Effect of repetition of Semont’s manoeuvre on benign paroxysmal positional vertigo of posterior semicircular canal

F. BROCCHETTI, G. GARAVENTA, F. AMELI, F. BARICALLA, M. CHIARLONE, M. PEIRANO, A. PRESTA, A. FIBBI
Otorhinolaryngology Unit, S. Paolo Hospital, Savona, Italy

Summary

If Semont’s liberating manoeuvre does not lead to relief of symptoms in benign paroxysmal positional vertigo of posterior semicircular canal after the first session, it can be repeated once again, in refractory cases, whilst symptomatic patients after second manoeuvre require rehabilitation therapy. Repeating Semont’s manoeuvre several times has proven to progressively increase the percentage of cured patients or it may convert posterior semicircular canal forms to typical incomplete or lateral semicircular canal forms, hence requiring other manoeuvres to achieve vertigo resolution. Aim of study was to assess the effect of liberating manoeuvres repeated up to 4 times and to establish possible passages from one canal to the other during manoeuvres as well as percentage of cases refractory to this therapy, who would then need rehabilitation. Benign paroxysmal positional vertigo was diagnosed in 448 cases of whom 344 (76.8%) of the posterior semicircular canal, 20 (0.45%) subjective positional vertigo and 74 of the lateral semicircular canal (4.2%). Right side was affected in 58.4% of cases, left in 35.4%, and bilateral in 7.1%. All 344 patients underwent Semont’s liberating manoeuvre (1st manoeuvre) with first control after 48 hours: if symptoms (typical, atypical nystagmus or paroxysmal vertigo evoked by Dix-Hallpike’s manoeuvre) persisted, Semont’s liberating manoeuvre was repeated (2nd manoeuvre). In presence of lateral semicircular canal benign paroxysmal positional vertigo conversion, Lempert’s manoeuvre was performed instead. Second control was performed after 48 hours and in cases of persistent typical, atypical or lateral semicircular canal nystagmus 3rd manoeuvre was performed. After further 48 hours, third control was carried out: symptomatic patients with typical forms were submitted to 4th manoeuvre, while typical incomplete forms or forms of the lateral semicircular canal underwent Lempert’s manoeuvre. In conclusion, symptoms disappeared after 1st manoeuvre in 61.6% of cases; further manoeuvres, carried out in view of possible changes in semiology of vertigo, increased the percentage of cured patients to 82.5% after the 2nd, 90.7% after 3rd and 94.1% after the 4th. Repeated positioning...
manoeuvres in benign paroxysmal positional vertigo led to a progressive increase in percentage of cured vertigo, at the same time, allowing detection of those cases converted to multicanal pathology, hence offering the possibility to proceed with appropriate liberating manoeuvres.

Introduction

Benign Paroxysmal Positional Vertigo (BPPV), first described by Bárány in 1921, and better defined by Dix and Hallpike in 1952, is of great clinical and pathophysiological interest not only on account of its frequency but also the interpretation of queries that it presents.

There are several therapeutic proposals, all inspired by physical-rehabilitation principles, based on the pathogenetic hypotheses of cupulolithiasis and canalolithiasis.

According to the cupulolithiasis theory, vertigo is caused by the utricular stimulation of the cupula of the semicircular canal by calcium carbonate crystals detached from the macula utriculi that come to rest on the cupula during certain movements of the head. Conversely, the canalolithiasis theory interprets vertigo as due to the deflexion of the crista ampullaris caused by the endolymphatic current induced by the movement of abnormal ear dust debris and cell derivatives present in the canal itself.

These phenomena may occur within the posterior semicircular canal (PSC), more rarely within the lateral semicircular canal (LSC) or within the superior canal; rare bilateral or multicanal forms have been seen in a small number of cases.

The clinical characteristics of typical PSC BPPV are well known: the onset is a violent vertigo crisis unleashed by the flexo-extension and/or lateral rotation of the head and is associated with an oscillatory horizontal nystagmus of the declive eye, with a contralateral vertical component that, after a short latency phase, shows an increase, a plateau and a decrease. During the intercritical phase, the symptoms consist in a sensation of vague loss of balance, “floating” or “lightheadedness”, hypothetically caused by the “otolithic depletion of the macula”, in the absence of specific oto-neurological signs.

Diagnosis, in the light of the history, is generally straightforward but needs to be confirmed by clinical oto-neurological tests and by manoeuvres carried out to elicit the nystagmus described by Dix and Hallpike.

PSC BPPV is usually cured by repositioning manoeuvres, the best known of which is probably Semont’s liberating manoeuvre (SLM), or with “rehabilitation” exercises that induce habit such as those described by Brandt and Daroff, Cawthorne-Cooksey, Nørr and Beckers or Vicini, while medical and surgical treatment have played a very limited role and are usually reserved for specific cases.

SLM leads to relief of symptoms after the first session in 35% to 83.96% of cases: in the event of failure, most Authors agree that treatment should be carried out once again in refractory cases to achieve a further increase in the percentage of success and to start rehabilitation in patients still refractory after the second manoeuvre.

Conversely, other Authors consider it useful to repeat SLM several times since they have shown that this procedure may increasingly improve the percentage of cured patients or may convert PSC forms into atypical or LSC forms, hence making it necessary to carry out other types of manoeuvres to eliminate vertigo.

Aim of the present investigation was to assess the effects of liberating manoeuvres, repeated up to four times in a group of BPPV patients, to better understand the possible interactions between the different canals, conversions from one canal to another, as well as the percentage of patients refractory to this therapy who must, therefore, undergo a rehabilitation cycle - at home or as day-hospital patients, which is more demanding both for the patient and the physician.

Patients and methods

From January 1998 to December 2001, 576 patients with positional vertigo came to our observation. All had undergone oto-neurological evaluation including search for positional nystagmus by means of Dix Hallpike and McClure manoeuvres, clinical evaluation of the vestibulo-spinal system together with co-ordination tests, the study of cranial nerves as well as...
The patients not presenting other pathological conditions possibly responsible for the negative clinical outcome.

The presence of horizontal paroxystic nystagmus with short latency, geotropic, bilateral and more intense in the affected side, at times associated with a second phase of apogeotropic nystagmus with a longer duration of the first phase after McClure’s diagnostic manoeuvre, was diagnosed as LSC BPPV. All the other variations were excluded.

BPPV was hence diagnosed in 448 patients (244 female, 204 male, mean age 58.3 years) of whom 344 (76.8%) with typical PSC BPPV, 20 (0.45%) typical incomplete PSC BPPV, 20 (0.45%) SPV and 74 (4.2%) LSC BPPV. The right side was affected in 58.4% of cases, the left in 34.5% and bilateral involvement was seen in 7.1%.

All 344 typical PSC BPPV patients underwent SLM (1st manoeuvre), with the first control after 48 hours. In cases of persistent symptoms with the onset of typical, atypical nystagmus or BPPV after Dix Hallpike’s diagnostic manoeuvre, SLM was repeated (2nd manoeuvre). In those patients presenting conversion to LSC forms, 20 were cured while 4 converted to typical PSC BPPV (Table II). The 8 with typical forms (2.24%) underwent a third SLM (3rd manoeuvre), the 24 typical incomplete forms were considered interactions between the posterior and lateral canals and hence treated with Lemper’s manoeuvre; also the 4 patients who had converted from a PSC to a LSC form were treated with Lemper’s manoeuvre (Table III). At the third control, all the typical forms were cured. Of the 24 patients (6.9%) with typical incomplete forms, 20 were cured while 4 converted to typical forms and were then treated with SLM (4th manoeuvre) (Table II). The 4 LSC BPPV cases treated with Lemper’s manoeuvre (3rd manoeuvre) converted to typical forms and then underwent a fourth SLM (Table II).

At the fourth control, all 96 patients initially presenting typical PSC BPPV were cured (Table II). The 12 typical incomplete PSC BPPV patients were cured by simply carrying out a second SLM. Evolution of the 8 SPV is shown in Table III. After the second SLM, only 4 patients were cured. The other 4 patients were treated with Lemper’s manoeuvre, repeated in the light of the hypothesis that the persistent symptoms could be due to the presence of ear dust in the LSC. However, the manoeuvre was not successful in these 4 patients. An extended daily rehabilitation programme at home was, therefore, started: two patients started VHT and two the Five technique. Only one patient benefited from VHT and only one from the Five technique. Treatment of the 16 patients that converted from PSC to LSC forms after the first SML is outlined in Table IV. These patients were all submitted to Lemper’s manoeuvre which eliminated symptoms in 4 cases. In the remaining 12, the lateral forms persisted in 8 cases.

Results

Results of the 1st Semont manoeuvre, on 344 PSC BPPV patients, are summarised in Table I. At the first control, 212 patients (61.6%) were cured and 132 (38.7%) were still symptomatic, 96 of whom (27.9%) still presented typical PSC BPPV, 12 typical incomplete PSC BPPV (3.4%), 8 had SPV (2.3%) and 16 LSC BPPV (4.6%) (Table I). The 116 patients with typical, atypical and subjective BPPV after treatment were again submitted to Semont’s manoeuvre (2nd manoeuvre), while the 16 patients with a conversion to LSC BPPV underwent Lemper’s manoeuvre. After the second control, 60 out of the 96 typical PSC BPPV patients were cured while 36 were still symptomatic. Of these, 8 had the typical, and 24 the atypical form, while 4 had converted to LSC BPPV (Table II). The 8 with typical forms (2.24%) underwent a third SLM (3rd manoeuvre), the 24 typical incomplete forms were considered interactions between the posterior and lateral canals and hence treated with Lemper’s manoeuvre; also the 4 patients who had converted from a PSC to a LSC form were treated with Lemper’s manoeuvre (Table III).
es whilst the remaining 4 cases converted to a typical incomplete PSC.

The 4 typical incomplete forms were, at first, treated with Semont’s manoeuvre (3rd manoeuvre), which was successful in 2 cases (0.58%). The other 2 cases responded successfully to Lempert’s manoeuvre (4th manoeuvre). The 8 patients, in whom LSC BPPV persisted, underwent a third Lempert’s manoeuvre. The symptoms disappeared in 6 cases (1.7%). The other 2 were cured with a fourth Lempert’s manoeuvre (Table IV).

In conclusion, analysis of these data shows that symptoms disappeared after a single liberating manoeuvre in 61.6% of cases; further liberating manoeuvres, selected after observing possible changes in the semiology of vertigo, led to an increase in the percentage (82.5%) of cured patients after the second treatment. After a third and fourth manoeuvre, a further increase in the success rate was observed rising to 90.7% and 94.1%, respectively.

Following this protocol, only 4 patients (1.16%) required home vestibular rehabilitation with Vicini’s Five technique 4 or Norrè’s VHT 5, with acceptable therapeutic results in two cases after two rehabilitation cycles.

**Discussion**

According to most Authors, treatment for PSC BPPV should, in general, envisage only a single repetition of SLM, reserving the use of rehabilitation techniques for refractory forms 11-15.

In fact, Semont reported that repetition of the liberating manoeuvre may increase the percentage of cured PSC BPPV from 84 to 93%; likewise, Hausler and Pampurik 12 achieved increases in the percentage of cured cases from 40 to 70% and Herdman et al. 18 from 64 to 79%.

Norrè 19 confirmed these findings studying two groups of patients treated with SLM that were not cured: the first group was treated with a second SLM, while the second group was treated with rehabilitation exercises. The Authors noted that the vertigo symptoms were solved in 52% of cases in the first group and in 32% in the second group. Instead, according to other Authors 11 carrying out at least 3 or 4 successive SLMs may further increase the percentage of cured patients. Data emerging from the present study confirmed the latter observations since the repeated SLMs, combined with Lempert’s manoeuvre, depending on the semicircular canal involved, led to percentages of cured patients that progressive-
ly rose from 61.6%, with the first manoeuvre, to 94.1% with the fourth.

Of particular interest, in our opinion, was the conversion of PSC to LSC and atypical forms: 20 PSC forms converted to LSC or to atypical forms and 8 patients treated with Lempert’s manoeuvre for a LSC form converted to typical or atypical PSC forms.

The possibility of transforming BPPV characteristics, already described both by Epley and Hughes 17 and Nuti et al. 16, is considered a consequence of the spontaneous movements of patients or a “complication” of the liberating manoeuvre, based on the hypothesis that debris may move from one canal to the other during the manoeuvres.

Ear dust particles may migrate to the different canals and this may be favoured by the particular individual anatomy of the horizontal canal outlet and of the common crus in the utricle and would thus explain the conversion between the various forms as well as the symptoms of the “typical incomplete” form.

In the light of these hypotheses, we consider typical incomplete BPPV forms as a possible transformation of a pure PSC form into a mixed one, with the simultaneous involvement of the LSC. This pathogenetic hypothesis seems to be proven by the relief of symptoms that we achieved with the combined use of Semont’s and Lempert’s liberating manoeuvres.

In our series, subjective forms, i.e., those perceived by the patient as a sensation of movement without evidence of nystagmus, accounted for 2.3% of the total, a smaller percentage than that reported by Epley 17, namely, 8.86% in a group of 400 patients. The results obtained in the treatment of these forms have been rather disappointing (50%) thus confirming Beyon’s 8 theory that considers these as incomplete BPPV, determined by the presence of ear dust particles of inadequate mass to create a cupular deflexion strong enough to cause a nystagmus but sufficient to stimulate the receptor threshold and to give rise to the subjective sensation of vertigo. In these
cases, the most effective treatment seems to be rehabilitation therapy. Furthermore, in our opinion, the persistence of vertigo after two SLM calls for a new control of the semiology to establish whether this is caused by the persistence of the primitive situation, refractory to liberating manoeuvres (anatomical variations of the canal, poor patient compliance during the manoeuvre, or a manoeuvre not carried out perfectly/correctly, etc.) or rather by the transformation into a different pathophysiological situation (conversion to LSC BPPV, posterior atypical BPPV or subjective BPPV), that need to be treated with an adequate manoeuvre.

**Conclusions**

Repetition of positioning manoeuvres in the treatment of BPPV leads to a progressive increase in the percentage of patients cured from vertigo and, at the same time, identifies cases that convert to multicanal pathology, thus offering the possibility to choose the most suitable liberating manoeuvres.
This possibility must always be borne in mind since this situation may occur in a significant percentage of patients and must be checked with control diagnostic manoeuvres. Subjective forms do not respond adequately to either liberating manoeuvres or to rehabilitation therapy since minimal volumes of ear dust in the semicircular canals are difficult to mobilise. Repetition of liberating manoeuvres is always recommended in order to reduce to a minimum the percentage of these forms that require more involved forms of treatment, considering the time they need and the possibility that they may not offer a solution for these patients.

References


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Address for correspondence: Dott. F. Brocchetti, U.O. di Otorinolaringoiatria, Ospedale San Paolo, Via Genova, 17100 Savona, Italy.
Fax: +39 019 8428091. E-mail: brocket@tin.it