ROLE OF INTRA-TYMPANIC INJECTION IN OTOLOGY

Essay

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By

Iman Mostafa Taha Basiouny
(M.B., B.Ch.)

Under the Supervision of

Prof. Dr. Mohammed I. Shabana
Professor of Audiology,
Faculty of Medicine, Cairo University

Prof. Dr. Osama Abdel-Nasseir
Professor of Otolaryngology,
Faculty of Medicine, Cairo University

Dr. Mohammed Sherif El-Minawi
Lecturer of Audiology,
Faculty of Medicine, Cairo University

Faculty of Medicine
Cairo University
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بسم الله الرحمن الرحيم

"ويسئلونك عن الروح قل الروح من أمر ربي وما أوتيتم من العلم إلا قليلا"

صدق الله العظيم
(الآية: ٨٥، سورة الإسراء)

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*"At first, I thank **God**, the most gracious and merciful"*

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Iman Mostafa Taha
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To My Family

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LIST OF ABBREVIATIONS

AIED : Autoimmune inner ear disease
CGT : Continuous gentamicin therapy
dB : Decibel
EchoG : Electrocochleography
ENG : Electonystagmography
GAD : Glutamic acid decarboxylase
HL : Hearing loss
Hz : Hertz
IK : Interstitial keratitis
IPBSNHL : Idiopathic progressive bilateral sensorineural hearing loss
ISSNHL : Idiopathic sudden sensorineural hearing loss
IT : Intra-tympanic
ITI : Intra-tympanic injection
ITS : Intra-tympanic steroid therapy
PAN : Polyarteritis Nodosa
PTA : Pure tone average
RVR : Reduced vestibular response
RW : Round window
SDS : Speech discrimination score
SNHL : sensorineural hearing loss
SLE : Systemic Lupus Erythematosus
TTG : Trans-tympanic gentamicin

ABSTRACT

Intra-tympanic therapy is often used to treat inner ear disorders such as Ménière's disease, sudden idiopathic sensorineural hearing loss and autoimmune hearing loss.

When intra-tympanically applied, drugs resulted in higher endolymph and perilymph concentrations than when intravenously administrated

Injection of intra-tympanic dexamethasone represents a safe and potentially effective treatment of sudden idiopathic sensorineural hearing loss with very good results reaches 80% if it is treated in first 72 hours.

Dexamethasone injection gives very good results in patient's with Ménière's disease improving all its symptoms specially vertigo which improves in more than 70% of the cases.

An alternative strategy is to use gentamicin as a means of achieving vestibular ablation in Ménière's patients.

The main advantages of intra-tympanic therapy are ease of administration, avoidance of surgery, alternative therapy when systemic route is contraindicated or poorly tolerated, and possible salvage therapy when systemic therapy fails.

Keywords: Intra-tympanic-injection-otology

Introduction

Introduction

Intra-tympanic pharmacotherapy was first used by Schukenecht in 1956 when aminoglycosides were instilled for the treatment of vertigo in Ménière's disease. Since that time, intra-tympanic applications of other agents has been used for various other inner ear disorders. These agents include corticosteroids and local anesthetics, **(Banergjee and Parnes, 2005)**.

Intra-tympanic therapy is often used to treat inner ear disorders such as Ménière's disease, sudden idiopathic sensorineural hearing loss and autoimmune hearing loss **(Tomoda et al., 1993)**.

When intra-tympanically applied, drugs resulted in higher endolymph and perilymph concentrations than with intravenous administration **(Chandrasekhar et al., 2000)**.

The main advantages of intra-tympanic therapy are ease of administration, avoidance of surgery, alternative therapy when systemic route is contraindicated or poorly tolerated, and possible salvage therapy when systemic therapy fails **(Doyle et al., 2004)**.

Standard initial line of treatment in old days for Ménière's disease was medical. Patients who were uncontrolled with medical treatment were considered candidates for surgical therapy in the form of a non-destructive endolymphatic sac surgery. Now intra-tympanic steroid injections have been proposed as the initial surgical procedure

of choice when endolymphatic sac surgery reserved only for who do not respond to intra-tympanic injections **(Gilbert et al., 2005)**.

Synthetic corticosteroids such as dexamethasone are primarily used for their potent anti-inflammatory effects, potent and varied metabolic effects and their modifications on the body's immune responses to diverse stimuli **(Doyle et al., 2004)**.

Intra-tympanic administration of dexamethasone may acutely affect sensorineural hearing loss associated with endolymphatic hydrops **(Hillman et al., 2003)**.

Intra-tympanic injections of corticosteroids should not be expected to give long-term control of vertigo in patients with Ménière's disease. Multiple courses of intra-tympanic injections of corticosteroids, in conjunction with other treatment, are necessary in most patients with Ménière's disease who have intractable vertigo **(Barrs and David, 2004)**.

In extremely severe cases of episodic vertigo, such as due to Ménière's disease, treatment that deadens the inner ear such as gentamicin injections may be considered. This is a last resort treatment for persons who have severe attacks of vertigo. Results, in term of relief of vertigo, are very good. Hearing is generally unaffected or worsened. Tinnitus is also generally unaffected but some recent studies report reduction in tinnitus **(Bauer et al., 2001)**.

Intra-tympanic steroids may affect symptoms of hearing loss and tinnitus in patients with various inner ear problems. Patients with Ménière's disease appear to respond in highest percentage of cases **(Silverstein et al., 1996)**.

Instillation of intra-tympanic steroids represents a safe and potentially effective treatment of sudden idiopathic sensorineural hearing loss. Currently, various methods of intra-tympanic application of active substances in the middle ear cavity are used: direct trans-tympanic injection, injection through a previously created (laser-assisted) tympanostomy, instillation through a previously inserted ventilation tube, tympanotomy with placement of steroid-soaked absorbable gelatin sponge and filing the remaining middle ear cavity with steroid solution, and continuous middle ear steroid perfusion through a microcatheter **(Selivanova et al., 2005)**.

The number of intra-tympanic steroid infusions and the duration of each treatment vary from one clinician to the next **(Doyle et al., 2004)**.

The most common risks are pain, short-lasting vertigo, otitis media, and tympanic membrane perforations. These are somewhat dependant on the drug and administration procedure used **(Doyle et al., 2004)**.

Rationale

Many researches in last twenty years focused on direct drug instillation into the middle ear cavity, aiming to deliver drug directly to the inner ear through round window permeability.

Different drugs were used to treat different diseases and the results vary from one clinician to the other.

So, we will try to review previous results and to find an optimum protocol in every situation.

Aim of the Work

The aim of this work is to review the role of intra-tympanic injection in treating different otolgoic pathologies.

ANATOMICAL AND PHYSIOLOGICAL BACKGROUND