

Review Article

## Sudden Sensorineural Hearing Loss (SSNHL) Evidence Based Management - State of the Art

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### Abstract

#### Introduction

Sudden sensorineural hearing loss (SSNHL) is defined as an acute hearing loss occurring within the period of three days (3) with the least magnitude of 30dB or more in three or more contiguous frequencies. Optimum management of SSNHL is disputed. This article attempts to review current literature on the subject and propose a protocol of management.

#### Methods

Latest guidelines on the SSNHL were accessed through Google Scholar database and reviewed for appropriateness. Studies assessing the management options were included. Efficacy of interventions were assessed, and recommendations made.

#### Results

17 publications including European Consensus Document and AAO HNS recommendation were assessed.

#### Conclusions

1. Systemic steroids use has a clear definitive recommendation in unison.
2. Intratympanic steroid use has been proposed mainly for salvage therapy.
3. Combined modality treatment options have been used with mixed outcome.
4. Based on the findings a protocol for management of SSNHL is proposed.

**Keywords:** Hearing Loss, Sensorineural, Sudden

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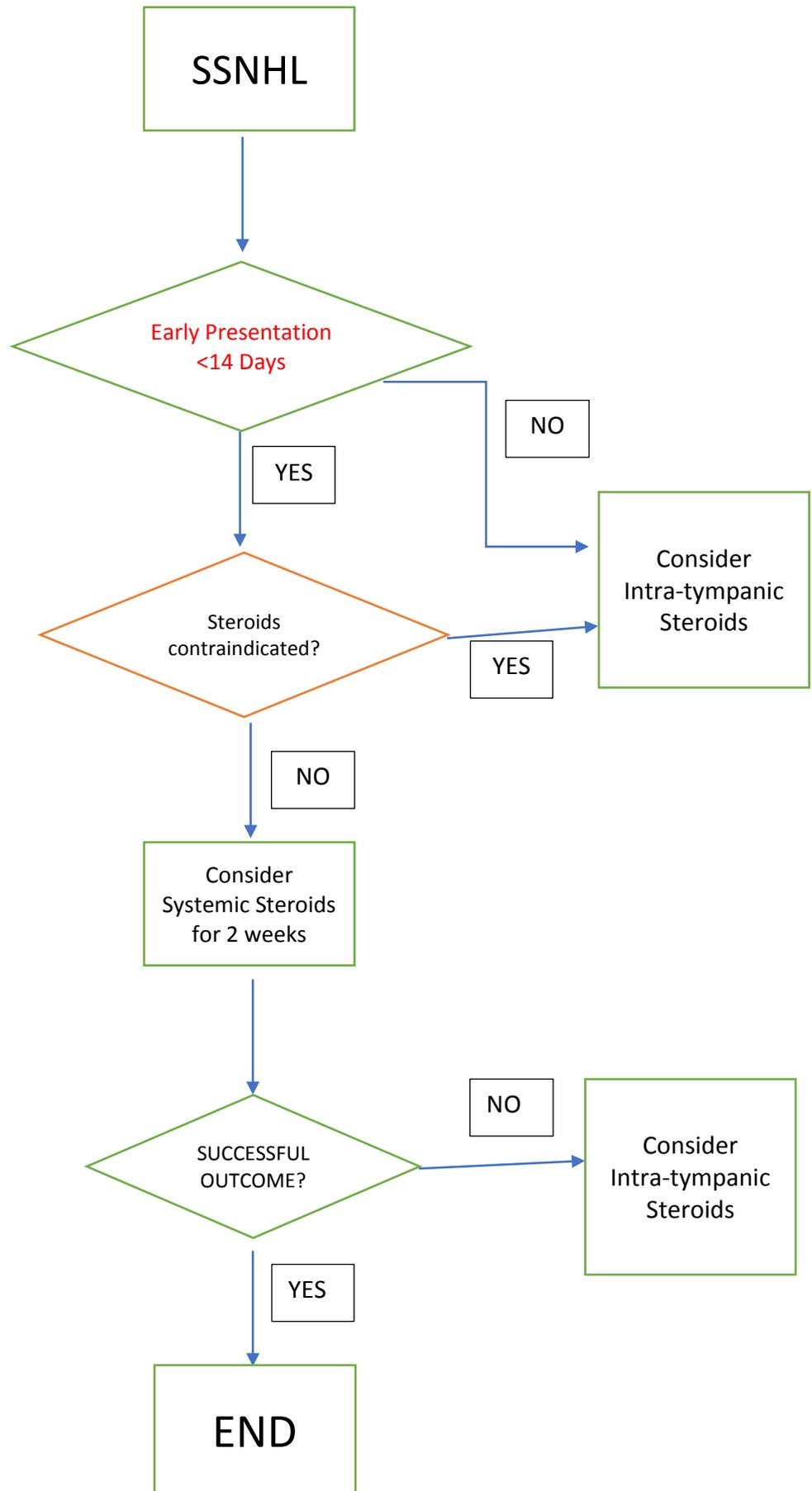
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Chart 1: Protocol for management of Sudden sensorineural hearing loss (SSNHL)



## **Introduction**

According to the National Institute on Deafness and Other Communication Disorders (NIDCD) of United States, sudden sensorineural hearing loss is defined as an acute loss of hearing occurring within the period of three days with the least magnitude of 30dB or more in three or more contiguous frequencies.<sup>4</sup> Impact of this condition on the quality of life is enormous and range from inability to communicate freely especially speech recognition in background noise, loss of directional sense, disabling tinnitus and imbalance.<sup>1</sup> We do not have the exact figures in Sri Lanka however, it is estimated to affect 5 - 27 cases per 100,000 population annually in United States.<sup>1</sup>

Pathophysiological basis of sudden onset hearing loss has been investigated in the past. Viral or vascular causes have been put forward as the commonest reasons behind the condition however a 2005 study has cited “stress response hypothesis” where activation of nuclear factor Kappa related stress response pathway rather than viral cochleitis or vascular insufficiency as the cause.<sup>2</sup> A more recent study in 2013, has compared histopathological features of temporal bones and conclude that aetiology is more likely to be viral than vascular insufficiency.<sup>3</sup>

Optimum diagnosis and management protocols are not universally accepted with huge variation. This review article aims to provide current evidence for best practices by reviewing recently published guidelines.

## **Objectives**

1. To find out the best management option(s) in the acute stage of the SSNHL
2. To find out the best management option(s) in the salvage stage of SSNHL

## **Methodology**

American Association of Otolaryngologists and head and Neck Surgeons guidelines published in 2019<sup>4</sup> is the latest on this subject from United States while Joint consensus group statement (ICON) published in 2018 is the latest from Europe<sup>1</sup>. In addition, a Google Scholar search on the subject using the keywords “Sudden Sensorineural Hearing Loss”, “management”, “steroids”, “transtympanic” and “intratympanic” was carried out. 21 publications were reviewed to find out answers for above questions and priority was given to articles with publication year within 5 years to date.

## **Results**

AAOHNS publication and European publications agree with the management strategies recommended in this article. Various aspects of SSNHL management is outlined and protocol is suggested for management.

## **Type of Hearing Loss**

One of the first considerations is to determine the nature of the hearing loss.<sup>4</sup> Clinical examination including the otoscopic and tuning fork tests complemented by audiometry will help to single out sensorineural hearing loss. This is the first step in the management. Based on the alternative diagnosis, appropriate management can be carried out.

### **Timing of the hearing loss**

There are two broad categories of presentations - acute and late. Acute can be defined as presentation within a week of perceived onset of the hearing loss.<sup>1,4</sup> "Late" presentation is anything beyond that. However, onset of the hearing loss beyond couple of months is unlikely to be helped by medical management. For salvage therapy the general guideline is to start treatment within 1 month.<sup>1,4</sup>

### **Acute Setting**

#### **Systemic steroids**

In acute phase systemic steroids were found to be effective in almost every study. It is also considered the gold standard against which other treatment options are judged.<sup>41</sup> Dosage and the type of steroid varies. Commonest is Oral Prednisolone 60mg a day 14 days.<sup>1</sup> Higher doses have been used for e.g. pulsed dose of 500mg of methyl prednisolone for 3 days followed by oral steroid for further 11 days and was compared with oral steroids 60mg a day for 14 days.<sup>5</sup> However, there was no difference between the outcome in terms of pure tone average or word recognition scores at 3 months using AAO HNS criteria<sup>5</sup>.

#### **Intratympanic steroids**

Interest in intratympanic steroids is rising as a treatment option for SSNHL. According to a recent (2019) meta-analysis, there is only one placebo controlled Randomized clinical trial comparing intratympanic steroid with a placebo.<sup>4</sup> In this study patients with history of sudden onset hearing loss of moderate degree were randomized to receive either intratympanic prednisolone or saline and their hearing outcome was measured. The intratympanic group showed statistically significant improvement of their hearing compared to the placebo.<sup>6</sup>

Intra-tympanic treatment is considered in some studies with varied success rates. In a study by where two groups of patients were randomized to be treated with oral and intratympanic steroids a comparable success rate of approximately 80% was demonstrated.<sup>7</sup>

American guideline is specific about the place of intra-tympanic on salvage treatment but on acute stage it is not definitive.<sup>4</sup>

In the patient group where systemic steroids are either contraindicated or sub optimal e.g. uncontrolled diabetes especially insulin dependent diabetes mellitus, tuberculosis, peptic ulcer disease, intratympanic steroid therapy may be preferred over the systemic therapy.<sup>1,4</sup>

In a study comparing oral steroids with intratympanic delivery conducted in Germany, systemic steroid group did better than intratympanic however the difference was not statistically significant. Therefore, authors recommend intratympanic route as an alternative to oral steroid.<sup>8</sup>

## **Combined intratympanic steroids and systemic steroids**

In a study where three groups of patients were studied to assess intratympanic, systemic and combined therapy published in Indian Journal of Otolaryngology and Head and Neck Surgery, combined group where oral prednisolone 1mg/kg with a tapering dose over a period of 4 weeks and intratympanic dexamethasone 0.5ml every week for 4 weeks has produced better results.<sup>9</sup> However, a similar study with a larger sample size but with different steroid combination didn't show a statistically different outcome between the groups.<sup>10</sup>

However, both the European and the US guidelines have not recommended combined steroids in their latest guidelines.<sup>1,4</sup>

## **SALVAGE Therapy**

In patients presenting two weeks later but before 4 weeks there may be still a chance of hearing recovery and the use of intratympanic route may be the most appropriate option.<sup>1,11,12</sup>

## **Other treatment modalities**

### **Hyperbaric Oxygen therapy**

When used with combination with steroids hyperbaric oxygen therapy may be useful in patients with SSNHL. In a subset of patients where severe to profound hearing loss is present and on prolonged treatment this combination is more useful.<sup>13</sup>

### **Antivirals, thrombolytics, vasodilators or vasoactive substances**

American academy categorically recommends against use of antivirals, thrombolytics, vasodilators or vasoactive substances.<sup>4</sup>

### **Brevascapaine**

In a Chinese study where combined therapy with Brevascapaine and corticosteroids hearing outcomes has been shown to be better than corticosteroids alone.<sup>14</sup>

### **Gene Therapy**

Another frontier in hearing loss management not yet translated in to mainstream practice is Gene Therapy.<sup>15</sup>

## **Prognosis**

Prognosis of the condition is also assessed in couple of studies and absence of vertigo, early treatment (the first 7 days), and hearing loss less than 50dB are shown as good prognostic factors.<sup>16</sup> Age was

not associated with prognosis in this study. Presence of vertigo at the onset of hearing loss is associated with poor prognosis.<sup>416</sup>

### **Conclusions:**

1. Sudden Sensorineural Hearing loss is a medical emergency needing prompt action. Its defined as loss of 30dB or more in three or more contiguous frequencies within a period of 72hours.
2. There are two clearly defined management stages, namely Acute and Salvage.
3. Steroids have a definitive role and systemic steroid treatment is considered the “gold standard”.
4. Intra-tympanic steroids can be given, the dose, method (grommets+/-), timing, frequency and duration considerations are diverse and no clear cut advantage over one another
5. Combined steroid regimes not clearly shown to be advantageous over single mode treatment
6. Hyperbaric oxygen therapy has some evidence but the availability and practicality issues are there
7. Antivirals, thrombolytics, vasoactive substances have not been shown to have a significant benefit as yet.
8. Newer treatment modalities including gene therapy is in the pipeline however their role is not yet fully established.

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