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Vestibular (Balance/Dizziness) & Vision Dysfunction

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Vestibular (Balance/Dizziness) Dysfunction

Persistent vertigo, dizziness, imbalance and visual disturbance are common symptoms of patients with concussion/mTBI and are often associated with objective impairments of the vestibular system.^{1,2} Vestibular impairments can occur peripherally in the inner ear, or centrally in nuclei that integrate vestibular signals in order to maintain balance and posture. The vestibular system also affects eye movement through a variety of mechanisms including the vestibulo-ocular reflex (VOR).

The most common cause of post-traumatic peripheral vestibular dysfunction is benign paroxysmal positional vertigo (BPPV).^{3,4} Patients experience episodes of vertigo, nystagmus and nausea with sudden changes in position, often including rolling over in bed or looking up. These attacks typically last less than 30 seconds but can be quite disabling and can occur multiple times per day. BPPV is caused by dislodged otoconia in the posterior semicircular canal (SCC). *The Dizziness Handicap Inventory* (Appendix 10.1) can help to assess the functional impact of dizziness. Other causes of dizziness can also be caused by post-concussion migraines, autonomic dysregulation, medications and other peripheral vestibular disorder. Patients with dizziness frequently experience concurrent psychological disorders such as anxiety.⁵ These may exacerbate the feeling of dizziness and should be managed along with primary vestibular treatments (see [Section 8](#)).

Assessment of vestibular function following mTBI identifies vestibular deficits that could lead to evidence-based interventions that will benefit the patient. Evaluation should minimally include a focused history⁶, a balance screen, VOR screen and the Dix-Hallpike manoeuvre. Balance testing should reference normal values to document impairment. These can be found in Iverson et al 2008⁷ and Vereeck et al 2008.⁸

When the history suggests BPPV, posterior semi-circular canal involvement can be diagnosed by the Dix-Hallpike manoeuvre (see [Appendix 10.2](#) for more information and [Appendix F](#) for links to video demonstrations). VOR abnormalities from peripheral vestibular dysfunction usually present with unilateral directed nystagmus in the acute phase of injury. Central compensation usually occurs and as a result spontaneous nystagmus is rarely seen. The presence of bilateral gaze evoked nystagmus or nystagmus in one or more planes is either congenital or representative for central nervous system pathology somewhere in the brain.

When assessment suggests vestibular dysfunction, vestibular interventions can be considered. While historically, medications have been used to suppress vestibular symptoms, including nausea, current evidence does not support this approach.⁹ A Cochrane review by Hillier and Hollohan (2007) identifies vestibular rehabilitation as an effective intervention for unilateral peripheral vestibular dysfunction¹; this has been supported by Gurley et al.⁶ Weaker evidence also suggests vestibular rehabilitation may be helpful for central vestibular dysfunction.¹⁰ Vestibular rehabilitation is typically provided by a specialized a healthcare professional with specialized training and involves various movement-based regimens to bring on vestibular symptoms and desensitize the vestibular system, coordinate eye and head movements, and improve functional balance and mobility. However, for the specific treatment of BPPV, Hillier and Hollohan (2007) conclude that canalith or particle repositioning manoeuvres are more effective than vestibular rehabilitation techniques.¹

RECOMMENDATIONS FOR VESTIBULAR (BALANCE/DIZZINESS) DYSFUNCTION

		GRADE
10.1	Evaluation by an experienced healthcare professional(s) with specialized training in the vestibular system, should include a thorough neurologic examination that emphasizes vision, vestibular, balance and coordination, and hearing. The evaluation should be conducted prior to 3 months post-injury. See Appendix 3.4 for specific exam details. ^a	B
10.2	If symptoms of benign positional vertigo are present, the Dix-Hallpike Manoeuvre (Appendix 10.2) should be used for assessment once the cervical spine has been cleared.	A

a. Adapted from the VA/DoD Management of Concussion/Mild Traumatic Brain Injury Clinical Practice Guideline (VA/DoD, 2016).

10.3	A canalith repositioning maneuver should be used to treat benign positional vertigo (BPPV) if the Dix-Hallpike manoeuvre is positive. The Epley manoeuvre (Appendix 10.3) should be used on patients with positive Dix-Hallpike manoeuvre for both subjective and objective BPPV. Others should be referred to an otolarynthologist or a healthcare professional certified in vestibular therapy.	A
10.4	People with functional balance impairment who screen positive on a balance measure should undergo further balance assessment and treatment by a qualified physician or healthcare professional certified in vestibular therapy pending clinical course.	C
10.5	Vestibular rehabilitation therapy is recommended for unilateral peripheral vestibular dysfunction.	A
10.6	When the patient identifies a problem with hearing the following steps should be followed: 1. Take a detailed patient history, including auditory history to rule out common causes of hearing complications. 2. Perform an otologic examination, including otoscopy. 3. Refer to audiology for hearing assessment if no other apparent cause is found. ^a	C
NEW 10.7	There is no evidence to suggest for or against the use of any particular modality for the treatment of tinnitus after concussion/mTBI. ^b	C

Vision Dysfunction

Patients presenting with vision disorders post-concussion/mTBI may have impairment of visual acuity, accommodation, versional eye movements, vergence eye movements, visual field integrity and may experience photosensitivity. Practitioners should take a detailed history of vision symptoms and screen for potentially unrecognized visual deficits with using simple confrontational field testing.^{11,12} Mild TBI/concussion patients with complex visual symptoms including diplopia and/or impaired vision should be referred to a neuro-ophthalmologist.¹³⁻¹⁵ Patients with impairments of accommodation, version or vergence movements, and/or photosensitivity may benefit from rehabilitative techniques rendered by qualified optometrists.¹¹⁻¹³

Vision rehabilitation can be beneficial for some patients^{11,12,16,17} and should be considered for the treatment of persistent vision disorders. Rehabilitative interventions include vision therapy, reading spectacles, prism spectacles and/or tinted spectacles.^{11,14,16}

RECOMMENDATIONS FOR VISION DYSFUNCTION		
		GRADE
10.9	Vision changes can occur post concussion and should be screened for (see Appendix 10.4). If vision symptoms are reported, take an appropriate case history and complete a visual examination.	C
10.10	When assessed in a medically-supervised interdisciplinary concussion clinic, patients with significant functionally-limiting visual symptoms could be considered for a referral to a regulated healthcare professional with training in vision assessment and therapy (i.e. ophthalmologist, optometrist) for assessment. ^a	C

RESOURCES		
APPENDICES		
1	Dizziness Handicap Inventory	Appendix 10.1
2	Dix-Hallpike Manoeuvre and Particle Repositioning Manoeuvre (PRM)	Appendix 10.2
3	The Epley Manoeuvre	Appendix 10.3
4	Screening Techniques for Vision Dysfunction	Appendix 10.4
5	Other Links/ Resources to consider	Appendix F

a. Adapted from the VA/DoD Management of Concussion/Mild Traumatic Brain Injury Clinical Practice Guideline (VA/DoD, 2016).

b. Taken from the VA/DoD Management of Concussion/Mild Traumatic Brain Injury Clinical Practice Guideline (VA/DoD, 2016).

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