Sudden Sensorineural Hearing Loss

Evidence-based Key Points

Sasan Dabiri, M.D. Assistant Professor
Department of Otorhinolaryngology – Head & Neck Surgery
Amir A’lam hospital
Tehran University of Medical Sciences
January 2014
Definition

The US National Institute for Deafness and Communication Disorders (NICDC) criteria:

- Hearing loss $\geq 30$ dB
- In $\geq 3$ consecutive frequencies
- Occurring $\leq 3$ days

However, some studies use differing criteria
Epidemiology

• Incidence: 5 – 20 in 100,000 in year
• Men = Women
• Mean age: 40 – 60 years
• Mostly occur on awakening
• Bilateral involvement: Less than 5% (rare)

Simultaneous bilateral: very rare
### Sudden Sensorineural Hearing Loss: Evidence-based Key Points

#### Etiology

<table>
<thead>
<tr>
<th>Infections</th>
<th>Autoimmune disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viral cochleitis associated with herpesviruses, parainfluenza virus,</td>
<td>Autoimmune inner ear disease; Cogan's syndrome; Susac syndrome;</td>
</tr>
<tr>
<td>influenza, mumps, measles, rubella or HIV; bacterial meningitis;</td>
<td>systemic lupus erythematosus; antiphospholipid antibody syndrome;</td>
</tr>
<tr>
<td>Mycoplasma pneumoniae infection; Lyme disease; tuberculosis, syphilis,</td>
<td>rheumatoid arthritis; Sjögren's syndrome; relapsing polychondritis;</td>
</tr>
<tr>
<td>or fungal infection</td>
<td>vasculitides (polyarteritis nodosa, Behçet’s disease, Kawasaki disease,</td>
</tr>
<tr>
<td></td>
<td>Wegener’s granulomatosis, temporal arteritis, or primary central nervous system</td>
</tr>
<tr>
<td></td>
<td>vasculitis)</td>
</tr>
<tr>
<td>Ototoxic drugs</td>
<td>Vascular disorder</td>
</tr>
<tr>
<td>Aminoglycosides, vancomycin, erythromycin, loop diuretics, antimalarials,</td>
<td>Vertebrobasilar cerebrovascular accident or transient ischemic attack; cerebellar</td>
</tr>
<tr>
<td>cisplatin, sildenafil, cocaine</td>
<td>infarction; inner ear hemorrhage</td>
</tr>
<tr>
<td>Neoplasms</td>
<td>Varied causes</td>
</tr>
<tr>
<td>Acoustic neurinoma; meningeal carcinomatosis; lymphoma, leukemia, or</td>
<td>Meniere’s disease, otosclerosis; Paget’s disease; multiple sclerosis; sarcoidosis;</td>
</tr>
<tr>
<td>plasma cell dyscrasia</td>
<td>hypothroidism; idiopathic SNHL</td>
</tr>
<tr>
<td>Trauma</td>
<td></td>
</tr>
<tr>
<td>Head injury, barotraumas; noise exposure</td>
<td></td>
</tr>
</tbody>
</table>

However, up to 90% of cases are idiopathic
Sudden Sensorineural Hearing Loss: Evidence-based Key Points

Prognosis

• Spontaneous improvement is common (in days)

1/3 to 2/3 experience complete or partial recovery

Recovery scales:
- Complete, <10 dB deficit
- Partial, ≥ 50 % of deficit
- None, <50 % of deficit
Prognosis

- Spontaneous improvement is common (in days)
- Variables that affect the *Prognosis* of untreated:
  - Age: *(children* or older than 40 years)*
  - Audiogram shape: *(downslope* or *flat)*
  - Severity of Loss: *(severe)*
  - WRS in speech audiometry: *(poor)*
  - Vestibular status: *(presence of vertigo)*
Evaluation

• Exclusion of Specific Causes routinely on the basis of:
  - History
  - Clinical Examination (including neurologic)

• Audiologic Confirmation of SSNHL
Evaluation

• Laboratory Testing as routine work-up

Strong Recommended Against
Sudden Sensorineural Hearing Loss: Evidence-based Key Points

Evaluation

• Computed Tomography (CT) for initial evaluation

Adverse Effects:
- Radiation Exposure
- Intravenous Contrast

Strong Recommended Against

ACR appropriateness criteria:
Relative Radiation Level for
- Head CT is 3
- For CXR = 1
- For MRI = 0
• Retrocochlear Evaluation
  • MRI (Gold Standard)
  • ABR
  • Audiometric follow-up

Recommended

CP angle tumor prevalence in SSNHL: 2.5 – 10 %
Management

SSNHL is an Otologic Emergency
Thus should be managed as soon as possible
(best results in early 3 days)

Sudden Sensorineural Hearing Loss: An Otologic Emergency
Indian J Otolaryngol Head Neck Surg
(January–March 2012) 64(1):1–4

Idiopathic Sudden Sensorineural Hearing Loss Is Not an Otologic Emergency
Otology & Neurotology
26:896–902 © 2005
Management

- Patient Education
  - about natural history
  - benefits and risks of medical Interventions
  - limitations of existing evidence regarding efficacy

Shared Decision Making

Strong Recommended

barrier is time rather than attitude or skill
Management

• Patient Education
• Steroid

<table>
<thead>
<tr>
<th>Steroid type</th>
<th>Equivalent dose (mg)</th>
<th>Relative anti-inflammatory</th>
<th>Duration of action (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endogenous cortisol</td>
<td>20</td>
<td>1</td>
<td>8 - 12</td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>20</td>
<td>1</td>
<td>8 - 12</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>5</td>
<td>4</td>
<td>12 - 36</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>4</td>
<td>5</td>
<td>12 - 36</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>0.75</td>
<td>30</td>
<td>36 - 72</td>
</tr>
</tbody>
</table>
Management

• Patient Education

• Steroid
  – Systemic

Suggested protocol:
10-day course of high-dose steroid (prednisolone: 1 mg/kg/day)

Does need to taper?
- any dose of steroid for < 3 weeks
- alternate-day steroid therapy

How long is continued?
Repeat 10-day course until partial recovery (≥ 50%) is seen

studies are contradictory on the effectiveness of steroid therapy
Management

- Patient Education
- **Steroid**
  - Systemic
  - **Intratympanic**

**IT access way:**
- Transmembrane inject
- VT & drop
- Micropump
- MicroWick

**Routine Drugs:**
- Hydrocortisone
- Dexamethasone
- Methylprednisolone

Methylprednisolone had the highest concentration and longest duration in perilymph and endolymph compared to dexamethasone & hydrocortisone;

It does not mean greater efficacy. Dexamethasone seems to be better tolerated.

Dexamethasone: vary from 1 to 25 mg/mL.
Methylprednisolone: mostly 62.5 mg/mL.
Management

- Patient Education
- Steroid
  - Systemic
  - Intratympanic

Suggested protocol:
- 0.3 to 0.5 mL of drug
- Injection at anterior of Tympanic membrane
- At least 15 minutes in dependent position
- Twice weekly for 2 weeks

Oral vs Intratympanic Corticosteroid Therapy for Idiopathic Sudden Sensorineural Hearing Loss: A Randomized Trial

JAMA, May 25, 2011—Vol 305, No. 20

Patients from the 16 participating clinical sites were enrolled between December 2004 and October 2009.
Sudden Sensorineural Hearing Loss: Evidence-based Key Points

Management

- **Patient Education**
- **Steroid**
  - Systemic
  - Intratympanic
    - Salvage

**Recommended**

Patients who fail to recover spontaneously or after initial management (steroid and/or observe)
Management

- Patient Education
- Steroid
  - Systemic
  - Intratympanic
- Other Medications

Recommended Against
# Sudden Sensorineural Hearing Loss: Evidence-based Key Points

## Management

<table>
<thead>
<tr>
<th>Steroids (antiinflammatory)</th>
<th>Agents to improve cochlear blood flow</th>
<th>Vasoactive agents</th>
<th>Vitamins and antioxidants</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betamethasone (^{17})</td>
<td>Naftidrofuryl (^{18, 19, 20, 21})</td>
<td>Calcium channel blockers (unspecified)</td>
<td>High dose vitamin B(^1) (^{22})</td>
<td>Aciclovir (antiviral) (^{23})</td>
</tr>
<tr>
<td>Decadron (^{26})</td>
<td>10 percent dextran (^{27})</td>
<td>Cyclandelate p.o. (^{22})</td>
<td>High dose vitamin B(^1) (^{22})</td>
<td>ATP high dose (^{28})</td>
</tr>
<tr>
<td>Hydrocortisone sodium succinate i.v. (^{31})</td>
<td>Dextran - 'high molecular weight' (^{32})</td>
<td>Histamine phosphate</td>
<td>High-dose vitamin B(^6) (^{22})</td>
<td>ATP-2Na i.v. (^{22, 33})</td>
</tr>
<tr>
<td>Intratympanic dexamethasone (^{38})</td>
<td>Dextran - 'low molecular weight' (^{46})</td>
<td>Vasodilators i.v.</td>
<td>High-dose vitamin C</td>
<td>Benecyclan</td>
</tr>
<tr>
<td>Prednisolone i.v. (^{31, 43})</td>
<td>Diuretics (unspecified)</td>
<td>Nicergoline (alpha-blocker) (^{34})</td>
<td>Nicotinic acid (^{44})</td>
<td>Betahistine</td>
</tr>
<tr>
<td>Steroids (unspecified) – oral (^{1, 16})</td>
<td>HES (hydroxyethyl starch) (^{18, 19, 21, 47})</td>
<td>Nifedipine (^{48})</td>
<td>Vitamin A (^{46})</td>
<td>Cavinton (^{45})</td>
</tr>
<tr>
<td>Steroids – targeted topical with round window catheter (^{34})</td>
<td>Normovolaemic haemodilution (^{55})</td>
<td></td>
<td>Vitamin E (^{48})</td>
<td>Cerebroxime (^{56})</td>
</tr>
<tr>
<td>Steroids (unspecified) i.v. (^{38})</td>
<td>Pentoxifylline i.v.</td>
<td>CO(_2/O_2) inhalation (&quot;Carbogen&quot;) (^{10, 27, 45, 50, 53})</td>
<td></td>
<td>CO(_2/O_2) inhalation (&quot;Carbogen&quot;) (^{10, 27, 45, 50, 53})</td>
</tr>
<tr>
<td></td>
<td>Plasma expanders (unspecified)</td>
<td>Defibrinogenation ('Bactrobin') (^{64})</td>
<td>Interferon (antiviral) (^{50, 61, 62, 63})</td>
<td>Interferon (antiviral) (^{50, 61, 62, 63})</td>
</tr>
<tr>
<td></td>
<td>Procaine i.v.</td>
<td>Diatrizoate meglumine</td>
<td></td>
<td>Iron therapy (^{63})</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distrozide (&quot;Hypaque&quot;)</td>
<td></td>
<td>Kallidinogenase p.o. (defibrinogenation) (^{22})</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diazepam (^{20})</td>
<td></td>
<td>Lemon bioflavonoid (^{67})</td>
</tr>
</tbody>
</table>

**Others**
- Epidural block (cervicothoracic) \(^{24}\)
- Nicergoline \(^{25}\)
- Flunarizine \(^{29}\)
- Prostacyclin 12 \(^{30}\)
- Ginko extract \(^{19, 34, 35}\)
- Prostacycline \(^{36, 37}\)
- HELP \(^{35, 40, 41}\)
- Sadamine \(^{62}\)
- Heparin infusion (anticoagulant) \(^{45}\)
- Hyperbaric oxygen \(^{50, 51, 52}\)
- Stellite ganglion block \(^{24, 46}\)
- Trimetazidine \(^{53}\)
- Urographin
- Integrated traditional Chinese and Western medicine (TCM-WM) \(^{57}\)
- Vercapamil
- Xantinolnicotinol ('Complanin') \(^{55, 66}\)
- Zinc \(^{48}\)
Sudden Sensorineural Hearing Loss: Evidence-based Key Points

Management

- Patient Education
- Steroid
  - Systemic
  - Intratympanic
- Other Medications
  - antiviral

Recommended Against

Randomized trials have not demonstrated effectiveness

- Valacyclovir 1 gram 3 times a day
- Famciclovir 500 mg 3 times a day
- Acyclovir 800 mg 5 times a day
Management

- Patient Education
- Steroid
  - Systemic
  - Intratympanic
- Other Medications
- Hyperbaric $O_2$

Optional

Better response in:
- Younger Patients
- Earlier Therapy (Within 3 months of Dx)
- Severe Hearing Loss
Sudden Sensorineural Hearing Loss: Evidence-based Key Points

Management

- Patient Education
- Steroid
  - Systemic
  - Intratympanic
- Other Medications
- Hyperbaric O2
- Rehabilitation

Strong Recommended

Hearing Aids

Nonsurgical
- Air conducting
  - Behind The Ear
  - In The Ear
  - In The Canal
  - Complete In Canal
- Bone Conducting
  - Eyeglasses
  - Headbands

Surgical
- Air conducting
  - Middle ear implants
- Bone conducting
  - BAHA
- Nerve Conducting
  - Cochlear Implant
Sudden Sensorineural Hearing Loss: Evidence-based Key Points

Management

- Patient Education
- Steroid
  - Systemic
  - Intratympanic
- Other Medications
- Hyperbaric O2
- Rehabilitation

Strong
Recommendation

Hearing Aids

Hearing Assistive Technologies
Sudden Sensorineural Hearing Loss: Evidence-based Key Points

Summary

NICDC criteria:
- Hearing loss $\geq 30$ dB
- In $\geq 3$ consecutive freq.
- Occurring $\leq 3$ days

- Patient Education +++
- Steroid
  - Systemic
  - Intratympanic
    - Salvage +
- Other Medications +++
- Hyperbaric O2
- Rehabilitation +++

- Clinical Evaluation +
- Audiometric Confirm +
- Lab. Tests +++
- CT Scan +++
- MRI +
Thanks for your attention