Evidence-based practice: management of sudden sensorineural hearing loss

BY JESSICA CHOONG AND STEPHEN O'LEARY

What is the current evidence for medical management of sudden sensorineural hearing loss? **Jessica Choong** and **Stephen O'Leary** present a review of the current evidence of treatments options.

Sudden sensorineural hearing loss (SSNHL) causes significant distress and, in many cases, a lasting sensory deficit that leads to marked impairment of binaural auditory processing and ease of listening in the presence of background noise. The difficulties that patients experience through the loss of auditory function in one ear include an inability to discriminate speech from background noise which can lead to a reduction in workplace productivity and, in many individuals, social isolation as challenging acoustic environments (typically social gatherings) are shunned. While persistent SSNHL can now be effectively rehabilitated with auditory prostheses, including osseointegrated prostheses or cochlear implants, these options are costly so there is considerable impetus to optimise medical management.

SSNHL is typically defined as a sudden degradation of audiometric thresholds in at least 30dB over three continuous frequencies. While it is thought that this probably arises from more than one pathological process, this does not, as yet, influence the therapeutic approach to management. It is also worth noting that the natural history of SSNHL has a spontaneous recovery rate of 65-66% which can hinder the reliability of studies investigating the benefit of medical interventions. Glucocorticosteroids, antiviral agents, vasodilators and hyperbaric oxygen have been proposed for the medical treatment of this condition and subjected to systematic reviews. Here we review the findings of these studies, and consider also some newer approaches including intratympanic steroid administration, treatment with antioxidants and intratympanic insulin growth factor-1.

"Loss of auditory function in one ear can result in the inability to discriminate speech from background noise, which can lead to a reduction in workplace productivity as well as social isolation."

Glucocorticoids

Glucocorticoids are currently the mainstay of treatment although the evidence for steroids is inconclusive, given the small number of studies with large heterogeneity and contradictory results. Steroids are commonly given orally for a period of one to two weeks at a typical dose of prednisolone 1mg /kg /day (some to a maximum of 60mg). The efficacy of this treatment appears to be greater if commenced within the first seven days of hearing loss. Although intratympanic steroids offer advantages such as reduced systemic toxicity and increased perilymph levels of steroid, there is no advantage in hearing recovery compared with systemic steroids. Furthermore, this approach requires initiation of treatment by an otorhinolaryngologist and has the potential to result in a permanent tympanic membrane perforation due to repeated injections.

Several randomised control trials have investigated the use of different intratympanic methylprednisolone or dexamethasone following a failed trial of oral or intravenous steroid management. However these studies had variable criteria for what constituted a failed systemic treatment. 30-50% of patients have been found to be refractive to oral or intravenous steroid therapy and an advantage for some additional recovery of hearing has been demonstrated in patients with profound SSNHL, however the clinical significance of this additional recovery is unclear.

Antivirals

Antivirals have been trialled due to a theory that SSNHL is a result of viral infection. There have been randomised control trials investigating the efficacy of antiviral therapy (some in conjunction with a steroid compared to steroid-alone treatment). There was no proven benefit to adding an antiviral agent to steroid therapy, or in using antivirals alone.

Vasodilators

Another proposed aetiology of SSNHL is of vascular insufficiency causing hypoxia. To target this, vasodilators including carbon, prostaglandin E1 and naftidrofuryl have been trailed. Each of the randomised control trials demonstrated some benefit associated with vasodilator therapy, however due to the heterogeneity of these studies no meta-analysis has been performed and the benefit of these medications remains unproven.

Hyperbaric oxygen

In keeping with the above theory, hyperbaric oxygen (HBO) has been trailed in SSNHL to improve oxygen delivery to the inner ear. There have been several small trials investigating HBO and the pooled data from some of these indicate that there is an increased chance of an improvement in pure tone audiometry (PTA) following treatment with HBO (NNT=5) if used in an acute setting. The clinical benefit of this PTA gain is limited and there is no evidence for the use of HBO in the delayed treatment of hearing loss.

Insulin-like growth factor-1 (IGF-1)

IGF-1 has been trialled in SSNHL with the hypothesis that the delivery of growth factors to the inner ear may reduce hair cell and neuronal degeneration. There was minimal benefit demonstrated and this benefit is unlikely to be of clinical significance.

Antioxidants

Antioxidants have been shown to be of use in preventing further apoptosis of stress-injured hair cells and spiral ganglion neurons following a range of cochlear insults, including noise trauma, acute labyrinthitis, aminoglycoside ototoxicity, bacterial infection, cochlear ischaemia, and trauma from cochlear implantation. Suckfuell et al [1] suggested there may be a benefit with the use of intratympanic AM-111 when there is severe-profound SSNHL. This appears promising, however further studies need to be performed to optimise dosing concentrations and regimens.

Conclusion

Oral steroids remain the mainstay for the treatment of SSNHL, despite the limited evidence for their use. There is no proven advantage in offering intratympanic steroids in the acute setting. However, this may be of benefit in SSNHL to oral steroids. Where HBO is available, this may confer a marginal benefit. Of the newer therapies, antioxidants (specifically AM-111) may prove to be beneficial.

References

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FURTHER READING

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Jessica Choong is a PhD candidate at the Department of Otolarynology, University of Melbourne. She is a medical graduate with an interest in pursuing a clinical career in ENT. Under Prof O'Leary's supervision, Dr Choong has been conducting basic research into the causes of delayed hearing loss following cochlear implantation, and the role that fibrosis plays in this.