INTRODUCTION

Intratympanic gentamicin treatment (IGT) is an evidence-based therapeutic option for recurrent vertigo attacks in Meniere’s disease. Recently, the “low dose” protocol with just one or two injections in total spaced 1 month apart or on demand is becoming the standard. The extent of deficit as well as possibility of recovery vestibular receptors function is important for permanent imbalance and control of vertigo. In this context the objective and quantitative assessment of the semicircular canals functions, including vertical ones seems to be valuable. Today, in every day clinical practice it is possible to monitor changes of that function, induced by IGT, with objective test methods such as the video head impulse test (vHIT).

AIM

To determine the deficits of horizontal and vertical semicircular canals after intratympanic low-dose gentamicin treatment for Meniere’s disease using video head impulse test in long term follow up.

METHODS

A prospective study of 15 subjects (9 women, 6 men, mean age 57 +/-15, range 36-69) with definite unilateral Meniere’s disease (AAO-HNS, 1995) treated with intratympanic gentamicin injection using low-dose protocol (concentrations of 20 mg/ml, buffered with bicarbonate, 1-2 injections, waiting a month between injections). The drug was injected, left in the middle ear for 30 minutes while the person was lying with treated ear up and then an attempt was made to clear it from the middle ear via the ET tube with swallowing. Patients were rechecked at one month (or 2 months). We expected spontaneous nystagmus, beating away from the injected side, and different from the situation prior to injection as well as subjective symptoms as chronic instability, oscillopsia. Usually it took video-frenzel goggles to see the nystagmus, as it wasn’t very strong. If symptoms were unchanged in the 2nd half of the preceding month, and there were no signs of drug effect on vestibular function and hearing, a second injection was given. Patients were tested on the day of first administration of gentamicin. Post – gentamicin testing was performed 4-6 and 12-18 months after treatment.

We measured the gain of the angular vestibulo-ocular reflex (VOR) in each of the canal planes using commercially available vHIT device. Additionally low frequency changes of horizontal vestibulo-ocular reflex were monitored using the bilateral caloric irrigation.

RESULTS

VOR gain before and after IGT

Before treatment 11 patients presented VOR gain of all semicircular canals in the normal range on the affected side (0.92 +/-0.20, 0.83 +/-0.30 and 0.79 +/-0.25 for the horizontal, anterior and posterior canal respectively). The remaining 4 subjects had decreased gain of horizontal and/or anterior, and/or posterior canal (0.67 +/-0.13, 0.63 +/-0.15, 0.37 +/-18).

Changes of VOR gain for horizontal canal in the patient 11.

Calorics

Abnormal caloric asymmetries between normal and affected side (averaged 47% +/-33%) were found in 10 subjects before treatment and deteriorated to 69% +/-31% when measured 4-6 weeks after treatment. No significant changes in caloric asymmetries were found in tests performed after 12-18 months.

Control of vertigo

Subjects in this study have experienced 24 +/- 8 episodes of vertigo during 6 months prior to IGT. During first 6 months following this treatment all patients were free of vertigo attacks. During the next 6-12 months 4 of 15 patients experienced a return of vertigo attacks after a single intratympanic injection of gentamicine. One or two additional injections were given after completion of data.

DISCUSSION

A recent study revealed that the high frequency VOR gain as measured in vHIT was normal in up to 45% of MD cases. Our results are consistent with findings that in patients with Meniere’s disease there is discrepancy between calorics and vHIT. There are divergent explanations for this phenomena (different “reaction” of type I and type II hair cells, hydrostatic influence on calorics and HIT responses). In this study the impact of IGT was apparently smaller on vertical canals. The most essential finding is that there is a clear “tendency” or evidence (in some cases) that VOR gain recovers after IGT. The explanation for this phenomenon we see in the low-dose gentamicin protocol. A somewhat old meta-analysis reported that low-dose methods have significantly poorer vertigo control (66.7% overall). This has not been our experience. This study shows, that control of vertigo following IGT can be obtained with only slight damage of vestibular receptor limited to low frequency VOR, which seems to be more susceptible to damage and more essential in pathophysiology of vertigo attacks.