SIDE-LYING MANEUVER AS AN ALTERNATIVE TO THE DIX-HALLPIKE TEST FOR DIAGNOSIS OF THE BPPV

Adnan, Akif rafi, Saeed Khan, Mahmood Alam, Ali Inam Khan, Muhammad Javaid, Isteraj Shahabi

ABSTRACT

Introduction: BPPV is defined as an abnormal sensation of motion that is elicited by certain critical provocative positions. The provocative positions usually trigger specific eye movements (i.e, nystagmus). The character and direction of the nystagmus are specific to the part of the inner ear affected and the pathophysiology. The diagnosis of BPPV is based on medical history and findings after the Dix-Hallpike test. It is sometimes difficult to perform the Dix-Hallpike test in elderly persons, due to the limited range of motion when extending the neck. In this study, we used a side-lying test to stimulate the posterior semicircular canal, while the head and neck were fully supported on the examination table.

Objective: The goal of this study was to determine if an alternative test yields the same results as the Dix-Hallpike maneuver.

Materials and Methods: This study was conducted in ENT department Hayatabad Medical complex Peshawar. A total no of 42 patients were included in this study. All patients presented with complaints of vertigo elicited by up or down rotations of the head or turning over in bed, often provocative positions for BPPV and those subjects referred by their physicians for objective diagnostic tests.

All patients were subjected to side-lying maneuver, subjects with negative positional maneuver were tested with Dix-Hallpike maneuver. Main outcome measures of our study was Slow-phase eye velocity of nystagmus.

Results: In our study 42 subjects with positive history of vertiginous spells were included. Female were 25(59.52%) and 17 (40.47) were male. Total of 36 (85.71%)patients were positive on side-lying maneuver. remaining 8 patients who had no response to side laying maneuver were subjected to dix hallpike maneuver. None of the dix hallpike maneuver subjects were positive for slow phase eye nystagmus.

Conclusions: Side-lying is a valid alternative test to the Dix-Hallpike maneuver, which could be useful when range-of-motion limitations or other problems preclude use of the Dix-Hallpike maneuver.

Key words: BPPV, DIX Hallpike maneuver, Side lying Maneuver

INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is the most common cause of vertigo. The onset of benign paroxysmal positional vertigo (BPPV) is typically sudden. Many patients wake up with the condition, noticing the vertigo while trying to sit up suddenly. Thereafter, propensity for positional vertigo may extend for days to weeks, occasionally for months or years. In many, the symptoms periodically resolve and then recur[1].

The severity covers a wide spectrum. In patients with extreme cases, the slightest head movement may be associated with nausea and vomiting. Despite strong nystagmus, other patients seem relatively unfazed.[2]

It is now widely accepted that individuals exhibit symptoms of BPPV when calcium carbonate crystals (otoconia), become displaced from the utricle of the inner ear and move into the semicircular canal(s).The presence of the debris causes the involved semicircular canal to become sensitive to changes in orientation of the head in the plane of the canal. The classic symptoms of BPPV include brief episodes of intense positionally provoked vertigo. The vertigo is typically accompanied by up beating, rotatory-torsional nystagmus with the superior pole of the eyes beating towards the affected ear during the fast phase. [3,4] This type of nystagmus occurs given the connection of the posterior semicircular canal to the superior oblique and inferior rectus extraocular muscles. The posterior semicircular canal is the most often involved canal due to its anatomical location.[5,6]

The Dix-Hallpike test was developed and introduced into clinical practice in 1952.[7] It is now used extensively in the differential diagnosis of positioning vertigo of both peripheral and central type. In relation to peripheral positioning vertigo, it is primarily used for the identification of posterior or anterior canal Benign Paroxysmal Positional Vertigo (BPPV), although the horizontal nystagmus associated with horizontal canal BPPV may also be elicited. In recent years alternative test maneuvers have become more widely utilized, es-

Department of ENT and Head and Neck Surgery KGMC/ HMC Peshawar

Address for correspondence:
Dr. Adnan
Department of ENT and Head and Neck Surgery KGMC/ HMC Peshawar
E-mail: adnanhmc@gmail.com

pecially where there is physical difficulty in performing the Dix-Hallpike test.[8] The side-lying test is an alternative technique for patients where hyperextension of their neck is difficult or contraindicated, or where there is lower back pain. It can also be helpful for obese patients, particularly where there is difficulty bending at the waist.[9]

MATERIAL AND MEHODS

This study was conducted in ENT department Hayatabad Medical complex Peshawar. A total no of 42 patients were included in this study. All patients presented with complaints of vertigo elicited by up or down rotations of the head or turning over in bed, often provocative positions for BPPV and those subjects referred by their physicians for objective diagnostic tests. Patients with neck or cardiovascular problems or who have had a recent stroke were not included in this study

All patients were subjected to side-lying maneuver, subjects with negative positional maneuver were tested with Dix-Hallpike maneuver. Main outcome measures of our study was Slow-phase eye velocity of nystagmus.

Side-lying test The side-lying test is an alternative to the Dix-Hallpike test. It primarily tests for posterior or anterior canal BPPV. It is useful where the Dix- Hallpike is not suitable or the side-lying position is more tolerable for the patient, or in anticipation of a Semont or Gans maneuver since it constitutes the first position of these treatments. Ask the patient to sit sideways in the middle of an examination couch in a position such that when they lie sideways their head and torso will be supported on the couch. Ask them to turn their head 45° away from the test ear, and hold both sides of the patient's head. Ask the patient to lie sideways such that they maintain the 45° head turn and will be lying sideways on the couch looking upwards towards the ceiling with slight lateral flexion of the head towards the couch. Instruct the patient that the side-lying position should be maintained for at least 30 seconds and up to 2 minutes. Ask them to bring their feet up onto the couch if possible, as this is likely to be more comfortable. (FIG 1)

RESULTS

In our study, 42 subjects with positive history of vertiginous spells were included. Female were 25(59.52%) and 17 (40.47%) were male (table 1). Total of 36 (85.71%)patients were positive on side-lying maneuver (table 2). 8 patients who had no response to side laying maneuver were subjected to Dix hallpike maneuver. None of the Dix hallpike maneuver subjects were positive for slow phase eye nystagmus.

DISCUSSION

Vertigo is the illusion of movements of oneself or the environment due to an imbalance of tonic neural activity in the vestibular-cortical pathway. Although patients usually report rotational vertigo, occasionally they describe a sensation of linear displacement or tilt. Vertigo is commonly exacerbated by head movements and accompanied by nausea and vomiting. Vertigo may be due to unilateral injury to the peripheral vestibular organs such as the labyrinth or vestibular nerve. It also results from damage to the central vestibular structures including the vestibular nuclei, vestibular thalamic nuclei, vestibular cortex, and cerebellum. While peripheral vestibular disorders are always characterized by a combination of perceptual, ocular motor, and postural symptoms and signs, central vestibular lesions may give rise to only some of them.[10]

The primary aim of the bedside evaluation of a dizzy patient is the detection of any vestibular deficits. While the vestibular impairments can be readily determined in patients with acute vertigo, meticulous examination is required in those with chronic dizziness. When the vertigo is induced in certain circumstances, reproduction of those situations is important during the evaluation. One of the most important aims of the bedside evaluation, especially in acute vertigo, is to differentiate the central from peripheral vestibular pathologies. Peripheral vestibular disorders resulting from damage to the labyrinth or vestibular nerve are usually benign, despite the possible presence of severe dizziness. Conversely, central vestibular disorders may be fatal without prompt and proper management.[11] Positional nystagmus refers to the nystagmus that develops in association with changes in the dependent position of the head in the direction of gravity. Table 1 differentiating BPPV from central positional /positional nystagmus.

Positional testing is an essential part of the vestibular examination for diagnosing positional vertigo. Positional nystagmus may be either paroxysmal or persistent. Both peripheral and central vestibular disorders may produce positional nystagmus. The positional nystagmus is mostly paroxysmal in peripheral vestibular disorders, and is almost always observed in benign paroxysmal positional vertigo (BPPV), which is ascribed to otolithic debris that becomes detached from the maculae of the otolithic organs and enters one of the semicircular canals. The patterns of positional nystagmus in BPPV differ according to the canal involved.

Classic BPPV is usually triggered by the sudden action of moving from the erect position to the supine position while angling the head 45° toward the side of the affected ear. Merely being in the provocative position is not enough. The head actually must move to the offending pose. After reaching the provocative position, a lag period of a few seconds occurs before the spell strikes. When BPPV is triggered, patients feel as though they are suddenly thrown into a rolling spin, toppling toward the side of the affected ear. Symptoms start very violently and usually dissipate within 20 or 30 seconds.[11] (Table 2)

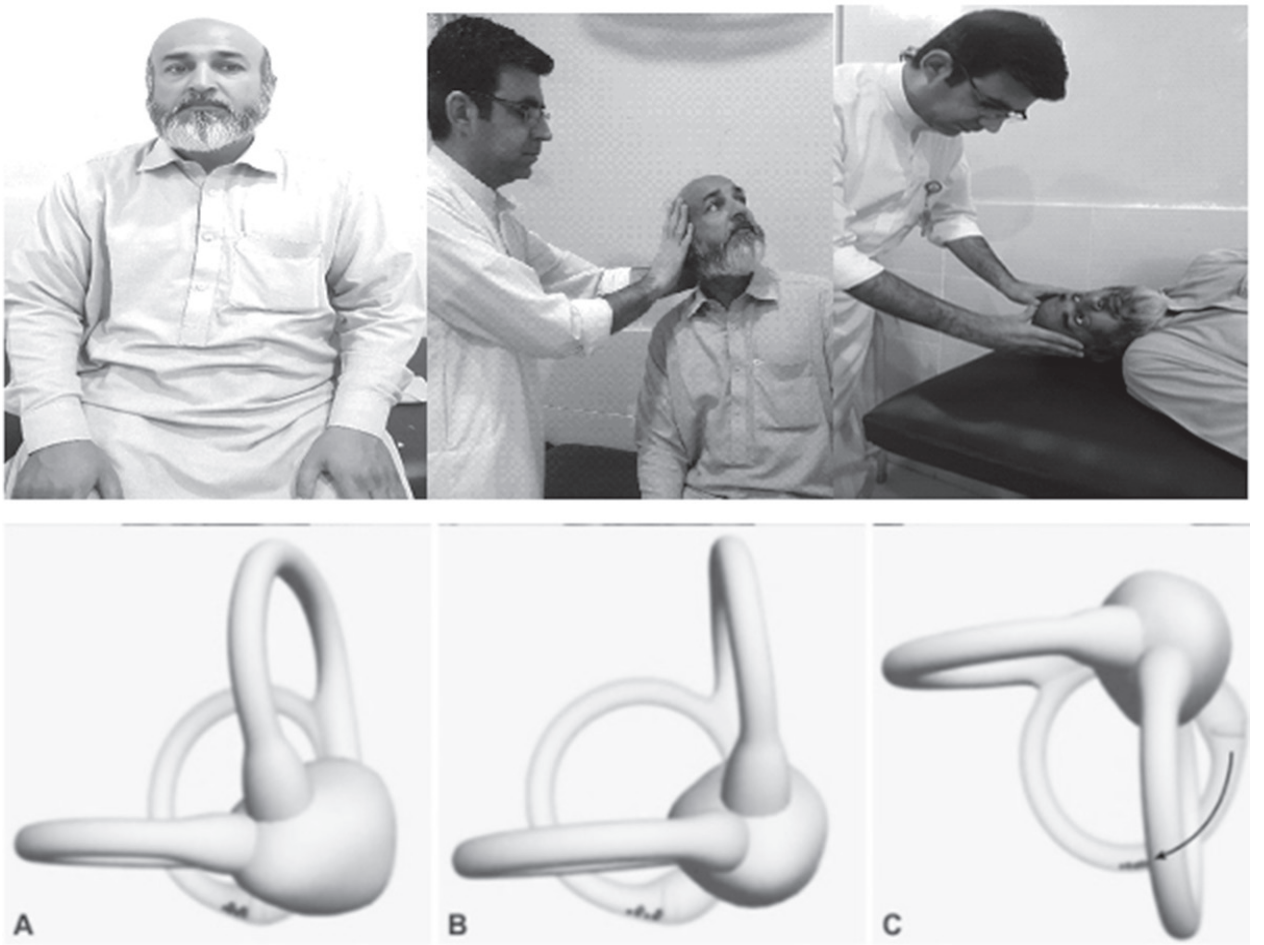

Fig 1: Side lying Maneuver

Table 1: Differentiating BPPV from central positional /positional nystagmus

	BPPV	Central Positioning nystagmus
Latency	2 - 40 (can be absent in cupuloithiasla)	Little or no latency
Direction	Both vertical and torsional elements present in primary gaze	Pure vertical or torsional on primary gaze; may sometimes closely mimic BPPV
Duration	< 60s (canalithiasis) but can persist longer i.e. >60s (cupulolithiasis)	Usually sustained i.e. >60s
Return to sitting	If present, will reverse in direction	Unlikely to reverse
Habituation	Habituates on repeat testing	Dose not habituate
Fixation	Torsional element dominates with fixation; vertical component dominates if fixation removed	Unaffected or may be reduced by removal of fixation
Symptoms	Time course of vertigo coincodes with nystagmus observed	May be asymptomatic; inconsistent with degree of nystagmus observed

Table 2: Eye movements associated with the different forms of BPPV

Canal	Underlying mechanism	Ear affected	Direction of nystagmus	Latency	Duration
Posterior	Canalithiasis	Lower ear	Torsion to affected ear Up-beating	2-40 s[10]	< 60s
Posterior	Cupulolithiasis	Lower ear	Torsion to affected ear Up-beating	No latency	> 60s
Anterior	Canalithiasis[11]	Director of the torsion	Torsion to affected car down-beating	2-40s	< 60s
Anterior	Cupulolithiasis[12]	Director of the torsion	Torsion to affected ear down-beating	No latency	> 60s
Horizontal	Canalithiasis (of posterior arm of the canal)	side with stronger nystagmus	Horizontal geotropic	2-40s	< 60s
Horizontal	Cupulolithiasis	Side with milder nystagmus	Horizontal apogeotropic	No latency	>60s
Horizontal	Canalithiasis of the short or anterior arm of the canal, near to the cupula	Side with milder nystagmus	Horizontal apogeotropic	2-40s	Shorter than in horizontal canal cupulolithiasis

Table 3: Gender

Gender	No	%
Male	17	40.47
Female	25	59.52
Total	42	100

Table 4: Results of Side lying Maneuver

No of patients	Nystagmus positive	Percentage	Nystagmus Negative	%
42	36	85.71 %	6	14.28

Caution is advised in patients with neck or cardiovascular problems (especially carotid sinus syncope and orthopnoea), who have had a recent stroke, or where there is a recent history of severe nausea or vomiting. Patients should be asked if they can adopt the position required for testing without difficulty in order to check their suitability. It is often helpful to demonstrate techniques to elderly patients or patients where there are cautions to testing, and ask them whether they think they are able to perform the test safely. Explain to the patient that they may experience some dizziness but that it is likely to be short-lived. Instruct the patient before the test to keep their eyes open throughout the test even or especially if they feel dizzy, looking straight ahead, and endeavoring to suppress blinks since observation of eye movements is essential. Inform the patient that they will be in the test position for at least 30 seconds and possibly up to 2 minutes. Ask the patient to report any subjective dizziness or vertigo during the test. If the history is suggestive of BPPV, it is often most appropriate to start by testing the ear on the side that is less likely to induce vertigo to increase the likelihood that both sides can be tested within the same session.[12] Any baseline nystagmus or any other eye movements that might influence the interpretation of the test result should be taken into account. During testing observe the patient's eyes, noting the presence of any nystagmus, or any other eye movements. The latency, duration and severity of any reported vertigo should be noted, as well as the presence, direction, magnitude, latency and duration of any nystagmus. (Table 1)

The Dix-Hallpike maneuver is the gold-standard test for a diagnosis of BPPV involving the posterior semicircular canal (PC, PC-BPPV). While seated on the examination table.[7,12]

Maneuver is contraindicated or not possible due to the presence of a neck problem (e.g., cervical spine instability, cervical disc herniation, prior cervical spine surgery, and vascular dissection), low back pain, or obesity.[13]

The side-lying test may be adopted as an alternative in such cases, wherein the patient is quickly laid en bloc toward the side being tested after the head is

turned 45° away from the side to be tested.[9]

In our study 25(59.52%) patients were female and 17 (40.47%) were male. Age ranges from 38 to 68 years. Mean age was 46years. Data show that BPPV has an increased incidence and prevalence with increasing age, with studies noting that approximately 40% of patients over 65 years of age referred to a neurootology clinic for dizziness or imbalance were suffering from BPPV and that untreated BPPV in the elderly has been associated with increased risk of falls. This underlines the need to be able to adapt test techniques in order to assess and treat the older or less mobile patient.[14]

All those patient presented to out patient clinic with pertinent history of vertiginous spells were subjected to side-lying diagnostic maneuver to elicit nystagmus. In our series 36 (85%) patients were positive for PC-BPPV on side lying maneuver. 6 patients had no clinical signs of BPPV on side lying maneuver. These patients after a rest period of 10 minutes were subjected to Dix hallpike maneuver to elicit any clinical sign of BPPV. All those patients who responded negative to side lying were also negative on Dix hallpike maneuver as well. Cohen HS et al also reported no significant differences were found between the tests.[9] Ou Y et al in his study reported the results had association between the Dix-Hallpike maneuver and side-lying maneuver, and the positive rate had no significant difference.[15]

It is advisable to perform a neck screen in patients either reporting neck problems or who are elderly before carrying out positioning tests. This is carried out by asking the patient to turn their head 45° in each direction with a small amount of lateral flexion. If they are able to do this without pain, tingling or feelings of passing out then a side-lying test should be possible. The procedure should be explained to the patient so that they understand what they will need to do and what to expect, demonstrating as necessary, and verbal consent obtained.

CONCLUSION

An appropriate positioning test should be performed in all patients with any history of vertigo, unsteadiness, light-headedness, disequilibrium or imbalance, unless contraindicated. As the Dix-Hallpike maneuver, the side-lying test has the same diagnostic value in determine the PC-BPPV. Because it is safer and easier to perform in the condition of range-of-motion limitations such as spondylosis, it can alter the Dix-Hallpike maneuver.

REFFRENCES

1. Katsarkas A. Benign paroxysmal positional vertigo (BPPV): idiopathic versus post-traumatic. Acta Otolaryngol 1999;119(7):745-9.
2. Shigeno K, et al. Benign paroxysmal positional vertigo and head position during sleep. J Vestib Res. 2012: Jan 1;22(4):197
3. Hall SF, Ruby RR, McClure JA. The mechanics of benign paroxysmal vertigo. J Otolaryngol 1979;8(2):151.
4. Parnes LS, McClure JA. Free-floating endolymph particles: a new operative finding during posterior semicircular canal occlusion. Laryngoscope 1992; 102 (9):988-92.
5. Schuknecht HF. Cupulolithiasis. Arch Otolaryngol 1969;90:765.
6. Schuknecht HF, Ruby RR. Cupulolithiasis. Adv Otorhinolaryngol 1973;20:434
7. Dix MR, Hallpike CS. The pathology symptomatology and diagnosis of certain common disorders of the vestibular system. Proc R Soc Med 1952;45:341-354.
8. Humphriss RL, Baguley DM, Sparkes V, Peerman SE, Moffat DA. Contraindications to the DixHallpike manoeuvre: a multidisciplinary review. International Journal of Audiology 2003; 42: 166-73.
9. Cohen H. Side-lying as an alternative to the Dix-Hallpike test of the posterior canal. Otology and Neurotology 2004; 25: 130-4.
10. Bhattacharyya N et al. Clinical practice guideline: benign paroxysmal positional vertigo. Otolaryngol Head Neck Surg. 139(5 Suppl 4):S47-81, 2008.
11. Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA , El-Kashlan H , Fife T Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngol Head Neck Surg. 2017 Mar;156(3)
12. Baloh RW, Honrubia V, Jacobson K. Benign positional vertigo: clinical and oculographic features in 240 cases. Neurology 1987;37:371-378
13. Humphriss RL, Baguley DM, Sparkes V, Peerman SE, Moffat DA. Contraindications to the Dix-Hallpike manoeuvre: a multidisciplinary review. Int J Audiol 2003;42:166-173.
14. Herdman S, Tusa R. 2007. Physical Therapy Management of Benign Positional Vertigo. In Herdman S (ed). Vestibular Rehabilitation (pp.233-64). Philadelphia:F.A.
15. Ou Y. Liang X, Zheng Y, Yang H, Chen S, Liu X, Liu W, Xu Y. Value of the different positioning tests in diagnosis of benign paroxysmal positional vertigo. Journal of Clinical Otorhinolaryngology [01 Nov 2005, 19(22):1032-1034]