



Quick repositioning maneuver for horizontal semicircular canal benign paroxysmal positional vertigo

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Abstract

Objective: To investigate the efficacy of quick repositioning maneuver for horizontal semicircular canal benign paroxysmal positional vertigo (H-BPPV).

Methods: Clinical data of 67 patients with H-BPPV who underwent quick repositioning maneuver in our hospital from July 2009 to November 2014 were retrospectively analyzed. The maneuver involved rotating the patient in the axial plane for 180° from the involved side towards contralateral side as quickly as possible.

Results: Complete symptom resolution was achieved in 61 patients (91.0%) at one week and in 64 patients (95.5%) at 3 months post-treatment. During the repositioning maneuver process, there were no obvious untoward responses except transient nausea with or without vomiting in a few patients.

Conclusion: The results indicate that the quick repositioning maneuver is an easy and effective alternative treatment in the management of H-BPPV.

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Keywords: Vertigo; Vestibular diseases; Horizontal semicircular canal; Repositioning maneuver

1. Introduction

Benign paroxysmal positional vertigo (BPPV) is the most common cause of frequent vertigo and is a self-limited disease of the peripheral vestibular disorders, which is characterized by sudden onset of whirling sensation elicited by positioning change. It accounts for approximately 20% of all patients with vertigo symptom (Epley, 1995). For patients with BPPV, the tests usually performed are Dix–Hallpike test and head-rolling test. Previously, the knowledge of BPPV was limited to the posterior semicircular canal BPPV

(P-BPPV). McClure first put forward horizontal semicircular canal benign paroxysmal positional vertigo (H-BPPV) in 1985 (McClure, 1985), and realized that H-BPPV was a subtype of BPPV. In 1988, Semont introduced a treatment for posterior canal BPPV, which they termed Semont's liberatory maneuver (Semont et al., 1988). The premise of the maneuver was based on the cupulolithiasis theory and was designed to 'liberate' misplaced static otoconia from the cupula of the canals into the utricle, restoring normal vestibular signaling. Building on the theoretical basis of Semont's liberatory maneuver and Barbecue maneuver for treatment of BPPV, we designed a new quick repositioning maneuver for management of H-BPPV (Li and Li, 2010). In this paper, we report results from 67 patients with H-BPPV treated with the quick repositioning maneuver at half a year or longer follow up.

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2. Materials and methods

From July 2009 to November 2014, 67 patients were diagnosed as H-BPPV after excluding dizziness of other causes. All patients experienced vertigo attacks induced by specific head movements or positions, especially when lying down to the right or left side. Most patients were afraid of lying or turning over for a fear of attacks. Of the 67 patients studied, 23 (34.3%) were males and 44 (65.7%) were females. The age of the patients ranged from 26 to 84 years with a mean of 53.3 ± 13.5 years. Among them, 7 patients were younger than 40 years, 43 were 40–65 years old, and 17 were older than 65 years. The duration of the disease ranged from half of day to 10 years. The left ear was affected in 37 cases (55.2%) and the right in 30 cases (44.8%).

2.1. Diagnosis criteria

The diagnosis was confirmed by the typical vertigo and geotropic nystagmus following the roll test. If a patient complained of vertigo and showed geotropic nystagmus when laid supine with head elevated 30° and placed in a right-sided decubitus position, right horizontal semicircular canal BPPV was diagnosed. Vertigo and nystagmus in a similar but left-sided position confirmed left horizontal semicircular canal BPPV. All patients received Dix–Hallpike test to rule out BPPV involving the posterior or anterior semicircular canal.

2.2. Repositioning maneuver

Patients with H-BPPV were treated by rotation in the axial plane. In cases of right H-BPPV, the patient was placed on the right side on a wide bed. The clinician stood behind the patients with his right hand holding the patient's right hand. The patients were given instructions to bring feet together and to stretch as straight as they can, while keeping their legs parallel to the floor. Patients were then rolled to the left decubitus position as quickly as possible and maintained in this position for 4 min (Fig. 1). On the contrary, patients were rolled to the right side quickly if they were diagnosed as left-sided H-BPPV.

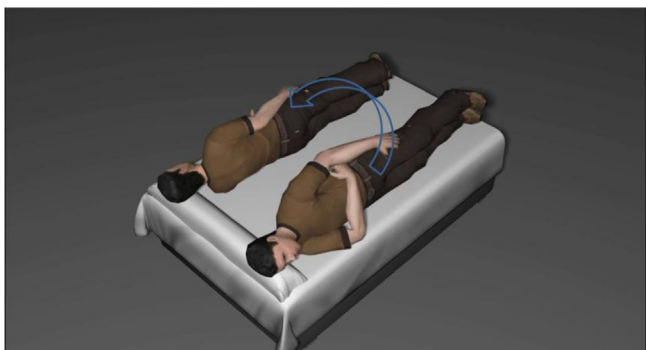


Fig. 1. Diagram of quick repositioning maneuver for right H-BPPV.

The patients were followed up in the outpatient clinic 2 days after each treatment and at one week and 3 months post-treatment. Treatment outcomes were graded as “complete” if there were no subjective complaints of vertigo, “partial” if there was significant improvement but persistent mild vertigo of non-positioning nature, “failure” if there remained a subjective complaint of positioning vertigo and/or present of nystagmus on Dix–Hallpike test or roll test, or “recurrent” if there was any return of vertigo or worsening of a much improved vertigo after a ninitial improved response (Haynes et al., 2002). Recurrent patients were treated with the different quick repositioning maneuver according to the involved semicircular canal.

2.3. Statistical methods

Comparisons were made using χ^2 test, and the results were considered statistically significant when $P < 0.05$.

3. Results

At one week post-treatment evaluation, complete recovery was seen in 58 patients (86.5%), partial recovery in 3 patients (4.5%) and failure in 6 patients (9.0%), yielding a total efficacy rate of 91.0% (61/67). At 3 months, complete recovery was seen in 63 patients (94.0%), partial recovery in one patient (1.5%) and recurrence in 3 patients (4.5%), yielding a total efficacy rate of 95.5% (64/67) (Table 1). The efficacy rates at one week and at 3 months were not statistically different ($p = 0.30$). During the repositioning maneuver, there were no obvious untoward responses, except a few patients having transient nausea with or without vomiting.

4. Discussion

H-BPPV accounts for 13.6%–47.8% of all BPPV cases (Shim et al., 2012; Cakir et al., 2006; Chiou et al., 2005). Some authors have explained that the disparity in reported incidences of H-BPPV may be the different courses of the condition in different medical referral systems (Chung et al., 2009). Compared with posterior semicircular canal BPPV (P-BPPV), H-BPPV has a higher self-resolution rate. A recent study has reported that inpatients with BPPV of shorter courses, the incidence of H-BPPV is significantly higher than P-BPPV (Cakir et al., 2006). Patients who sought evaluation early after the onset of symptoms have a higher rate of H-BPPV than patients with delays in evaluation and diagnosis. Females are more susceptible to BPPV. In this study, 44

Table 1
Effects of quick repositioning maneuver on H-BPPV.

Time of follow up	Complete recovery	Partial recovery	Failure	Recurrence	Total efficacy rate
1 w	58	3	6	0	61 (91.0%)
3 m	63	1	0	3	64 (95.5%)

$\chi^2 = 12.072$, $P = 0.30$.

patients (65.7%) were females, which is close to the report of 74% by von Brevern et al. (2007). Vibert et al. (2003) found that hormonal changes due to menopause exerted an influence on calcium metabolism, and speculated that the high incidence of BPPV in old women was closely related to osteopenia or osteoporosis. Furthermore, women's susceptibility to migraines is another reason why women are likely to develop BPPV (von Brevern et al., 2007).

In this study, we only chose patients with vertigo and geotropic horizontal nystagmus elicited by the supine roll test, so all of the patients suffered from canalolithiasis. Repositioning maneuvers are still the main treatment for H-BPPV. The maneuvers now used in the clinic include Barbecue or Lempert maneuver, Gufoni maneuver, Forced Prolonged Position, Vannucchi-Asprella maneuver and so on. Every maneuver has its advantages and disadvantages.

Barbecue and Lempert maneuvers are simple and easy to operate, but require multiple sessions, and many patients (such as those with obesity, advanced age, cervical spondylosis or musculoskeletal deficiencies) are not capable of undergoing a 360° Barbecue rotation (Crevits, 2005). Gufoni maneuver is also easy and simple to perform, with successful rates of one session at about 78.1%–86% and two sessions at 93%–100%. Several authors have recommended the Gufoni maneuver as the first choice for H-BPPV patients with geotropic nystagmus (Casani et al., 2011). However, in our experience, it is not always easy to bring the patient from a sitting position down on the healthy side, which may impact the maneuver's efficacy. Forced prolonged position (FPP) is a very easy procedure with a total average success rate of 96% by having the patient sleep on the healthy side for more than 12 h. This method can be used for all canalolithiasis, cupulolithiasis-utricle (Cup-U) and cupulolithiasis-cupula (Cup-C) types of BPPV (Chu et al., 2014). Although regarded as an easy method by patients, FPP requires a longtime (at least 12 h as opposed to the few minutes required for repositioning maneuvers) that many elderly patients and individuals with musculoskeletal or cardiologic problems can not tolerate. Furthermore, large particles of otoconial debris may not be able to simply slide in the nonampullary arm of the HSC toward the vestibule (Korres et al., 2011).

Enlightened by the Semont's maneuver for posterior BPPV, we designed the quick repositioning maneuver for H-BPPV. In this maneuver, the patient rotated in the axial plane of the body for 180° as fast as possible. A satisfactory therapeutic efficacy was demonstrated in this study with total effective rates of 91.0% and 95.5% at one week and 3 months after treatment, respectively. The procedure provides an acceleration that dislodges and moves the otoliths from the canal to the utricle by exploiting relative motion between osseous semicircular canals and endolymph and the inertial movement of solid content in the fluid. We found in performing the maneuver, that the faster the patient turned, the

higher the success rate. This can be interpreted as that fast turning increases relative inertia displacement of the floating otolithic debris in the endolymph, making it easier for the otolith to enter the utricular cavity.

Our results indicate that this quick repositioning maneuver is an easy and effective alternative method for the management of H-BPPV. This repositioning maneuver is also applicable to patients with limited neck motion, as cervical spondylosis, short neck, or obesity.

Conflict of interest

None.

References

- Cakir, B.O., Ercan, I., Cakir, Z.A., et al., 2006. What is the true incidence of horizontal semicircular canal benign paroxysmal positional vertigo? *Otolaryngol. Head Neck Surg.* 134, 451–454.
- Casani, A.P., Nacci, A., Dallan, I., et al., 2011. Horizontal semicircular canal benign paroxysmal positional vertigo: effectiveness of two different methods of treatment. *Audiol. Neurotol.* 16, 175–184.
- Chiou, W.Y., Lee, H.L., Tsai, S.C., et al., 2005. A single therapy for all subtypes of horizontal canal positional vertigo. *Laryngoscope* 115, 1432–1435.
- Chu, L.C., Yang, C.C., Tsai, H.T., et al., 2014. A simple algorithm for treating horizontal benign paroxysmal positional vertigo. *Otol. Neurotol.* 35, 1621–1625.
- Chung, K.W., Park, K.N., Ko, M.H., et al., 2009. Incidence of horizontal canal benign paroxysmal positional vertigo as a function of the duration of symptoms. *Otol. Neurotol.* 30, 202–205.
- Crevits, L., 2005. Different canalith repositioning procedures for horizontal canal benign paroxysmal positional vertigo. *Otolaryngol. Head Neck Surg.* 133, 817.
- Epley, J.M., 1995. Positional vertigo related to semicircular canalolithiasis. *Otolaryngol. Head Neck Surg.* 112, 154–161.
- Haynes, D.S., Resser, J.R., Labadie, R.F., et al., 2002. Treatment of benign positional vertigo using the semont maneuver: efficacy in patients presenting without nystagmus. *Laryngoscope* 112, 796–801.
- Korres, S., Riga, M.G., Xenellis, J., et al., 2011. Treatment of the horizontal semicircular canal canalolithiasis: pros and cons of the repositioning maneuvers in a clinical study and critical review of the literature. *Otol. Neurotol.* 32, 1302–1308.
- Li, J., Li, H., 2010. New repositioning techniques for benign paroxysmal positional vertigo: the Li repositioning maneuvers. *J. Laryngol. Otol.* 124, 905–908.
- McClure, J.A., 1985. Horizontal canal BPV. *J. Otolaryngol.* 14, 30–35.
- Semont, A., Freyss, G., Vitte, E., 1988. Curing the BPPV with alibatory maneuver. *Adv. Otorhinolaryngol.* 42, 290–293.
- Shim, D.B., Kim, J.H., Park, K.C., et al., 2012. Correlation between the head-lying side during sleep and the affected side by benign paroxysmal positional vertigo involving the posterior or horizontal semicircular canal. *Laryngoscope* 122, 873–876.
- Vibert, D., Kompis, M., Hausler, R., 2003. Benign paroxysmal positional vertigo in older women may be related to osteoporosis and osteopenia. *Ann. Otol. Rhinol. Laryngol.* 112, 885–889.
- von Brevern, M., Radtke, A., Lezius, F., et al., 2007. Epidemiology of benign paroxysmal positional vertigo: a population based study. *J. Neurol. Neurosurg. Psychiatry* 78, 710–715.