

Full Length Research Paper

Clinical analysis of benign paroxysmal positional vertigo secondary to Meniere's disease

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In the present study, the clinical characteristics of 15 cases of benign paroxysmal positional vertigo (BPPV) secondary to Meniere's disease (MD) were retrospectively analyzed, in order to improve the diagnosis and therapeutic efficacy. Patients clinically characterized as positional paroxysmal vertigo were diagnosed as MD by electrocochleography (ECoChG) and glycerol test and were confirmed as BPPV associated with MD by Dix-Hallpike test and roll test. They were treated with Epley maneuver or Barbecue roll maneuver according to the type of BPPV, and the efficacy was evaluated. BPPV occurred after MD in all of the cases, of which 13 cases were posterior semicircular canal lithiasis and 2 cases were horizontal semicircular canal lithiasis. In this study, 10 patients were cured after 3 to 4 times of posture treatment (66.7%), 4 patients were cured after no less than 5 times and 1 patient received endolymphatic sac decompression because of recurrent vertigo. BPPV can result from MD, and a possible mechanism may be the hydrolabyrinth that lead to otolith falling off. BPPV occurred in the ipsilateral posterior semicircular canal in majority of cases, with an obvious sexual bias to female. Otolith reposition is an effective method to treat BPPV secondary to MD, while it is refractory compared to simple BPPV and requires multiple times of treatments. This may be related to the recurrence of hydrolabyrinth.

Key words: Meniere's disease, benign paroxysmal positional vertigo.

INTRODUCTION

Meniere's disease (MD) and benign paroxysmal positional vertigo (BPPV) are common peripheral vertigo diseases. BPPV can occur as primary or idiopathic disease, but can also be a secondary disease to MD, vestibular neuritis, idiopathic sudden deafness, posterior circulation ischemia or systematic postoperative complications. BPPV accounts for 20 to 30% of all vertigo diseases (Dix and Hallpike, 1952). There are certain clinical characteristics on BPPV secondary to MD compared to simple MD. Herein we summarized our findings from a retrospective analysis of 15 BPPV cases associated with MD.

PATIENTS AND METHODS

A total of 15 hospitalized patients were recruited from the department of otolaryngology from July 2007 to June 2009, and included 1 male and 14 female, aged between 46 to 49 years (mean 54 ± 3.5 years). Among them, 2 had horizontal semicircular canal BPPV and 13 posterior semicircular canal BPPV diagnosed by postural test. Diagnosis and treatment of MD was based on the guidelines developed by AAO-HNS Committee (Ervin, 2004). Generally, patients clinically presenting MD were diagnosed by glycerol test and ECoChG. Diagnosis of BPPV was based on the results of Dix-Hallpike test and roll test, according to the criteria developed by the American Academy of Otolaryngology-Head and Neck Surgery Foundation (2008) (Bhattacharyya et al., 2008). Posture-induced test was performed routinely on each MD patient and patients with positive posture-induced test received repositioning treatments thereafter. This study was approved by the Ethics Committee of Sun Yat-Sen University and informed consent

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Table 1. Course of in MD.

Course of MD (years)	Case number
≤ 5	3
6 - 9	5
≥ 10	7

was obtained from each subject. Patients with posterior semicircular canal BPPV received otolith reposition using the Epley maneuver (Epley, 1980). Briefly, the patient seated with the head placed 45° to the affected side and lay supine with the head gesture. The head tilted 30° downward, turned to the neutral position and then slowly to 45° to the asymptomatic side. Then the head and body were rotated 45° until facing downward, after which the patient was brought to sitting position, head turned forward 30° with chin down. Each position was kept for 1 to 2 min or until vertigo subsided.

Patients with lateral semicircular canal BPPV were treated by the Barbecue roll maneuver (Lempert and Tiel-Wilck, 1996). Briefly, the patient seated and lay supine promptly. The head tilted 90° to the asymptomatic side. Then the body was rotated 180° to the asymptomatic side with head tilted to the neutral position. The body was further rotated 180° to the initial supine position and the patient then sat up. Each position was kept for 1 to 2 min or until vertigo subsided. All patients received follow-up for 6 months at least, post in-hospital treatments.

RESULTS

Most BPPV associated with MD occurred in female patients. There were 14 females in this group with only 1 male. In all of the cases, BPPV occurred after MD in all of the cases, of which 13 cases were posterior semicircular canal lithiasis (9 in the ipsilateral ear, 2 in the contralateral ear and 2 in both ears) and 2 cases were horizontal semicircular canal lithiasis (1 was cupula lithiasis in the ipsilateral ear). In this study, 10 patients recovered after 3 to 4 times of posture treatment (66.7%), 4 after no less than 5 times, and 1 received endolymphatic sac decompression because of recurrent vertigo. The interval between two treatments was about 2 to 3 days.

In the 15 cases of BPPV secondary to the MD, the incidence rate increases as the MD course prolonged (Table 1). The histological sequence of the endolymphatic hydrops is from cochlea to saccule, utricle and then the semicircular canal. At the same time, hydrolabyrinth causes otolith membrane expansion, which intensifies the drainage tube obstruction. Among the studied 15 MD patients, 86.7% (13 cases) of BPPV occurred on the hydrolabyrinth side, while only 13.3% (2 cases) happened on the asymptomatic side (Table 2). This may be related to hydrolabyrinth induced abnormalities on otolith structure in utricle and semicircular canals. There were 13 cases of posterior semicircular canal lithiasis and 2 cases of horizontal semicircular canal lithiasis.

DISCUSSION

Though the prevalence of BPPV secondary to MD varied greatly in published reports, it was previously reported to be 1 - 2% (Baloh et al., 1987). In recent reports, the incidence of MD induced BPPV is as high as 45% (Hughes and Proctor, 1997). 9 cases of secondary BPPV in 162 MD cases were reported (Gross et al., 2000). In 2007, the incidence of secondary BPPV was reported only as 0.3% (Wu et al., 2007). In the 150 hospitalized MD patients in the department from July 2007 to June 2009, there were 15 with confirmed secondary BPPV (10%). The discrepancy in the incidence between studies might be due to the differences in the study design, inclusion/exclusion criteria, criteria for diagnosis and patient population. Posture-induced test is routinely performed on each MD patient in our department to eliminate the potential missed diagnosis of secondary BPPV.

During clinical diagnosis and treatment, we found that BPPV secondary to MD has special clinical characteristics compared with simple BPPV.

BPPV occurs as a secondary disease to MD

The range and degree of the affected membranous labyrinth grew as the course of the hydrops prolonged, and ended with the change of otolith structure even falling of otolith. Meanwhile there was no case of MD secondary to BPPV that was observed in our clinical records. However, this putative conclusion is limited by the sample size and requires further confirmation in the process of clinical record accumulation.

BPPV mainly occurs on the hydrolabyrinth side

Among the 15 MD patients, 86.7% (13 cases) of BPPV occurred at the hydrolabyrinth side, while only 13.3% (2 cases) at the asymptomatic side. This may be related to hydrolabyrinth induced abnormalities on otolith structure in utricle and semicircular canals. There were 13 posterior semicircular canal lithiasis and 2 horizontal semicircular canal lithiasis. In the MD induced hydrolabyrinth, posterior semicircular canal labyrinth is more prevalent compared with the horizontal semicircular canal labyrinth. Meanwhile, the sacculus is more pliable than utricle, thus obstruction occurred more often in sacculus, which implies that there should be only a few concurrent BPPV cases among the MD patients.

Recently during the dissection of temporal bones of concurrent BPPV and MD patients, there were many basophilia sediments in the semicircular canal and cupula, with high prevalence in the posterior semicircular canal at the hydrolabyrinth side (Morita et al., 2009). This anatomic

Table 2. MD hydrolabyrinth side compared with BPPV.

Hydrolabyrinth side		BPPV symptomatic side	
		Horizontal semicircular	Posterior semicircular
Bilateral	3	Bilateral	2
		Unilateral	1
Unilateral	12	Ipsilateral	8
		Contralateral	2

evidence agrees with our observation that BPPV occurred highly in the posterior semicircular canal of the MD symptomatic side.

Progression of BPPV in hydrolabyrinth side is inconsistent and non-synchronous with the outcome of MD

We found that during the treatment and follow up of MD cases, BPPV progression or recurrence continually existed independently after hydrolabyrinth relief and hearing recovery of inner ear according to ECochG examination. To these effect, Gross et al. (2000) proposed the possible mechanism that the effective flow of endolymph is improved by the relief of MD induced hydrolabyrinth during the treatment, but there is still obstruction or angusty in the semicircular canal membranous labyrinth, therefore BPPV can exist independently after effective control of MD.

However, an MD patient received combination treatment of routine medication, tympanum infusion of glucocorticoid and Meniett physical therapy. There was no obvious recovery on hydrolabyrinth and vertigo, while BPPV (later confirmed as semicircular canali-thiasis) recurred repeatedly. The patient finally received endolymphatic sac decompression to relieve hydrolabyrinth and no BPPV occurred thus far in the 2 years follow up. Combined with the other observations, this phenomenon may prompt that in the treatment of BPPV associated with MD, the effective relief of hydrolabyrinth may be the precondition of curing BPPV, while it is not sufficient to cure BPPV due to the partial obstruction or stritness occurring after hydrolabyrinth. BPPV will continue for a certain period and then become inconsistent and non-synchronous with the outcome of MD.

BPPV secondary to the MD is refractory compared to simple BPPV and requires multiple times of repositioning treatments.

Compared with simple BPPV cases, 10 patients (66.7%)

in this study were cured after 3 to 4 times of postural treatment and 4 patients (26.7%) were cured after 5 times of postural treatment. Secondary BPPV is more difficult compared with simple BPPV and it requires more times of treatment. We believe that the repeated endolymph dropsys reduce the elasticity of repeatedly swollen membranous labyrinth, resulting in the partial obstruction or angusty in the semicircular canal membranous labyrinth, even partial collapse or accretio of membranous labyrinth. Single repositioning treatment may not be able to reposition the fallen otolith back to the utricle completely. Thus multiple times of repositioning treatment are required, even individual cases requiring operation.

Obvious sexual bias

In the current research, there is only one male patient out of the 15 cases, while this obvious sexual bias is not supported by any conclusive theory in epidemiology. However, the sex distribution of patients with MD in many previous reports exhibited a low level bias to female (Wladislavosky-Waserman et al., 1984; Watanabe et al., 1995). In addition, the female patients take 78% of the 150 admitted patients with MD in our hospital. Therefore, whether the sexual bias exists in the secondary BPPV requires further research on expanded clinical sample size.

In conclusion, we summarized the general clinical characteristics of BPPV secondary to MD from the retrospective analysis of 15 cases in our medical practice. With the accumulation of medical cases and the progress of related research, we will have a deeper understanding of this disease.

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