

Cerebellar Lesions

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Fact Sheet

Many individuals present to emergency rooms with acute symptoms of vertigo and imbalance. Others seek consultation from physicians with gradual imbalance and dizziness. In either case, determining the presence of cerebellar involvement with or without peripheral vestibular hypofunction has important treatment implications.

Cerebellar or Brainstem Stroke

Patients presenting to the emergency room with vertigo and imbalance should be tested for a cerebellar or brainstem stroke. However, a lesion may not always be apparent on a CT scan. If the history and other clinical findings are not consistent with benign paroxysmal positional vertigo (BPPV), peripheral vestibular neuritis, or vestibular migraine, a stroke should be considered. One way to differentiate between a stroke and a peripheral problem is the inability of the individual to coordinate his legs to walk.

Anterior Inferior Cerebellar Artery (AICA) Stroke

If the cerebellar stroke is related to a blockage or hemorrhage of the anterior inferior cerebellar artery (AICA), there is a possibility that the labyrinthine artery could be affected. The labyrinthine artery supplies the peripheral vestibular apparatus. In this case, patients would also have both hearing loss and peripheral vestibular hypofunction on the same side of the stroke. These patients should be referred to a clinic that specializes in both vestibular function testing and treating patients with central and peripheral vestibular involvement.

Cerebellar Atrophy or Degeneration

Cerebellar degeneration is a progressive disease, which presents with an ataxic gait and imbalance.¹ Subtypes may also affect both central and peripheral pathways and cause abnormalities in the vestibular ocular reflex (VOR) as well as oculomotor deficits.^{2,3} Studies have shown there is a high risk of falls with injuries with this population and fall prevention therapy is strongly suggested.⁴ MRIs can help locate the cite of damage and amount of cerebellar atrophy.

Clinical Tests and Measures to Identify Cerebellar Involvement

Cerebellar signs which can be found during a thorough oculomotor exam include gaze evoked nystagmus, smooth pursuit and saccade abnormalities, and the inability to suppress the vestibular ocular reflex (VOR cancellation).⁵ Because of these deficits, many patients complain of double vision or blurring (oscillopsia) with walking or head movements, causing dizziness and nausea. The scale for the assessment and rating of ataxia (SARA) can quantify impairments including gait, stance, sitting, speech, and coordination, but does not address oculomotor deficits.⁶ Computerized Dynamic Posturography (CDP) quantifies the ability of patients to utilize their visual, somatosensory and vestibular systems. Patients with cerebellar

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loss may not only have increased sway on all conditions, but may also have falls on conditions 5 and 6, where both the visual and somatosensory inputs are altered, especially if there is vestibular loss.^{6,7} The Berg balance scale (BBS) and dynamic gait index (DGI) are outcome measures that determine fall risk.^{8,9}

Clinical Tests and Measures to Identify Peripheral Vestibular Involvement

The head thrust test (also known as the head impulse test) can be used at the bedside to assess bilateral or unilateral hypofunction. Diagnostic tests including bithermal caloric and rotary chair, performed in specialized dizziness and balance centers and ENT clinics, determine the degree of vestibular loss and amount of central compensation.¹⁰ Patient Prognosis Even though patients with cerebellar involvement require more physical therapy visits than those with peripheral vestibular loss, these patients can benefit from vestibular rehabilitation.^{11,12,13} If the physician is able to determine the diagnosis and promptly refer the patient with cerebellar disease to a PT who specializes in dizziness and imbalance, the therapist can evaluate, establish functional goals, begin appropriate treatment intervention, and achieve the best outcome possible. Physical Therapy Interventions Physical therapy treatments that promote sensory integration and postural control are critical for this population.^{14,15} If peripheral vestibular hypofunction is identified, gaze stability exercises are the intervention of choice to improve the gain of the VOR.¹⁶ Even if there is no peripheral vestibular loss, the patients with oculomotor deficits causing dizziness can benefit from habituation exercises to decrease symptoms provoked by movements of both self and environment.¹¹

References

1. Hoffman PM, Stuart WH et al. Hereditary late-onset cerebellar degeneration. *Neurology*. 1971;21(8):771-777.
2. Gomez CM, Thompson RM et al. Spinocerebellar ataxia 6: gaze evoked and vertical nystagmus, purkinje cell degeneration and variable age of onset. *Ann Neurol*. 1997;42:933-950.
3. Takeichi N, Fukushima K et al. Dissociation of smooth pursuit and vestibulo-ocular reflex cancellation in SCA-6. *Neurology*. 2000;54:860-866.
4. van de Warrenburg BP, Janneke AG et al. Falls in Degenerative Cerebellar Ataxias. *Movement Disorders*. 2005;20(4):497– 508
5. Schmitz-Hubsch T, S. Tezenas du Montcel et al. Scale for the assessment and rating of ataxia; development of a new clinical scale. *Neurology*.2006;66:1717-1720.
6. Black FO, Wall C III, Nashner LM. Effect of visual and support surface references upon postural control in vestibular deficit subjects. *Acta Otolaryngol*. 1983;95:199-210.
7. Herdman SJ, Hall CD et al. Misclassification of patients with spinocerebellar ataxia as having psychogenic postural instability based on computerized dynamic posturography. *Frontiers in Neurology*.2011;2:21. Published online 2011 April 4. doi: 10.3389/fneur.2011.00021 PMID: PMC3077917.
8. Berg K, Wood-Dauphinee SL et al. Measuring balance in the elderly: validation of an instrument. *Can J Public Health*. 1992;83(Suppl 2):S7-11.
9. Shumway-Cook A, Baldwin M et al. Predicting the probability for falls in community-dwelling older adults. *Phys Ther* 1997;77:812-819.
10. Shepard NT, Telian SA. *Practical Management of the Balance Disorder Patient*. San Diego: Singular Publishing 1996.
11. Shepard NT Telian SA et al. Vestibular and balance rehabilitation. *Ann OtolRhinol Laryngol* 1993;102:198-205.
12. Brown, KE, Whitney et al. Physical Therapy for Central Vestibular dysfunction. *Arch Phys Med Rehab*. 2006;87:76-81.
13. Ilg W, Synofzik M et al. Intensive coordinative training improves motor performance in degenerative cerebellar disease. *Neurology* 2009;73:1823-1830
14. Shumway –Cook, Horak FB. Assessing the influence of sensory interaction of Balance: suggestion from the field. *Phys Ther*. 1986; 66:1538-1550.
15. Horak FB, Jones-Rycewicz C et al. Effects of vestibular rehabilitation on dizziness and imbalance. *Otolaryngol Head Neck Surg*. 1992; 106: 175-180.
16. Herdman SJ, Clendaniel RA et al. Vestibular adaptation exercises and recovery: acute stage after acoustic neuroma resection. *Otolaryngol Head Neck Surg* 1995; 113: 77-87.

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