Research Article

Effect of Intratympanic Dexamethasone in Intractable Unilateral Meniere’s Disease

Pradeep Pradhan1*, Kanwar Sen2 and Priti Lal1

1Department of Otolaryngology, Safdarjung Hospital & Vardhman Mahavir Medical College, India
2Department of Otolaryngology, Dr. RML hospital, India

Abstract

Objective: To evaluate the effectiveness of Intratympanic dexamethasone in controlling vertigo and sensor neural hearing loss in intractable Meniere’s disease.

Methods: 30 patients with intractable Meniere’s disease were treated with intratympanic dexamethasone injections. Post treatment pure tone audiograms and dizziness scores were compared with the pretreatment audiogram and dizziness scores respectively.

Results: Improvement in mean vertigo score was noticed from 91.58 (range 80-100) (pretreatment) to 49.295 (p=0.351) at 6 months and to 60.4 (p= 0.974) at the end of 2 years after intratympanic injection. 9 (40.90%) and 5 (25%) patients were found to be free of vertigo at the end of 06 months and 2 years respectively. None of the patients showed any significant improvement in hearing (>10dB) at the end of 2 years of follow-ups. Only one patient was found with a small central perforation at the end of 1 month of treatment.

Conclusion: Intratympanic steroid is a safe and an effective method of treating intractable Meniere’s disease. Although improvement in vertigo was more pronounced in the short term, 25% of the patients were detected free of vertigo at the end of 2 years. No significant improvement in hearing was noticed after 2 years of treatment.

ABBREVIATIONS

AAO- HNS: American Academy of Otolaryngology and Head and Neck Surgery; PTA: Pure Tone Audiometry; DHI: Dizziness Handicap Inventory

INTRODUCTION

Diuretics, salt restricted diet and labyrinthine sedatives are considered as the mainstay of treatment in Meniere’s disease and two third of the patients get relieved by this conservative management [1]. Patients who are refractory to the standard medical treatment are often advised for ablative procedures. In the recent years due to the advancement of minimal invasive therapies, intratympanic medications (intratympanic steroid, gentamycin) have been tried in patients with intractable Meniere’s disease. With the increasing evidence implicating autoimmunity as an aetiologic agent in Meniere’s disease [2], corticosteroids find a place in the management of this disorder which acts by virtue of their anti inflammatory and immunosuppressive action. Although effective control of vertigo is achieved by intratympanic gentamycin injection, its use is limited by deteriorating effect on hearing and disequilibrium in the postoperative period. Hence the use of intratympanic dexamethasone has gained popularity over gentamycin for the treatment of Meniere’s disease in recent years [3]. In vitro studies shows dexamethasone injection in the inner ear can affect the fluid and electrolyte transport through stria vascularis [4] which indicates that steroid decrease the inner ear pressure by its action on water and electrolyte transport, mediated by mineralocorticoid receptor mediated genes [5,6] and by aquaporin channels [7]. Again drugs passing through round window membrane are found to have higher concentration in the inner ear than when given in systemic route [8] avoiding the systemic complications of steroid. Steroid also increases cochlear blood flow when given intra tympanically [9]. Different studies were performed in the past, which showed variable vertigo and hearing outcomes of intratympanic dexamethasone in patients of Meniere’s disease. Being an office based minor surgical procedure; patients can be discharged on the same day and are associated with minimal postoperative morbidity. We report our experience of the use of intratympanic dexamethasone in unilateral intractable Meniere’s disease for long term control of vertigo and hearing.
MATERIALS AND METHODS

The study was conducted at PGIMER, Dr. RML Hospital, a tertiary care academic hospital. Ethical committee clearance has been taken before starting the study project. The study period was from October 2009 to April 2014. A total of 30 patients of unilateral Meniere’s disease (as diagnosed by the AAO- HNS criteria 1995) who had not responded to medical management with dietary restrictions, betahistine hydrochloride and diuretics (Benzthiazide-2.5 mg plus triamterine 50 mg) were included in the study. Patients with cochlear hydrops, history of hypertension and those who had taken oral corticosteroids in the past 6 months were excluded. After receiving written informed consent of the patient, 0.3-0.5 ml of dexamethasone (4mg/mL) was injected intratympanically in the anterosuperior quadrant of the tympanic membrane to allow for maximum filling of the middle ear space. The patient was asked to lie with the injected ear up for the next 30 minutes and swallow as little as possible during this time to allow the drug to remain for as long as possible in the middle ear. Injections were given at weekly intervals for 3 weeks. Post treatment visits were done at 01 month, 03 months, 06 months, and at the end of 02 years (from the day of the first intratympanic dexamethasone injection) for the assessment of giddiness and hearing. Pure Tone Audiometry (PTA) was done at each follow up visit and worst post treatment audiogram was compared with a pretreatment audiogram. A 10 dB change in the hearing thresholds at 500, 1000, 2000 and 3000 Hz was considered significant.

Vertigo was subjectively assessed at each follow up visit using the Jacobson’s Dizziness Handicap inventory (DHI) scale which consisted of 25 questions pertaining to the physical, emotional and functional disability experienced by the patient due to vertigo. Each question contains three options, ‘no’ (worth 0 points), ‘sometimes’ (worth 2 points) or a ‘yes’ (worth 4 points) as it is answered by patient. Each patient could therefore score between 0 and 100 points. The lower the score, the lesser the dizziness handicap. Successful control of vertigo was defined as complete cessation of definite spells of vertigo. The pretreatment dizziness scores were compared with the post treatment scores for each patient at every follow-up visit. Any complications found were noted.

The paired ‘t’ test was used to compare the worst post treatment and pretreatment audiograms and also the post treatment and pretreatment dizziness scores.

RESULTS

30 patients were included in the study of which there were 16 males and 14 females. The age ranged from 23 to 75 years (mean age: 43.6 years). The duration of disease ranged from 0.5 to 15 years (mean duration 3.6 years) and the average period of follow-up was 2.6 years.

Of 30 patients, 25 (85%) had complete control of vertigo at 01 month follow-up which was found significant when compared to pretreatment patients. (p=0.000). At the end of 3 months, 25 of the 30 patients reported for follow up, of which 12 (48%) patients were found to be free of vertigo (p=0.139). At the end of 6 months, 22 patients could be followed and of which 12 (40.90%) patients were found free of vertigo (p=0.536). Likewise at the end of 2 year, of a total of 30 patients, 20 were followed and 5 (25%) of them were detected free of vertigo (p=0.718). On an individual level, the mean giddiness score before treatment was 91.58 (range 80 -100). At 01 month in the post treatment period the mean score was 33.409 (p = 0.002) and at 03 months the mean score was 37.409 (p=0.040). At the third follow up i.e. at 06 months the mean score recorded was 49.295 (p=0.351) and the score increased to 60.4 at the end of 2 years (p = 0.974).

The average hearing thresholds before treatment was 50 dB. At 01 month post treatment, the average hearing threshold improved to 46 dB (p=0.800) and remained so at 3 months of follow-up (p=0.771) when 25 patients had come for hearing assessment. At 06 months the average threshold was 45 dB (p=0.556). The average hearing threshold at 2 years follow up was 55 dB and the difference between the pretreatment and post treatment hearing threshold was found to be insignificant (p=0.149).

Of the 30 patients, 02 patients (6.6%) demonstrated significant hearing improvement i.e. more than 10 dB improvement in the hearing thresholds at the end of one month In the remaining 28 patients, hearing threshold remained same as the pretreatment hearing threshold.

In the consecutive two visits i.e. at 3 months and 6 months, no patients were found with significant improvement in hearing. Similarly at the end of 2 years, of 20 patients, one patient (5%) showed deterioration in hearing threshold (>10dB) and in rest it remained unchanged. Only one patient was found with a small central perforation at the end of 1 month which healed with conservative management after 2 months. There was no other complication noted.

DISCUSSION

Intratympanic dexamethasone (4mg/mL) injection in our study produced significant improvement in vertigo control at the first follow-up period i.e. after one month and gradually decreased in the subsequent visits. So the improvement in vertigo, in our study, with 03 doses of dexamethasone appears to be more marked in the short term as the number of patients with complete control of vertigo fell from 85% in the first one month to 40.90% at the end of 6 months and 25% by the end of 2 years. Similarly the mean giddiness score significantly decreased in the first two consecutive follow-up periods i.e. at the end of 1 month and 3 months and after that again the mean score increased gradually till the end of 2 years, when the improvement in the scores was found to be insignificant (p=0.974).

Review of reports published previously have reported varying results ranging from no improvement to as high as 90% vertigo control [10-12]. Probably this difference is due to the varying study designs, type and dosing schedule of the steroid administered and also the different follow up period. These differing results pose a challenge for the clinician while consenting the patients.

According to Parnes [3] dexamethasone levels in the perilymph and the endolymph get significantly depleted within six hours of administration. Hamid et al [13] in their study used 24 mg/ml of dexamethasone and reported a vertigo control and...
even hearing improvement in 90% of the patients. Therefore, probably using corticosteroids with a higher dosage/repeated dosing may lead to significant long term benefits, and this would merit further studies to standardize the dosing schedule.

This significant control in vertigo albeit short term is probably due to the near direct application of corticosteroids to the area of immune dysfunction as opposed to when given systemically where the drug may not cross the blood labyrinthine barrier as effectively. Parnes et al & Chandrashekhar et al [3,14] reported that the concentration of steroids in the endolymph and perilymph is significantly higher when they are given intratympanically than when given intravenously. However, the intratympanic use of corticosteroids did not translate into significant improvement in hearing in our experience. Though 2(6.66%) patients were found with significant improvement in hearing at the end of one month, in the consecutive postoperative visits no improvement was noticed.

Other authors have also reported similar discouraging results in the past. Silverstein [15] had conducted a well designed randomized double blind crossover trial where a group of 29 patients of stage IV Meniere’s disease were treated with intratympanic dexamethasone. But no improvement in hearing was noted. Similarly Arriaga and Goldman [16] did not report a significant improvement in hearing. Although we may not have achieved a significant improvement of hearing thresholds but dexamethasone did not significantly worsen hearing either with only 6.6% of our patients reporting deterioration of hearing thresholds and that too was short term deterioration, and probably could be attributed to the fluctuating nature of hearing loss characteristically seen in this disease. At the end of two years there was no significant change in the hearing thresholds in comparison with the pretreatment thresholds. This is in contrast to the use of intratympanic gentamycin for Meniere’s disease where 20-30% incidence of hearing loss has been reported [11] Bole as-Aguirre MS [18] conducted a study of intratympanic where 20-30% incidence of hearing loss has been reported to the use of intratympanic gentamycin for Meniere’s disease in comparison with the pretreatment thresholds. This is in contrast to the studies by Cassani et al [19] between intratympanic dexamethasone and gentamycin containing 60 patients of unilateral Meniere’s disease, demonstrated better control of vertigo (93.5% vs 61%) and (12.5%) hearing impairment with low dose gentamycin injection after 2 years of follow-up. Phillips JS, Westerberg B [20] also reported significant improvement in giddiness after 2 years of intratympanic steroid injection.

This study, as also the previous studies reported in literature on the subject have not reported any significant complications or adverse effects. On the contrary intratympanic administration of steroids for the treatment of refractory Meniere’s disease has some distinct advantages as it is minimally invasive, less expensive and can even be given to patients who cannot tolerate oral steroids such as diabetics.

CONCLUSION

Dexamethasone given intratympanically, effectively and safely controls the vertigo in patients who are refractory to standard medical management. Although the improvement in vertigo is more pronounced in the short term period post treatment, but we observed that even over a two year period, 25% of them were detected free of vertigo as compared to the pretreatment levels. The effect on hearing improvement was not significant both on short term and long term period.

REFERENCES


