GUIDELINE
Sudden Hearing Loss

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Learner Objectives

• After this presentation you should:
  – 1) understand which tests and interventions to order for sudden hearing loss
  – 2) understand which tests and interventions to not order for sudden hearing loss
  – 3) understand the evidence regarding oral and intratympanic steroid therapies

Guideline

Clinical Practice Guideline: Sudden Hearing Loss
Stachler, Chandrasekhar, Archer et al.
Otolaryngology - Head and Neck Surgery
146:S1, 2012
Guideline Action Statements

1. Exclude conductive hearing loss
2. Assess for modifying factors
3. CT scan
4. Audiometric confirmation
5. Laboratory testing
6. Retrocochlear pathology
7. Patient education
8. Initial corticosteroids
9. Hyperbaric oxygen
10. Other pharm therapy
11. Salvage therapy
12. Outcomes assessment
13. Rehabilitation

Yellow=recommended for; Blue=recommended against; White=option/neutral

Abbreviations

• SHL: Sudden hearing loss
• SNHL: Sensorineural hearing loss
• SSNHL: Sudden sensorineural hearing loss
• ISSNHL: Idiopathic sudden sensorineural hearing loss
• CNDHL: Conductive hearing loss

Definitions

• Sudden Hearing Loss (SHL)
  – Subjective sensation of hearing impairment in one or both ears occurring in less than a 72-hour period
• Sudden Sensorineural Hearing Loss (SSNHL)
  – Subset of SHL
  – Sensorineural in nature
  – Decrease in hearing of ≥30 dB affecting at least 3 consecutive frequencies
STATEMENT 1. EXCLUSION OF CONDUCTIVE HEARING LOSS

Exclusion of Conductive Hearing Loss

- Conductive hearing loss, namely cerumen impaction, is a common cause of SHL.
- Treatment options are very different between CNDHL and SSNL.
- Treatment for CNDHL is very effective.
- Assumption that hearing loss is CNDHL delays intervention for SSNHL.
Strong Recommendation Against

STATEMENT 3. COMPUTED TOMOGRAPHY

Computed Tomography

• Should not order in initial evaluation
  – Intentionally vague
• Low yield
• Radiation exposure
• Consider if history suggests bone disorder or metastatic disease to bone

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STATEMENT 5. LABORATORY TESTING

Strong Recommendation Against

Laboratory Testing

- Should not order routine labs
- Can consider specific directed labs if indicated
- Little evidence routine labs will change diagnosis, prognosis, or treatment
  - Autoimmune, TSH, folate, clotting factors all failed to show significant associations

STATEMENT 6. RETROCOCHLEAR PATHOLOGY

Recommendation
Retrocochlear Pathology
• Should consider retro-cochlear pathology as potential etiology
• Can assess with MRI initially
• Can use abnormal ABR or change in serial audiogram as indication for MRI
• Hearing recovery does not predict presence of a tumor

MRI Scan
• Highest yield of any modality: 7% - 13.75%
• Unrelated incidental findings very high
• Acoustic neuroma most common finding
• Other potential causative findings present

Option
STATEMENT 8. INITIAL CORTICOSTEROIDS
Initial Corticosteroids

- Can be oral or intratympanic
- Form of steroid not defined
  - Prednisone, methylprednisolone, solumedrol and dexamethasone
- Dosage at 1mg/kg/d (prednisone equivalent)
  - Maximal to 60mg/d
  - Single dose daily
  - 10-14 days prior to taper

- Intratympanic dosage undefined
  - Inject 0.4-0.8cc in middle ear every 3-7 days for a total of 3-4 sessions

- No RCTs have shown efficacy of either modality over placebo
- One RCT on oral vs IT: no difference
### Steroid, Dosage, Duration

**Meta-analysis, CT vs Systemic**

- **Steroid**
  - Methylprednisolone*, prednisolone, dexamethasone*
- **Starting dosage (systemic, mg)**
  - MP: 48, 100 IV, 1/kg
  - PNSL: 60, 75, 1/kg
  - Dex: 30, 10, 20 IV, 10 IV
- **Duration (init days/taper days)**
  - 9/5, 7/6, 1/8, 5/6, 3/14, 3/6, 10/0, 7/7, 9/3, 4/10

*used systemic and IT

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### Initial Therapy

**IT versus Systemic versus CT**

- Han et al., 2017 (meta-analysis)
  - 13 dB, 16% WRS for CT > systemic
- Liebau et al., 2016 (meta and modeling)
  - "no clear dose-effect relationship"
- Ovet et al., 2016 (retrospective case series)
  - Systemic=CT in pediatric patients
- Qiang et al., 2016 (meta-analysis)
  - 3.43 dB, IT>systemic
- IT=Systemic
  - Garavello et al., 2012 (meta-analysis)
  - Bae et al., 2013 (735 patients)

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### Initial Corticosteroids

- **My Protocol**
  - Oral steroids only
    - 60mg/d prednisone for 21 days followed by taper:
      - 40 x 3d, 20 x 3d, 10 x 3d, 5 x 3d, stop
  - **Clinical considerations**
    - MP or Dex off the shelf
    - Hospital Fee ($1,884)
STATEMENT 11. SALVAGE THERAPY

Recommendation

Salvage Therapy

- Intratympanic steroid
- Variability in Studies
  - <5 days after systemic to 3 months
  - Dexamethasone, methylprednisolone
  - 1mg/ml dex to 62.5mg/ml MP
  - Single injection to 14 days continuous infusion
  - Success: >10dB->20dB, WRS 12%-20%

Garavello et al., 2012
Salvage IT

- Looked at sudden total SNHL; retrospective
- Oral vs IT for initial treatment
  - No difference, both with some improvement
  - Often late effects
- Adding IT for failures
  - No difference than OP alone

Nakache et al., 2015

Salvage IT Steroids

- 5/148 studies qualified for meta-analysis (RCT)
- Dex better than MP
- IT better than Catheter
- Avg Threshold Improvement (3 of 5 studies)
  - 11.4dB, 9.8dB, 13.9dB

Ng et al., 2014

Salvage IT Steroids

“...we are unable to calculate the weighted raw mean difference in dB improvement in patients who underwent salvage [IT]...patients who underwent salvage intratympanic steroids were found to have improved a mean of 10.0dB more than patients who did not. The significance of this amount of improvement is debatable.”

Ng et al., 2014
Salvage Therapy
New Developments

- Nakagawa et al., 2016
  - IGF-1 gelatinized IT > IT DEX
- Liebau et al., 2017
  - Dose delivery modeling:
    - No effect of dose
    - No effect of timing
  - Need reporting of outcomes by individual patients
  - Need reporting of initial hearing level and final level; change is not an adequate outcome parameter

STATEMENT 10. OTHER PHARMACOLOGIC THERAPY
Recommendation Against
Other Pharmacologic Therapy

- Antivirals
  - 4 RCTs comparing antiviral with steroid vs placebo with steroid
  - No significant difference in any study
  - Antivirals have many side effects
    - Nausea, emesis, photosensitivity
    - Seizures, neurological changes, dizziness

Other Pharmacologic Therapy

- Vasoactive Drugs
  - Cochrane review 2009
    - Could not recommend vasoactive medications
    - Prostaglandin E1, naftidrofuryl, ginko biloba, pentoxyfilline, dextran

- Defibrinogenation Therapy
  - Poorly controlled studies, no effect

Summary of Guideline
Strong Recommendation

• Exclusion of conductive hearing loss
• Patient education
• Rehabilitation

Recommendation

• Modifying factors
• Audiometric confirmation of ISSNHL
• Retrocochlear pathology
• Salvage therapy
• Outcomes assessment

Option

• Initial corticosteroids
• Hyperbaric oxygen therapy
Recommendation Against

• Other pharmacologic therapy

Strong Recommendation Against

• Computed tomography
• Laboratory testing

Summary

• Do:
  – Exclude conductive hearing loss
  – Rule out retrocochlear pathology
  – Consider the use of steroids for treatment
  – Consider the use of hyperbaric oxygen
  – Consider IT steroids for salvage
  – Obtain follow-up audiometry
Summary

• Do not:
  – Order a CT scan
  – Order routine lab tests
  – Use antivirals or other medications

Non-Discussed Guideline Statements

Recommendation

STATEMENT 2. MODIFYING FACTORS
Modifying Factors

- Patient should be assessed for bilateral hearing loss, recurrent hearing loss, or focal neurological signs
- Modifying factors often are associated with specific disease processes other than ISSNHL and require differing intervention

Modifying Factors

- Associated vertigo
  - Can be associated with Meniere’s disease, stroke, autoimmune disorder, vasculopathy, ototoxicity
- Tinnitus
  - Commonly associated with hearing loss and not suspicious for other neurologic condition
- Key modifying factors
  - Bilateral loss, prior episodes, other neurologic signs

Recommendation

STATEMENT 4. Audiometric confirmation of ISSNHL
Audiometric Confirmation of ISSNHL

• ≥30 dB affecting at least 3 contiguous frequencies
• Assess certainty
  • Very certain: prior audio
  • Certain: no prior otologic history and hearing felt to be normal prior to event
  • Fairly certain: longstanding hearing loss but current event subjectively worse
  • Uncertain: clinician suspects pre-existing hearing loss

Audiometry Recommendations

• Follow ANSI standards
• Ear specific masked air and bone thresholds
• Ear specific speech reception thresholds (SRT)
• Ear specific word recognition score (WRS %)
• Immittance Measurements
  – Tympanometry
  – Acoustic reflexes

Strong Recommendation

STATEMENT 7. PATIENT EDUCATION
Patient Education

- Discuss diagnosis including the possible causes
- Discuss available treatment options
- Discuss risks and benefits regarding treatment
- Shared decision making:
  - Assist patients to evaluate the risk/benefit of treatment options
  - Focus on QOL and functional health status
  - Describe objective treatment outcomes.

Option

STATEMENT 9. HYPERBARIC OXYGEN THERAPY

Hyperbaric Oxygen Therapy

- Evidence for hearing improvement is "modest and imprecise"
- Expensive and of limited availability
- Need to treat 5 to improve 1 by 25%  
  - Cochrane review
- 79% HBO+oral steroid vs. 71.3% oral steroid  
  - non-significant; Cekin et al., 2009
Outcomes Assessment

- Should perform audiograms to assess efficacy of interventions, even if observation
- Traditional Criteria:
  - Complete recovery
    - Within 10 dB (PTA or SRT) of premorbid hearing
  - Partial
    - Within 50% of premorbid hearing (PTA or SRT in dB)
  - No recovery
    - Less than 50% of premorbid hearing (PTA or SRT in dB)

Outcomes Assessment

- Complete Recovery
  - Within 10dB PTA and 5-10% WRS of unaffected ear
- No recovery
  - Less than 10dB HL improvement
- Partial (depends on degree of sudden HL)
  - If non-serviceable: return to any serviceable level
  - If serviceable: 10dB HL or 10% WRS improvement
STATEMENT 13.
REHABILITATION

Rehabilitation

- Patients should be counselled regarding potential benefits of hearing aid amplification and assistive listening devices
- Should counsel patient to the myriad of questions regarding SSNHL
  - Why? What can I do? What about the other ear?
  - Is there a surgery?