VIDEO

Self-treatment of benign paroxysmal positional vertigo

Semont maneuver vs Epley procedure

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Abstract—The authors compared the efficacy of a self-applied modified Semont maneuver (MSM) with self-treatment with a modified Epley procedure (MEP) in 70 patients with posterior canal benign paroxysmal positional vertigo. The response rate after 1 week, defined as absence of positional vertigo and torsional/upbeating nystagmus on positional testing, was 95% in the MEP group (n = 37) vs 58% in the MSM group (n = 33; $p < 0.001$). Treatment failure was related to incorrect performance of the maneuver in the MSM group, whereas treatment-related side effects did not differ significantly between the groups.

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Posterior canal benign paroxysmal positional vertigo (PC-BPPV) is caused by dislodged otoconia that move within the PC whenever head position is changed. The resulting endolymph flow activates hair cell receptors, causing short-lasting vertigo and a mixed torsional/upbeating nystagmus. This "canalolithiasis" hypothesis has been corroborated by the success of therapist-guided positioning maneuvers that aim to clear the PC of trapped particles. In controlled trials, single applications of the Epley procedure[1] or the Semont maneuver[2] relieved 70 to 90% of patients.[3-5] However, this indicates that some patients require repeated treatment until positional vertigo resolves completely. Therefore, complementary self-treatment is a desirable option to abort BPPV. We recently showed that self-treatment with a modified Epley procedure (MEP) relieved 64% of 28 patients within 1 week, whereas the Semont maneuver has not yet been evaluated for self-treatment.[6] Therefore, we compared the efficacy of self-treatment with a modified Semont maneuver (MSM) and the MEP.

Patients and methods. Forty-one outpatients with unilateral PC-BPPV from a dizziness clinic and 29 patients from a neurologist's practice were included according to the following criteria:

1. History of short-lasting (<1 minute) rotational vertigo precipitated by changes of head position;
2. A mixed torsional/upbeating nystagmus beating toward the undermost ear elicited by positional testing in the lateral or head-hanging position for <60 seconds[7] as observed with Frenzel glasses; and
3. Reversal of torsional nystagmus on sitting up.

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Patients who had received any positioning maneuver during the acute episode of BPPV, patients with bilateral or horizontal canal BPPV, and patients who could not reliably perform self-treatment because of language problems or lack of mobility were excluded.

Seventy-nine patients were eligible. After giving informed consent according to the local ethics committee, patients were randomly assigned to apply MEP (n = 42) or MSM (n = 37). Five patients in the MEP group and four in the MSM group were lost to follow-up. Seven of these nine patients did not return for positional testing, and two did not complete the exercise because of concurrent cardiac arrhythmia or a sore hip. Therefore, statistical analysis was performed on 70 patients (10 men, 60 women; age, 35 to 80 years [mean, 60 ± 12 years]). The median duration of acute BPPV was 8 weeks. BPPV was idiopathic in 55 patients or occurred after head trauma (n = 4) or vestibular disease (n = 11). Age, sex, and mean duration of the acute episode did not differ significantly between the two groups.

All patients received an illustrated instruction with their specific exercise for the affected ear (figure 1). The sequence of head and body movements was explained. Patients then performed the maneuver once under supervision of the instructing physician. Patients performed the exercise three times daily until positional vertigo had ceased for at least 24 hours. They indicated in a diary whether positional vertigo occurred during each treatment session to determine the number of sessions needed for subjective relief of vertigo and documented treatment-related side effects (e.g., nausea, gait imbalance, and dizziness). Successful treatment after 1 week was defined as absence of positional vertigo *and* absence of nystagmus on positional testing. Patients were asked to perform the maneuver again on their second visit to assess accuracy of treatment execution.

Statistical analysis. Statistical analysis included chi-square test for dichotomous variables and Student's *t*-test for continuous variables for comparison between treatment groups. Kaplan–Meier analysis, including log-rank test, was performed to test for differences in number of treatment sessions completed until positional

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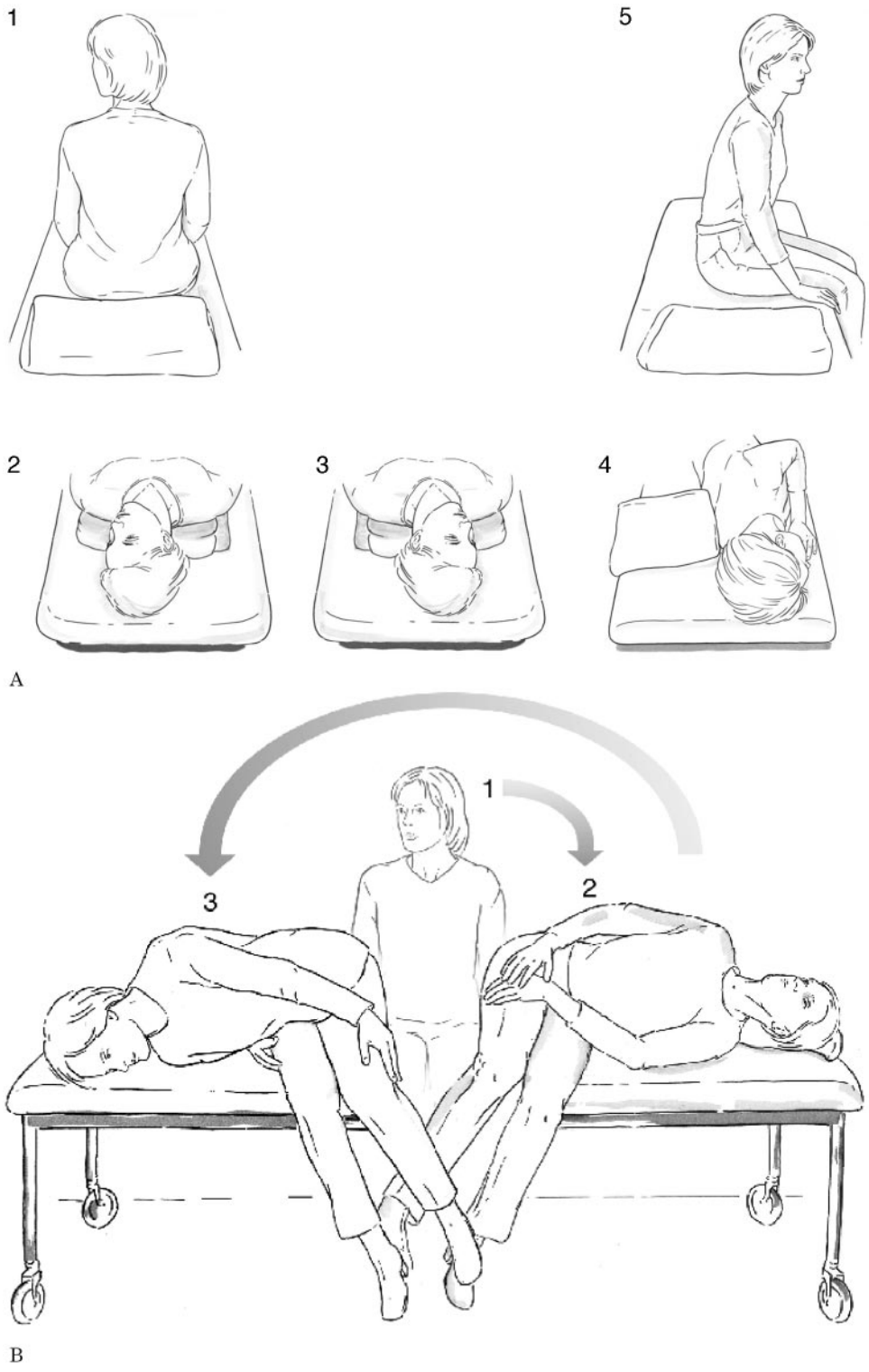

Figure 1. (A) Instructions for the modified Epley procedure (MEP) for left ear posterior canal benign paroxysmal positional vertigo (PC-BPPV). For right ear BPPV, the procedure has to be performed in the opposite direction, starting with the head turned to the right side. 1. Start by sitting on a bed with your head turned 45° to the left. Place a pillow behind you so that on lying back it will be under your shoulders. 2. Lie back quickly with shoulders on the pillow, neck extended, and head resting on the bed. In this position, the affected (left) ear is underneath. Wait for 30 seconds. 3. Turn your head 90° to the right (without raising it), and wait again for 30 seconds. 4. Turn your body and head another 90° to the right, and wait for another 30 seconds. 5. Sit up on the right side. This maneuver should be performed three times a day. Repeat this daily until you are free from positional vertigo for 24 hours. (B) Instructions for the modified Semont maneuver (MSM) for left ear PC-BPPV. For right ear BPPV, the maneuver has to be performed in the opposite direction, starting with the head turned toward the left ear. 1. Sit upright on a bed with your head turned 45° toward the right ear. 2. Drop quickly to the left side, so that your head touches the bed behind your left ear. Wait 30 seconds. 3. Move head and trunk in a swift movement toward the other side without stopping in the upright position, so that your head comes to rest on the right side of your forehead. Wait again for 30 seconds. 4. Sit up again. This maneuver should be performed three times a day. Repeat this daily until you are free from positional vertigo for 24 hours. (See the video in the supplementary material on the Neurology *Web site; go to www.neurology.org.)*

vertigo resolved. Logistic regression was used for multivariate analysis. Ninety-five percent CIs are presented. A significance level of 0.05 was adopted.

Results. At follow-up evaluation after 1 week, 35 of 37 patients (95%; CI, 81 to 99%) in the MEP group were asymptomatic and showed a negative positional test, whereas in the MSM group, only 19 of 33 patients (58%; CI, 39 to 75%) were cured (relative risk, 1.64; CI, 1.21 to 2.22). Figure 2 shows the number of treatment sessions patients performed until they felt relieved from positional vertigo. The two groups did not differ significantly with respect to treatment-related side effects. Seven of 37 patients (19%; CI, 8 to 35%) in the MEP group and 12 of 33 patients (36%; CI, 20 to 55%) in the MSM group performed the maneuver incorrectly ($p > 0.05$). However, although incorrect performance had no effect on treatment outcome in the MEP group ($p > 0.05$), there were significantly more treatment failures in the MSM group among patients who performed the maneuver incorrectly compared with those

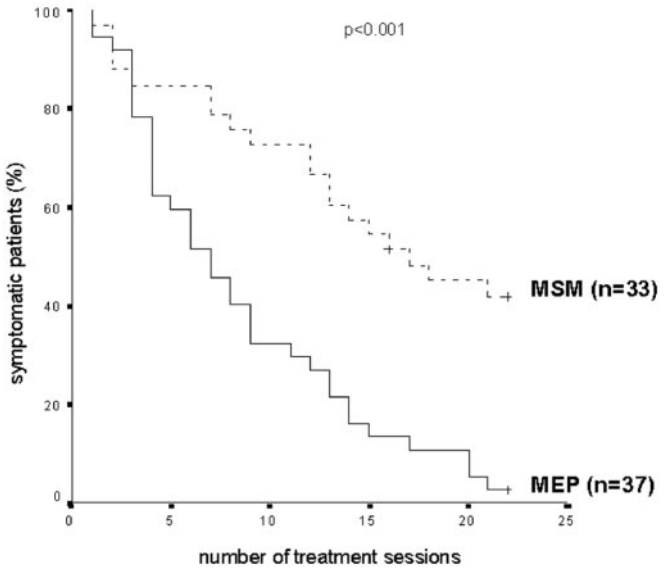

Figure 2. Kaplan–Meier table showing the percentage of patients who were still symptomatic after 1 week of self-treatment (22 treatment sessions). Significantly more patients were relieved from vertigo and had a negative positional test in the modified Epley procedure group (MEP) compared with the modified Semont maneuver group (MSM).

who made no mistakes ($p < 0.05$). The most frequent mistake was a too slow head and body movement in the MSM group (n = 9) and an incorrect head rotation in any of the head positions in the MEP group (n = 7). Age, sex, and duration of the acute episode of BPPV were not associated with treatment outcome. Similarly, a logistic regression including age, sex, positioning maneuver, duration of the acute episode, and accuracy of treatment performance showed that only inaccurate performance and positioning maneuver were significantly associated with outcome.

Discussion. Our study shows that self-treatment with MEP is more effective to abolish PC-BPPV within 1 week compared with self-treatment with MSM. Whereas BPPV resolved in 95% of patients who applied MEP, MSM cured only 58% of patients. The response rate in both groups was higher than would have been expected from spontaneous remissions within 1 to 2 weeks reported in previous studies, ranging from 0 to 50%.[4,5,8]

The efficacy of MEP is comparable with the Epley procedure and the Semont maneuver, with success rates ranging from 70% after single application to nearly 100% after repeated application.[1-5] In a comparative study, the Epley procedure and the Semont maneuver were found to be equally effective with response rates of 90 to 95% after one or two applications.[9] In view of these results, we considered an untreated control group unjustified from an ethical point of view. The rapid resolution of positional vertigo within a few days in most of our patients after a median duration of 8 weeks argues for a treatment effect and against a spontaneous remission.

In a previous, nonrandomized study, we reported a lower success rate of 64% for self-treatment with MEP (n = 28), which was, however, superior to treatment with Brandt–Daroff exercises[10] (23% response rate after 1 week; n = 26).[6] The Semont maneuver as self-treatment was evaluated for the first time in this study. Although less effective than MEP, MSM successfully relieved half of patients from BPPV. Failure of MSM was related to incorrect maneuver execution. The most frequent mistake was a too slow head and body movement. During the Semont maneuver, the particles sink to the lowermost point when the patient lies down on the affected side. When the patient then moves in one swift movement toward the contralateral side, the particles, because of inertia, do not immediately fall back toward the ampullary end of the PC but may pass its vertex and fall out through its upper open end. If the movement is not performed sufficiently swiftly, the particles, instead of passing the vertex, fall back toward the cupula. Conversely, incorrect performance of MEP did not adversely affect treatment outcome, indicating that the step-wise propagation of particles through the PC induced by the MEP is more robust with respect to minor deviations from treatment instructions. Our results confirm that self-treatment may provide rapid relief from PC-BPPV and should be considered as complementary treatment especially for patients who fail to respond to single therapist-guided positioning maneuvers. It may also be a viable tool for patients with frequent recurrences rendering them independent from costly and time-consuming medical care. Because, according to our data, MEP is more effective than MSM in relieving BPPV, we recommend MEP as first-line self-treatment approach.

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