OUTCOME OF THE DIX - HALLPIKE MANEUVER AND THE BRIEF HEAD TURN MANEUVER IN BENIGN PAROXYSMAL POSITIONAL VERTIGO PATIENTS

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Abstract

Objective To review the outcome of the Dix-Hallpike maneuver (DHM) and the brief head turn maneuver (BHTM) in patients who had typical history of benign paroxysmal positional vertigo (BPPV).

Methods Sixty patients who presented with typical history of BPPV from December 2003-November 2004 were retrospective review. All patients were tested with the DHM and/or the BHTM and were divided into 2 groups, according to positive or negative test result. Analysis the data was done using Statistical package for Social Science (SPSS) version 11.

Results The age of the patients ranged from 24-69 years with men to women ratio of 1: 1.7. The onset of symptom prior to treatment varied from 1 hour- to 3.5 years. The range of duration of vertigo in each episode was 1 seconds to 5 minutes. There is no statistical significant difference between positive and negative groups in all of the above parameters. Twenty-eight percent (17 cases) of the patients showed positive test. Eight and five cases had positive only in the DHM or the BHTM respectively. Four cases had positive in both tests.

Conclusions Patients who had typical history of BPPV should be evaluated with both DHM and BHTM to localized the affected ear and clearify the underlying pathology. With positive result, specific treatment can be performed. Chiang Mai Med Bull 2005;44(3):101-106.

Keywords: Benign paroxysmal positional vertigo (BPPV), the Dix-Hallpike maneuver (DHM), the brief head turn maneuver (BHTM)
by specific head movement. Cupulolithiasis and Canalolithiasis are the 2 hypotheses that are generally accepted as the pathogenesis of BPPV.

Navacharoen et al. reviewed 1,283 clinical records from vertiginous patients in Maharaj Nakorn Chiang Mai Hospital from 1986 to 1994 and 1997 to 2001 and found BPPV as the most common cause of vertigo in 22.1% and 49.6%, respectively. The suspected pathology of BPPV was mostly located in the posterior semicircular canal (PSC).

Diagnosis of BPPV is based on a typical history and the presence of a reproducible vertigo and paroxysmal positioning nystagmus. History plays a very important role in the diagnostic procedure, but it cannot indicate the correct treatment for all patients. Parnes (2003) proposed that the history and eye-findings during positional testing were the gold standard for diagnosing BPPV. Norre (1994, 1995) suggested that nystagmus could be reproduced using the Dix-Hallpike maneuver (DHM) during an electronystagmography (ENG) recording, or it could be presented in the vestibular habituation training test battery. However, the ENG is less reliable than DHM under the Frenzel’s glasses. When the DHM does not induce the vertigo and nystagmus, the other tests; ENG or the vestibular habituation, may be used to confirm the presence of BPPV.

There are two major options for the treatment of BPPV. Firstly, nonsurgical treatment includes reassurance, medication, and physical maneuvers. Medication does not reduce the frequency of recurrent vertigo attack, but it may reduce intensity of the symptoms. Secondly, surgical treatment by either singular nerve section or canal plugging is effective, but it has attendant risks and is rarely indicated. The posterior semicircular canal (PSC) BPPV is treated effectively by the physical maneuvers of the canalith repositioning procedure (CRP). The 360-degree CRP is used for horizontal semicircular canal (HSC) BPPV patients. For patients who have a history highly suggestive of BPPV but no characteristic response to the tests, Brandt-Daroff exercises, which involve repetitive side-to-side head movement, are often helpful.

Yukpan et al. reported 103 cases of BPPV at Maharaj Nakorn Chiang Mai Hospital. The DHM showed a positive result in 52%. Norre founded that 67 of 95 BPPV patients described a typical history and positive DHM.

The DHM is the classic test maneuver induced pathognomonic finding of BPPV. It is the method used for diagnosing PSC BPPV. To perform this test, the patient is seated and positioned so that the head can be extended over the top edge of a couch during supine position. The head is then turned 45 degrees toward the ear being tested and quickly lowered into the supine position with the head extending about 30 degrees below the horizon. The patient’s head is held in this position while the examiner observes the patient’s eyes for nystagmus. Then the patient is returned to the seated position and the eyes are observed for reversal nystagmus. To complete the maneuver, the other side is examined in the same manner.

Vertigo in the HSC BPPV can be provoked with the brief head turn maneuver (BHTM) by turning the head quickly from supine to either lateral position. Both sides are tested. The direction of roll causing the greatest nystagmus intensity often identifies the
affected side.\textsuperscript{(5,10-12)} Compared with the vertical-torsional nystagmus of the PSC BPPV, this horizontal nystagmus of the HSC BPPV has a shorter latency, stronger intensity and less fatigability, and it is usually associated with severe autonomic symptoms.\textsuperscript{(5,11)} A verticalrotatory nystagmus indicates a combination of posterior and horizontal BPPV.\textsuperscript{(11)}

The DHM and BHTM are contraindicated in patients with severe cervical arthrosis, vertebrobasilar insufficiency, back pain, a high grade carotid stenosis, and unstable heart disease.\textsuperscript{(11)} The risk and are benefit also considered in patients with retinal detachment, ischemic heart disease, and hypertension.\textsuperscript{(7)}

In our study, the diagnosis of BPPV relied on the history of positioning vertigo and positive tests on the DHM and/ or BHTM. Both of the tests were carried out with either Frenzel’s glasses or an infrared nystagmometer.

Objective

To review the outcome of the Dix- Hallpike maneuver and brief head turn maneuver for the diagnosis of BPPV in Maharaj Nakorn Chiang Mai Hospital.

Methods

A retrospective review of the clinical records of patients who presented with brief episodes of position induced vertigo was carried out at the Department of Otolaryngology, Faculty of Medicine, Chiang Mai University during a one year-period from December 2003- November 2004. All patients were examined with the DHM and/ or BHTM. Each patient had a complete ear, nose, throat and neurotological examination. All of them had a normal central nervous system with neither signs nor symptoms that contraindicated test performing.

The result was divided into 2 groups, positive and negative test. The group of positive tests included patients with vertigo and nystagmus in the DHM or BHTM. The group of negative tests was vice versa.

The data were recorded an age, sex, history of position-induced vertigo, time of onset prior to hospital treatment, duration of vertigo in each episode, and result of the tests. The Mann-Whitney U test was used to identify a possible significant difference between the positive and negative test group with respect to age, duration prior to hospital treatment, and duration of vertigo. The chi-squared test was applied to identify significant differences in sex distribution.

Results

Sixty patients with complete medical records presented with a typical history of BPPV at the Department of Otolaryngology, Faculty of Medicine, Chiang Mai University from December 1, 2003 to November 30, 2004. Twenty two patients were men and 38 women, with an age range of 24-60 years. The time from the onset of symptoms to treatment varied from 1 hour to 3.5 years. The duration range of vertigo in each episode was from 1 second to 5 minutes. Seventeen patients had positive test results and 43 had negative ones (Table 1). The mean and standard deviation of age, duration of symptoms prior to hospital treatment, and duration of vertigo in each group are demonstrated in table 2.

Age, sex, duration of symptoms prior to hospital treatment, and duration of vertigo in each episode between the two groups were compared (table 3). There was no statistical significance in any of the parameters.
According to the positive test result, PSC and HCS pathology was suspected in 8 cases of each. One patient had a negative DHM, but positive BHTM, which showed clockwise nystagmus in the left head turn position.

### Discussion

BPPV is the most common cause of vertigo.\(^{(1)}\) The diagnosis of BPPV is based on the history and eye-findings during positional testing.\(^{(5)}\) The DHM and BHTM are simple diagnostic tests that induce vertigo and confirm characteristic nystagmus. These tests require a short period of time, have easy steps to follow, can be performed with uncomplicated instruments. They are also well tolerated with minimal morbidity and stress to the patients, and they yield effective benefits if they are carried out under no contraindicated cases. The right diagnosis leads to correct treatment, which in with case of BPPV means proper selection of patients for exercise treatment.\(^{(6)}\)

Comparing this study to the one by Yukpan et al.,\(^{(8)}\) the ratio between men and women was not much different (1:1.8 in the study by Yukpan compared to 1:1.7 in this study). The age range was also nearly the same (19-84 years in Yukpan’s study compared to 24-69 years in ours). In patients who came to the hospital earlier, 65% in Yukpan’s study came within the first month compared to 85% in ours. These data might reflect an improvement in health awareness. The positioning test revealed positive result less frequently (52% in Yukpan’s study compared to 28.3% in ours).

Though the data showed no statistically significant difference between the two groups of test results in all parameters (age, sex, duration of symptoms prior to hospital treatment, and duration of vertigo in each episode), the shorter onset of symptoms seemed to give more positive results. The positive test group also had a narrower range of standard deviation in this parameter. Yukpan et al.\(^{(8)}\) reported

### Table 1. Tests results

<table>
<thead>
<tr>
<th>Test done</th>
<th>Positive</th>
<th>Negative</th>
<th>Total (cases)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The DHM alone</td>
<td>8</td>
<td>25</td>
<td>33</td>
</tr>
<tr>
<td>The BHTM alone</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Both of the tests</td>
<td>9</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>Total (cases)</td>
<td>17</td>
<td>43</td>
<td>60</td>
</tr>
</tbody>
</table>

### Table 3. P-value between the 2 groups.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>P-value(^{§})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.455*</td>
</tr>
<tr>
<td>Sex</td>
<td>0.451*</td>
</tr>
<tr>
<td>Duration of symptoms prior to hospital treatment</td>
<td>0.889*</td>
</tr>
<tr>
<td>Duration of vertigo in each episode</td>
<td>0.862*</td>
</tr>
</tbody>
</table>

\(^{§}\) statistical significant P-value < 0.05, \(^{*}\) the Mann-Whitney U test, \(^{#}\) the chi-square test

### Table 2. The mean and standard deviation of age, duration of symptoms prior to hospital treatment, and duration of vertigo in the positive and negative test group.

<table>
<thead>
<tr>
<th>Result of the tests</th>
<th>Age (years)</th>
<th>Duration of symptoms (days)</th>
<th>Duration of vertigo (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive test (17 cases)</td>
<td>45.0±11.4</td>
<td>18.4±42.4</td>
<td>2.1±2.0</td>
</tr>
<tr>
<td>Negative test (43 cases)</td>
<td>47.8±11.5</td>
<td>77.0±255.5</td>
<td>2.0±1.5</td>
</tr>
<tr>
<td>Total (60 cases)</td>
<td>47.0±11.4</td>
<td>60.4±218.3</td>
<td>2.0±1.6</td>
</tr>
</tbody>
</table>
these findings as well.

Forty-seven percent of patients in the positive group had a higher incidence of HSC BPPV than in previous studies. Tirelli et al. (2004) observed 542 patients with BPPV. The PSC was involved in 459 cases (84.7%). Only 13.3% had HSC involvement and 2% had concomitant involvement of the PSC and HSC. Parnes et al. (2003) diagnosed the horizontal canal variant less than 5% of BPPV cases. Korres et al. (2004) found that 110 of 122 BPPV patients (90.2%) had PSC involvement, and 10 cases (8.2%) had horizontal canal pathology.

In the positive test group, 5 of 9 patients, who were evaluated in both tests, had a positive test in the BHTM only. Both tests were positive in 3 of 4 cases, which showed horizontal nystagmus in both maneuvers. All of these patients were diagnosed as HSC BPPV.

One case had negative DHM, but a positive BHTM test, which showed clockwise nystagmus in the left lateral head turn position. This patient was suspected of having both PSC and HSC pathology. The combination of the PSC and HSC BPPV in the same patient supports the canalolithiasis theory, as the ampullary aperture of the PSC and non-ampullary aperture of the HSC are undermost in a standing position. The floating particles tend to fall into those apertures, with a predilection for the PCS. For this reason, the conversion to another canal, occurs most commonly from the PSC to HSC.

Conclusion

BPPV is the most common cause of vertigo at Maharaj Nakorn Chiang Mai Hospital. Its typical history is brief episodes of position induced vertigo. Among 60 cases of typical history BPPV patients, the DHM and BHTM were positive in 28.3%. HSC involvement was found in 50% of these cases, which was higher than in previous studies.

The DHM and BHTM are simple diagnostic tests that induce vertigo and confirm characteristic nystagmus and should be carried out in vertiginous patients if BPPV is suspected. The tests will help to define the affected ear and pathology. With precise diagnosis the most effective and appropriate physical maneuver can be performed.

References