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Otology for the Head and Neck Cancer Patient

2024 Stanford Head and Neck Cancer Patient and Caregiver Education Symposium

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March 2nd, 2024

Disclosure and Disclaimers

- Disclosures: None
  - No financial ties to any companies or organizations

- Disclaimer:
  - Most of the images are illustrations or non-sensitive photos
  - There are occasional images which are sensitive. These images may contain content that is offensive or disturbing (surgical photos or images of cancer)
    - These are not included with the intention of being offensive, but rather to educate and ultimately provide patient benefit by promoting understanding
    - I will try to warn the audience prior to showing such photos

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Goals

- Educate and raise awareness about otologic issues facing head and neck cancer patients.

- Inspire and encourage you or your loved on to seek care

- Offer hope about treatments to potentially improve quality of life

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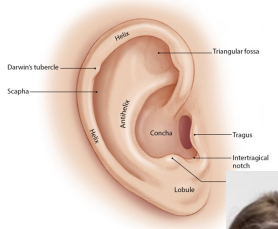
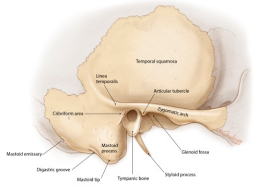
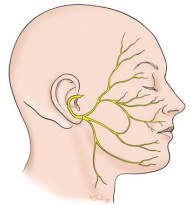
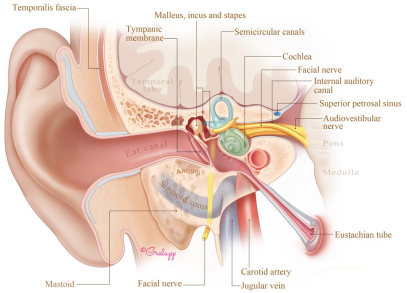
Otology







Otology is a branch of medicine that studies normal and pathological anatomy and physiology of the **ear** as well as its diseases, diagnosis, and treatment.



Includes:

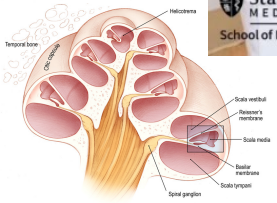
Hearing

Balance

Eustachian Tube Function

Facial Nerve Function

Diseases of the Temporal Bone



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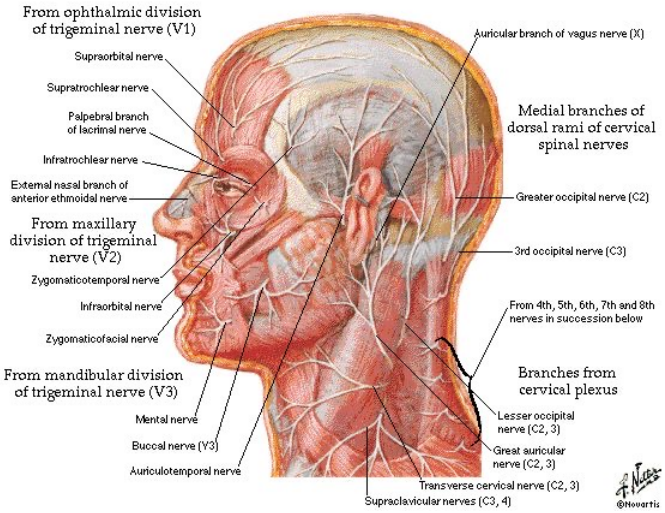
What Types of Head & Neck Cancer Patients Can Have Otologic Issues?

ALL!

Can be related to the cancer itself or the treatment

- radiation, chemotherapy, or surgery



Especially:

- Anyone who has had **radiation therapy**
- Anyone who has had **chemotherapy**
- Anyone who has had **hyperbaric oxygen therapy**
- Tumors of the **ear or temporal bone** (ex: often skin, parotid gland)
- Tumors of the **nasopharynx or oropharynx** (back of nose or throat)
- Some patients with cancer in neck lymph nodes

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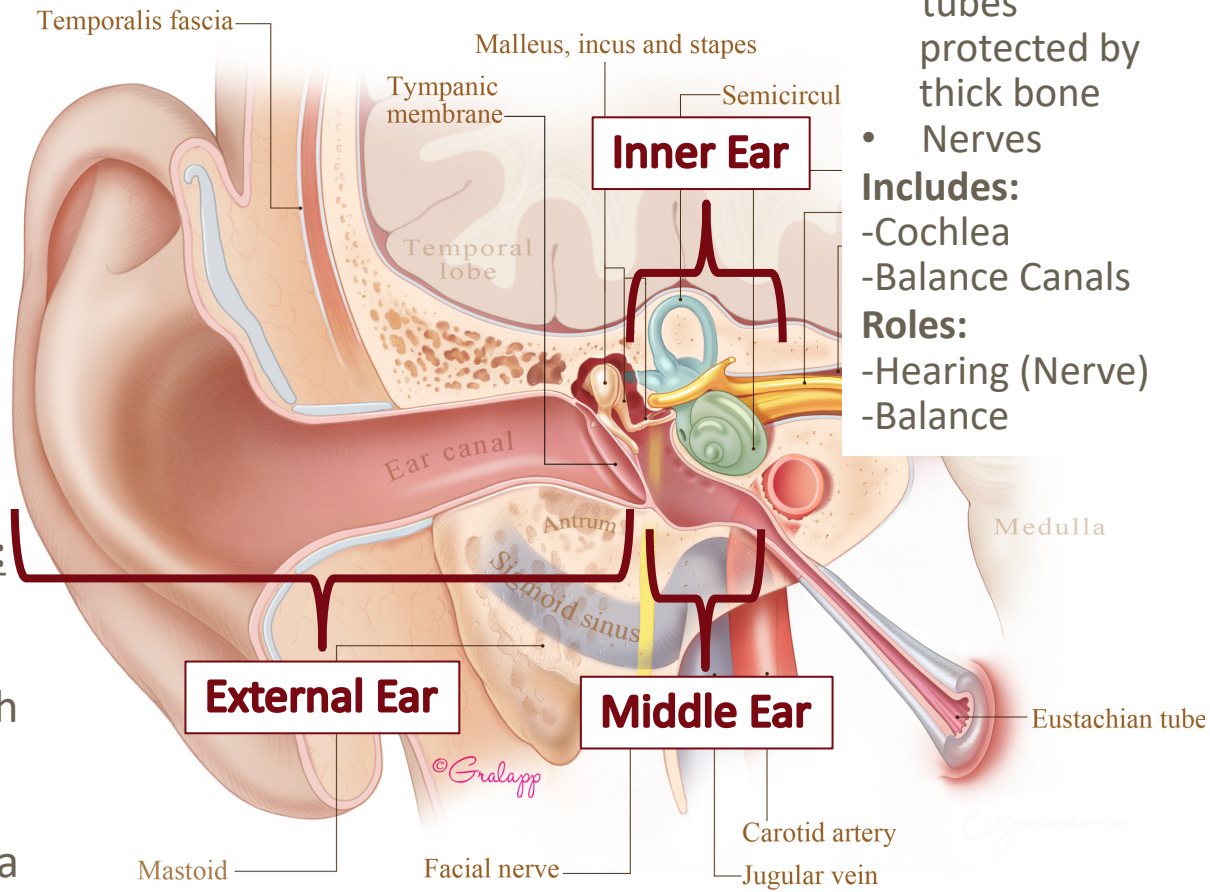
Ear Anatomy 101



Inner Ear:

- Fluid-filled tubes protected by thick bone
- Nerves

Includes:
-Cochlea
-Balance Canals
Roles:
-Hearing (Nerve)
-Balance

Middle Ear:

- Behind Ear Drum
- Lined with Mucosa

Includes:
-Ear Drum (Tympanic Membrane)
-Space behind ear drum
-Bones of Hearing (Ossicles)
-Eustachian Tube
Roles:
-Hearing (Mechanical)
-Regulating Pressure

External Ear:

- Outside Ear Drum
- Lined with Skin

Includes:
Auricle/Pinna
Ear Canal

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Otologic Issues Facing Head & Neck Cancer Patients

- Hearing Loss
  - Mechanical (Conductive)
  - Nerve/Cochlear (Sensorineural)
- Tinnitus
- Fullness/Pressure (Aural fullness)
- Eustachian Tube Dysfunction
- Pain (Otalgia)
- Chronic/recurrent fluid behind ear drum (middle ear effusions)
- Chronic infections (external or middle ear)
- Bone necrosis and infection (Osteonecrosis, Osteomyelitis)
- Aesthetic/function issues from losing parts of the ear
- Facial Nerve Dysfunction

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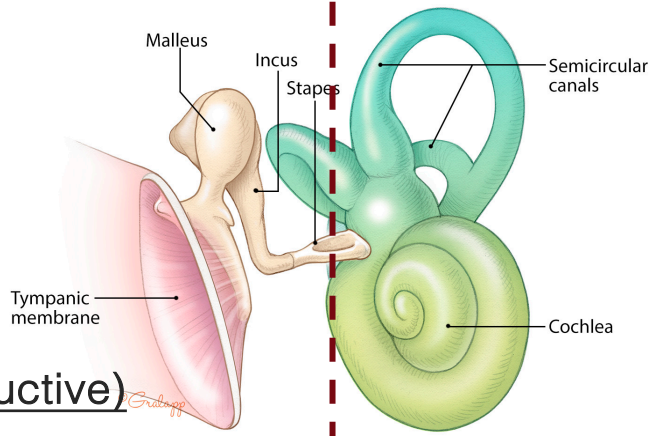
Hearing Loss

Most common otologic issue in head and neck cancer patients.



Can be immediate or delayed (years after treatments).

May be reversible (more common with conductive) or irreversible (more common with sensorineural).

Mechanical (Conductive)

- Causes:
  - Tumor involving or blocking ear
  - Surgical removal or scarring
  - Radiation – fluid behind eardrum (30-60%)
  - Infection of external or middle ear
- Treatment:
  - Hearing aid (amplification)
  - Surgical (higher risk poor outcomes for cancer patients)
    - Implantable bone conductive hearing aid
    - Ear tubes, tympanoplasty, Eustachian tube dilation, ossiculoplasty, etc.

Nerve/Cochlear (Sensorineural)

- Causes:
  - Ototoxic chemotherapy medications (30-80%)
    - Cisplatin
  - Cochlear damage from radiation (10-90%)
  - Dependent on dose for both chemo and radiation
  - Combination of both increases risk greatly
  - Efforts are being made in both fields to minimize
- Treatment: Hearing aid (amplification)
  - Only surgical option is cochlear implant (for select patients)

Symptoms Associated with Hearing Loss

- Tinnitus (ringing, buzzing, or sounds in the ear)
  - This is a product of hearing loss!
  - Internal noise created by the brain to “replace” sounds that have been lost.
- Fullness/pressure sensation
- Pain or sensitivity to sound (hyperacusis)
- Echo of voice or amplification of internal sounds (autophony)

Original Article

November 15, 2010

Hearing Loss and Complaint in Patients With Head and Neck Cancer Treated With Radiotherapy

Christiane Schultz, MS; Maria Valéria Schmidt Goffi-Gomez, PhD; Patrícia Helena Pecora Liberman, MS; et al

Author Affiliations | Article Information

Arch Otolaryngol Head Neck Surg. 2010;136(11):1065-1069. doi:10.1001/archoto.2010.180

Individuals with untreated hearing losses were more sorrowful, with more feelings of loneliness, depression, worry, anxiety, and paranoia.[22,24] They had fewer social activities and were less able to integrate information regarding their environment. Hearing loss affects individuals' psychosocial situation and, if untreated, contributes to social isolation, depression, and low self-esteem. It also seems to be a cofactor related to senile dementia.[17] As could be seen

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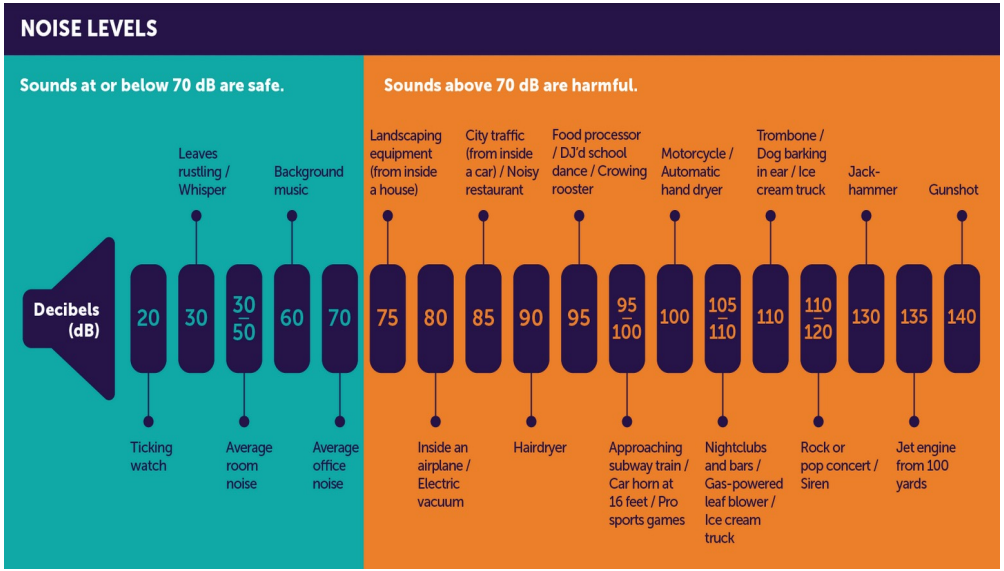
Check and Protect Your Hearing!

- Encourage you ENT and/or Oncologist to <u>arrange a hearing test (audiogram) before treatment</u> that could affect your hearing
  - certain chemotherapy, radiation in certain areas, some surgery
- <u>Check your hearing</u>:
  - During and after treatment
  - Every 1-5 years after
  - If you (or loved ones) notice any change
- <u>Wear FDA approved hearing protection</u> (ear plugs) during any activities with excessive noise
  - occupational, yard work, firearms, machinery



Treat Hearing Loss!

- Greatly affects patient quality of life and quality of life of loved ones
- Can be safety issue
  - Driving, safety alarms, hearing loved ones
- Associated with cognitive decline and cognitive/mental load

Take Charge of Your Otologic Health

App-based Resources

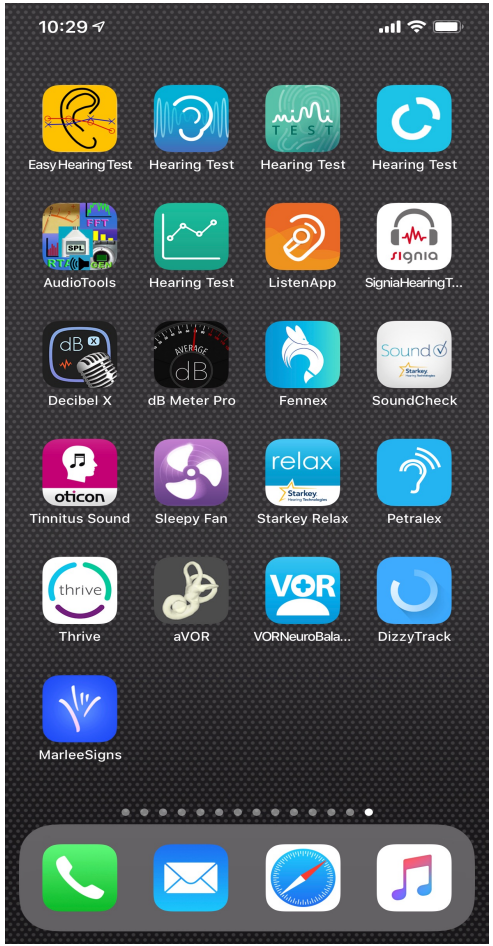
Hearing Tests*

- Mimi Hearing Test
- Easy Hearing Test
- Hearing Test & Ear Age Test
- HearIQ
- Sennheiser Hearing Test

*These apps are NOT equivalent to a test administered by a licensed audiologist

Decibel Meters

- Decibel X
- Decibel dB
- Fennex
- Sound Check



Hearing Amplification Aids

- Petralex
- Listening Device Hearing Aid

Live Transcription Apps

- AVA: Transcribe
- Otter: Transcribe
- Caption Call

Tinnitus Maskers

- Oto: Tinnitus & Sleep
- ReSound Tinnitus Relief
- Tinnitus Masker Relief Sounds
- Sleep Fan
- Starkey Relax

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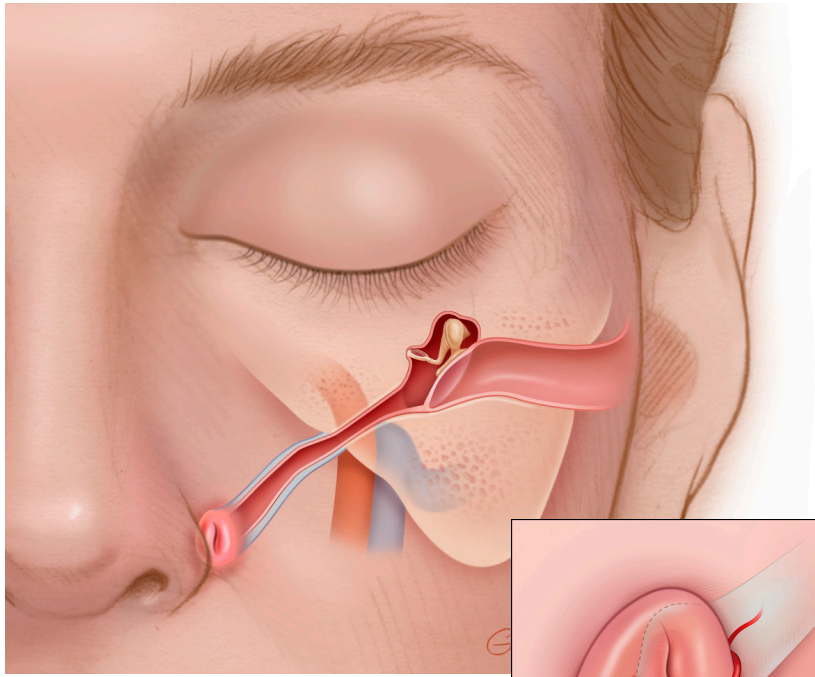
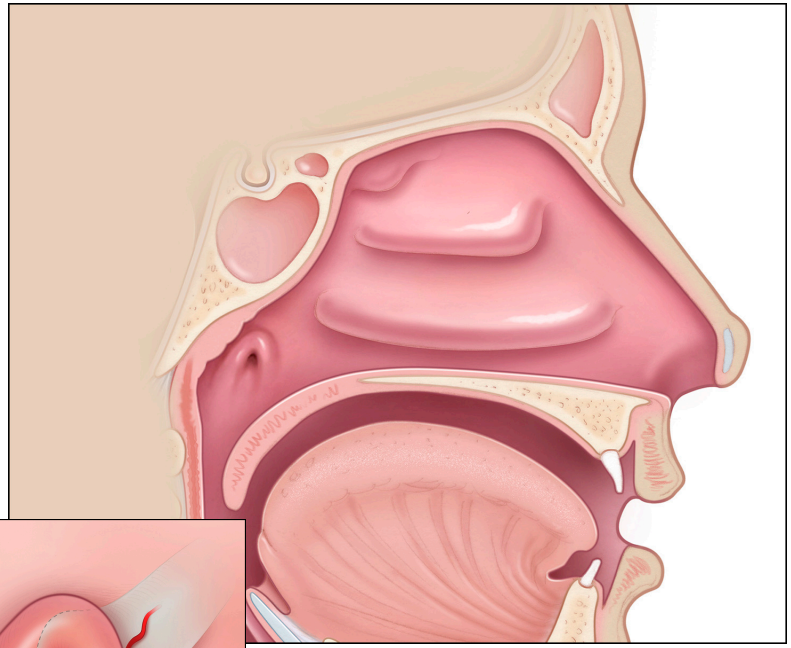
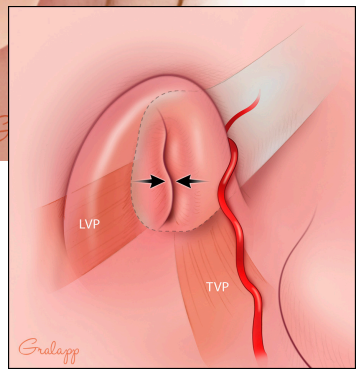
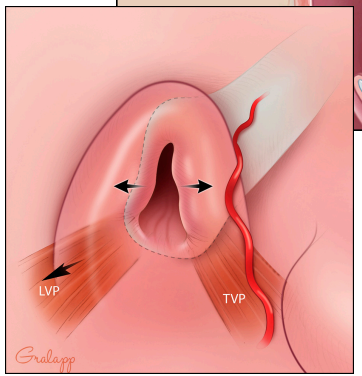
Eustachian Tube

Eustachian tube opens with every swallow or yawn to act as a pressure-equalizing valve for the middle ear.









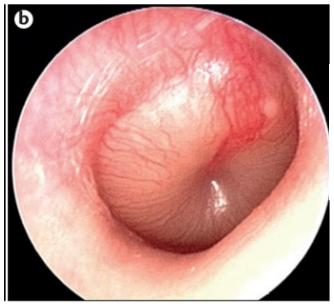
It also serves to drain the mucus produced by the lining of the middle ear.

SENSITIVE CONTENT WARNING

Eustachian Tube Dysfunction

- Blockage of the Eustachian tube isolates the middle ear space from the outside environment.
- The lining of the middle ear absorbs the trapped air and creates a negative pressure that pulls the eardrum inward.
- The eardrum is thin and pliable, like plastic wrap, and is densely innervated.
- When it becomes stretched inward, patients often experience pain, pressure, and hearing loss (mechanical/conductive).
- Continued blockage of the Eustachian tube leads to the accumulation of fluid in the middle ear space that further increases the pressure and hearing loss. This is called serous otitis media.
- Should bacteria contaminate this fluid, a middle ear infection may result, called acute otitis media. This can result in increased pain, perforation of the eardrum, further hearing loss, and drainage of fluid out the ear.

Serous Otitis Media
(fluid behind ear drum)



Acute Otitis Media
(infected fluid behind ear drum)

Perforated Ear Drum with Drainage (otorrhea)

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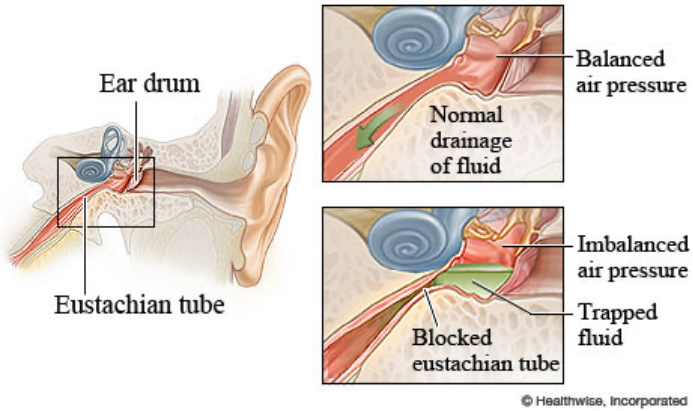
Eustachian Tube Dysfunction (ETD) In Head & Neck Cancer Patients

ETD and effusions are "well-known but poorly documented" in H&N cancer patients



Tell your physicians about your ear issues! Help yourself, help us collect data to help others!

Causes:

1. Physical blockage of the ET by tumors of the back of the nose or sometimes mouth (nasopharyngeal)
   - 45%-65%, often presenting symptom
   - This can sometimes improve with treatment (usually chemotherapy and radiation)
2. Radiation-Induced ETD (20-88%) for any H&N cancer
   - Inflammation can cause swelling of the lining of the middle ear and Eustachian tube that can prevent drainage
     - EARLY- during treatment and up to 1 year
   - Causes changes in the small blood vessels of the middle ear that affect gas exchange → pressure changes and trapped fluid
   - Scarring and fibrosis can inhibit proper movement and cause blockage of ET
     - LATE – 6 months to 5+ years

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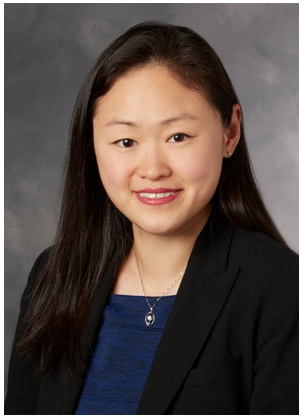
Eustachian Tube Dysfunction, Middle Ear Effusion, Middle Ear Infections: Treatments

- Middle Ear Infections:
  - Oral antibiotics (no perforation)
  - Antibiotic drops (perforation)

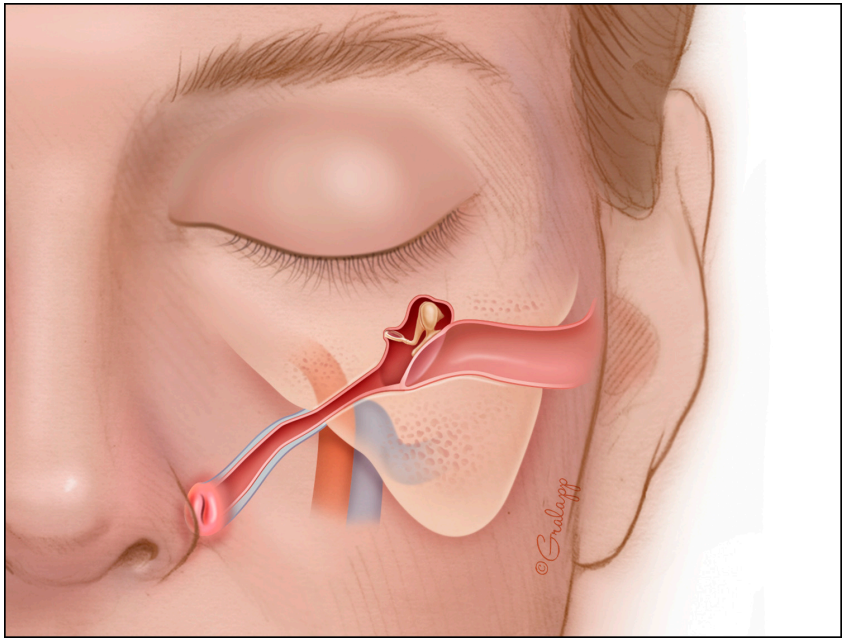
- Middle Ear Effusions:
  - Ideally, improve Eustachian Tube Dysfunction (ETD)
  - **Ear tubes** can help symptoms, but in patients with radiation-induced ETD, this very often (~58%) results in chronic ear drainage, recurrent infections, and/or holes in the eardrum that do not heal (may require surgery)
    - Ear tubes are therefore **NOT recommended** by most otologists for effusions caused by radiation
  - **Myringotomy** (small cut in eardrum) and aspiration of fluid can temporize symptoms
    - Holes made without tubes placed usually heal, but still risk persistent perforation
  - Many have improvement by 6 months, but more data is needed

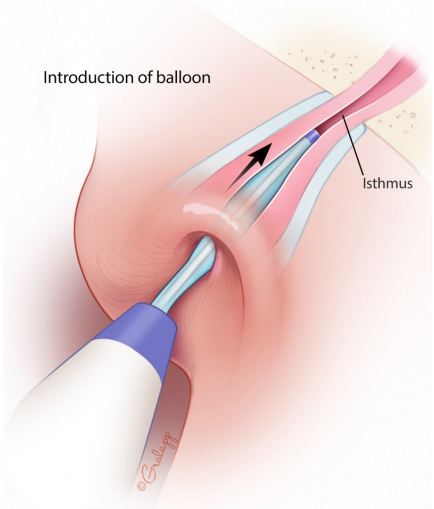
- Eustachian Tube Dysfunction
  - Many improve after 6 months when inflammation decreases (30-60%)
  - **Ventilation exercises** of the ET during and after irradiation therapy may help (this has not been well studied!)
    - Frequent Valsalva maneuver
    - Daily use of autoinflation devices like the Otovent® balloon (not strong data)
  - **Eustachian Tube Balloon Dilation**
    - Possible option for refractory cases
    - Patient specific- can depend on where and how severe scarring if this is an option that could be helpful

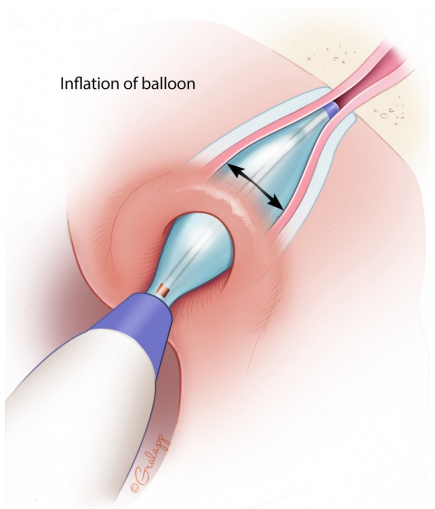
Eustachian Tube Balloon Dilation



Dr. Jennifer Lee
Stanford OHNS







*Increased risk of creating a “permanently open” Eustachian tube in patients with lots of scar (radiation induced)

SENSITIVE CONTENT WARNING

Chronic Ear Infections: External Ear and Ear Canal

- Most commonly when radiation fields include ear canal
- Radiation damages natural glands that produce wax and cause changes (thinning, dryness) to ear canal skin that disrupt the ear canal's natural self-cleaning mechanism
- Patients may simply have stubborn wax (mild → severe)
- Blocked wax or skin changes can lead to infections of the ear canal and/or outer ear

❖ Symptoms: drainage, itchiness, redness, swelling, pain, decrease hearing, fullness

❖ Treatment (active infections):

-Ear cleaning

-Antibiotic or antifungal ear drops (3-8 weeks)

❖ Prevention: May need routine ear cleaning every 6 months – 1 year

SENSITIVE CONTENT WARNING

Osteoradionecrosis

- Osteoradionecrosis is bone death due to radiation.
- The bone dies because radiation damages its blood vessels.
- Most common in patients with temporal bone in radiation field (tumors of the ear, parotid gland, and nasopharynx)
- Devascularized (dead) bone is susceptible to infection (osteomyelitis).
- This is a very rare but can be very severe issue.
- Often requires weeks to months of IV antibiotics and possibly very extensive surgery.
- This usually starts with more minor symptoms like aching pain or ear drainage.
- Can progress to cause problems with nerve controlling facial movement or sensation.

Do not ignore symptoms!
Tell your physician!
Advocate for a specialist's opinion if not improving with treatments!

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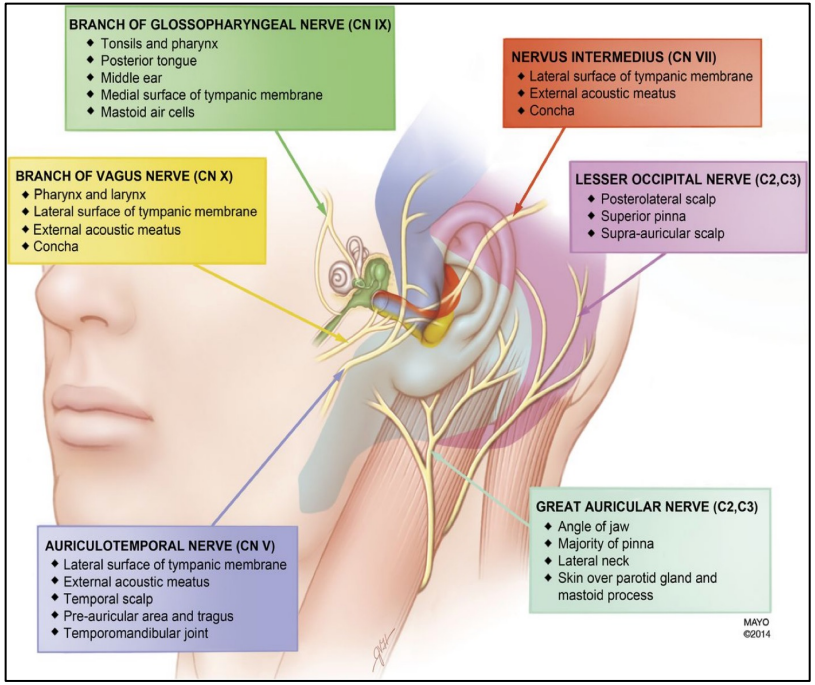
Otalgia – Ear Pain

Incidence and Causes:

- Very common during and for a time after radiation
  - As high as 86% in some studies
- ETD, effusions, infection of middle or external ear
- Nerves
  - Tumor involvement
  - Referred pain (TMJ is among the most common)
  - Surgical damage to nerves
- Radiation- inflammation (early) and scarring (late)
  - Outer ear, ear canal, middle ear



Treatment:

- Most pain resolves or improves after 6 months, when inflammation improves
- Pain associated with Eustachian Tube Dysfunction, effusions of the middle ear, TMJ, and infections can be managed by addressing these issues
- Long-term pain from scarring and nerve damage can sometimes be improved with physical therapy and massage therapy.
- Pain specialists can medically manage refractory pain

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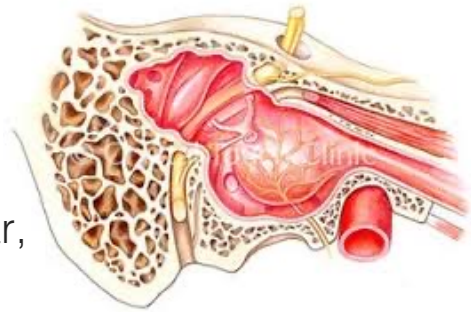
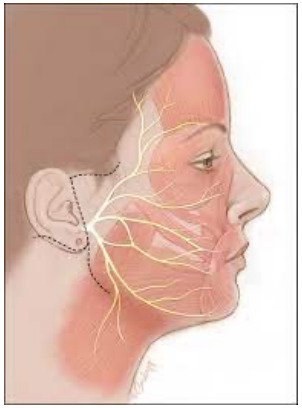
Facial Nerve Dysfunction

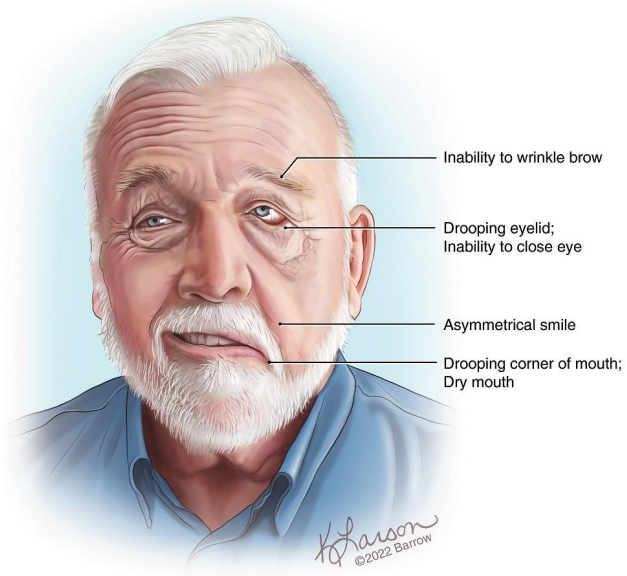




- The facial nerve runs from the brain, through the ear, and then through the parotid gland (jaw/cheek) to innervate the muscles that control facial function
- This nerve can be damaged due to cancer involvement or treatment for cancers in this area (surgery, sometimes radiation)

❖ Symptoms:

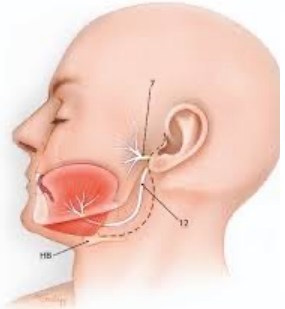
- Facial weakness or paralysis, usually on one side
  - Can involve part of one side of the face or the whole side of the face
- Damage to cornea of eye if the eyelid cannot close
- Difficulty breathing from the nostril (collapse)
- Excessive tearing
- Difficulty drinking due to inability to properly close lips

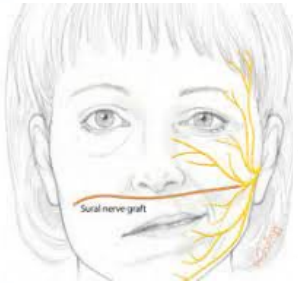


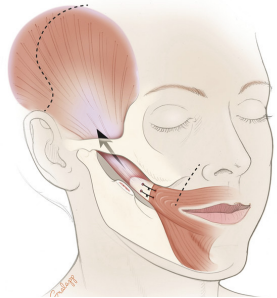
Facial Nerve Dysfunction: Treatments

- There are a variety of interventions that can improve quality of life
  - Improve aesthetics and/or function
  - Range from non-invasive interventions (lifestyle modifications), to small procedures (Botox injections), to many different surgeries
- Seek consultation of a facial nerve specialist!
- Seek consultation for the psychological component
  - Counseling and support groups
  - Medical therapy

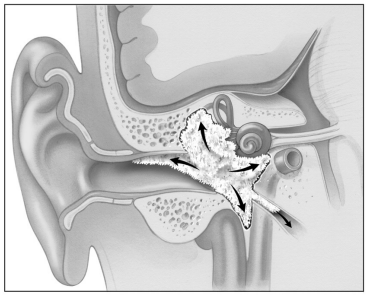
Dr. John-Paul Pepper
Facial Plastics
Stanford OHNS

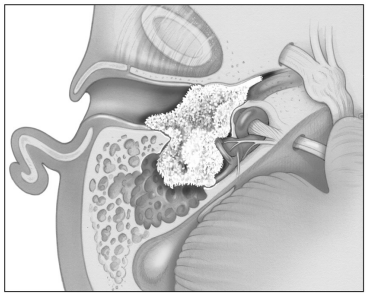


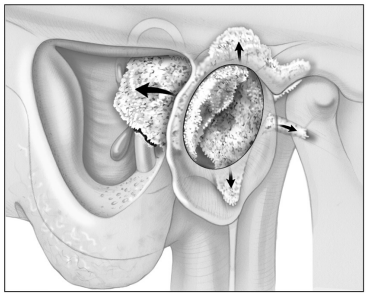


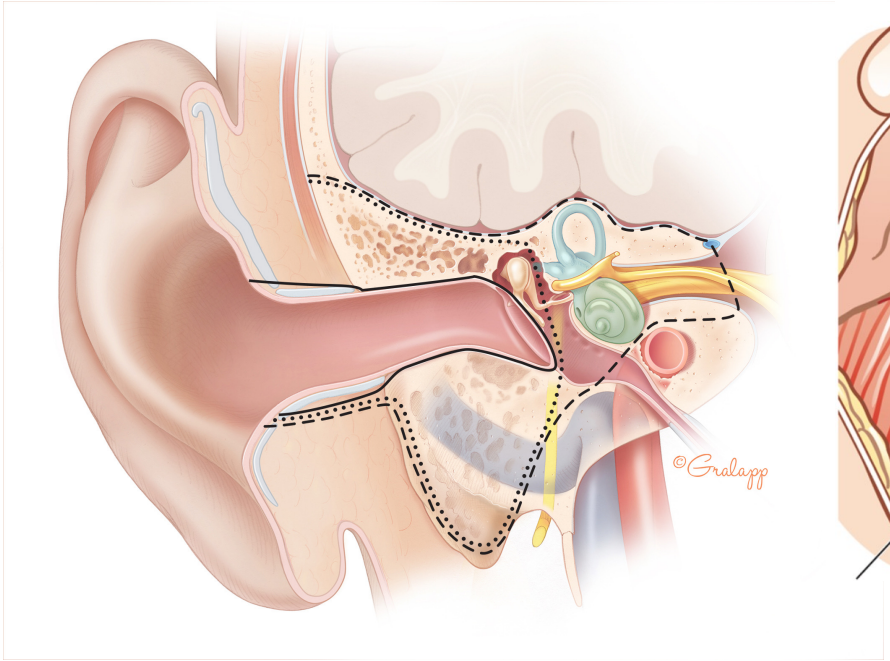


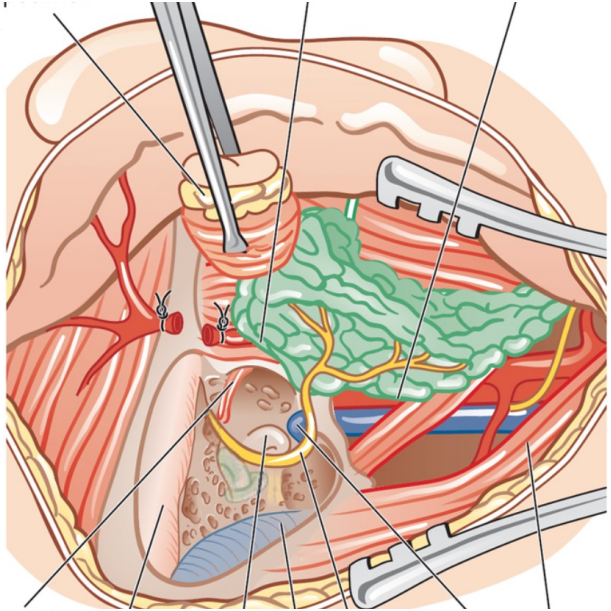
Cancer of the Ear or Temporal Bone











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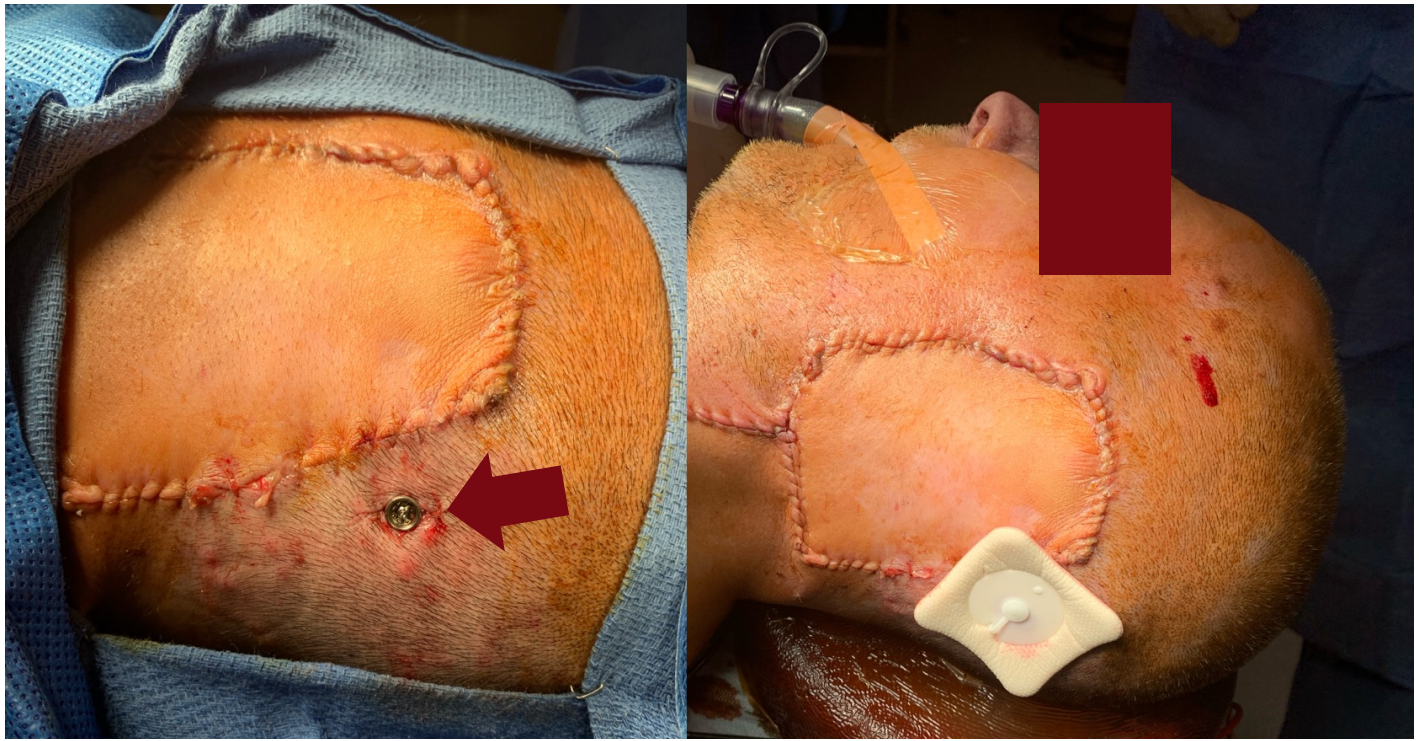
SENSITIVE CONTENT WARNING

Implantable Bone Conduction Hearing Aids and Auricular Prosthetics



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Implantable Bone Conduction Hearing Aids and Auricular Prosthetics

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Implantable Bone Conduction Hearing Aids and Auricular Prosthetics

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Thank You for Your Time and Attention!

Questions???


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