



Intratympanic Steroids in Sudden Sensorineural Hearing Loss: A Case Study

Dr. Asma.M, Dr. M.K.Rajasekar

Sree Balaji Medical College And Hospital,Chromepet,Chennai 600044.

(Received: 04 February 2024

Revised: 11 March 2024

Accepted: 08 April 2024)

KEYWORDS

sudden sensorineural hearing loss, transtympanic steroids

ABSTRACT:

Sudden Sensorineural Hearing Loss (SSNHL) is a medical emergency characterized by a sudden, unexplained loss of hearing in one ear, often with an unclear cause. Although various potential causes exist, the condition is often considered idiopathic due to the lack of a confirmed etiology. Steroids have been a primary treatment for SSNHL, but recent experiences with transtympanic steroid injections have shown promising results. However, the optimal number of injections, dosage, steroid type, and treatment window remain topics of debate. This report presents a rare case of idiopathic SSNHL with profound hearing loss, successfully treated with six transtympanic steroid injections, resulting in a complete restoration of hearing. Additionally, the report reviews different methods and improvements in transtympanic steroid injections from other studies.

1. Introduction

Idiopathic Sudden Sensorineural Hearing Loss (ISSHL) is a condition marked by the sudden loss of hearing in either one or both ears without a clear precipitating cause. It affects a significant portion of the population, with an estimated 5 to 20 cases per 100,000 individuals and approximately 4,000 new cases each year in India. The exact cause of ISSHL remains elusive, with various theories proposed, including disturbances in cochlear blood flow, viral infections, autoimmune responses, and damage to Reissner's membrane.

The treatment of ISSHL has been challenging due to uncertainty surrounding its etiology. Proposed treatments have been based on hypotheses rather than concrete evidence. These treatments have included vasodilators, diuretics, anticoagulants, plasma expanders, corticosteroids, contrast dye, and hyperbaric oxygen therapy. However, evaluating the effectiveness of these treatments has been complicated by the condition's low incidence rate and the tendency for hearing to spontaneously recover in many cases.

Corticosteroids, such as prednisone and methylprednisolone, have been commonly prescribed to

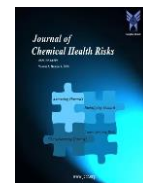
treat ISSHL. However, these systemic steroid treatments can lead to potential side effects, including glucose intolerance, hypertension, adrenal suppression, gastrointestinal bleeding, and altered mental states. The duration of steroid use for ISSHL is relatively short, typically around two weeks, which reduces the risk of side effects associated with long-term steroid use. A more recent method of corticosteroid delivery for ISSHL treatment is the intratympanic (IT) route, involving the direct application of steroids to the middle ear.

2. Objectives

This report presents a rare case of idiopathic SSNHL with profound hearing loss, successfully treated with six transtympanic steroid injections, resulting in a complete restoration of hearing. Additionally, the report reviews different methods and improvements in transtympanic steroid injections from other studies.

3. Methods

A 20-year-old female patient presented with a sudden inability to hear in her right ear. She reported no history of trauma or ear discharge but complained of associated



tinnitus in her right ear. Physical examination revealed normal bilateral tympanic membranes, with Rinne's test results indicating hearing loss in the right ear. Audiometry confirmed a hearing loss of 46.6 dBHL in the right ear.

Investigations:

Several diagnostic tests were performed:

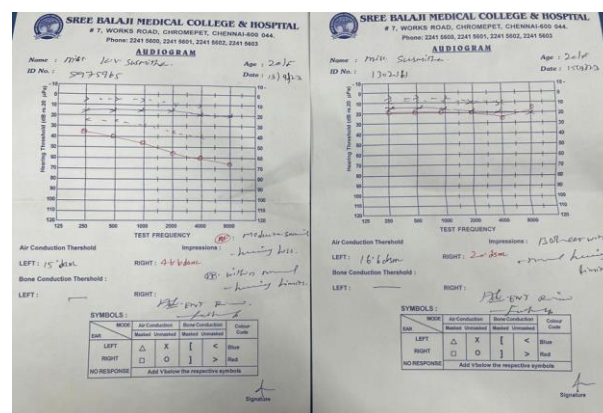
1. MRI of the brain and ear: Showed no evidence of an acoustic neuroma on either side.
2. Carotid and vertebral artery Doppler: Indicated minor plaque in both common carotid bulbs.
3. Non-contrast CT of the paranasal sinuses (PNS): Revealed mild sinusitis, a slight deviation of the nasal septum, and a polyp in the right maxillary sinus.
4. The patient was initially treated with oral steroids (prednisolone Tablets), starting at 60 mg daily from September 13th to 16th, 2023, followed by a tapering dose of 40 mg daily from September 17th to 20th, and finally 20 mg daily from September 21st to 24th, 2023. However, there was no improvement noted in pure-tone audiometry (PTA) results.

Treatment:

After the failure of oral steroid treatment, the patient was transitioned to intratympanic steroid injections using Dexamethasone. The injections consisted of a 4 mg/ml dose, and 0.3 ml of the steroid solution was administered intratympanically on September 13th and 15th, 2023. To ensure proper administration, 0.1 ml of xylocaine was mixed with the steroid solution, and the injection was given in the middle of the inferior quadrant of the tympanic membrane to avoid injury to the underlying labyrinth. Xylocaine served as a marker and provided surface anesthesia over the promontory area.

4. Results

Following the intratympanic steroid injections, a significant improvement in hearing was observed. A PTA on September 15th, 2023, revealed an improvement in the right ear's hearing threshold to 20 dB. The patient achieved complete recovery of hearing and did not experience adverse side effects.



5. Discussion

The efficacy of steroid treatments for ISSHL remains inconclusive due to the condition's variable natural history and uncertain etiology. Moreover, spontaneous improvement frequently occurs early after the onset of hearing loss, making it challenging to evaluate the contribution of any specific treatment. Various steroid regimens have been attempted, including high-dose prednisone and intratympanic (IT) steroids, each with its own success rates.

Studies have explored different steroid types (prednisone, methylprednisolone, dexamethasone) and concentrations (ranging from 10 to 24 mg/ml) for IT steroid administration. The frequency and total number of injections, as well as the timing, have also varied across studies. Some studies have combined oral and IT steroids to improve prognosis, while others have opted for IT steroids as the sole initial treatment.

IT steroid therapy carries advantages such as reduced potential for systemic side effects. It is recommended to start IT steroids promptly when the patient seeks medical attention, and they can be used as the mainstay of treatment or in conjunction with other modalities. In cases of ISSHL showing signs of improvement, it is advisable to consider more than three doses of intratympanic steroids. Initiation of IT steroids on the first day of medical evaluation can be an effective treatment strategy, either as the primary treatment or in combination with other modalities. The effectiveness of IT steroid treatment depends on various factors, including dose, concentration, frequency, and the total number of injections, as well as the choice of steroid type. Further research and standardized protocols are



needed to establish the most effective treatment approach for ISSHL.

References

1. Haynes DS, O'Malley M, Cohen S, Watford K, Labadie RF. Intratympanic dexamethasone for sudden sensorineural hearing loss after failure of systemic therapy. *Laryngoscope*. 2007 Jan;117(1):3-15. [PubMed]
2. Filipo R, Attanasio G, Russo FY, Viccaro M, Mancini P, Covelli E. Intratympanic steroid therapy in moderate sudden hearing loss: a randomized, triple-blind, placebo-controlled trial. *Laryngoscope*. 2013 Mar;123(3):774-8. [PubMed]
3. Chandrasekhar SS, Rubinstein RY, Kwartler JA, Gatz M, Connelly PE, Huang E, Baredes S. Dexamethasone pharmacokinetics in the inner ear: comparison of route of administration and use of facilitating agents. *Otolaryngol Head Neck Surg*. 2000 Apr;122(4):521-8. [PubMed]
4. Xie Y, Orabi NA, Zwolan TA, Basura GJ. Outcomes of unilateral idiopathic sudden sensorineural hearing loss: Two decades of experience. *Laryngoscope Invest Otolaryngol*. 2019 Dec;4(6):693-702. [PMC free article] [PubMed]
5. Wei BP, Stathopoulos D, O'Leary S. Steroids for idiopathic sudden sensorineural hearing loss. *Cochrane Database Syst Rev*. 2013 Jul 02;2013(7):CD003998. [PMC free article] [PubMed]
6. Chandrasekhar SS, Tsai Do BS, Schwartz SR, Bontempo LJ, Faucett EA, Finestone SA, Hollingsworth DB, Kelley DM, Kmucha ST, Moonis G, Poling GL, Roberts JK, Stachler RJ, Zeitler DM, Corrigan MD, Nnacheta LC, Satterfield L. Clinical Practice Guideline: Sudden Hearing Loss (Update). *Otolaryngol Head Neck Surg*. 2019 Aug;161(1_suppl):S1-S45. [PubMed]
7. Nevoux J, Barbara M, Dornhoffer J, Gibson W, Kitahara T, Darrouzet V. International consensus (ICON) on treatment of Ménière's disease. *Eur Ann Otorhinolaryngol Head Neck Dis*. 2018 Feb;135(1S):S29-S32. [PubMed]
8. Nyberg S, Abbott NJ, Shi X, Steyger PS, Dabdoub A. Delivery of therapeutics to the inner ear: The

challenge of the blood-labyrinth barrier. *Sci Transl Med*. 2019 Mar 06;11(482) [PMC free article] [PubMed]