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Medical Policy Manual Medicine, Policy No. 169

Vestibular Evoked Myogenic Potential Testing

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IMPORTANT REMINDER

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

DESCRIPTION

The purpose of vestibular evoked myogenic potential (VEMP) testing is to provide a diagnostic option that is an alternative to or an improvement on existing tests, such as clinical diagnosis, in patients with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo (BPPV).

MEDICAL POLICY CRITERIA

Vestibular evoked myogenic potential tests are considered **investigational** for any indication.

NOTE: A summary of the supporting rationale for the policy criteria is at the end of the policy.

CROSS REFERENCES

None

BACKGROUND

VERTIGO

The vestibular system is an important component in balance control. It includes 5 end organs, 3 semicircular canals sensitive to head rotations, and 2 otolith organs (saccule, utricle) that sense gravity and straight-line (forward, backward, left, right, downward or upward) accelerations. Vertigo is the primary symptom of vestibular dysfunction. It can be experienced as illusory movements such as spinning, swaying, or tilting. Vertigo may be associated with a feeling of being pushed or pulled to the ground, blurred vision, nausea and vomiting, or postural and gait instability. Vertigo may arise from damage or dysfunction of the vestibular labyrinth, vestibular nerve, or central vestibular structures in the brainstem.

Vertigo may be caused by loose particles (otoconia) from the otolith organs that pass into 1 of the semicircular canals, most frequently the posterior canal. Specific head movements cause the particle to stimulate the canal, causing brief benign paroxysmal positional vertigo.

DIAGNOSIS

Brief benign paroxysmal positional vertigo can usually be diagnosed clinically based on history of positional vertigo, response to the Dix-Hallpike maneuver or lateral roll tests, and resolution of symptoms with canal repositioning maneuvers.

If vertigo cannot be attributed to benign paroxysmal positional vertigo based on history, symptoms, or response to the standard maneuvers, a number of laboratory-based tests can be used to determine whether the vertigo is due to loss of vestibular function.[1, 2] These tests are based on the vestibulo-ocular reflex, which is an involuntary beating movement of the eyes (nystagmus) in response to vestibular stimulation. Nystagmus induced by these tests can help to distinguish between central and peripheral etiologies, in addition to determining whether the deficit is unilateral or bilateral. The typical tests include the electronystagmography (ENG) or videonystagmography (VNG) test batteries, caloric testing, and rotational chair testing.

VESTIBULAR EVOKED MYOGENIC POTENTIAL TESTING

Vestibular evoked myogenic potential (VEMP) tests are newer techniques that use loud sound (e.g., click, tone burst) or bone vibration (e.g., tendon hammer tap to the forehead or mastoid) to assess otolith function.[3] Both the saccule and utricle are sensitive to sound as well as vibration and movement.

Cervical VEMPs are measured by surface electrodes on the ipsilateral sternocleidomastoid muscle in the neck and are thought to originate primarily in the saccule. Abnormality in any part of the auditory cervical VEMP pathway (saccule, inferior vestibular nerve, vestibular nucleus, medial vestibulospinal tract, the accessory nucleus, the eleventh nerve, sternocleidomastoid) can affect the response.

Ocular VEMPs detect subtle activity of an extraocular muscle using surface electrodes under the contralateral eye during an upward gaze and are thought to be due primarily to stimulation of the utricle. The vestibulo-ocular reflex stimulated by sound or vibration is very small, but synchronous bursts of activity of the extraocular muscles can be detected by electromyography. Lesions that affect the ocular VEMP may occur in the utricle, superior vestibular nerve, vestibular nucleus, and the crossed vestibulo-ocular reflex pathways.

TREATMENT

The central vestibular system is able to compensate for loss of peripheral vestibular function. Thus, the primary therapy for peripheral vestibular dysfunction is exercise-based and includes

exercises to promote gaze stability, habituate symptoms, and improve balance and gait.[4] Medications such as vestibular suppressants or antiemetics may be used in the acute stage but are not recommended for chronic use. For patients who have recurrent symptoms uncontrolled by other methods, a surgical or ablative approach may be used. The objective of ablation is to stabilize the deficit to allow central compensation.

REGULATORY STATUS

Vestibular analysis devices are currently regulated by the U.S. Food and Drug Administration (FDA) through the 510(k) pathway, under FDA product code LXV. The term "vestibular analysis devices" includes both diagnostic devices (e.g., rotary chairs, multiaxial chairs) and therapeutic devices (e.g., balance training and balance rehabilitation devices). Some devices indicated for diagnostic testing are included in Table 1.

Table 1. Vestibular Analysis Devices Approved by the U.S. Food and Drug Administration

Device	Manufacturer	Date Cleared	510(k) No.
ICS Impulse®	Otometrics	Feb 2013	K122550
Sway Balance™	Sway Medical (Capacity Sports)	Sep 2012	K121590
Nydiag 200 Rotary Chair	Interacoustics A/S	Dec 2010	K102364
Epley Omniax®	Vesticon	Jun 2008	K071973
VMT System	Target Health	Oct 1998	K971549
VORTEQ™ (Vestibular Ocular Reflex Test Equipment)	Micromedical Technologies	May 1989	K891008
RVT-50 Rotary Chair for Vestibular Testing	ICS Medical	Sep 1987	K872093
EquiTest®	Natus Medical (NeuroCom International)	Aug 1985	K851744
Chair, Vestibular, Rotary, Computerized	Contraves	Aug 1978	K781268

An example of equipment used for vestibular evoked myogenic potentials is the Bio-Logic Nav-Pro (Bio-logic Systems Corp), which in 2003 was cleared for marketing by the FDA through the 510(k) process (K994149) for use in the recording and displaying human physiologic data, and for auditory screening and assisting in evaluation of auditory and hearing-related disorders using auditory brainstem responses recorded from electroencephalography electrodes placed on the scalp.

EVIDENCE SUMMARY

VESTIBULAR EVOKED MYOGENIC POTENTIAL TESTING

Study Selection Criteria

Selection criteria for studies are determined using principles described above. There is a large and rapidly growing literature on VEMPs for the assessment of otolith function, although most studies assess how cVEMP and oVEMP change with various disease states. VEMPs have been evaluated in superior canal dehiscence, vestibular neuritis, BPPV, vestibular schwannoma, Meniere disease, vestibular migraine, and central vestibular disorders.[5]

There are a number of concerns about using VEMPs to assess the otolith organs. One issue is that sound and bone conduction stimuli are likely to influence senses other than the saccule and utricle, and stimulation of structures other than the utricle can affect the VEMP. In addition, VEMP responses have been shown to decrease with age, with a high rate of absent responses in normal older adults.[6] Another is that latency and amplitude measures are very sensitive to variables that can be introduced by the examiner, as observed in a 2016 study that included 1038 patients whose ailments included vestibular migraine or neuritis, BPPV, somatoform, phobic postural vertigo, unilateral or bilateral vestibulopathy, Meniere disease, downbeat nystagmus syndrome, and other diagnoses.[7] The authors observed significant differences between examiners for measures of oVEMP and cVEMP latencies, concluding that the field should "work on a better standard for VEMP recordings."

A cohort study (Hunter 2017) compared cVEMP and oVEMP testing in 39 individuals who had known superior semicircular canal dehiscence, with a control cohort of 84 age-matched symptom-free individuals.[8] Primary endpoints included peak-to-peak amplitudes of the 2 treatments and sensitivity and specificity. The authors observed that between cVEMP and oVEMP, cVEMP peak amplitudes (>214.3 μV) were less effective overall for diagnosis of semicircular canal dehiscence (area under the curve, 0.731). At the 2 treatment centers from which patients were drawn, oVEMP amplitudes and cVEMP thresholds proved to be the superior tests (overall area under the curve scores, 0.856 and 0.912, respectively). For patients between 50 and 60 years of age, testing cVEMP threshold (<75 decibels) provided sensitivity of 100%, as well as good specificity (92.9%). Overall, findings suggested superiority of cVEMP thresholds or oVEMP amplitudes over measurement of cVEMP amplitudes.

SUMMARY OF EVIDENCE

Undiagnosed Benign Paroxysmal Positional Vertigo

For individuals who have a suspected vestibular disorder not clinically diagnosed as BPPV who receive VEMP testing, the evidence includes mainly association studies. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. There is a large and rapidly growing literature on VEMP tests for the assessment of otolith function, although most studies have assessed how the cervical VEMP and ocular VEMP change with various disease states. Studies on diagnostic accuracy and clinical utility of this technique for evaluating otolith organs and central pathways are needed in the appropriate populations. The evidence is insufficient to determine the effects of the technology on health outcomes.

PRACTICE GUIDELINE SUMMARY

AMERICAN ACADEMY OF NEUROLOGY

In 2000, the American Academy of Neurology (AAN) published a technology assessment on vestibular testing techniques in adults and children.[1] The assessment compared various vestibular testing techniques (see Table 2).

Table 2. Comparison of Vestibular Test Techniques and Level of Evidence

Technique	Advantages	Disadvantages	SOR and QOE[a]
Clinical head-shaking test	Inexpensive, easily performed during examination	Nonquantitative; may not detect bilateral vestibular loss or mild	Class III

Technique	Advantages	Disadvantages	SOR and QOE[a]
		unilateral vestibular loss	
Vibration-induced nystagmus	Inexpensive, easily performed during examination	Nonquantitative; may not detect bilateral vestibular loss or mild unilateral vestibular loss	Class III
Clinical head thrust sign	Inexpensive, easily performed during examination	Nonquantitative; may not detect bilateral vestibular loss or mild unilateral vestibular loss	Class III
Caloric testing (ENG or infrared VNG)	"Gold standard" study for detecting unilateral vestibular loss	Intensity of caloric stimulation depends on anatomy and irrigation technique; less sensitive and specific than rotational chair testing for bilateral vestibular loss	Strength: A; Quality: classes II, III, IV, and expert consensus
Rotational chair testing (computer-driven chair rotations)	"Gold standard" study for detecting bilateral vestibular loss	Not widely available; generally not effective for testing frequencies >1.0 Hz; less sensitive than caloric testing for unilateral vestibular hypofunction	Strength: A; Quality: classes II, III, IV, and expert consensus
Passive examiner-generated head rotation testing	Portable alternative to rotational chair testing	Probably not practical at frequencies >2 Hz and may be difficult for patients with neck pain; not sensitive to unilateral vestibular loss	Strength: B; Quality: class II, not yet fully accepted by expert consensus
Active head rotation (self-generated head turns)	Allows testing of vestibule-ocular reflex from 1-5 Hz; portable; inexpensive	Normative data limited; some patients cannot rotate head sufficiently well to test at higher frequencies; may not detect partial unilateral vestibular loss	Strength: B; Quality: class II, not yet fully accepted by expert consensus

ENG: electronystagmography; QOE: quality of evidence; SOR: strength of recommendation; VNG: videonystagmography.
[a] The American Academy of Neurology strength of evidence rating system is as follows. For strength of recommendation: A: established as useful or predictive; B: probably useful or predictive. For quality of evidence: class II: Evidence provided by a prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared with a broad spectrum of control subjects, in which the test is applied in a blinded evaluation, and enabling the assessment of appropriate measures of diagnostic accuracy; class III: Evidence provided by a retrospective study, in which either persons with the established condition or control subjects are of a narrow spectrum, and in which the test is applied in a blinded evaluation; class IV: Any design in which the test is not applied in a blinded evaluation, OR evidence is provided by the expert opinion alone or in descriptive case series (without control subjects).

The 2017 practice guidelines from AAN assessed the diagnostic value of vestibular evoked myogenic potential testing in individuals with vestibular symptoms.[9] The conditions of interest included superior canal dehiscence syndrome, vestibular neuritis or migraine, Meniere disease, and benign paroxysmal positional vertigo (BPPV). The evidence for testing in BPPV was drawn from 2 class III studies, neither of which presented sufficient diagnostic value of vestibular evoked myogenic potential testing for the treatment to be recommended (level C evidence).

AMERICAN ACADEMY OF OTOLARYNGOLOGY – HEAD AND NECK SURGERY

In 2008, the American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS) published practice guidelines on BPPV.[10] The guidelines were endorsed by AAN and the American Academy of Family Physicians. The panel made strong recommendations for the diagnosis of BPPV when vertigo associated with nystagmus is provoked by the Dix-Hallpike maneuver. The panel recommended against vestibular testing, unless the diagnosis is uncertain or there are additional symptoms or signs unrelated to BPPV that warrant testing.

In 2017, the AAO-HNS updated its guidelines on BPPV, retaining the recommendation for the diagnosis of BPPV if a Dix-Hallpike maneuver elicits vertigo associated with nystagmus.[11] The panel recommended a canalith repositioning procedure as treatment for posterior canal BPPV, although subsequent postprocedural postural restrictions were strongly warned against. Patients with symptoms similar to BPPV but for whom the Dix-Hallpike does not evoke nystagmus should be subjected to a supine roll test. Potential diagnoses of BPPV should be distinguished from confounding factors, and patients should have regular reassessment and follow-up. The panel did not recommend radiographic imaging, vestibular testing, or vestibular suppressant medications as treatment for BPPV, although disease management options for caregivers include vestibular rehabilitation and/or observation.

AMERICAN ACADEMY OF AUDIOLOGY

The 2009 American Academy of Audiology has a position statement on the audiologist's role in the diagnosis and treatment of vestibular disorders.[12] Citing a 2009 scope of practice report, the Academy stated that "An audiologist is a person who, by virtue of academic degree, clinical training, and license to practice and/or professional credential, is uniquely qualified to provide a comprehensive array of professional services related to the prevention of hearing loss and the audiologic identification, assessment, diagnosis, and treatment of persons with impairment of auditory and vestibular function, and to the prevention of impairments associated with them."[13] Evaluations of vestibular and extravestibular systems may include:

- video-oculography, videonystagmography, and electronystagmography
- tests of dynamic visual acuity,
- tests of active and passive rotation,
- tests of postural stability, and
- tests of vestibular evoked myogenic potentials.

Vestibular treatment and therapy protocols that fall within the scope of practice are also described. The Academy considers vestibular function testing following treatment to be an essential part of the clinical practice.

INTERNATIONAL FEDERATION OF CLINICAL NEUROPHYSIOLOGY

A 2014 expert consensus document on cervical vestibular evoked myogenic potential methods from the International Federation of Clinical Neurophysiology has stated that the clinical use of vestibular evoked myogenic potential "is evolving and questions still exist about its physiology and measurement."[14]

SUMMARY

There is not enough evidence to show that vestibular evoked myogenic potential testing has clinical utility for patients with vestibular disorders including but not limited to benign paroxysmal positional vertigo. Therefore, the use of vestibular evoked myogenic potential testing is considered investigational for any indication.

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CODES

NOTE: Prior to January 1, 2021, there were no specific codes available for VEMP testing, therefore an unlisted code (92700; *Unlisted otorhinolaryngological service or procedure)* was used. Effective January 1, 2021, specific VEMP testing codes listed below are available and should be used.

Codes	Number	Description
CPT	92517	Vestibular evoked myogenic potential (VEMP) testing, with interpretation and report; cervical (cVEMP)
	92518	Vestibular evoked myogenic potential (VEMP) testing, with interpretation and report; ocular (oVEMP)
	92519	Vestibular evoked myogenic potential (VEMP) testing, with interpretation and report; cervical (cVEMP) and ocular (oVEMP)
	92700	Unlisted otorhinolaryngological service or procedure
HCPCS	None	

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