

Short Term Results of Intra Tympanic Gentamicin and Dexamethasone on Hearing and Tinnitus in Meniere's disease: A Case Control Study

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Abstract

Objective: The role of this study was to evaluate the effectiveness of intra tympanic administration of Gentamicin(40 mgs/ml) and Dexamethasone 0.5 ml(4 mgs/ml) on hearing and tinnitus of patients who had recurrent acute attacks of vertigo, tinnitus and hearing loss. **Study Design:** 60 consecutive patients of Meniere's disease were randomly divided into 3 groups of twenty patients each. Group A included 20 patients who received intra tympanic gentamicin, Group B included 20 patients who received intra tympanic dexamethasone and Group C included 20 patients who received intra tympanic normal saline 0.5 ml. The mean pure tone thresholds at speech frequencies were noted before treatment and 2 weeks, 3 months and 6 months after treatment. Tinnitus was surveyed with a set questionnaire (Tinnitus Handicap Inventory). **Results:** The mean PTA at speech frequencies for Group A worsened from 50 dB to 62 dB which was statistically significant. Two ears developed profound sensorineural hearing loss. The mean tinnitus handicap inventory grade of group A was 4. Mean was 2 at the end of 6 months which indicates significant reduction of the tinnitus score. Group B patients had a mean PTA at speech frequencies of 42 dB. There was no gain in 12 patients and less than 10 dB in the remaining eight patients and no worsening of hearing was seen. The mean tinnitus handicap inventory grade in Group B was 2.5 and was 2 at 6 months after treatment. Group C patients had a mean PTA of 48 dB before treatment and were same after treatment however the tinnitus handicap grade was 2.5 before the treatment and 2.0 after treatment. **Conclusion:** Intra tympanic gentamicin is more effective in controlling tinnitus as compared to dexamethasone and placebo and there was no marked difference in control of tinnitus between placebo and steroids. There is significant hearing loss with IT Gentamicin and no marked difference between steroid and placebo on hearing.

Keywords: tinnitus, injections, vertigo, deafness.

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INTRODUCTION

Meniere's disease is defined as recurrent attacks of spontaneous episodic vertigo, hearing loss, aural fullness and tinnitus (AAO-HNS)¹. In 1861 Prosper Meniere first recognised that this disorder originated from inner ear but wrongly attributed it to haemorrhage². In 1938 Hallpike and Yamakawa independently described a hydrops in endolymphatic system of patients with Meniere's disease². A number of different treatment modalities have been identified for this disease, ranging from dietary measures (e.g. low salt diet) and medication (e.g. betahistine, diuretics) to extensive surgery (e.g. endolymphatic sac surgery). Although a large number of studies have been conducted on therapy for Meniere's disease, an effective evidence based therapy has never been established². Recently intra tympanic medications have gained widespread popularity³. It is worthwhile to conduct a first-hand study comparing the effect of gentamicin with dexamethasone.

MATERIALS AND METHODS

The prospective study of 60 patients with Meniere's disease (AAO-HNS criteria) was conducted in District Hospital Pulwama a secondary care hospital in Kashmir valley from February 2015 to August 2015. Patients with persistent symptoms despite maximal medical management were included in the study. All patients gave their informed consent before the procedure. Patients with tinnitus were graded using tinnitus handicap inventory before and after treatment. Patients with hearing loss underwent PTA before treatment and 2 weeks and 6 months post intra tympanic medication. Using a spinal needle 27 gauges and 2 ml syringe intratympanic administration of drugs was given in antero inferior quadrant of tympanic membrane with the head tilted to normal ear for 20 minutes. Gentamicin 2 ml (40 mgs/ml), dexamethasone 0.5 ml (4 mgs/ml) and normal saline 0.5 ml was administered.

RESULTS

The average age of patients was 45 years with a male female ratio of 1:1.14. The mean PTA of the patients was 43.66 dB before any intervention was done (Figure 1).

PTA hearing improvement of equal or less than 10 dB was noticed in 8 patients. PTA hearing worsening was noted in 16 patients with two patients developing profound SNHL (Figure 2).

Out of the 60 patients in the study 52 patients had

HEARING THRESHOLDS BEFORE INTERVENTION



Figure 1: Hearing Thresholds before Intervention.

tinnitus. 30 patients described the tinnitus as low pitched hissing, 12 patients described it close to the sound made by flowing water in a stream, 6 described the tinnitus as loud thuds, 4 patients had a pulsatile type of tinnitus (Figure 3).

Out of the 52 patients 32 patients responded after 6 months of intervention whereas 12 patients did not respond and had no change in tinnitus. There was worsening in 8 patients. 16 of the 20 patients of Group A responded and the mean THI was 4 prior to intervention and was 2 six months after the intervention which indicates a significant reduction. There was no significant reduction in tinnitus in Group B and Group C (Tables 1-3).

In our study the most common complication was temporary dizziness (n = 12). Tympanic membrane perforation occurred in two patients which was subsequently managed with regular trichloroacetic acid cauterisation of the margins.

DISCUSSION

Immunologic injury is implicated in many inner ear pathologies, and Meniere's disease may be due in some cases to immune dysfunction. Immunologic or allergic causes of Meniere's disease were proposed as early as the 1890s. In a recent study conducted by Tomoda et al³. 30 patients with classic Meniere's disease underwent

HEARING AFTER 6 MONTHS OF INTERVENTION



Figure 2. Hearing after 6 months of Intervention.

Type of tinnitus



Figure 3. Type of tinnitus.

Table 1. Comparison of Tinnitus score change.

Number	Responders	Non-responders	Worsening
52	32	12	8

Table 2. Group wise change in tinnitus responder.

Number	Group A (n = 20)	Group B (n = 20)	Group C (n = 20)
32	16	10	6

systemic and otologic investigations. Several cases showed hypergammaglobulinemia and antibody elevation to type 2 collagen in the serum and endolymph. Five of 18 patients (28%) were treated with oral prednisolone (60 mg/day). Hughes et al. also reported a good response in 20% of Menier's patients treated with oral prednisolone⁴. Shea reported that Menier's patients with acute rapidly progressive hearing loss have a marked response to oral dexamethasone⁵. Recently, intratympanic (IT) steroids have been used more widely due to lack of systemic side effects. IT steroids may have an anti-inflammatory effect in the labyrinth, as suggested by the beneficial response in inner ear diseases with likely immune causes⁶. In addition, recent in vitro studies suggest that steroid perfusion of labyrinthine tissues can affect sodium and fluid transport⁷. In our study there was some improvement in tinnitus with intra tympanic dexamethasone with no deterioration of hearing. So when hearing is to be preserved intra tympanic steroids may be used.

Gentamicin is an antibiotic which damages the inner ear and the balance organ when it is applied behind the ear drum. This treatment may decrease the spells of vertigo in Meniere's disease. In a review of 50 patients conducted by Pullens et al. they found a beneficial effect of intra tympanic gentamicin therapy in Meniere's disease². Rodriguez et al. found a beneficial effect of intra tympanic gentamicin in controlling vertigo and tinnitus of patients with Meniere's disease⁸. G W Hicks did a similar study and found that intra tympanic drug therapy i.e gentamicin and dexamethasone are both effective for controlling tinnitus⁹. Eklund et al. in their study of 93 patients of meniere's disease found intra tympanic gentamicin produced significant improvement in tinnitus however produced significant deterioration in hearing¹⁰.

CONCLUSION

Intra tympanic gentamicin therapy could be a simple and effective management option for controlling tinnitus however hearing loss is significant with IT gentamicin therapy. Intra tympanic steroids produce marginal improvement in tinnitus with no hearing loss. However further double blinded studies are needed to confirm the results.

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