Sudden Sensorineural Hearing Loss Following Wasp Sting and Successful Treatment With Intratympanic Steroids

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ABSTRACT

OBJECTIVE: A sting by a *Vespula vulgaris* (wasp) should be considered as a cause of sudden sensorineural hearing loss. Although the mechanism of this cause is not well understood, management approach is similar to idiopathic sudden sensorineural hearing loss.

METHODS: We describe a novel case of sudden sensorineural hearing loss encountered at a community otolaryngology clinic. It developed in a 26-year-old man after a sting to the ear canal by a *V vulgaris* (wasp) species.

RESULTS: The patient failed to respond to oral steroids, but had complete recovery to normal hearing levels with intratympanic steroids.

CONCLUSIONS: Sudden sensorineural hearing loss can be caused by the sting of a *V vulgaris* species and may be resolved with the use intratympanic steroids.

KEYWORDS: Sudden sensorineural hearing loss, sting, intratympanic steroids, wasp, *V vulgaris*

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Introduction

Sudden sensorineural hearing loss (SSNHL) is defined by the National Institute for Deafness and Communication Disorders (NICDC) as hearing loss of at least 30 dB over at least 3 test frequencies occurring during a time period of 3 days.[1] The cut-off value of 30 dB has been disputed, and recent clinical guidelines argue that the threshold value can be lowered under 30 dB in clinical practice.[2]

The causal basis for the development of SSNHL is widespread, with an idiopathic cause as the most commonly attributed mechanism (or lack thereof).[3] Important associations between the development of SSNHL and infectious disease, otologic disease, trauma, vascular, or hematologic causes, and neoplastic causes have been previously demonstrated. The most common associated symptoms with SSNHL include tinnitus and vertigo.[4,5]

Hymenoptera species can cause severe systemic allergic reactions on stinging. Local reactions commonly include redness and swelling, which frequently resolve within hours of being stung. Development of SSNHL following a sting from the Hymenoptera species, specifically the wasp, is rare. One prior case has been reported in the literature by Duzenli et al,[6] where a 19-year-old male beekeeper was stung in the chest region by a honey bee (*Apis mellifera*) and developed unilateral SSNHL. Here, we report a case of SSNHL following a wasp sting to the ear canal.

Case Report

A 26-year-old man was referred to our ENT clinic for unilateral hearing loss and ear pain in the right ear. Patient stated that his hearing was symmetric and normal prior to a wasp sting. Medical history taking revealed an initial presentation to the emergency department, approximately 29 days prior to our encounter in the clinic, for a sting to the right ear canal by an insect, and the development of unilateral hearing loss approximately 8 to 10 hours later. At that time, the patient complained of a foreign body sensation in the right ear. After inspection of the ear canal in the emergency department, the reported foreign body was removed and was revealed to be a wasp (*Vespula vulgaris*).

Inspection of the ear canal at the time of our evaluation revealed erythema above the right tympanic membrane and what initially appeared to be a small perforation in the left upper quadrant of the right tympanic membrane. Impedance testing were Type A bilaterally with normal volumes, so this could have just been a monomeric/dimeric portion of the Tympanic Membrane. Pure tone audiometry revealed a moderate hearing loss across all tested frequencies in the right ear. It was down-sloping with loss ranging from 40 dB at 0.25 kHz, down to 60 dB at 8 kHz (Figure 1). Pure tone audiometry of the left ear was normal. Initial approach to management was a trial of oral steroids (Prednisone 60 mg for 1 week,

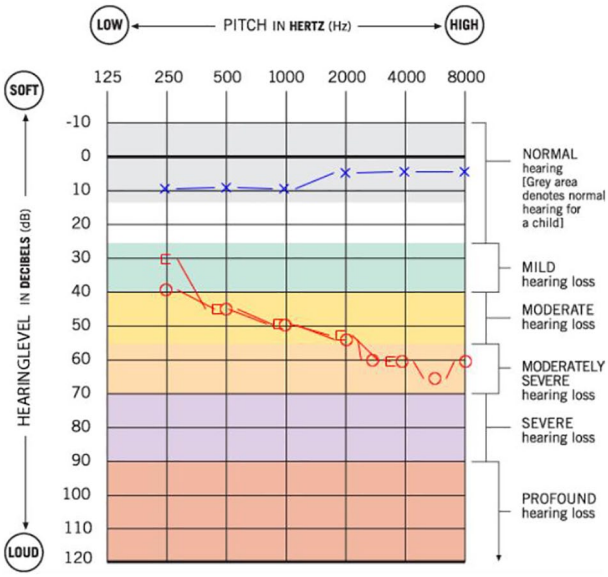

Figure 1. Audiogram at initial presentation to our ENT clinic, prior to treatment: x—left air conduction, o—right air conduction, and [—right bone conduction, masked.

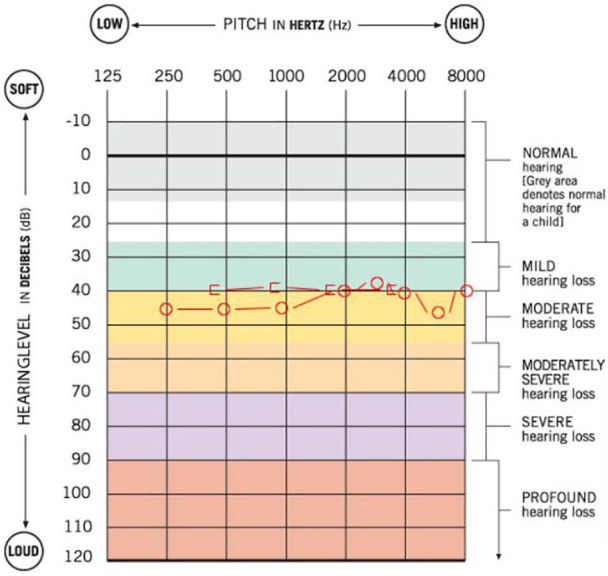

Figure 2. Audiogram following course of oral steroids: o—right air conduction and [—right bone conduction, masked.

followed by a taper over the following week). Patient was asked to follow-up within 14 days or sooner, but did not follow up until 42 days later.

At that visit after completion of the oral steroids, he denied improvement. Pure tone audiometry still showed a moderate hearing loss—approximately 40 dB across all tested frequencies, a slight improvement in the higher frequencies when compared with the previous audiogram (Figure 2). An alternative approach using a intratympanic dexamethasone injection was tried. Topical phenol was applied to the right tympanic membrane and 0.5 mL dexamethasone (4 mg/mL) was injected through the anesthetized area.

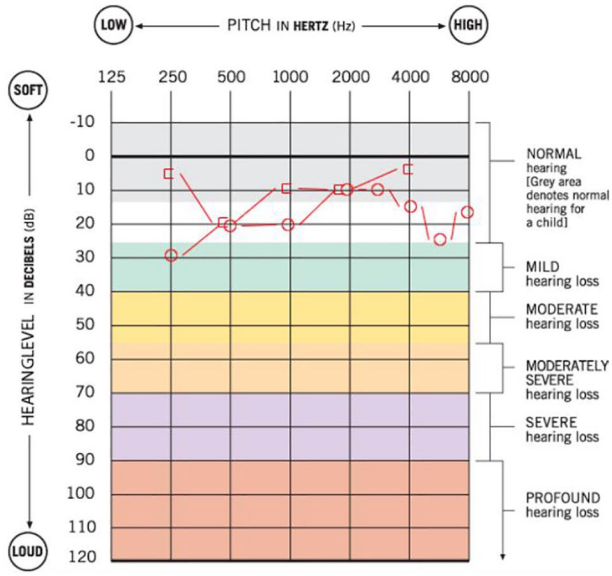

Figure 3. Audiogram following intratympanic steroid injection: o—right air conduction and [—right bone conduction, masked.

At follow-up visit 7 days later, the patient reported a return of his hearing to baseline. There was a pinhole perforation to the right ear in the location of the intratympanic injection, but the previously described perforation/monomeric/dimeric area in the left upper quadrant had resolved. A repeat audiogram, now approximately 42 days from the initial onset of hearing loss, revealed a resolution of the sensorineural hearing loss. Bone conduction was all within normal range. Air conduction was also within normal range except for an air-bone gap of 20 and 10 dB at the 0.25 and 1 kHz, respectively, secondary to the small perforation from the intratympanic steroid injection site (Figure 3). Impedance testing showed a large volume, as expected.

Discussion

The definition of SSNHL according to the NICDC is the hearing loss of at least 30 dB over a minimum of 3 testing frequencies occurring over a 72-hour period.[1] Clinical practice guidelines dictate this threshold may be lowered below 30 dB.[2] Multiple possible causes have been reported as a cause of SSNHL—including idiopathic causes, infectious disease, otologic disease, trauma, vascular, or hematologic, and neoplastic causes.[3] In addition, immune-mediated disorders have been reported to cause SSNHL.[7]

The overall prognosis for patients developing SSNHL points toward full or partial recovery in most cases. In a cohort of 56 patients who were diagnosed with idiopathic SSNHL, Yimtae et al[4] found 64.3% displayed a degree of recovery with 28.6% demonstrating complete recovery. The most favorable prognosis is associated with the development of low-frequency hearing loss, as compared with high-frequency hearing loss.[8] Although there is no uniform guideline for the treatment of SSNHL, treatment commonly begins with oral

glucocorticoids, followed by intratympanic injection if hearing loss does not improve or resolve.

Winged Hymenoptera species include wasps, bees, hornets, and yellow jackets—all of which are able to sting humans. Following contact of the stinging apparatus, the onset of a local and/or systemic reaction occurs. Local reactions typically involve erythema, pain, and edema surrounding the injection site. Systemic reactions or anaphylaxis may develop rapidly, resulting in a severe allergic reaction that may include urticaria, flushing, wheezing, airway obstruction, hypotension, shock, and circulatory collapse. The pathogenesis of both local and systemic reactions to Hymenoptera venom is believed to be IgE-mediated mechanisms.[9,10]

In this case report, we describe the development of SSNHL in our patient who sustained a wasp sting to the ear canal 8 to 10 hours prior. An initial trial of oral glucocorticoids (Prednisone: 60 mg for 1 week followed by taper) was attempted without success. Next, intratympanic glucocorticoid injection of 0.5 mL dexamethasone (4 mg/mL) was performed. Following this, the patient returned to baseline hearing within 7 days.

The exact mechanism for our patient's SSNHL following wasp-sting is unknown. Previous literature has demonstrated the association of SSNHL and increased total IgE levels.[7] It is possible there may be a connection between the IgE levels associated with local or systemic reactions induced by Hymenoptera species and the development of SSNHL. However, further studies are warranted to investigate this association.

Conclusions

SSNHL can be due to multiple causes, with the most common being an idiopathic mechanism. Regardless of the mechanism, treatment involves the use of oral and intratympanic steroid injections. A thorough history should be taken to attempt to elicit a cause. The possibility of an insect sting as a cause, particularly Hymenoptera species, should be kept in mind.

Acknowledgements

Audiogram graphing tool, https://www.hearingaidknow.com/audiogram-creator.

Author Contributions

J. S. was the attening physician and AA was the resident physician for this patient. A. A. and M. V. contributed equally to writing the manuscript. A.A. worked on editin, submiting, and correspondence.

Informed Consent

Patient consent to publish this case study has been obtained.

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