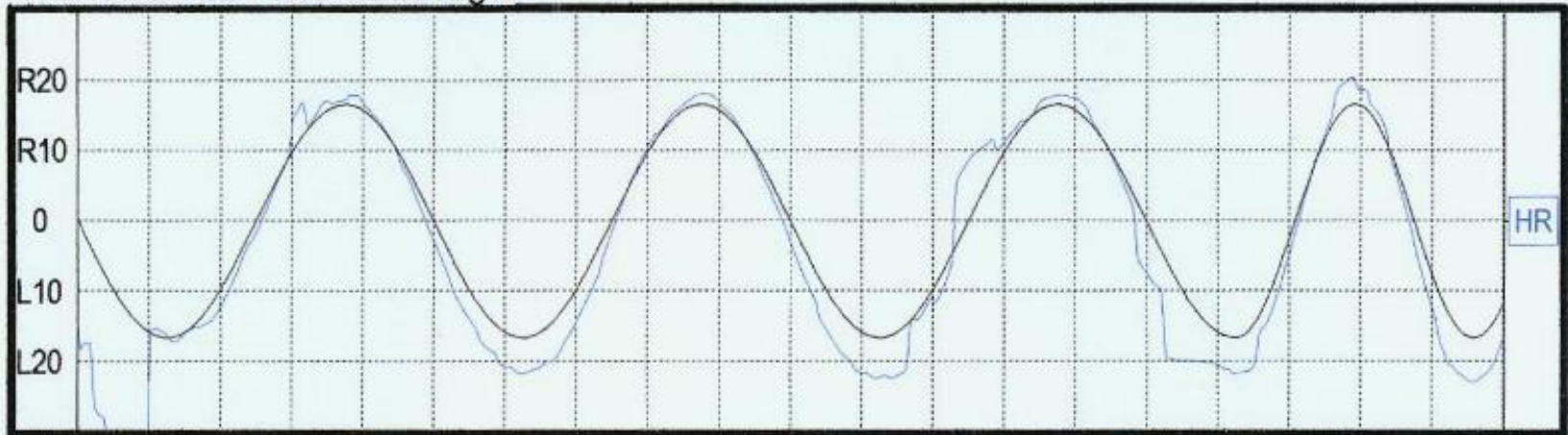
Audio mild right asymmetric SNHL

Normal smooth pursuit, saccades, OKN

Normal smooth pursuit

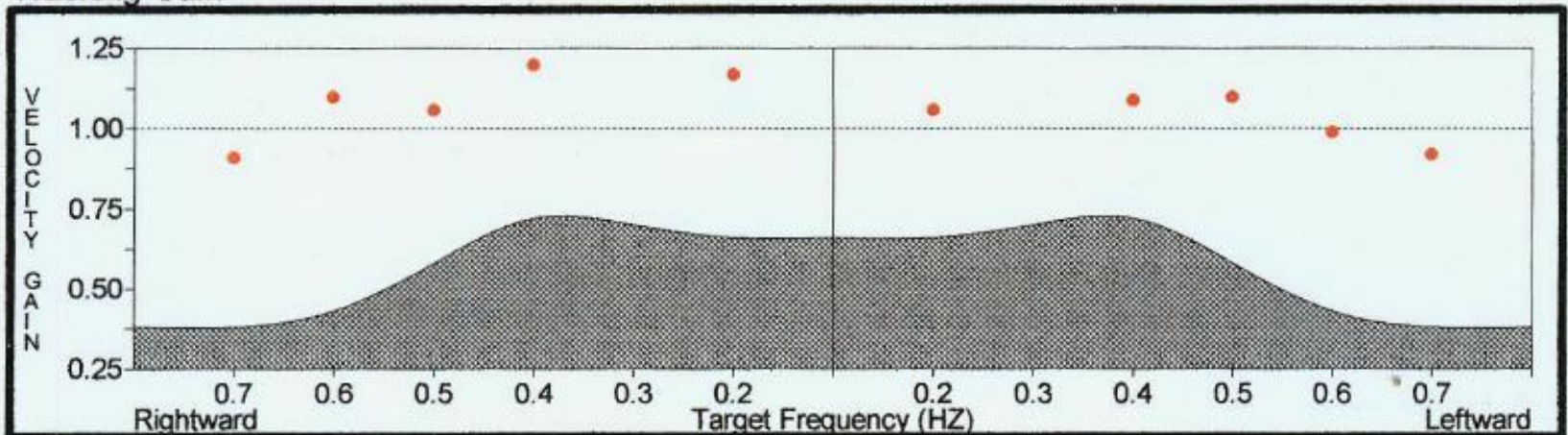
Tracking - Individual Eyes

Sine Horizontal - Horizontal Right



00:20

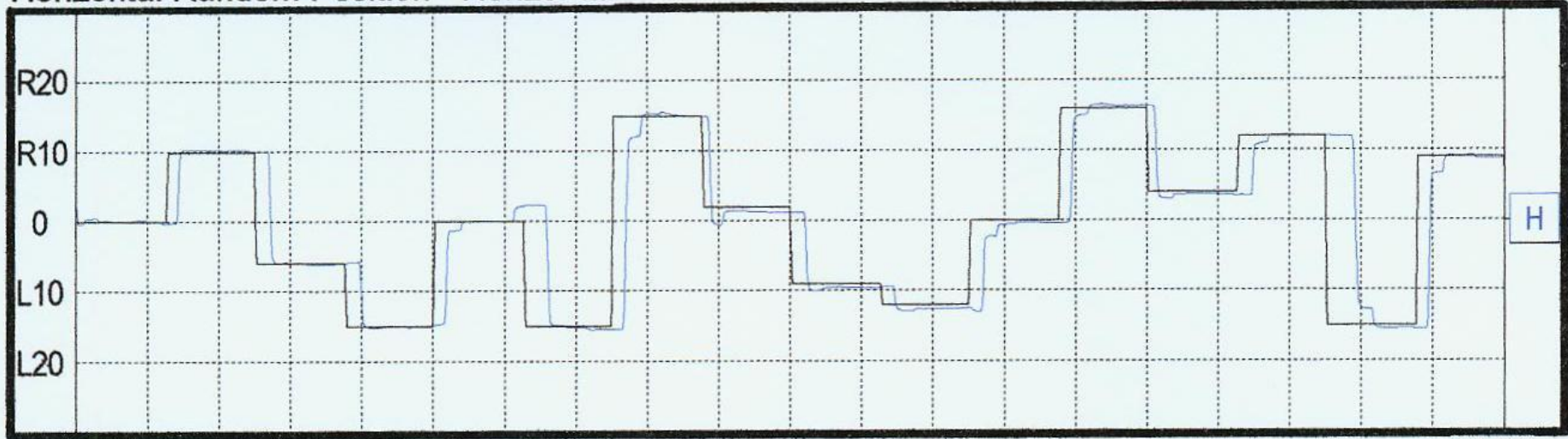
Tracking Gain



Normal saccades

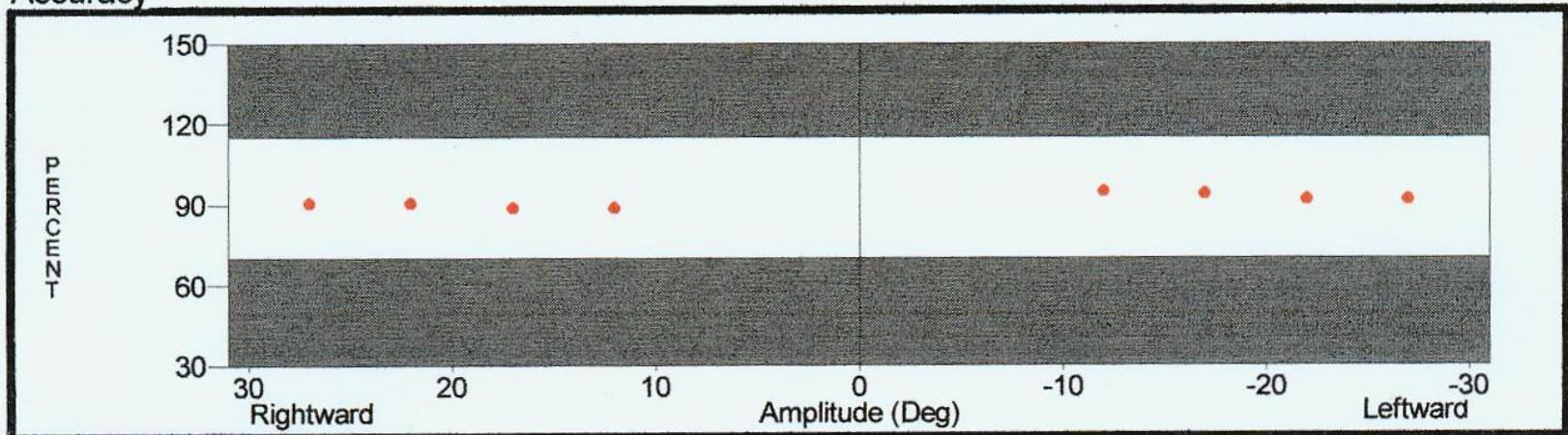
Saccade - Both Eyes

Horizontal Random Position - Horizontal



00:20

Accuracy



Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

Audio mild right asymmetric SNHL

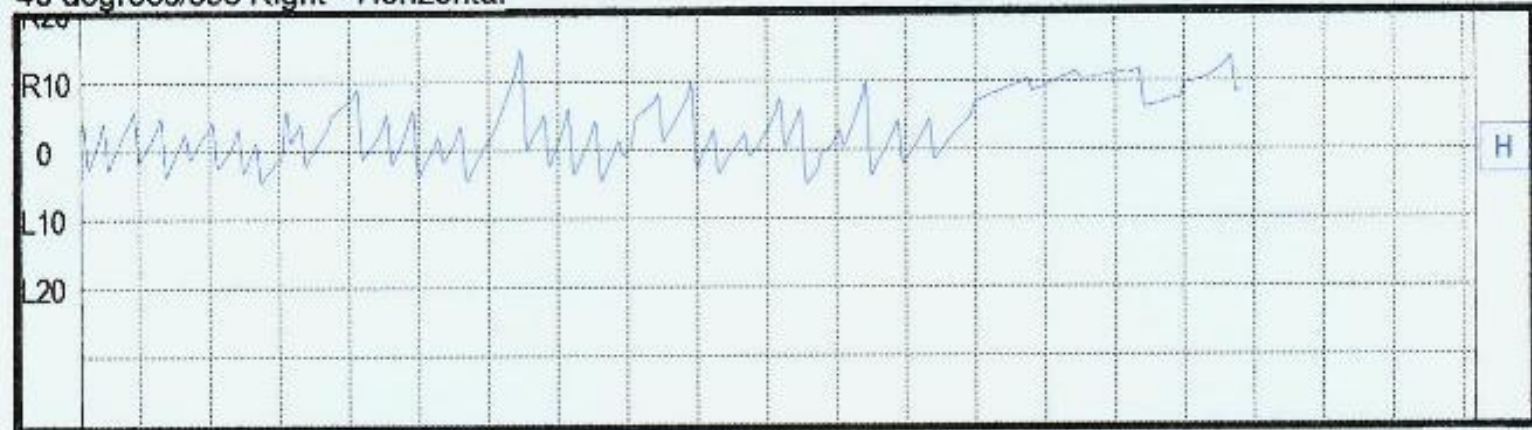
Normal smooth pursuit, saccades

Asymmetric optokinetic nystagmus

Asymmetric optokinetic nystagmus

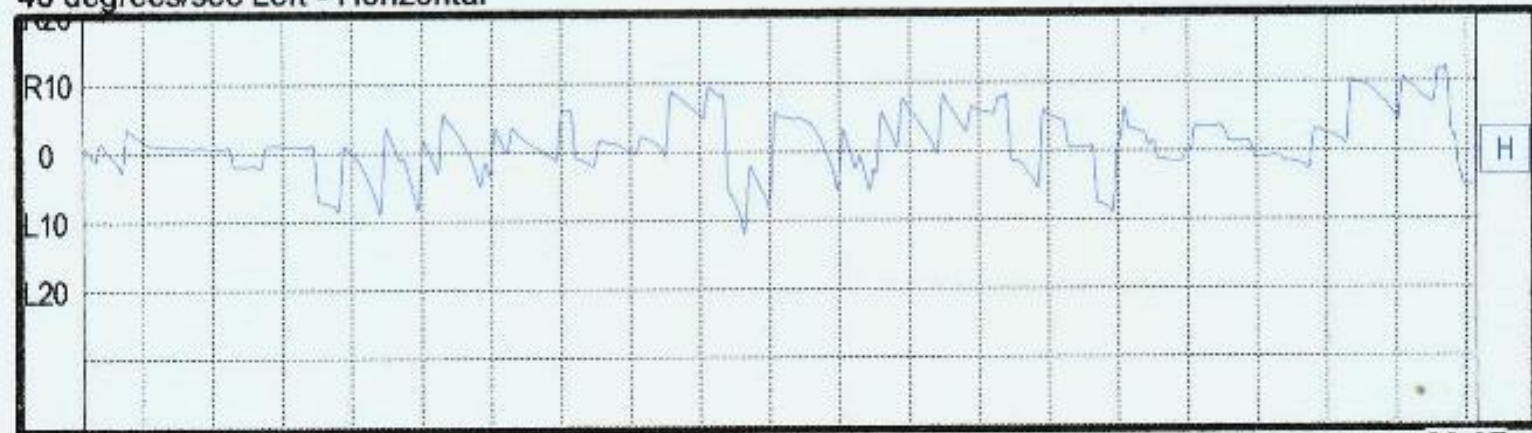
Optokinetic - Both Eyes

40 degrees/sec Right - Horizontal



00:50

40 degrees/sec Left - Horizontal



00:37

Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

Audio mild right asymmetric SNHL

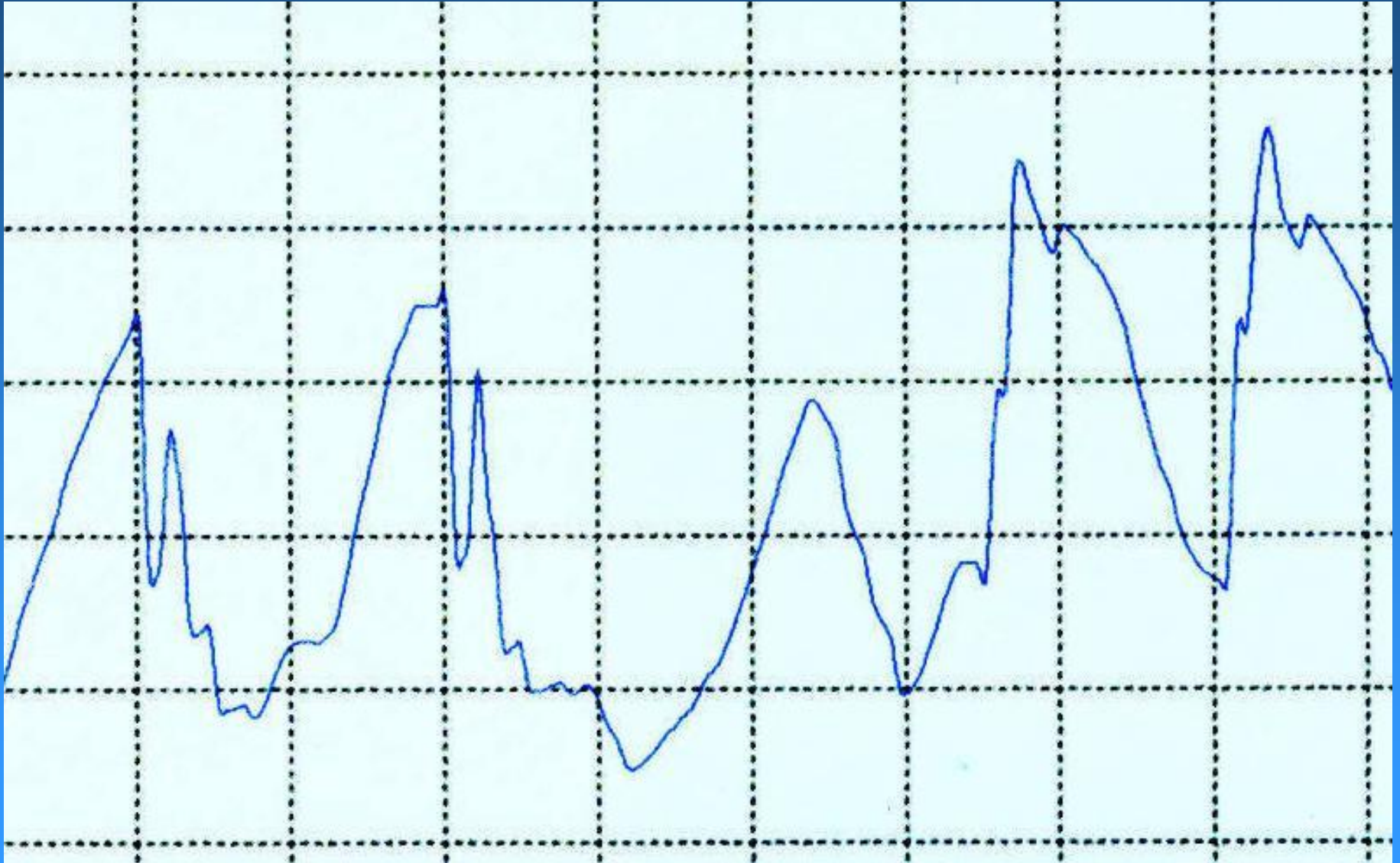
Normal smooth pursuit, saccades

Asymmetric optokinetic nystagmus

Head pulsion test positive for right UVH

Video normal Video slow

Head pulsion test positive for R UVH



Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

Audio mild right asymmetric SNHL

Normal smooth pursuit, saccades

Head pulsion test positive for right UVH

Grade 2 spontaneous nystagmus

Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

Normal smooth pursuit, saccades

Optokinetic nystagmus asymmetric

Grade 2 spontaneous nystagmus

Head shake nystagmus (++ nausea)

Assessment

Vertigo and ataxia

**Spontaneous and head shake nystagmus
in keeping with R UVH**

Head pulsion test positive for R UVH

No CNS signs on eye movement exam

Diagnosis: ?

Diagnosis

Vestibular neuronitis

Plan:

MRI booked through public system

Vestibular rehab exercises

Ataxia

46 yrs male

Active farmer/shearer

Nonepisodic dysequilibrium/ataxia

Especially whilst shearing

Fell from a platform 3 months ago

Slight nausea all the time

Examination

General ENT all normal

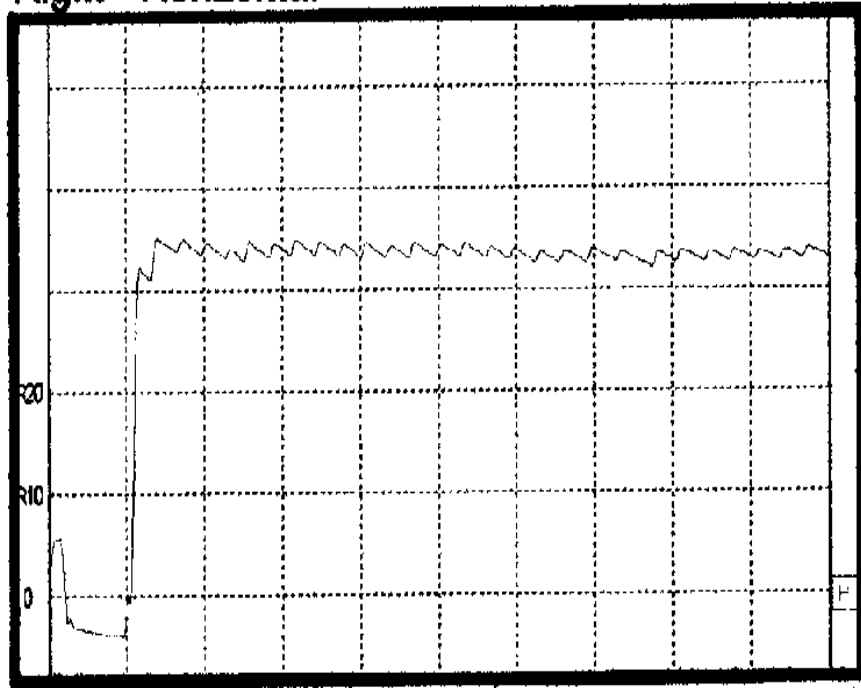
Cranial nerves intact

Cerebellar function within normal limits

Gaze evoked nystagmus

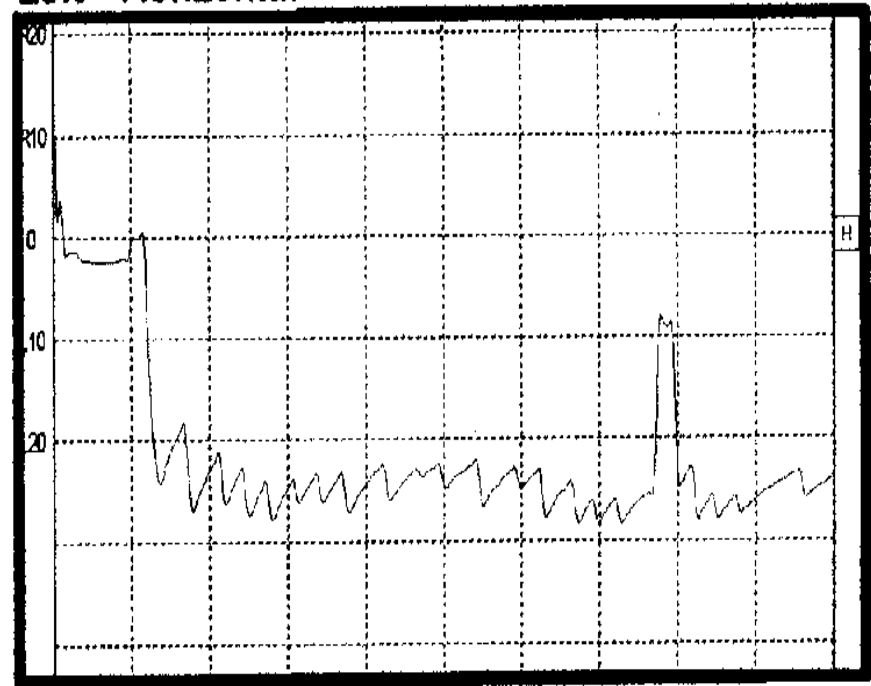
Gaze evoked nystagmus

Right - Horizontal



00:10

Left - Horizontal



00:10

Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

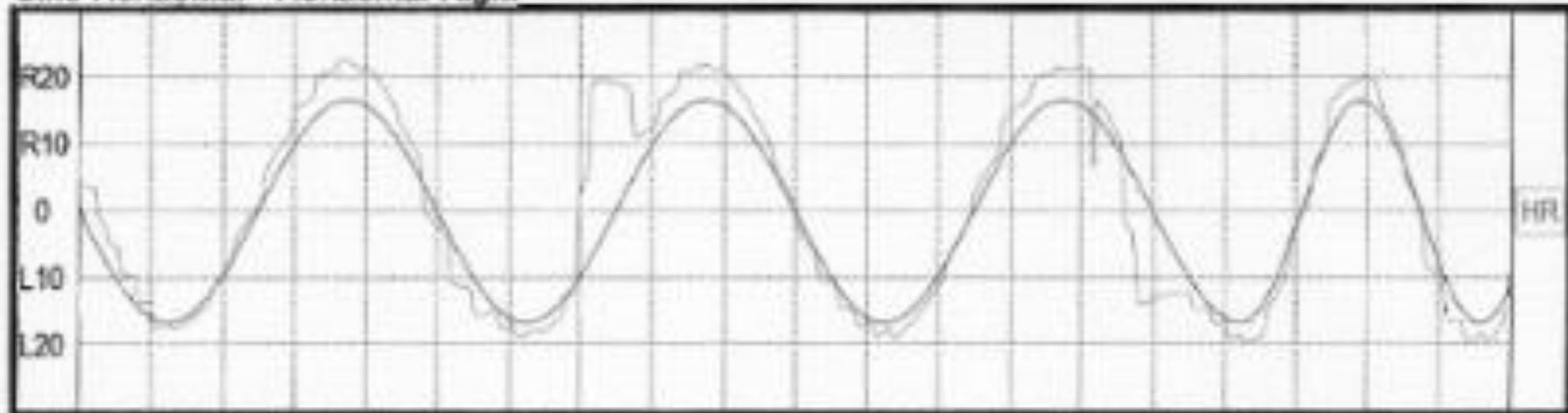
Gaze evoked nystagmus

Saccadic smooth pursuit

Saccadic smooth pursuit

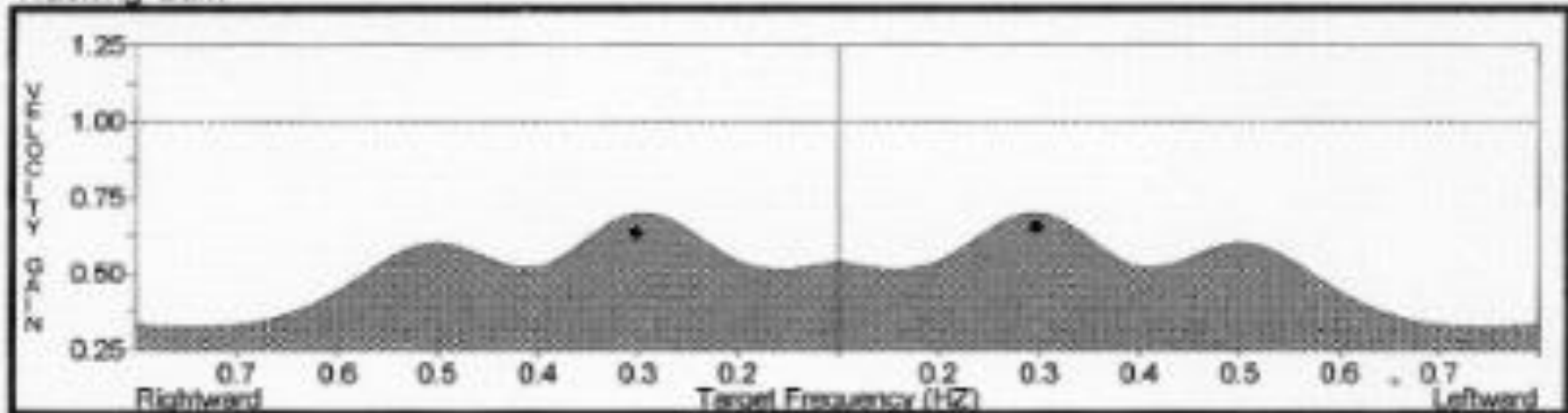
Tracking - Individual Eyes

Sine Horizontal - Horizontal Right

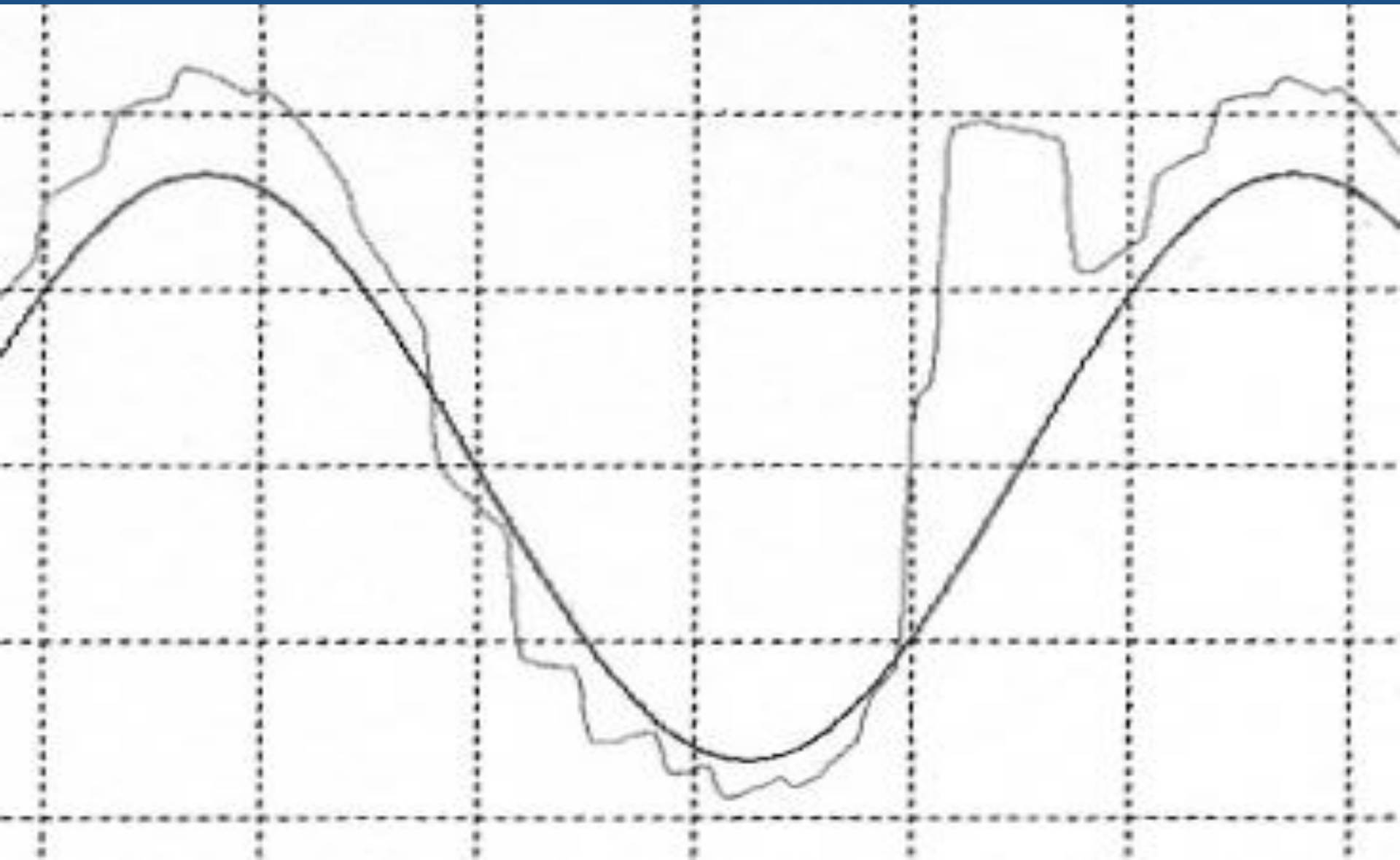


00:20

Tracking Gain



Saccadic smooth pursuit



Examination

General ENT all normal

Cranial nerves intact

Cerebellar function within normal limits

Gaze evoked nystagmus

Saccadic smooth pursuit

Head pulsion test positive for left weakness

Assessment

Ataxia

CNS signs on eye movement assessment

No distinct cerebellar signs

Diagnosis: ?

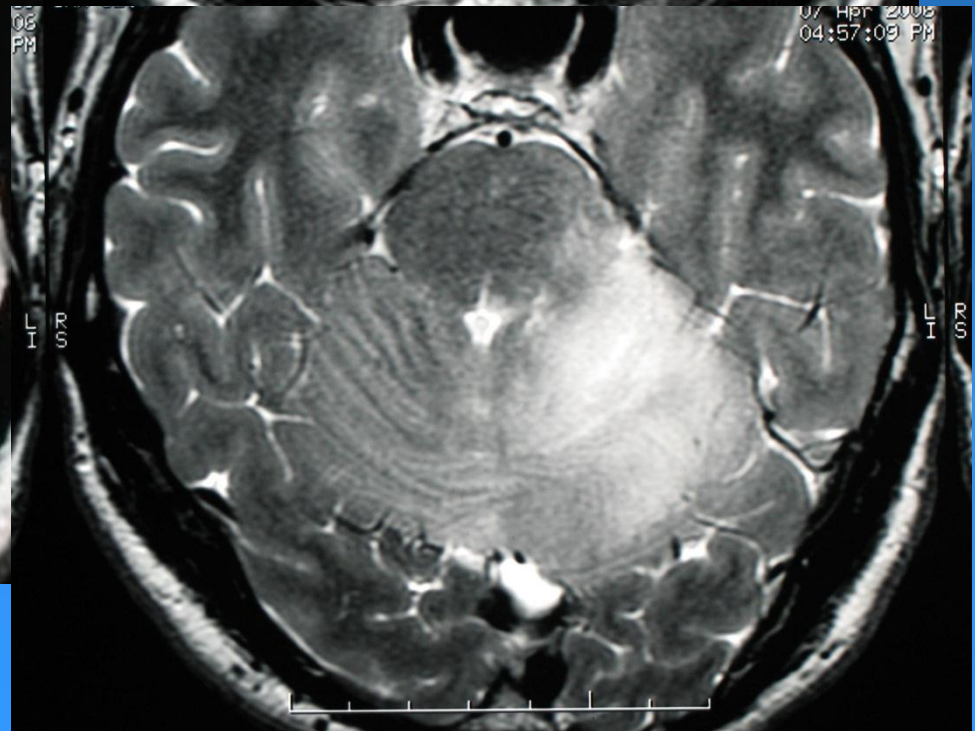
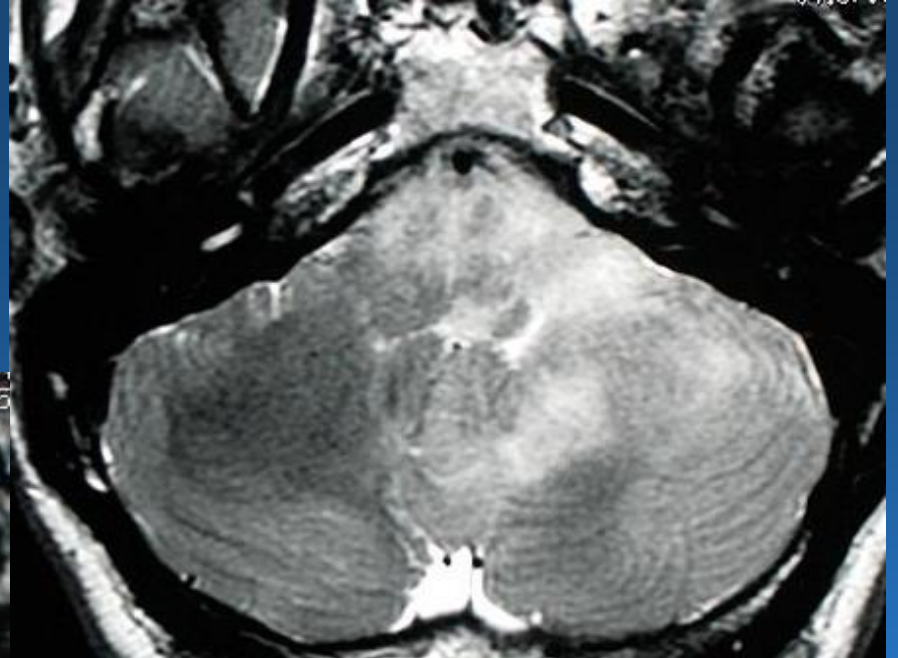
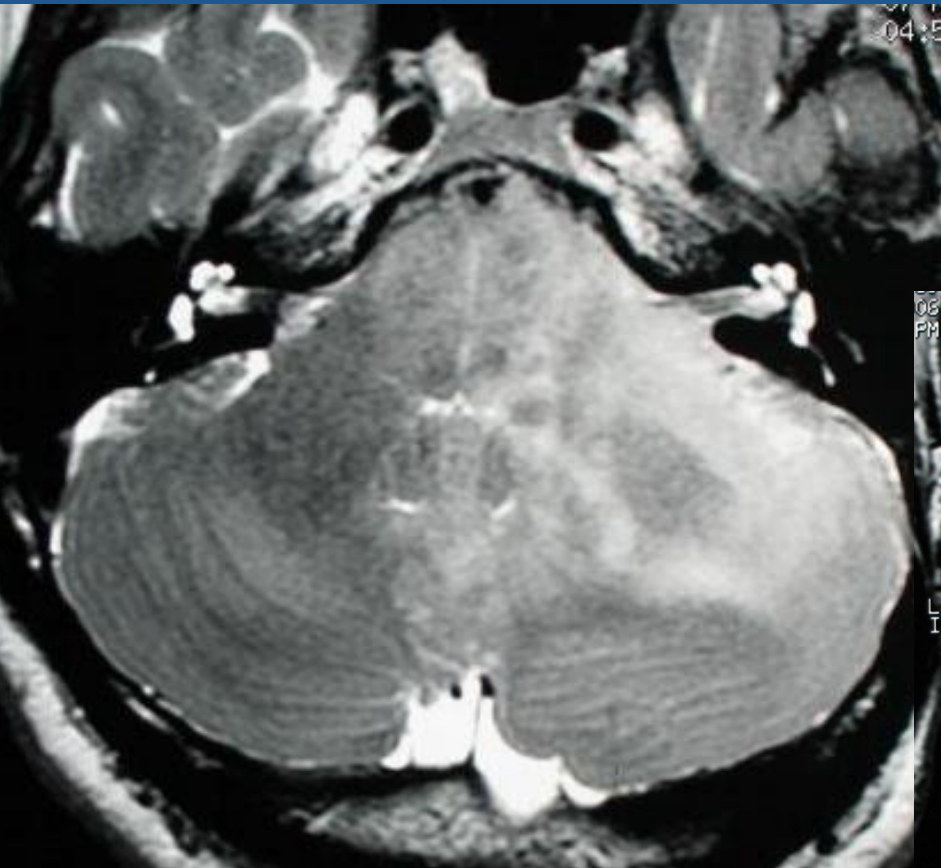
Diagnosis

Central not peripheral cause

MRI

MRI scan

Acute disseminated encephalomyelitis



Episodic vertigo

67 yrs male

Retired truck driver

Noise induced sensorineural hearing loss

Later episodic prostrating vertigo

associated cres/decreases right hearing loss

aggravated by head movement

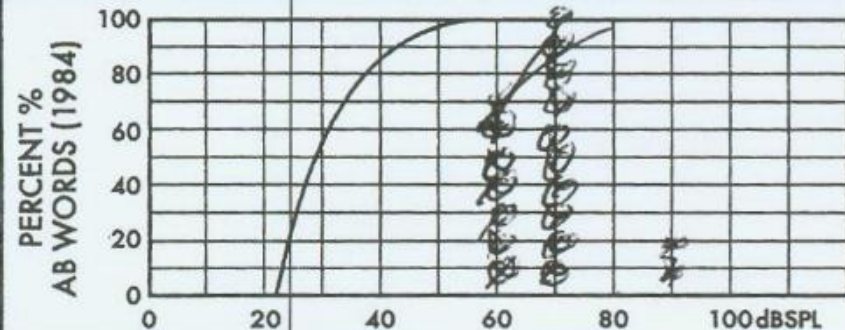
better eyes closed and lying still

lasting a couple of hours

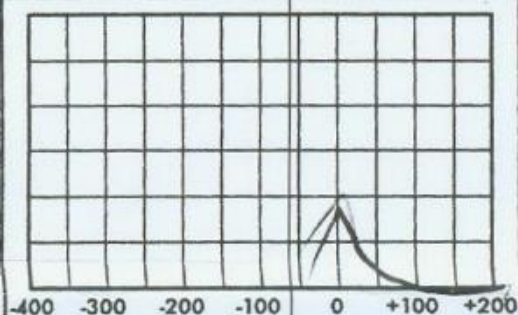
Working diagnosis: Meniere's

Audio

SPEECH DISCRIMINATION



TYMPANOGRAM



Audiometer *AB30*

Calibration Date *11/06*

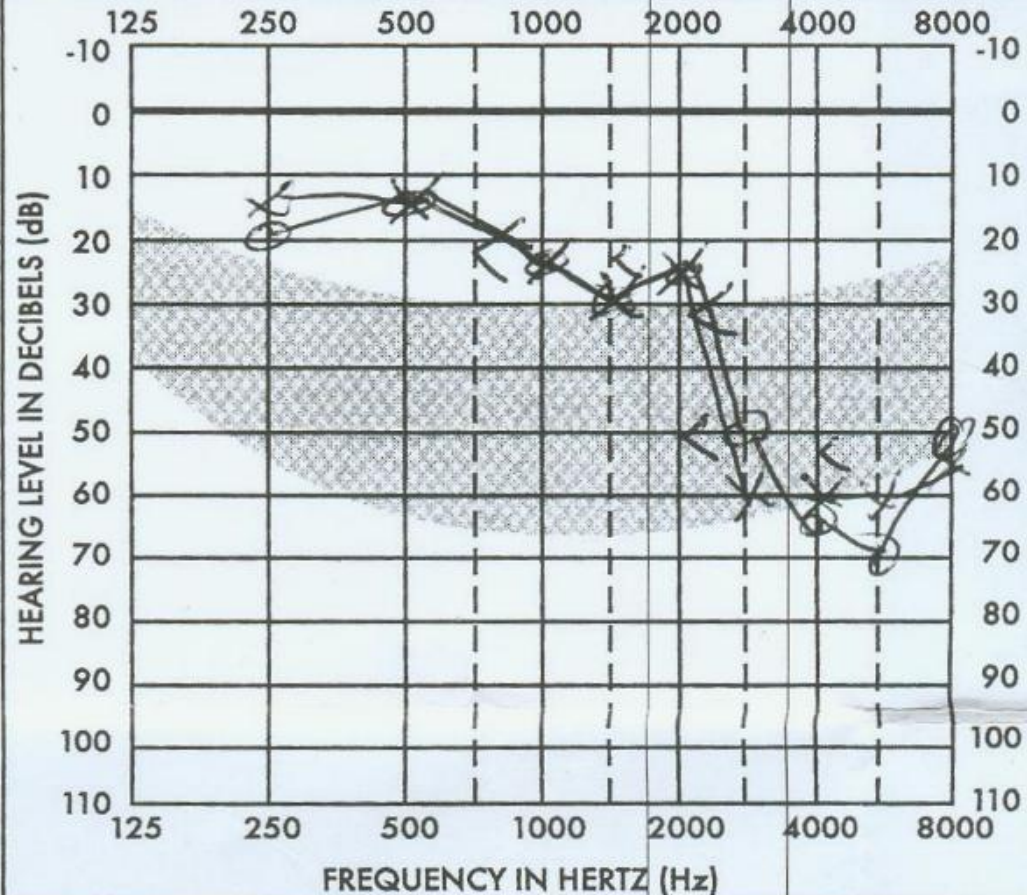
Head Phones ☒

Insert Phones ☐

*reflex (Lk)
present
c + R
→ ipsilateral
stim*

	C +200	C MEP	C TM	MEP (mmW)	TYPE
R			-9	0	4
L			1.7	0	A

PURE TONE AUDIOMETRY



X = Left

O = Right

Later developments

One month later

“Couldn’t read half of what he was looking at”

Words “seem to slip away”

Still transient vertigo

Examination

Examination unremarkable

No neurological signs

Later developments

Another three weeks later

Severe incapacitating dysequilibrium

Unable to stand/walk unsupported

No vertigo/cochlea symptoms

Examination

Wide based gait

Cerebellar exam within normal limits

Gaze paretic nystagmus for rightward gaze

But not for leftward gaze

Examination

Wide based gait

Cerebellar exam within normal limits

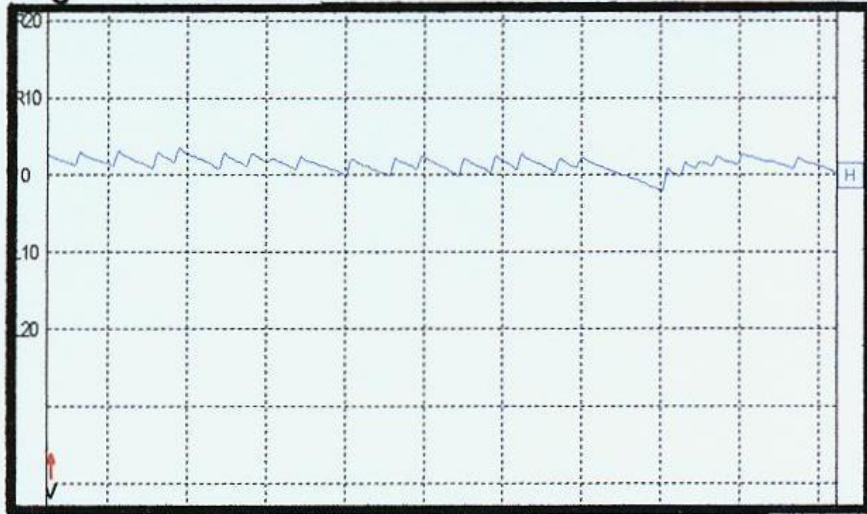
Gaze paretic nystagmus for rightward gaze

But not for leftward gaze (printout)

Gaze paretic nystagmus

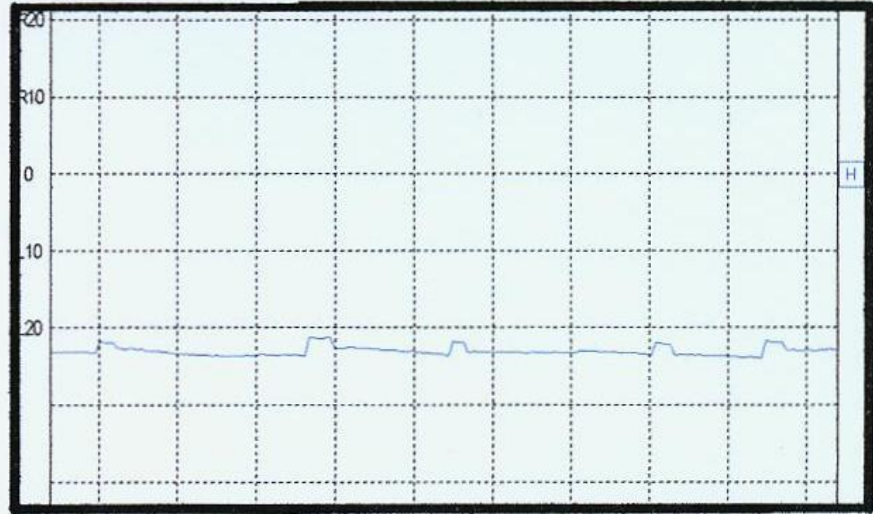
Gaze - Both Eyes

Right - Horizontal



00:14

Left - Horizontal



00:19

Examination

Wide based gait

Cerebellar exam within normal limits

Gaze paretic nystagmus for rightward gaze

But not for leftward gaze (printout)

Saccadic smooth pursuit

Examination

Wide based gait

Cerebellar exam within normal limits

Gaze paretic nystagmus to rightward gaze

Saccadic smooth pursuit

Dysmetric saccades video printout 2

Examination

Wide based gait

Cerebellar exam within normal limits

Gaze paretic nystagmus to rightward gaze

Saccadic smooth pursuit

Dysmetric saccades

Asymmetric OKN right left printout

Examination

Wide based gait

Cerebellar exam within normal limits

Gaze paretic nystagmus to rightward gaze

Saccadic smooth pursuit

Dysmetric saccades

Asymmetric OKN

Head pulsion positive to left printout

Examination

Wide based gait

Cerebellar exam within normal limits

Gaze paretic nystagmus to rightward gaze

Saccadic smooth pursuit

Dysmetric saccades

Asymmetric OKN

Head pulsion positive to left printout

Bithermal calorics no asymmetry

Assessment

No more vertigo

Positive head pulsion implies vestibular involvement peripheral/central

Central signs on eye movement assessment

No unilateral vestibular weakness on calorics

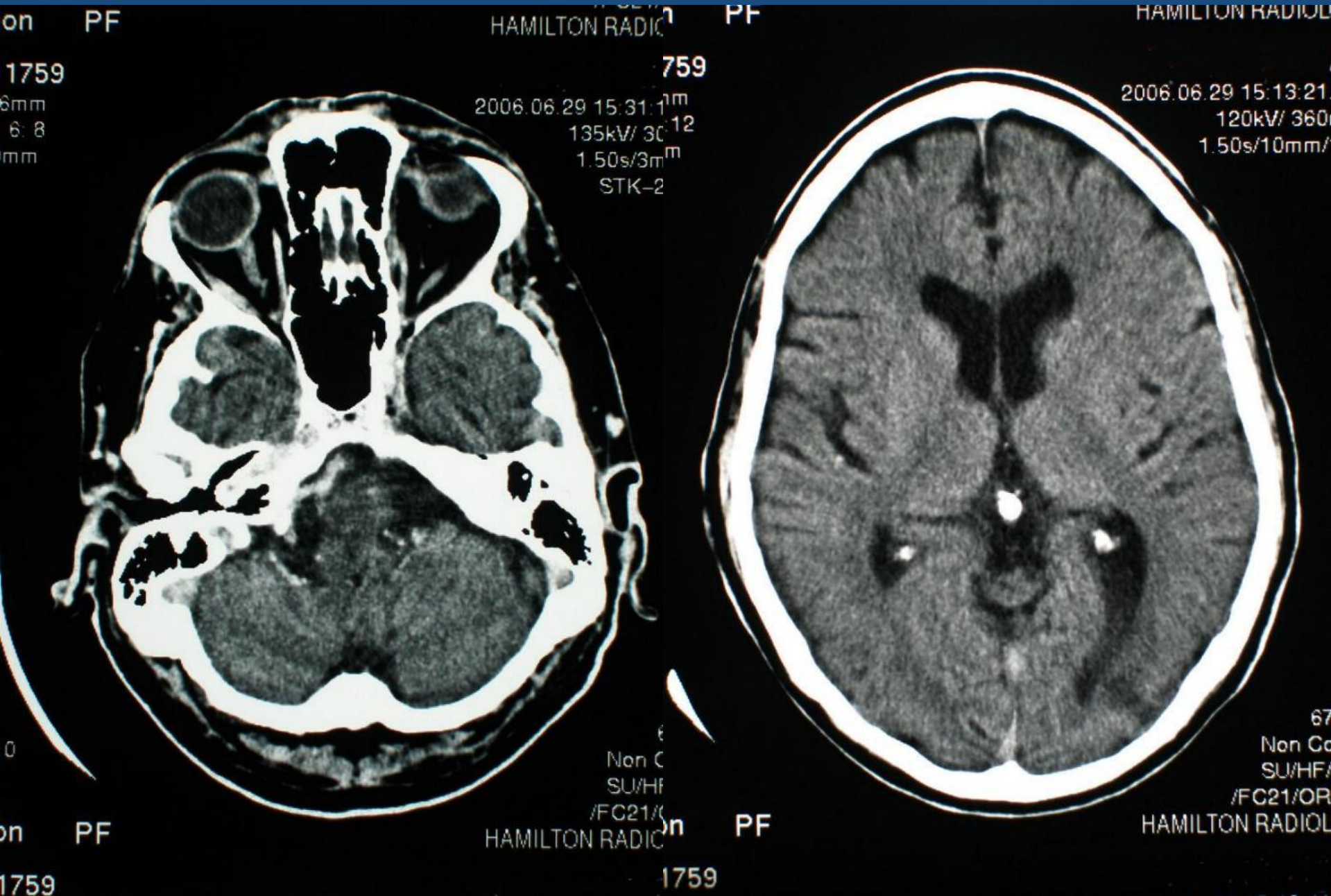
Diagnosis: ?

Diagnosis

Must be central

MRI

Multiple subtle CNS lesions probably ischaemic in origin



Progress

Referred to a neurologist

**But admitted to Waikato Hospital with
suspected TIA before the appointment**

Middle ear disease and Balance dysfunction

AR Currie

Tangmere Clinic

8 Mill Lane

Hamilton

Tel: 07 839 5562

Fax: 07 839 5568

E-mail: tangmere@clear.net.nz