

# Paroxysmal positional vertigo: short- and long-term clinical and methodological analyses of 794 patients

## *Analisi clinico-metodologica a breve e lungo termine su 794 pazienti affetti da vertigine posizionale parossistica*

G. LEOPARDI, G. CHIARELLA<sup>1</sup>, G. SERAFINI<sup>2</sup>, A. PENNACCHI<sup>3</sup>, L. BRUSCHINI<sup>4</sup>, S. BRIZI<sup>5</sup>,

I. TASCA<sup>6</sup>, C. SIMONCELLI<sup>7</sup>, E. CASSANDRO<sup>1</sup>

Department of Otolaryngology, USL 11, Empoli, Italy

<sup>1</sup>Clinic of Audiology, "Magna Graecia" University, Catanzaro, Italy

<sup>2</sup>Department of Otolaryngology, USL Termoli, Italy

<sup>3</sup>Department of Otolaryngology, "Umberto I" Hospital, Ancona, Italy

<sup>4</sup>II ENT Clinic, "S. Chiara" Hospital, Pisa, Italy

<sup>5</sup>Department of Voice Therapy, USL Spoleto, Italy

<sup>6</sup>Department of Otolaryngology, USL Imola, Italy

<sup>7</sup>Clinic of Otolaryngology, University of Perugia, Italy

### Key words

Vertigo • Paroxysmal positional vertigo • Treatment • Prognosis

### Parole chiave

Vertigini • Vertigine parossistica posizionale • Trattamento • Prognosi

### Summary

Between 1995 and 2001, eight Italian clinical centres used the same diagnostic and therapeutic protocol in order to assess the clinical progress of paroxysmal positional vertigo and the benefits of an appropriate follow-up in prevention of relapse. The study population comprises 794 patients affected by paroxysmal positional vertigo. The study protocol comprised diagnostic staging including a complete otoneurological test, an anamnestic questionnaire aimed at identifying any possible risk factor, a blood test in basal conditions and monitoring of blood pressure. If necessary, more specific instrumental tests have been carried out. Appropriate rehabilitative manoeuvres were performed from 1 to 3 times within the same session. The patient was checked 3-5 days later: in the presence of a positive result, the treatment was repeated; if negative, patients were seen at clinical follow-up 7, 30, 180 and 365 days after recovery. Wherever possible, patients have been contacted 2 years after the first treatment and asked to answer a questionnaire and to attend for a clinical check-up. The incidence of paroxysmal positional vertigo appeared to be higher in females and in patients aged 50-70 years, being low in patients under 30. In 88.8% of cases posterior semicircular canals showed a significant involvement; in 6.8% of cases, only involvement of lateral semicircular canals; monolateral (2.7%) and bilateral (1.7%) multicanalar forms were rare. Paroxysmal positional vertigo forms involving posterior semicircular canals have been treated with Semont (simplified by Toupet), Epley, Parnes Price-Jones manoeuvres; those, involving lateral semicircular canals with Vannucchi-Vicini forced position and "barbecue" or Gufoni manoeuvre. Whilst all these manoeuvres were equally effective, longer recovery times have been observed in paroxysmal positional vertigo forms involving lateral semicircular canals when the Vannucchi-Vicini forced position was ineffective. Any relapses have been evaluated at least 15

### Riassunto

Otto centri clinici in Italia hanno utilizzato un identico protocollo, diagnostico e terapeutico, dal 1995 al 2001, allo scopo di valutare l'andamento clinico della vertigine posizionale parossistica e l'utilità di un follow-up appropriato nella prevenzione delle recidive. La casistica complessiva comprende 794 pazienti affetti da vertigine posizionale parossistica. Il protocollo ha previsto una fase diagnostica comprendente un bilancio otoneurologico completo, un questionario anamnestic per valutare la presenza di eventuali fattori di rischio, esami ematochimici "di base" ed il monitoraggio dei valori pressori. Ove necessario, sono stati effettuati accertamenti strumentali di secondo livello. L'operatore ha quindi scelto la manovra riabilitativa più adatta al caso, effettuandola da 1 a 3 volte nell'ambito della stessa seduta. Dopo 3-5 giorni è stata effettuata una seduta di controllo. In caso di positività, era previsto un nuovo trattamento con gli stessi criteri. In caso contrario (test diagnostico negativo) il paziente veniva sottoposto a controlli clinici a 7, 30 e 180 giorni ed ad un anno dall'avvenuta guarigione. I pazienti sono stati ricontattati, ove possibile, a distanza di due anni dal primo trattamento, proponendo loro un questionario ed invitandoli ad un controllo clinico. La patologia, più frequente nelle donne e nella 5°-6° decade di vita, risulta infrequente al di sotto dei 30 anni di età. Maggiore è risultato l'interessamento dei canali semicirculari posteriori pari all'88,8% dei casi. Il coinvolgimento dei canali semicirculari laterali è stato riscontrato nel 6,8% dei casi; rare le forme multicanalari con interessamento monolaterale (2,7%) o bilaterale (1,7%). Le forme del canale semicircularare posteriore sono state trattate con manovra di Semont (semplificata da Toupet), di Epley e di Parnes Price-Jones, quelle del canale semicircularare laterale con la posizione coatta di Vannucchi-Vicini, con manovra a "barbecue" o di Gufoni. Le manovre usate si equivalgono in termini di efficacia, pur osservandosi tempi più lunghi per la guarigione delle forme a carico del canale semicircularare laterale quando la posizione coatta non risultasse ef-

days after a negative clinical pattern. Possible involvement of other semicircular canals (recurrence) some time after the first onset has been considered separately. Follow-up at 6 months showed recurrence in 12.4% of cases, while being chronic in 1.5% of cases. Only 9.3% of cases showed recurrence at 6 months, no statistically significant difference being observed between vertical (8.9%) and lateral canal (9.6%). forms. Relapses occurred in 3.1% of cases, in one third of which at least two risk factors were detected.

## Introduction

Paroxysmal positional vertigo (PPV) is the most frequent disease affecting the peripheral vestibular system<sup>1-4</sup>. Although its nosological identification is not recent<sup>5</sup>, it is only in the last ten years that PPV has been taken into due consideration and properly treated. The frequency, relatively simple diagnosis<sup>2,6</sup> and feasibility of easy, effective treatment by means of rehabilitative therapy<sup>4,6,7</sup>, have led to more widespread use of vestibular rehabilitation procedures. Many Authors have, however, reconsidered the apparently benign nature of PPV. In the early 1990s, it appeared to be a condition which could be easily treated with simple and, often, single manoeuvres<sup>8-10</sup>, but later revealed a tendency to recur with time, despite the rehabilitative procedure<sup>11,12</sup>. Moreover, in a small percentage of patients complete recovery was difficult to achieve<sup>12,13</sup> and, indeed, these cases were defined as "chronic".

Treatment of PPV, varies considerably, both on account of the continuous introduction of new procedures but also because most specialists tend tailor treatment to the patient's needs or to their own experience. Although we agree that "tailored" may be useful, some guidelines are, in our opinion, necessary. Specialists should, nonetheless, maintain the possibility to autonomously choose the therapy but the guidelines would, at the same time, offer a useful instrument for monitoring results, comparing the effectiveness of the various procedures and the approach to be adopted for possible recurrence. Since 1995, a common diagnostic-therapeutic protocol has been used in the treatment of PPV.

Aims of this approach are to determine the presence and importance of possible risk factors, standardise, as far as possible choice of treatment and create a homogeneous study population, thus providing data as accurate as possible on epidemiology of the disease. With the collaboration of a growing number of Centres, this common protocol was also been shown to be a valid instrument not only for evaluating the effectiveness of the different procedures available but

*ficace. È stata valutata l'eventuale ripresa della patologia (recidiva) dopo almeno quindici giorni dalla negativizzazione del quadro clinico. È stato inoltre considerato separatamente l'eventuale interessamento, a distanza dalla prima manifestazione, di canali semicircolari diversi (ricadute). Considerato un follow-up a sei mesi, sono state osservate ripresentazioni della malattia nel 12,4% dei casi, mentre circa l'1,5% dei casi ha assunto carattere di cronicizzazione. Le recidive a sei mesi si sono verificate solo nel 9,3% del campione, senza differenze statisticamente significative tra le forme dei canali verticali (recidive 8,9%) e di quelli laterali (9,6%). Le ricadute invece hanno riguardato il 3,1% dei casi, ed in un terzo di essi è stata individuata la presenza di almeno due fattori di rischio.*

also in providing useful information on a very large patient population which, for the first time in Italy, makes use of the homogeneous experience in several Centres.

## Materials and methods

The present study was carried out by eight Hospital and University Centres. The initial stage of the PPV protocol is diagnostic and includes a complete otoneurologic evaluation with caloric stimulation, identification of PPV through Dix-Hallpike<sup>5</sup> and Pagnini-McClure<sup>13</sup> manoeuvres and an anamnestic questionnaire aimed at determining the possible presence of risk factors (cardiovascular diseases, endocrine-metabolic disorders, traumas). Most patients underwent a baseline blood test (haemochrome, haemostasis pattern, lipaemia, hepatic and renal function, blood glucose, sodium and potassium levels) and pressure value monitoring. If necessary, further clinical tests were carried out (neuroradiologic tests in atypical cases and forms with a slow evolution, supraortal vessel Doppler sonography etc.).

Once the diagnostic stage was completed, the specialist decided which rehabilitative manoeuvre was most suitable for the individual case. This manoeuvre was then effected 1 to 3 times within the same session, depending upon "negativisation" of the paroxysmal nystagmus. A check-up was carried out 3-5 days later. In the case of a positive diagnostic manoeuvre, further treatment was carried out following the same criteria. Conversely (negative check-up test), the patient underwent only clinical tests by means of the appropriate diagnostic manoeuvres 7, 30 and 180 days after recovery. If more than one treatment was necessary, the initial rehabilitative manoeuvre was reported until the 4<sup>th</sup> session and, then, changed if still ineffective. However, patients did not undergo more than eight consecutive rehabilitative sessions (Fig. 1).

Follow-up was continued even if the patient did not show any symptoms. If nystagmus reappeared the

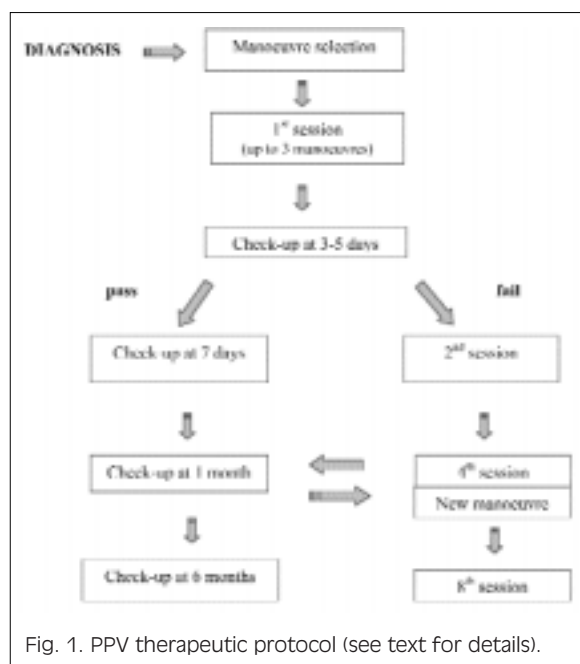


Fig. 1. PPV therapeutic protocol (see text for details).

patient was again included in the protocol, as before. Moreover, the earlier protocol included a further check-up one year after recovery but, as expected, we observed a high percentage of “non-attendance” amongst patients who had achieved full recovery. Two years after the first treatment, patients were contacted by phone and asked to answer a questionnaire and to undergo a check-up. Unfortunately, pertinent data are somewhat limited both on account of difficulty in finding some patients after a prolonged period of time and also because, in the event of a possible recurrence, patients tend, if not properly informed, to go to another doctor. This is the reason why it is difficult to carry out reliable studies on remote recurrence.

## Results and discussion

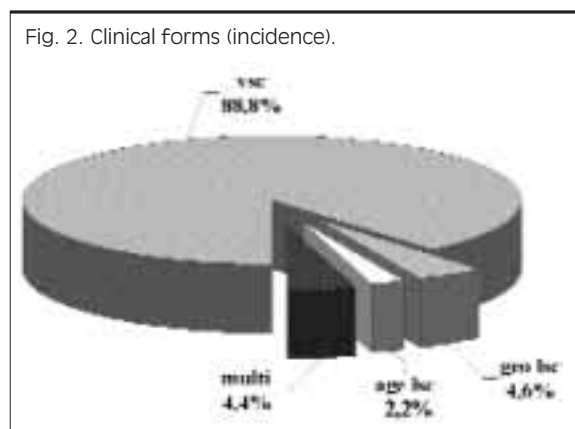
An analysis was made, 7 years after the introduction of the PPV protocol, of the entire patient population, comprising 794 patients, mean age 54.9 years (SD 14.4) treated between 1995 and 2001.

As far as concerns epidemiology, PPV affects both sexes, however, primarily females, with a prevalence rate of 1.7/1. Adults of all ages may be affected, however, the incidence of PPV is higher between the 5<sup>th</sup> and the 6<sup>th</sup> decade (55.6% of cases), tending towards a decrease between the 7<sup>th</sup> and 8<sup>th</sup> decade, particularly in females. This decrease appears to be in contrast with the hypothesis suggesting that macular degeneration could enhance the formation of otolithic clus-

ters within the labyrinth<sup>2 12</sup>. In this study population, 23.2% of the female patients were aged between 45 and 55 years and presented high cholesterolaemia and clinical symptoms typical of perimenopausal hormonal disorders, thus suggesting a possible influence of endocrine factors in the pathogenesis. Moreover, this hypothesis would explain the higher incidence of the disease in females reported in most studies in the literature<sup>1 37</sup>.

Involvement of vertical semicircular canals (VSC) is much more frequent (88.8% of cases) due to their anatomical position showing a higher incidence on the right side (ratio: 1.3/1). The “atypical” forms involving the common crus of these canals account for 14.3%, a percentage which is probably underestimated. Only recently, indeed, has the hypothesis of the involvement of VSC common crus<sup>6 11 14</sup> been advanced and accepted, thus suggesting that many of these cases may not have been reported in the past. Lateral canals (6.8% total) are more often affected by geotropic (68.5% total) than ageotropic forms depending upon the localisation of the cluster within the canal<sup>3 15</sup>. Multicanalar forms, on the other hand, are generally rare and, in our experience, account for 4.4% of cases with a clear predominance of monolateral forms (posterior and lateral canals on the same side) (Fig. 2). Post-traumatic forms (the rate of which, in the present study, appears to be less frequent than that reported by others<sup>12</sup>) are an exception to this tendency, since bilateral involvement was detected in several cases (Fig. 3).

When using the PPV protocol, 48.9% of patients recovered following one manoeuvre, regardless of the canal or side involved. When compared to other reports<sup>7 10 16</sup>, this decreased percentage is probably due to the close follow-up of patients during the first few



### Abbreviations

vsc: vertical semicircular canal; geo lsc: geotropic lateral semicircular canal; age lsc: ageotropic lateral semicircular canal.

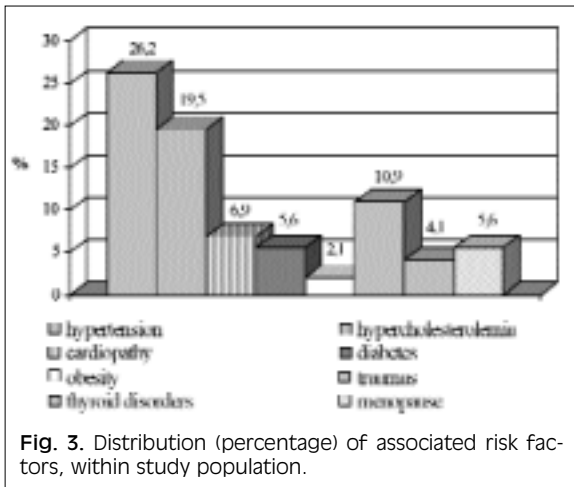


Fig. 3. Distribution (percentage) of associated risk factors, within study population.

weeks. This allowed us to detect and, therefore, treat any remaining nystagmus which, often, showed no significant symptomatology and which, in many cases would likely have spontaneously evolved towards “negativisation”. However, we are far from the high “one-manoevre-recovery” percentage reported during the early 1990s<sup>8,10</sup>, which raises the question of whether we are becoming less efficient over the years of whether those results were based on an “unconfirmed” recovery. Indeed, 22.4% of cases require 3 or more rehabilitative sessions, sometimes even reaching the 4<sup>th</sup> session and then being obliged to perform a different manoeuvre in 10.8% of cases. Furthermore, “chronic” cases represent yet another issue: 1.5% of patients do not achieve complete recovery and, if they do, it may last for only a short time despite 8 or more rehabilitative sessions and possibly, at least, 2 different manoeuvres. These patients, however, despite the clear improvement in symptomatology, show periods of instability characterised by frequent recurrences. Like other Authors, we were uncertain concerning the management of these “atypical” forms. In our opinion, the “atypical” definition concerns the course of the disease<sup>4,11</sup> rather than the clinical aspects of the nystagmus. The present protocol, therefore, requires, first of all, high resolution magnetic resonance (MR) of the brain with a contrast medium in order to exclude any central lesion and then a “self-rehabilitation” protocol including periodic home visits and outpatient checkups in the event of significant recurrence. In our personal experience, MR highlighted the presence of central nervous system disorders, in only two cases even if their influence on PPV is still doubtful.

Forms affecting the lateral semicircular canals often recover by simply performing the Vannucchi-Vicini forced position<sup>3</sup> regardless of its side and shape (geotropic or ageotropic). During clinical examination,

13.4% of cases treated with the above-mentioned manoeuvre failed to recover probably due to the adherence of debris to the cupula of the ampulla (cupulolithiasis). A repositioning manoeuvre, such as the “barbecue” or Gufoni manoeuvre<sup>17</sup>, was, therefore, necessary.

Relapse may occur even after several years. We arbitrarily distinguished between “recurrence” (i.e., new onset of the disease at least 15 days after recovery, involving the same canal and side as before) and “relapse” (i.e., recurrence of the disease involving a different canal).

At six months follow-up, recurrences were found in only 9.3% of cases, with no statistically significant differences between forms affecting vertical (8.9%) and lateral (9.6%) canals. Relapses, on the other hand, were detected in 3.1% of cases, in over a third of which (35.3%) we found the correlated presence of at least 2 risk factors (mostly cardiovascular and endocrine-metabolic disease). The remaining risk factors examined were not of statistical significance (Fig. 3). Overall recurrence, six months after recovery, was, therefore, 12.4% (Tab. I). Compared to reports in the literature<sup>4,9</sup>, this percentage was lower due possibly to various factors. As already pointed out, close follow-up enables us to identify and treat all those patients who have not completely recovered and not showing any significant symptoms, some of whom would, no doubt, later present as a “recurrence” a few weeks after recovery if not followed up. If, on the one hand, this would account for the lower percentage of recovery following the use of just one manoeuvre, it would, on the other explain the lower incidence of recurrences. Furthermore, in our opinion, performing more than one manoeuvre, within the same session, according to negativisation of the nystagmus, improves the outcome of treatment. Finally, current follow-up is too short; recurrences and relapses should be assessed several years after recovery although, as already mentioned, this appears to be extremely difficult. In those patients observed at 2-year follow-up (18% cases) a higher percentage of recurrence or relapse was observed, corresponding approximately to 19.6% of all cases. In our experience, no significant difference in efficacy was found

Table I. Incidence of recurrences, relapses and chronic forms (% study population, relatively to involved canal).

	Recurrences	Relapses	Chronic f.
VSC	8.9%	2.9%	1.8%
LSC	9.6%	3.5%	1.4%
Total	9.3%	3.1%	1.5%

between the various rehabilitative manoeuvres used. Forms affecting vertical canals were indifferently treated with Semont's manoeuvre<sup>10</sup> simplified by Toupet, Epley's manoeuvre<sup>8</sup> or simplification of the same by Parnes Price-Jones<sup>9</sup>. Very rarely, the patient was, invited to follow a Brandt-Darhoff or Five "self-rehabilitative" protocol (< 5% cases). As far as concerns forms affecting lateral canals, 78% of patients underwent a repositioning manoeuvre (barbecue, or Gufoni or Vannucchi-Asprella)<sup>17</sup> as the initial form of treatment, with no significant differences being observed in effectiveness. The remaining patients were treated with Vannucchi-Vicini forced position.

## Conclusions

The protocol used presents, in our opinion, several positive aspects: it is particularly efficacious in controlling recurrences and relapses, the percentage being lower than that reported in other studies. However, longer follow-up is necessary before this result can be confirmed. Difficulties found in carrying out an adequate follow-up are, obviously, the same as those encountered by other colleagues. The need, in some cases, for more than one manoeuvre to achieve recovery should not be a problem for the patient. Another positive aspect is the standardised approach of the physician as far as concerns frequency of check-ups, number of manoeuvres to be performed at each session, clinical tests to be carried out before and after treatment. Besides making our sample uniform, this standardisation has the advantage of providing the doctor with baseline parameters and of learning from common experiences and possible mistakes. Although the protocol does not limit the specialist as far as concerns the choice of procedure to be carried out which can be adapted to the characteristics of the patients or to the preferences of the specialist. Howev-

er, in our opinion, in those forms affecting the vertical canals Epley or Parnes Price-Jones manoeuvres are preferable since besides being equally effective, are better tolerated by the patient, often avoiding vertigo (Semont releasing vertigo) and, during the initial stage, allowing the diagnostic control of the nystagmus, which determines whether or not to perform the manoeuvre. Personally, quite apart from efficacy and historical value, we advise a simplified Semont's manoeuvre in obese patients or patients with limited neck movement. We do not recommend, as first choice, FIVE or Brandt-Darhoff home self-rehabilitation as the patient is unlikely to perform them correctly, particularly if the vertigo has a significant symptomatology or the patient is extremely anxious. In such cases, the result would be non-compliance or partial compliance, or partial compliance aimed at personal clinical improvement. These procedures are advisable, on the other hand, in those patients who are unable to go to the surgery or in "chronic" cases, at the end of the standard rehabilitative treatment, or, in those cases already showing spontaneous recovery and minimum physical signs. In forms affecting lateral semicircular canals, in the initial stage, we suggest the Vannucchi-Vicini forced position, according to the direction of the nystagmus. However, a periodical follow-up is necessary and, in the case of non-recovery, rehabilitative manoeuvres should be carried out. We do not advise drug treatment, apart from the use, if necessary, of antiemetics, or, if the patient is extremely anxious, low doses of benzodiazepines, may be given during the initial stage. Finally, standardisation of follow-up allows the patient to avoid unnecessary worries and to effectively and rapidly treat any possible recurrence. As far as concerns the latter point, the patient should be informed, from the very beginning, concerning this possibility, and of the need for routine follow-up and even further rehabilitative sessions.

## References

- Baloh RW. *The dizzy patient*. Postgrad Med 1999;105:161-4, 167-72.
- Moriarty B, Rutka J, Hawke M. *The incidence and distribution of cupular deposit in the labyrinth*. Laryngoscope 1992;102:56-9.
- Pagnini P, Nuti D, Vannucchi P. *Benign paroxysmal vertigo of the horizontal canal*. ORL J Otorhinolaryngol Relat Spec 1989;51:161-70.
- Sherman D, Massoud EA. *Treatment outcomes of benign paroxysmal positional vertigo*. J Otolaryngol 2001;30:295-9.
- Dix R, Hallpike CS. *The pathology, symptomatology and diagnosis of certain, common disorders of vestibular system*. Ann Otol Laryngol 1952;6:987-1016.
- Macias JD, Lambert KM, Massingale S, Ellenshon A, Fritzt JA. *Variables affecting treatment in benign paroxysmal positional vertigo*. Laryngoscope 2000;110:1921-4.
- Nuti D, Nati C, Passali D. *Treatment of benign paroxysmal positional vertigo: no need for postmaneuver restriction*. Otolaryngol Head Neck Surg 2000;122:440-4.
- Epley JM. *The canalith repositioning procedure: for treatment of benign paroxysmal vertigo*. Otolaryngol Head Neck Surg 1992;107:399-404.
- Parnes LS, Price-Jones RG. *Particle repositioning manoeuvre for benign paroxysmal positional vertigo*. Ann Otol Rhinol Laryngol 1993;102:325-31.
- Semont A, Freyss G, Vitte E. *Vertige positionnel paroxystique bénin et manoeuvre libératoire*. Ann Oto-Laryng (Paris) 1989;106:473-6.
- Casani AP, Dallan I, Berrettini S, Raffi G, Segnini G. *Le*

*manovre terapeutiche nella Vertigine Parossistica Posizionale: possono indicarne una possibile genesi centrale?* Acta Otolaryngol Ital 2002;22:66-73.

- <sup>12</sup> Katsarkas A. *Benign Paroxysmal Positional Vertigo (BP-PV): idiopatica versus post-traumatica*. Acta Otolaryngol 1999;119:745-9.
- <sup>13</sup> McClure JA, Parnes LS. *A cure for benign positional vertigo*. Baillieres Clin Neurol 1994;3:537-45.
- <sup>14</sup> De Campora L, Romano L, Barbieri M, Nuti D. *Il ritardo diagnostico nella vertigine posizionale parossistica benigna: impatto economico*. Acta Otolaryngol Ital 2001;21:277-80.
- <sup>15</sup> Casani AP, Vannucci G, Fattori B, Berrettini S. *The treatment of horizontal canal positional vertigo: our experience in 66 cases*. Laryngoscope 2002;112:172-8.
- <sup>16</sup> Waterston J. *Vertigo. A practical approach to diagnosis and treatment*. Aust Fam Physician 1999;28:883-7.
- <sup>17</sup> Asprella Libonati G, Gufoni M. *Vertigine parossistica da CSL: manovre di barbecue ed altre varianti*. Atti XVI Giornate Italiane di Otoneurologia. Sorrento 1999. p. 321-36.

■ Received September 26, 2002.

■ Accepted January 7, 2003.

■ Address for correspondence: Dr. G. Chiarella, Cattedra di Audiologia dell'Università "Magna Graecia" di Catanzaro, c/o Clinica Villa del Sole, V.le Pio X, 202, 88100 Catanzaro, Italy. Fax: +39-0961-742021. E-mail: pinochiarella@virgilio.it