11.2b Equilibrium

Equilibrium, or orientation in space, is maintained by the visual, kinesthetic, and vestibular mechanisms. When impairments of equilibrium are predominantly due to or have effects on other organ systems, the impairment should be evaluated in the relevant organ system, eg, disorders of the nervous system (Chapter 13), cardiovascular system (Chapters 3 and 4), and visual system (Chapter 12).

Disturbances of equilibrium may be classified as follows: (1) **vertigo,** a sensation of rotation of the subject or of objects about the subject in any plane; (2) giddiness or lightheadedness, distinguished from vertigo by the absence of feelings of movement[2]; and (3) abnormalities of postural stability and/or standing balance with or without vertigo. Vertigo may be produced by disorders of the vestibular mechanism and its central nervous system components, including the cerebral cortex, cerebellum, and brain stem, and by eye movements.

Permanent impairment may result from any disorder causing vertigo or disorientation in space. Three regulatory systems—vestibular, ocular (visual), and kinesthetic (proprioceptive)—are related to the vestibulo-ocular reflex. The evaluation of impairments of equilibrium may include consideration of one or more of these mechanisms.[5,6] This chapter addresses only disturbances in equilibrium due to vestibular disorders.

Clinical evaluations may include electronystagmography,[2] caloric irrigation, positional and rotatory tests, dynamic posturography, Romberg and tandem Romberg tests, and radiological brain imaging studies. The results of these laboratory tests should be correlated with validated clinical measures of balance and ambulation to determine the true state of equilibratory dysfunction. For other causes of disequilibrium, see the relevant chapter, such as the neurologic system (Chapter 13), for central nervous system disorders.

Vestibular System

Permanent impairment can result from defects of the vestibular (labyrinthine) mechanism and its central connections. The defects are evidenced by loss of equilibrium produced by disturbance or loss of vestibular function.

Complete loss of vestibular function may be unilateral or bilateral. When the loss is unilateral, adequate central nervous system compensation may or may not occur. With total bilateral loss of vestibular function, equilibrium is totally dependent on the kinesthetic and visual systems, which usually are unable to compensate fully for movement or ambulation. Depending on the ability to perform activities of daily living, the percentage of permanent impairment of the whole person may range from 0% to 95%.

Disturbances of vestibular function are evidenced by vertigo (vestibular dysequilibrium) as defined above. Lightheadedness and abnormalities of gait not associated with vertigo are not defined here as being disturbances of vestibular function.

Vertigo may be accompanied by varying degrees of nausea, vomiting, headache, immobility, ataxia, and nystagmus. Movement may increase the vertigo and the accompanying signs and symptoms. Peripheral vestibular (labyrinthine) disorders are often associated with hearing loss and tinnitus. Vestibular disorders may result in temporary or permanent impairments. Evaluation of vestibular impairment should be performed when the condition is stable and maximum adjustment has been achieved, which generally is considered to occur months after resolution of the disease or injury.[5,6]

The classification in Table 11-4 has been developed for evaluation of those individuals with permanent disturbances of the vestibular mechanism. The impairment ratings reflect the severity of the permanent impairment and the ability of the individual to perform activities of daily living. Since vestibular disorders are dynamic, assessment of permanent impairment should be based on determination of the person's condition after it is stable. Although symptoms may be intermittent, the examiner needs to gauge functioning during episodes with exacerbations. Vestibular impairment as defined here is rated similarly in Chapter 13.

Table 11-4 Criteria for Rating Impairment Due to Vestibular Disorders

Class 1 0% Impairment of the Whole Person	Class 2 1%-10% Impairment of the Whole Person	Class 3 11%-30% Impairment of the Whole Person	Class 4 31%-60% Impairment of the Whole Person	Class 5 61%-95% Impairment of the Whole Person
Symptoms or signs of vestibular dysequilibrium present without supporting objective findings ***and*** activities of daily living can be performed without assistance	Symptoms or signs of vestibular dysequilibrium present with supporting objective findings ***and*** activities of daily living can be performed without assistance, except for complex activities (eg, riding a bicycle) or certain types of demanding activities related to the individual's work (eg, walking on girders or scaffolds)	Symptoms or signs of vestibular dysequilibrium present with supporting objective findings ***and*** activities of daily living cannot be performed without assistance, except for simple activities (eg, self-care, some household duties, walking, and riding in a motor vehicle operated by another person)	Symptoms or signs of vestibular dysequilibrium present with supporting objective findings ***and*** activities of daily living cannot be performed without assistance, except for self-care	Symptoms or signs of vestibular dysequilibrium present with supporting objective findings ***and*** activities of daily living cannot be performed without assistance, except for self-care not requiring ambulation ***and*** home confinement is necessary

Class 1 0% Impairment of the Whole Person
Symptoms or signs of vestibular dysequilibrium present without supporting objective findings ***and*** activities of daily living can be performed without assistance

Class 2 1%-10% Impairment of the Whole Person
Symptoms or signs of vestibular dysequilibrium present with supporting objective findings ***and*** activities of daily living can be performed without assistance, except for complex activities (eg, riding a bicycle) or certain types of demanding activities related to the subject's work (eg, walking on girders or scaffolds)

Example 11-4
0% Impairment Due to Floating Vestibular Otoconia

Subject: 70-year-old man.

History: Retired physician; onset of **dizziness** last week when leaning head to right or to left side. Sensation of giddiness with positional change of body but not with turning of head when upright. No nausea or vomiting. Uses the Epley maneuver to reposition otoconia.

Current Symptoms: Asymptomatic; the dizziness has not recurred; no disruption of activities of daily living.

Clinical Studies: ENG study: normal. Dix-Hallpike test: positive, with head rotation to the left and to the right.

Diagnosis: Floating vestibular otoconia.

Impairment Rating: 0% impairment of the whole person.

Comment: Treatment to be repeated as necessary.

Example 11-5
1% to 10% Impairment Due to Labyrinthitis

Subject: 50-year-old-woman.

History: Sudden onset of severe vertigo, nausea, and vomiting. No history of upper respiratory infection, fever, cough, or chills. Confined to bed. Spontaneous nystagmus to left noted. Hearing normal; no tinnitus. Treated with vestibular suppressors. Gradual, slow recovery of ability to ambulate, but unable to walk in the dark for about 1 year.

Current Symptoms: Can perform activities of daily living without assistance. Slightly unsteady when fatigued. Does not tolerate rocking motion (sailboat) without visual fixation of horizon. Unable to ride bicycle, but can drive automobile at night.

Physical Exam: Normal.

Clinical Studies: ENG and caloric studies: no vestibular function of right ear. Other neuro-otologic findings: within normal limits. Audiogram: normal hearing bilaterally. Mastoid X-rays: normal. CT scans of temporal bones: normal.

Diagnosis: Labyrinthitis, probably viral, with total loss of vestibular function, right ear.