

Intratympanic steroids for sensorineural hearing loss. A changing trend

Opinion

Application of medications directly to the inner ear by way of ear canal is certainly not a new concept; physicians have been pouring medications into ears for empirical treatment of variety of ailments for millennia.¹⁻³ Intra tympanic delivery offers obvious advantages over other methods like a focused delivery, high drug levels where it is needed the most, use of much smaller quantity of medication, less systemic side effects. Although gentamycin is now the most commonly used intra tympanic drug, the list has expanded to include steroids, and in future will likely include other agents like antioxidants, growth factors, neurogenic proteins and gene therapy vectors. Once the physiological and developmental sequence of the organ of corti is established, along with perfection in gene delivery mechanism- the treatment potential of intra tympanic drug delivery will be fully realized.⁴⁻⁸

Corticosteroids have been used extensively for inner ear disease for their anti-inflammatory effects. The effect of glucocorticoids is caused by formation of a protein from the mRNA, which brings about the final action. This action on the expression of target genes takes several hours while the other non-genomic effects are immediate.⁹ The hallmark for intratympanic steroid infusion is the presence of glucocorticoid receptors in the inner ear through which the circulation corticosteroids can directly affect the inner ear physiology. Corticosteroids may also increase the vascularity of inner ear.¹⁰⁻¹⁵ Hydrocortisone was found to prevent decrease in cochlear blood flow and also reduce degeneration of stria vascularis. The round window membrane is the portal of entry into the inner ear of substances injected into the middle ear. The average thickness of round window is 70 micrometers and has three layers. The perilymph dispersion of a substance via round window depends on the permeability and rate of clearance of the substance.

Idiopathic SSNHL is a common otological emergency; first described in 1944. The incidence is 5 to 20 per 100,000 persons per year.¹⁶ The most common theories to explain the aetiopathogenesis are viral or vascular. Corticosteroids have been shown by many studies to improve hearing significantly in patients with sudden SNHL with little reported inner ear toxicity apart from procedural complications. In United States there is a consensus that the window period for minimum acceptable care should consist of a short (less than 4 weeks) of oral steroid after which there is little chance of recovery. There have been a few randomized controlled trials of anti-viral therapy but failed to show any additional benefit of adding acyclovir to prednisolone. Additional benefits can be obtained from inhalation of carbogen as reported by Fisch.^{17,18} Recently several publications have reported small case series of SSNHL in which intratympanic corticosteroid treatment achieved a 50% success of salvaging hearing in cases of primary oral steroid failure suggesting that intratympanic corticosteroids may be as good or better than oral steroids but prospective randomized clinical trials are absent. Intratympanic drug administration yielded highest inner ear drug levels, equally in perilymph and endolymph. Methylprednisolone achieves the highest drug concentration in inner ear for the longest time thus it is considered the drug with the greatest

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potential for administration. To conclude, idiopathic SSNHL is a common otological emergency and needs prompt medical attention as the window period is only 4 weeks for treatment with steroids. Recent uncontrolled reports have shown that intratympanic steroids (especially methylprednisolone) may be as effective as oral steroid due to higher concentration and duration of drug along with minimal systemic side effects. It is the responsibility of the otolaryngologist to raise awareness of SSNHL in the medical community to promote earlier otological evaluation and diagnosis leading to a higher cure rate. We need randomized controlled trials to generate data for oral versus intratympanic steroids treatment for SSNHL and until then intratympanic treatment must be considered a promising experimental therapy after discussion with each patient as regards the risks and benefits and uncertainty of efficacy of intratympanic therapy before embarking on the treatment.¹⁹

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Conflict of interest

The author declares no conflict of interest.

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