

RESIDUAL DIZZINESS AFTER CANALITH REPOSITIONING MANEUVERS IN PATIENTS WITH POSTERIOR CANAL BENIGN POSITIONAL PAROXYSMAL VERTIGO (BPPV)

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ABSTRACT:

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Background: Residual dizziness (RD) is a sense of persistent lightheadedness, sense of floating and imbalance that lasts for 1-3 weeks and occurs in almost 2/3 of benign paroxysmal positional vertigo (BPPV) patients after canalith repositioning maneuvers.

Aim of the work: To detect frequency of occurrence of RD after successful canalith repositioning maneuvers using Epley or Semont's and to detect the possible aggravating factors of RD after canalith repositioning maneuvers using Epley or Semont's.

Patients and methods: This study was done on 42 posterior semicircular canal BPPV patients. During 1st visit history, Videonystagmography, Modified Clinical test of sensory interaction in balance, DHI questionnaire and visual analogue scale were done. Patients were distributed by systematic random selection to undergo Epley or Semont maneuvers and were followed up after 1 week. After 1 week, Dix Hallpike, history and questionnaires were repeated.

Results: Semont's maneuver contributes more to RD development than Epley maneuver. As 42.9% of BPPV patients who underwent Semont had RD and 21.4% of BPPV patients who underwent Epley had RD. RD is more prevalent among older age. Long duration of BPPV before maneuvers, frequency of attacks, latency and degree of nystagmus in Dix Hallpike showed significant difference between RD and non-RD patients. Patients with higher DHI scores are more prone to RD than non- RD patients.

Conclusions: Semont maneuver causes more RD than Epley maneuver. Patients with RD are not much affected by visual influences that affect the vestibular system than the non- RD patients.

Keywords: Residual dizziness, Posterior canal BPPV, Epley maneuver, Semont maneuver.

INTRODUCTION:

Epley and Semont's maneuvers are effective in treating BPPV, as most patients report resolving symptoms afterwards. However, some patients still complain of residual dizziness (RD) after successful

repositioning⁽¹⁾. Its prevalence ranges from 38% to 61%⁽²⁾.

Residual dizziness is defined by non-positional dizziness, persistent imbalance, feeling of floating, continuous light headedness and short-lasting unsteadiness occurring during head movement, standing or

walking in absence of vertigo or nystagmus. It lasts for 1 to 3 weeks^(3,4).

There are many theories to explain residual dizziness including presence of otoconial debris after incomplete repositioning, presence of otolith dysfunction, coexistence of another vestibular lesion and long time needed for central adaptation after repositioning⁽¹⁾.

It was suggested by *Bal et al.*,⁽⁵⁾ that light cupula mechanism occurs due to degenerated otoconia, and the other theory may be due to cells floating in the endolymph such as monocytes or lymphocytes. Unilateral influence supports the light debris theory. It occurs more in lateral canal rather than posterior canal and that is because it is more difficult for light particles to adhere to the PSCC cupula than lateral semicircular canal cupula. It leads to positional direction changing positional nystagmus.

This residual dizziness causes decrease in postural control that can affect the quality of life, contributing to falling and psychological problems to patients. Many risk factors contribute to occurrence of residual dizziness including anxiety, postural hypotension, longer duration of vertigo before repositioning and more than one episode of BPPV in history.

Also, age >65 years contributes significantly to residual dizziness due to changes in otoconia morphology due to vascular changes in inner ear. Other risk factors include female gender, 2ry BPPV, higher Dizziness Handicap Inventory score before treatment, osteopenia and onset in winter with previous history of BPPV⁽⁶⁾.

Rationale:

RD affects almost two third of BPPV patients and since it is of high prevalence and has an impact on patients' quality of life, this study addresses residual dizziness after successful canalith repositioning maneuvers in posterior canal BPPV patients

AIM OF THE WORK:

1. To detect frequency of occurrence of residual dizziness after successful canalith repositioning maneuvers using Epley or Semont's.
2. To detect possible aggravating factors of residual dizziness after canalith repositioning maneuvers using Epley or Semont's.

MATERIAL AND METHODS:

This study is a prospective observational study that was carried out in the outpatient vestibular clinic of the Audiology unit -ENT department – Ain Shams University Hospitals. It was completed within 12 months.

Study Population:

This study included 42 posterior canal BPPV canalithiasis patients, aged 18 years or above, diagnosed with Dix Hallpike test. Patients with anterior canal or horizontal canal BPPV, multiple canals BPPV or Posterior canal BPPV cupulolithiasis were excluded. Patients were chosen to undergo either Epley or Semont's maneuvers by systematic random sample.

Equipment and tools:

- Micro Medical Videonystagmography using spectrum software.
- Dizziness Handicap Inventory Questionnaire (DHI) Arabic version⁽⁷⁾.
- Visual Analogue Scale (VAS)⁽⁸⁾.

Study Procedures:

Patients diagnosed with posterior canal BPPV by Dix Hallpike test underwent:

- A detailed history including presence of risk factors.
- Modified Clinical test of sensory interaction in balance as the patients are tested in 4 conditions⁽⁹⁾.

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- Fulfillment of Dizziness Handicap inventory (DHI) questionnaire Arabic version which consists of 25 questions to assess dizziness affection on patients' quality of life before and after repositioning maneuvers.
- Fulfillment of Visual analogue Scale which consists of 9 questions with a scale from 0 to 9 to assess patients' severity of dizziness in different life situations before and after the maneuver.
- Videonystagmography (VNG) was done for patients to confirm the diagnosis of posterior canal and to diagnose associated vestibular co-morbidities if present. (oculomotor tests, positional, Dix Hallpike and caloric).

Patients were randomly selected to apply either Epley or Semont's. After the maneuver patients returned back to the clinic after 1 week for follow up.

After 1 week in the 2nd visit:

- To prove the success of the maneuvers a Dix Hallpike test was done
- Patients reporting improvement (absence of symptoms) of BPPV after successful repositioning maneuvers will be asked by history of presence of any residual dizziness symptoms.

- Dizziness Handicap Inventory (DHI) and visual analogue scale will be filled again by each patient.

Statistical plan:

Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 27. The comparison between groups regarding qualitative data was done by using *Chi-square test* and/or *Fisher exact test*. The comparison between two independent groups with quantitative data and parametric distribution was done by using *Independent t-test* while with non-parametric distribution were done by using *Mann-Whitney test*. The p-value was considered significant at the level of <0.05.

Ethical Considerations:

An informed oral consent was taken from the patients before testing and aim of the study and procedures were explained. The study protocol had been approved by the Ain Shams University Ethical committee of Human Research (FMASU: MS848/2022).

RESULTS:

Table 1: Relation of Maneuver used with presence of RD symptoms.

| Maneuver used | Presence of RD | % of total BPPV patients who underwent the maneuver | Test value | P-value | Sig. |
|---------------|----------------|---|------------|---------|------|
| Epley | RD | 9 (21.4%) | 8.400* | 0.004 | HS |
| | Non-RD | 12 (28.6%) | | | |
| Semont | RD | 18 (42.9%) | | | |
| | Non-RD | 3 (7.1%) | | | |

P-value > 0.05: Non-significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant. *: Chi-square test.

This table shows that Semont maneuver contributes more to RD occurrence than Epley's maneuver.

RD symptoms include:

Light headedness, sense of imbalance and sense of floating.

Positive RD symptoms:

Presence of one or more of the RD symptoms.

Table (2): Relation of presence of residual dizziness symptoms with demographic data and characteristics of the studied patients

| | | Residual dizziness symptoms | | Test value | P-value | Sig. |
|--------|-------------------|-----------------------------|---------------|------------|---------|------|
| | | Negative | Positive | | | |
| | | No. = 15 | No. = 27 | | | |
| Age | Mean ± SD | 47.73 ± 9.72 | 58.85 ± 13.40 | 2.821• | 0.007 | HS |
| | Range | 32–67 | 34 – 76 | | | |
| | < 60 yrs. (no=24) | 13 (86.7%) | 11 (40.7%) | 8.305* | 0.004 | HS |
| | ≥ 60 yrs. (no=18) | 2 (13.3%) | 16 (59.3%) | | | |
| Gender | Female | 9 (60.0%) | 14 (51.9%) | 0.258* | 0.611 | NS |
| | Male | 6 (40.0%) | 13 (48.1%) | | | |

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant.

*: Chi-square test; •: Independent t-test.

This table shows the relation between age, gender and presence of residual dizziness and showed significant difference with increasing age.

In this table the studied group was further divided into 2 subgroups according to age. Subgroup I (24 patients): <60 years of age and Subgroup II (18 patients): > or = 60 years of age.

Table (3): Relation of presence of residual dizziness with characteristics of vestibular symptoms of BPPV among the study group subjects.

| | | Residual dizziness symptoms | | Test value | P-value | Sig. |
|--|--------------|-----------------------------|-------------|------------|---------|------|
| | | Negative | Positive | | | |
| | | No. = 15 | No. = 27 | | | |
| Duration of vestibular complaint in months | Median (IQR) | 9(1 – 36) | 9(2 – 24) | -0.211≠ | 0.833 | NS |
| | Range | 0.33 – 120 | 0.72 – 40 | | | |
| Duration of BPPV attacks in months | Median (IQR) | 3 (1 – 12) | 10 (2 – 24) | 2.081≠ | 0.037 | S |
| | Range | 0.33 – 36 | 0.67 – 240 | | | |
| Duration of last attack in days | Median (IQR) | 7(5 – 10) | 10(5 – 14) | -1.048≠ | 0.295 | NS |
| | Range | 3 – 21 | 3 – 30 | | | |
| Frequency of attacks per day | Median (IQR) | 2 (1 – 3) | 4 (3 – 6) | -2.251≠ | 0.024 | S |
| | Range | 1 – 10 | 1 – 20 | | | |
| Last attack how many days ago | Median (IQR) | 1(1 – 1) | 1(1 – 1) | -0.627≠ | 0.530 | NS |
| | Range | 0 – 4 | 0 – 7 | | | |

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant; ≠: Mann-Whitney test.

This table shows that as the duration of BPPV increases, the incidence of developing residual dizziness later on increases and as

the frequency of attacks per day increases, the residual dizziness is expected to occur more.

Table (4): Relation of presence of residual dizziness symptoms with baseline (before the maneuver) DHI scores, VAS scores and mCTSIB among the studied patients.

| Baseline | | Residual dizziness symptoms | | Test value | P-value | Sig. |
|----------------------|--------------|-----------------------------|-----------------|------------|---------|------|
| | | Negative | Positive | | | |
| | | No. = 15 | No. = 27 | | | |
| DHI Total score | Median (IQR) | 28 (26 – 32) | 52 (36 – 68) | -2.536≠ | 0.011 | S |
| | Range | 2 – 86 | 6 – 84 | | | |
| DHI Handicap Grading | None | 1 (6.7%) | 3 (11.1%) | 15.906* | 0.001 | HS |
| | Mild | 11 (73.3%) | 4 (14.8%) | | | |
| | Moderate | 0 (0.0%) | 10 (37.0%) | | | |
| | Severe | 3 (20.0%) | 10 (37.0%) | | | |
| VAS | Median (IQR) | 1.8 (0.4 – 4.5) | 2.8 (0.8 – 4.5) | -0.567≠ | 0.570 | NS |
| | Range | 0 – 7.5 | 0 – 7.5 | | | |

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| | | | | | | |
|--------------------|----------|------------|------------|--------|-------|----|
| VAS grading | None | 3 (20.0%) | 7 (25.9%) | 1.244* | 0.742 | NS |
| | Mild | 7 (46.7%) | 8 (29.6%) | | | |
| | Moderate | 4 (26.7%) | 10 (37.0%) | | | |
| | Severe | 1 (6.7%) | 2 (7.4%) | | | |
| mCTSIB | normal | 12 (80.0%) | 24 (88.9%) | 0.622* | 0.430 | NS |
| | Abnormal | 3 (20.0%) | 3 (11.1%) | | | |

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant.

*: Chi-square test; ≠: Mann-Whitney test.

This table shows that DHI score total and grading are significantly higher in residual dizziness patients before the maneuver than the other group of non-RD patients.

m-CTSIB results showed no significance between RD and non-RD groups regarding presence of abnormality. As 14.3 % of patients showed abnormal results.

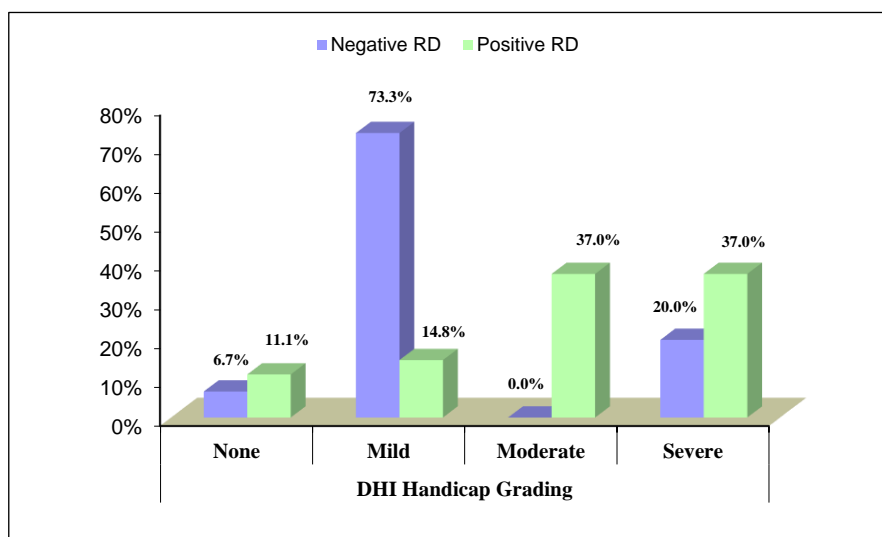


Diagram 1: Relation of presence of residual dizziness symptoms with DHI handicap grading at baseline.

Table (5): Relation of presence of residual dizziness symptoms with DHI and VAS scores at follow-up among the studied patients.

| At follow-up | | Residual dizziness symptoms | | Test value | P-value | Sig. |
|------------------------|--------------|-----------------------------|---------------|------------|---------|------|
| | | Negative | Positive | | | |
| | | No. = 15 | No. = 27 | | | |
| DHI Total score | Median (IQR) | 20 (6 – 28) | 36 (18 – 50) | 2.500≠ | 0.012 | S |
| | Range | 0 – 36 | 0 – 76 | | | |
| DHI grading | None | 6 (40.0%) | 5 (18.5%) | 8.739* | 0.033 | S |
| | Mild | 8 (53.3%) | 8 (29.6%) | | | |
| | Moderate | 1 (6.7%) | 10 (37.0%) | | | |
| | Severe | 0 (0.0%) | 4 (14.8%) | | | |
| VAS | Median (IQR) | 1.6 (0 – 3.6) | 2.2 (0 – 3.8) | -0.384≠ | 0.701 | NS |
| | Range | 0 – 6.1 | 0 – 5.4 | | | |
| VAS (2) grading | None | 4 (26.7%) | 7 (25.9%) | 0.003* | 0.998 | NS |
| | Mild | 6 (40.0%) | 11 (40.7%) | | | |
| | Moderate | 5 (33.3%) | 9 (33.3%) | | | |
| | Severe | 0 (0.0%) | 0 (0.0%) | | | |

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant.

*: Chi-square test; ≠: Mann-Whitney test.

This table shows that DHI scores and gradings are significantly higher among RD group than the other non-RD group also after the maneuvers.

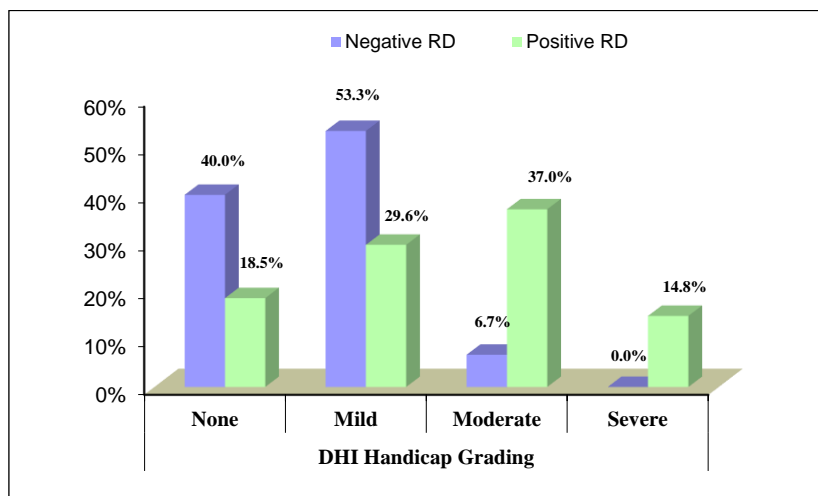


Diagram 2: Relation of presence of residual dizziness symptoms with DHI handicap grading in percentage at follow up.

Table 6: Relation of presence of residual dizziness symptoms with VNG diagnosis and nystagmus details in Dix Hallpike among the studied patients

| | | Residual dizziness symptoms | | Test value | P-value | Sig. |
|------------------------------|---|-----------------------------|----------------------|------------|---------|------|
| | | Negative No. = 15 | Positive No. = 27 | | | |
| VNG Diagnosis | BPPV only | 9 (60.0%) | 19 (70.4%) | 0.467* | 0.495 | NS |
| | BPPV with vestibular comorbidities | 6 (40.0%) | 8 (29.6%) | | | |
| Nystagmus details | | | | | | |
| Direction | Torsional upbeating not reversed with sitting | 12 (80.0%) | 18 (66.7%) | 0.840* | 0.359 | NS |
| | Torsional upbeating reversed with sitting | 3 (20.0%) | 11 (33.3%) | | | |
| Latency in seconds | Median (IQR) | 5 (4 – 10) | 2 (2 – 4) | -2.932≠ | 0.003 | HS |
| | Range | 2 – 10 | 1 – 15 | | | |
| Duration in seconds | Mean ± SD | 17.00 ± 8.01 | 22.07 ± 9.80 | -1.711• | 0.095 | NS |
| | Range | 5 – 30 | 4 – 45 | | | |
| Degree | Mean ± SD | 11.93 ± 2.15 | 15.41 ± 4.33 | 2.900• | 0.006 | HS |
| | Range | 8 – 15 | 9 – 23 | | | |
| Dix hallpike (VNG) BPPV side | Right | 4 (26.7%) | 12 (44.4%) | 2.103* | 0.349 | NS |
| | Left | 11 (73.3%) | 14 (51.9%) | | | |
| | Bilateral | 0 (0.0%) | 1 (3.7%) | | | |

P-value > 0.05: Non significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant.

*: Chi-square test; •: Independent t-test; ≠: Mann-Whitney test.

This table shows the relation between presence of abnormalities in VNG and presence of residual dizziness and showed that as the degree of nystagmus increases and the latency decreases that contributes more to RD occurrence.

DISCUSSION:

This study involved 42 BPPV patients with posterior canal BPPV who underwent either Epley or Semont maneuver by

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systematic random selection and residual dizziness was assessed.

Table (1) showed comparison between Epley and Semont's maneuver regarding occurrence of residual dizziness. It showed that there is significant difference between frequency of occurrence of residual dizziness in Epley and Semont's maneuvers. As the percentage of patients that underwent Semont's who developed RD was 42.9% among BPPV patients, while the percentage of patients that underwent Epley who developed RD was 21.4% among BPPV patients.

In this study, the explanation for that could be due to the pathophysiology of the disease itself. Since all involved patients are canalithiasis, Epley maneuver will allow better return of particles to the utricle with less dispersed otoconia that may result in residual dizziness. However, Semont's maneuver may have contributed to more dispersion of otoconia in canalithiasis type of BPPV leading to development more of residual dizziness.

Toupet et al.⁽¹⁰⁾ in their study on 226 posterior canal BPPV patients divided them randomly into 2 different groups, one group to undergo Epley maneuver the other to undergo Semont's maneuver. They observed that both maneuvers had similar efficacy in reducing BPPV vertigo and dizziness. Residual dizziness scores measured by visual analogue scale were higher in Epley group during the first 3 days but became similar to those of Semont's group at days 4 and 5, which indicates that Epley maneuver provides immediate improvement more than Semont's in the first few days after the maneuver, however by the end of the first week the results become comparable. They also found that patients treated with one or two Epley maneuvers had higher scores of dizziness than patients undergoing Semont's when assessed by visual analogue scale 3 days after the maneuvers. It was suggested that the difference of dizziness scores

between Semont's and Epley's groups might be related to differences in the dynamics of otoconia displacement.

In this study it was found that there is significant relation between the presence of residual dizziness with increasing age, as shown in Table (2). Patients above 60 years who developed residual dizziness were 59.3%, while patients who developed residual dizziness below 60 years were 40.7%. This may be due to physiological aging process that leads to change in otoconial morphology due to vascular changes in elderly and decrease blood supply.

Fu et al.,⁽¹¹⁾ also reported that old age and middle-aged patients are affected more by residual dizziness than young age group and that may be due to the age-associated decline in the sensory system (vestibular, visual, and proprioceptive systems) and that leads to a longer time for central adaptation after successful particle repositioning.

However, there is no significant difference between both genders in developing residual dizziness as shown in Table (2) as the female percentage in residual dizziness was 51.9% and the male percentage was 48.1%.

Teggi et al.,⁽¹²⁾ also reported no association between gender and residual dizziness. However, *Caruso and Nuti*⁽¹³⁾ reported that there is higher residual dizziness among female patients who are more liable for osteoporosis that contributes to residual dizziness. In addition, BPPV itself occurs more in females also because they are more liable for osteoporosis

Moreover, this study showed that there was significant difference between duration of BPPV attacks in months, frequency of attacks per day and residual dizziness. While there was no significant difference between duration of vestibular complaint in months, duration of last attack in days, last attack how many days ago and residual dizziness as shown in Table (3).

The longer the duration of BPPV before the maneuver, the more residual dizziness is expected to occur. The median duration in months was 10 among residual dizziness patients and was 3 among non-residual dizziness patients. That may be due to presence of dispersed otoconia or residual debris from the long duration of BPPV and recurrence of attacks that still didn't return back to the utricle, so still causing sense of imbalance without vertigo or overt nystagmus. In addition, residual dizziness increases with increasing the frequency of attacks before the maneuver as the median frequency was 4 among residual dizziness patients and 2 among non-residual dizziness patients.

A study made by *Teggi et al.*,⁽¹²⁾ on 60 patients and *Dispenza et al.*,⁽⁶⁾ on 148 patients also reported that with longer duration of BPPV and increasing number of attacks, the possibility of residual dizziness occurrence increases. The long duration of BPPV may denote the presence of residual debris that despite patient's continuous head movement still didn't return back to the utricle.

Stambolieva and Angov⁽¹⁴⁾, *Teggi et al.*,⁽¹⁵⁾ and *Lee et al.*,⁽¹⁶⁾ reported that there is strong correlation between the duration of vertigo before successful canalith repositioning maneuvers and the presence of residual dizziness. As the longer the otoconia remain floating in the endolymph before the repositioning maneuver, the longer the time for recovery and central adaptation will be needed. While *Oghalai et al.*,⁽¹⁷⁾ reported that There is no agreement about the correlation between RD and duration of BPPV.

DHI and VAS scores were compared before and after the maneuver as regarding patients who developed residual dizziness and those who didn't develop RD.

Tables (4 & 5) show that there is significant impairment in DHI scores and grading among residual dizziness group of patients when compared with the non-RD

group either before or after the maneuver. After the maneuver the scores in both groups were improved, however the RD group still had worse scores than the non-RD group. Diagrams (1 & 2) show the DHI grading before and after the maneuver respectively.

This is in agreement with *Fu et al.*,⁽¹¹⁾ as according to his study on 181 BPPV patients who showed higher DHI scores (moderate or severe) before the maneuver were more prone to development of RD than patients with mild and normal scores and so it can be used for RD prediction. That was related to the high level of anxiety attributed to the unpredictability of the disease itself that was found to be present more among RD patients.

While VAS score and grading showed no significant difference between patients with residual dizziness and those without and these same results were observed both before the maneuver and also after the maneuver, as shown in Tables (4 & 5). Residual dizziness patients showed higher scores than non-residual dizziness patients, but not that much high to cause significant difference. That may be because the VAS scale questions assess how much the vestibular system is affected by visual disturbance and different situations that provoke dizziness that may not be present significantly within patients in this study.

On the contrary, VAS scores in some studies including *Teggi et al.*,⁽¹²⁾ and *Toupet et al.*,⁽¹⁸⁾ reported VAS association with residual dizziness maneuvers. As patients with residual dizziness still subjectively report sense of imbalance and may give higher scores than those patients without residual dizziness.

As regards to the nystagmus parameters that are shown in Dix Hallpike position in Table (6), the direction, duration in seconds and subjective sense of dizziness were found to be not related to residual dizziness. However, the latency in seconds and degree of nystagmus showed significant association

with RD. As the latency decreases and the degree of nystagmus increases, RD is more likely to occur.

Yu *et al.*,⁽¹⁹⁾ reported that posterior canal BPPV patients with decreased duration and increased velocity in the slow phase of recorded nystagmus in Dix Hallpike position take longer time for recovery and have worse prognosis in BPPV that persists after one canalith repositioning maneuver. The latency of the nystagmus is related to the delay in the setting of otoconia in the semicircular canal. The smaller the mass of otoconia, the greater the velocity of particles and maybe that's why RD patients have more increased degree of nystagmus (velocity) as they might have more dispersed otoconia and residual debris that lead to RD development.

Table (6) shows that the majority of BPPV patients 59.5% (25 patients) were affected on left side in Dix Hallpike. However, the table shows that whether the Dix Hallpike was positive on right or left side, it was non-significant to residual dizziness occurrence. On the contrary, there is widely accepted hypothesis as stated by Brevern *et al.*,⁽²⁰⁾ and Godha *et al.*,⁽²¹⁾ that the right side is affected more and that was explained by the habit of most patients to sleep on their right side that's why they are more conscious to vertigo occurring on that side.

Conclusion:

In this study it was found that Semont maneuver causes more residual dizziness than Epley maneuver. In addition, risk factors of residual dizziness include old age, long duration of BPPV before maneuver, higher frequency of attacks per day, higher scores of DHI before and after the maneuver, shorter latency and higher degree of nystagmus in Dix Hallpike.

It is recommended that patients with risk factors that contribute more to RD to go for Epley maneuver and if residual dizziness persists, full vestibular assessment to the

patients together with application of appropriate vestibular and balance rehabilitation program.

Conflicts of interest:

No conflict of interest

List of abbreviations:

BPPV : Benign paroxysmal positional vertigo.
DHI : Dizziness Handicap Inventory.
o-VEMP : Ocular evoked myogenic potentials.
RD : Residual dizziness.
VAS : Visual analogue scale.
VNG : Video-nystagmography.

REFERENCES:

1. **Seok, JI., Lee, H. and Yoo, J. (2008):** Residual dizziness after successful repositioning treatment in patients with benign paroxysmal positional vertigo. *J Clin Neurol*; 4:107-10.
2. **Jiang, X., He, L., Gai, Y., Jia, C., Li, W., Hu, S., Tang, J. and Cao, L. (2020):** Risk factors for residual dizziness in patients successfully treated for unilateral benign posterior semicircular canal paroxysmal positional vertigo. *The Journal of international medical research*.
3. **Kim H. and Lee, H. (2014):** Autonomic dysfunction as a possible cause of residual dizziness after successful treatment in benign paroxysmal positional vertigo. *Clin Neurophysiol*; 125:608–614
4. **Martellucci S., Pagliuca G., Vincentiis, M., Greco, A., Virgilio, A., Benedetti, F., Gallipoli, C., Rosato, C., Clemenzi, V. and Gallo, A. (2016):** Features of residual dizziness after canalith repositioning procedures for benign paroxysmal positional vertigo. *Otolaryngology Head and Neck surgery* .154(4) :693-701
5. **Bal N., Altun M., Kuru E., Behmen M. and Toker O. (2022):** Light cupula phenomenon: a systematic review, *The Egyptian Journal of Otolaryngology* volume 38, Article number: 150
6. **Dispenza, F., Mazzucco, W., Mazzola, S. and Martines, F. (2019):** Observational study on risk factors determining residual

- dizziness after successful benign paroxysmal positional vertigo treatment: the role of subclinical BPPV, *ACTA Otolaryngologica Italica*, 39:347-352.
7. **Elgohary, M., Tawfik, S. and Ghounaim, M. (2000):** Clinical measures of equilibrium versus computerized dynamic posturography in balance disorder patients [Unpublished MS thesis]. Cairo: Faculty of Medicine, Ain Shams University.
 8. **Talaat, H., Zein El Abeiden, A. and Ali, R. (2019):** Arabic version of the visual vertigo analogue scale for assessment visual vertigo syndrome. *Egyptian Journal of Ear Nose and Throat and Allied Sciences*
 9. **Peterka R, Loughlin P. (2004):** Dynamic Regulation of Sensorimotor Integration in Human Postural Control. *J Neurophysiol.*;91(1):410-423.
 10. **Toupet M., Ferrary E., and Grayeli A. (2012):** Effect of Repositioning Maneuver Type and Postmaneuver Restrictions on Vertigo and Dizziness in Benign Positional Paroxysmal Vertigo, the scientific world journal , Volume 2012 | Article ID 162123
 11. **Fu W., He F., Bai Y., An X., Shi Y., Han J. and Wang X. (2022):** Risk factors of residual dizziness after successful treatment for Benign paroxysmal positional vertigo in middle age and older adults ., *Frontiers in neurology* 13:850088
 12. **Teggi R., Leone G. and Bondi S. (2011):** Residual dizziness after successful repositioning maneuvers for idiopathic benign paroxysmal positional vertigo in the elderly. *Eur Arch Otorhinolaryngology*; 268:507-11
 13. **Caruso G and Nuti D. (2005):** Epidemiological data from 2270 PPV patients. *Audiological Med.*;3:7-11.
 14. **Stambolieva K. and Angov G. (2006):** Postural stability in patients with different durations of benign paroxysmal positional vertigo. *Eur Arch Otorhinolaryngology* ,263:118-122
 15. **Teggi R., Quagliari S., Gatti O. and Benazzo M. (2013):** Residual dizziness after successful repositioning maneuvers for idiopathic benign paroxysmal positional vertigo. *ORL J Otorhinolaryngology*; 2:74-81.
 16. **Lee J., Lee I and Kim M. (2021):** Correlation between residual dizziness and modified clinical test of sensory integration and balance in patients with benign paroxysmal positional vertigo, *vestibular science*, 20(3):93-100.
 17. **Oghalai J., Manolidis S. and Barth J. (2000):** Unrecognised benign paroxysmal positional vertigo in elderly patients. *Otolaryngolgy Head Neck Surgery* 2000; 122:630-4.
 18. **Toupet M., Ferrary E. and Grayeli A. (2011):** Visual analogue scale to assess vertigo and dizziness after repositioning maneuvers for benign paroxysmal positional vertigo, *Journal of vestibular research* 21 (4):235-41
 19. **Yu J., Meng G., Xu S., Chen P., Liu X., Zhao Y., Liu X. and Jin A. (2020):** Association between Dix Hallpike test parameters and successful repositioning maneuver in posterior semicircular canal benign paroxysmal positional vertigo : a case control study, *Annals of translational medicine journal* , Vol 8.no 6.
 20. **Brevern V., Radtke K., Lezius F., Feldmann M., Ziese T., Lempert T. and Neuhauser H. (2007) :** Epidemiology of benign paroxysmal positional vertigo : a population based study . *J neurology , neurosurgery , psychiatry* ,78:710-715.
 21. **Godha S., Mundra A., Mundra R., Bhalot L. and Singh A (2020):** VEMP: An objective test for diagnosing the cases of BPPV, *Indian J, otolaryngology Head Neck surgery* 72 (2):251-256.

الدوار المتبقي في مرض الدوار الحركي الحميد في القناة الخلفية عقب الاستعداد

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المقدمه: الدوار المتبقي هو عدم اتزان مستمر و احساس بعدم ثبات علي الارض يستمر من اسبوع الي ثلاث اسابيع و يحدث بالتقريب في ثلثي مرضي الدوار الحركي بعد جلسات الاستعداد.

اهداف البحث : معرفه معدل حدوث الدوار المتبقي بعد طرق الاستعداد الناجحه لقناه الاذن الهلاليه الخلفيه باستخدام طريقه ايبلي او سيمونت و معرفه احتماليه اسباب حدوث الدوار المتبقي بعد طرق الاستعداد الناجحه لقناه الاذن الهلاليه الخلفيه باستخدام طريقه ايبلي او سيمونت

المرضي و طريقه البحث: شملت هذه الدراسه 42 مريض للدوار الحركي في القناه الخلفيه. في الزياره الاولى تم اخذ تاريخ مفصل و عمل اختبار قياس رآره العين بالفديو و ملئ استبيان تحديد درجه الاعاقه لمرضي الدوار و ملئ مقياس الدوار البصري التناظري و عمل اختبار التكامل الحسي الاكلينيكي المعدل. تم توزيع المرضي بطريقه منهجيه عشوائيه لعمل جلسه الاستعداد ايبلي او سيمونت و تم المتابعه بعد اسبوع. بعد اسبوع تم عمل اختبار الديكس هالبيك و اخذ التاريخ المرضي و عمل الاستبيانات مره اخري.

النتائج : جلسه الاستعداد سيمونت ادت الي حدوث الدوار المتبقي اكثر من ايبلي. 42,9% من مرضي الدوار الحركي الذين تم توزيعهم في جلسات السيمونت عانوا من دوار متبقي اما 21,4% من مرضي الدوار الحركي الذين تم توزيعهم في جلسات ايبلي عانوا من دوار متبقي. الدوار المتبقي اكثر حدوثا في كبار السن. وجد فرق واضح في مجموعه الدوار المتبقي عن المجموعه التي لم تعاني من دوار متبقي في زياده مده الدوار الحركي قبل جلسه الاستعداد, زياده عدد نوبات الدوار الحركي, توقيت ظهور رآره العين و شدة رآره العين في اختبار الديكس هالبيك. المرضي ذو نتائج عاليه في استبيان تحديد درجه الاعاقه لمرضي الدوار عانوا اكثر من دوار متبقي.

الخلاصه: جلسات الاستعداد سيمونت تسبب دوار متبقي اكثر من ايبلي و المرضي الذين يعانون من دوار متبقي لا يتأثروا بالمؤثرات البصريه التي تؤثر علي جهاز الاتزان.

الكلمات الداله: دوار متبقي, دوار حركي في القناه الخلفية الهلاليه, جلسه الاستعداد ايبلي, جلسه الاستعداد سيمونت.