

## Headmirror's ENT in a Nutshell

### Temporal Bone Trauma

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#### Presentation (0:30)

- Symptomatology
  - High force injuries (high speed MVC, falls from significant height)
  - Trauma to side of head or occiput
- History
  - Facial nerve function (grimacing symmetrically) from the field or primary survey
  - CSF otorrhea
  - Acute changes in hearing, vertigo, loud tinnitus
- Clinical Examination
  - Thorough trauma examination with assessment of facial skeleton
  - Battle sign: bruising from extravasated blood behind ear
  - Raccoon sign: periorbital ecchymosis associated with skull base fractures
  - Ear canal: assess for laceration
  - Tuning forks (see below)

#### Workup (4:15)

- Imaging:
  - Most trauma protocols obtain sub-millimeter thickness CT of the head
  - Consider dedicated temporal bone CT scan (0.4 / 0.6 mm) :
    - Mastoid or middle ear opacification
    - Fracture line
    - Pneumolabyrinth or pneumocephalus near temporal bone
    - Concerning physical exam findings
  - **Longitudinal** fracture parallels petrous ridge (can involve ear canal and foramen lacerum)
    - Lower chance of facial nerve or otic capsule involvement but very common so due to high frequency we still see these critical structures involved
  - **Transverse** fracture crosses foramen magnum and perpendicular to petrous ridge
    - Less common but higher chance of otic capsule or facial nerve involvement
  - Better defined as **otic capsule sparing or involving** and **does it involve the facial nerve**
- Audiologic evaluation
  - **Tuning forks**
    - Weber test
      - Lateralizes to contralateral ear – concern for sensorineural hearing loss
      - Lateralize to ipsilateral ear – conductive hearing loss

- Rinne test
  - **Audiogram**
    - Obtain if fracture concerning for otic capsule involved as soon as patient is able to participate in testing
    - Non otic capsule involving fractures can be followed up in 6 weeks with audiogram
- Facial Nerve Testing
  - Most common location of facial nerve involvement is **perigeniculate facial nerve** (geniculate ganglion, proximal tympanic segment, labyrinthine segment)
  - Unsedated neurologic exam is best chance to determine if there is facial nerve injury clinically
  - If evidence of facial nerve involvement, 72 hours after insult (after Wallerian degeneration) get electrodiagnostic testing
    - **ENoG or evoked EMG** (supramaximal stimulus as stylomastoid foramen)
      - Uses contralateral side as control, % difference in the compound action potential by the evoked EMG response
      - If **>90% degenerated**, consider role of surgical decompression

### Complications (12:10)

- Hearing loss
  - Conductive hearing loss most common (hemotympanum)
    - Tympanic membrane perforation
    - Ossicular chain disruption (dislocation of malleus and incus joint)
  - Sensorineural hearing loss
    - Otic capsule involvement
    - Labyrinthine concussion (vertigo + sensorineural hearing loss)
- Facial nerve injury
  - More common in transverse but due to frequency we do see this with longitudinal
- CSF leak
  - 10-30%
  - 2/3 will resolve on their own
  - Assess for how high flow leak is, repair if indicated

### Treatment (15:20)

- Conductive hearing loss
  - Hemotympanum will resolve on their own
  - Tympanic membrane perforation will typically heal on its own spontaneously
  - If conductive hearing loss is persistent at 3 month mark, middle ear exploration may be indicated
- Sensorineural hearing loss (otic capsule involved)
  - High dosed steroids
  - Air in labyrinth and profound hearing loss are less likely to recover

- Cochlear implantation considered, however, time sensitive to avoid labyrinthitis ossificans
- Facial nerve injury
  - Complete paralysis (HB VI/VI) supported by ENoG
    - Intervention is surgical decompression within two weeks of injury
    - Expect to return to ~ HBIII (eye-closure, some smile)
  - Incomplete paralysis
    - Likelihood of spontaneous improvement is high
    - No role for decompression
    - Can treat with steroids
  - Surgical approach: hearing preserved
    - Middle fossa +/- transmastoid approach
      - Decompress labyrinthine segment, geniculate ganglion and tympanic segment
  - Surgical approach: hearing not preserved
    - Translabyrinthine approach with decompression of above
- CSF leak
  - Traumatic CSF leak warrants antibiotics to prevent meningitis
  - Reassess at 1 week (still leaking, high-flow, low-flow leak) to determine if intervention is indicated