

Joint Trauma System



Aural Blast Injury/Acoustic Trauma and Hearing Loss

Part of the Joint Trauma System (JTS) Clinical Practice Guideline (CPG) Training Series



Purpose



This CPG helps identify and treat aural trauma and hearing loss to prevent morbidity and preserve as much function as possible through early intervention.

This presentation is based on the [JTS Aural Blast Injury/Acoustic Trauma and Hearing Loss CPG, 27 Jul 2018 \(ID:05\)](#). It is a high-level review. Please refer to the complete CPG for detailed instructions. Information contained in this presentation is only a guideline and not a substitute for clinical judgment.

Agenda



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Background



- Approximately 2% of total force develops permanent injury annually.
- Service members exposed to hazardous noise, greater than 140dB, are at high risk for acoustic trauma and hearing loss.
- Service members exposed to blasts are at risk for both aural and acoustic trauma.

Summary



- Blasts are noise hazards in addition to other blast effects.
- The tympanic membrane (TM) is the most sensitive organ to primary blast effects, but all components can be affected resulting in conductive hearing loss.
 - Risk of injury is determined by proximity to source of blast.
 - Ear can also be subject to secondary, tertiary, and quaternary blast effects.

Aural Blast Injury Facts

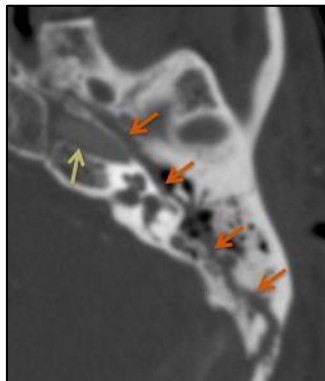


- The ossicular chain can also be injured by blast effect
 - Fracture or disarticulation
 - Healing of tympanic membrane can stiffen the ossicular chain
 - Injury causes conductive hearing loss (CHL) with or without SNHL
- Vertigo after a blast may be due to traumatic brain injury or inner ear injury

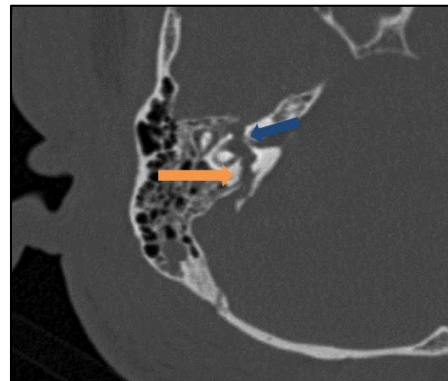
Temporal Bone Fractures

Temporal bone fractures can affect ear canal and hearing.

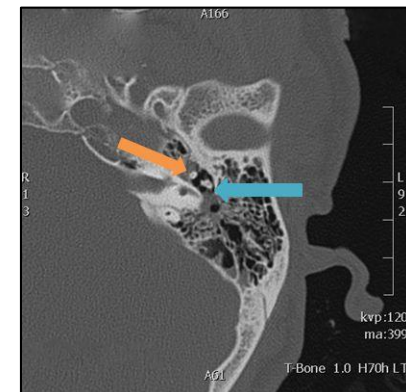
- Risk of meningitis with CSF leak
- Facial nerve injury possible with temporal bone fractures
 - Full evaluation of facial nerve function
 - Referral for expert consultation (otolaryngologist/ENT) for possible intervention if evidence of injury



Temporal Bone Fracture



Temporal Bone Fracture - Cochlea



Temporal Bone Fracture –
Separation of Malleus & Incus

Symptoms

■ Symptoms of noise injury

- Hearing Loss
- Acute Tinnitus
- Aural Fullness
- Recruitment (ear pain with loud noise)
- Troubles localizing sounds
- Difficulty hearing in a noisy background
- Vertigo

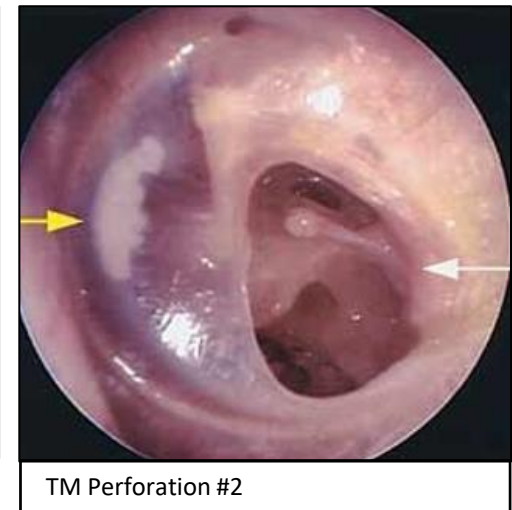


Hemotympanum

- ## ■ Patients with symptoms should be directed to self-report for evaluation and treatment as soon as practicable

Evaluation

- Patients exposed to blast should have focused assessment of hearing function and evaluation of the ear
 - Signs of TM perforation include:
 - Symptoms of sensorineural hearing loss (SNHL)
 - Bloody ear discharge
 - Signs of conductive hearing loss (CHL)



Treatment



- If debris in the external auditory canal or middle ear treat with a fluoroquinolone and steroid containing antibiotic (i.e. ciprofloxacin/dexamethasone drops)
 - ❑ Do not irrigate canal
 - ❑ Patient to maintain strict dry ear precautions until TM perforation healed/repared
 - ❑ Most heal within 8 weeks
- If concern for temporal bone fracture, broad spectrum antibiotic prophylaxis and expert consultation recommended

Treatment



- Vertigo may be due to vestibular trauma
 - Patients should undergo Dix-Hallpike test and canalith repositioning if positive
- Hearing loss greater than 72 hrs warrants hearing test/audiogram
 - Restrict from further noise exposure until complete evaluation
 - Patient with threshold shift greater than 25 dB in three consecutive frequencies should be considered for steroid therapy
 - Patients should be evaluated by ENT

Absolute Indications for ENT Referral



- Temporal bone fracture
- Hearing loss (HL) > 72 hrs or duty limiting HL
- TM perforation not resolved after 8 weeks; refractory drainage or significant SNHL
- Vertigo not resolved within 7 days
- Clear ear drainage
- Persistent discolored ear drainage after 3 days of topical antibiotic/steroid combination
- Facial nerve paralysis
- On audiogram:
 - Pure tone threshold average across 500,1000, and 2000 Hz > 30 dB or any hearing threshold > 35 dB
 - Any hearing threshold greater than 45 dB at 3000 Hz or 55 dB at 4000 Hz

Relative Indications for ENT Referral



- Debris in the external auditory canal that does not clear with topical drops
- Inability to visualize the TM despite treatment with topical drops
- Persistent dizziness
- Patient with significant communication problems regardless of the hearing test results
- Tinnitus that interferes with patient duty performance

PI Monitoring



■ Intent (Expected Outcomes)

- All patients with signs or symptoms of acoustic trauma receive hearing screening at concussion care centers.
- All patients at risk for TM injury are assessed when initially evaluated at each MTF in the continuum.

■ Performance/Adherence Measures

- The patient is assessed by otoscopy and audiometry for symptoms of acoustic trauma.
- The patient was assessed for TM injury during the initial evaluation at each MTF.

■ Data Source

- Patient Record
- Department of Defense Trauma Registry (DoDTR)

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Appendices



- **Appendix A:** Dix-Hallpike Test
- **Appendix B:** Epley Maneuver
- **Appendix C:** Additional Information Regarding Off-Label Uses in CPGs

Contributors



- Carlos, Esquivel, MD
- Col Mark Parker, USAF, MC
- MAJ Kwame Curtis, USAF, MC
- LTC Andy Merkley, USAF, MC
- Phil Littlefield, MD
- CDR George Conley, MC, USN
- CDR Sean Wise, MC, USN
- MAJ Brent Feldt, USAF, MC
- Lynn Henselman, PhD
- CAPT Zsolt Stockinger, MC, USN

Slides: Maj Andrew Hall, MC, USAF
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