Panel II – Vestibular Rehabilitation

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New Techniques on Vestibular Diagnosis and Intervention

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Background: Evaluation of balance complaints in vestibular patients is done with nystagmus measuring tools like videonystagmography (VNG) and functional Computerized Dynamic Posturography (CDP). More recently, evoked potentials, like Vestibular Evoked Myogenic Potentials (VEMPs), are a promising technique, and allow some topo-diagnostics in differentiating lesions from the saccule and utricle and respective afferences, as shown by cervical Vestibular Evoked Myogenic Potentials (cVEMPs) and ocular Vestibular Evoked Myogenic Potentials (oVEMPs). Now patients with vertigo complaints can undergo a video Head Impulse Test (vHIT), a new clinical test of dynamic semicircular canal (SCC) function that uses a high-speed digital video camera to record head and eye movement during and immediately after passive head rotations (while performing the Halmagyi test). Similarly, the angular vestibulo-ocular reflex (aVOR) is a teaching, training, and test tool for the vestibulo-ocular reflex.

Material and methods: Citation report results from Web of Science Core Collection between 1900 and 2018 for the terms: Videonystagmography (VNG); Computerized Dynamic Posturography (CDP); cervical Vestibular Evoked Myogenic Potentials (cVEMP); ocular Vestibular Evoked Myogenic Potentials (oVEMP); video Head Impulse Test (vHIT); angular vestibulo-ocular reflex (aVOR), combined with research in Health Superior School – Polytechnic of Porto, MOODLE@ESS database.

Results: Cervical Vestibular Evoked Myogenic Potential (cVEMP) testing is a vestibular function test used for evaluating saccular and inferior vestibular nerve function, measured by sternocleidomastoid (SCM) muscle activity. It is inhibitory and works ipsilaterally – British Society of Audiology (2012), Isaradisaikul (2012), Craig (2106). Ocular Vestibular Evoked Myogenic Potentials (oVEMP) testing is a vestibular function test for evaluating primarily utricle and superior vestibular nerve function, measured by extra-ocular muscles activity. It is excitatory and contralateral – Craig (2016). Angular vestibulo-ocular reflex (aVOR) is an app designed for both IPhone and IPad. It is a teaching, training, and test tool of the vestibulo-ocular reflex (VOR) system and its disorders, including BPPV. It demonstrates eye saccades, included those caused by canalithiasis (free-floating particles in the canals), and both functioning and dysfunctional VOR. It shows how BPPV is caused and forms a basis for treatment.

Conclusions: The future of vestibular diagnosis and intervention seems promising, with emerging new technologies each year, providing there is investment available for appropriate equipment. Even with budget constraints, a choice needs to be made based on customer preferences, indications, the occupancy rate of the equipment, and its profitability, as well as the criteria for its use.

Keywords: VNG • CDP • VEMP • vHIT • aVOR

Vestibular Rehabilitation Protocols

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Background: The main purpose of the vestibular system is to allow humans to interact and keep in touch with the surrounding environment safely. The balance system is composed of sensory inputs: vestibular, visual, and proprioceptive systems. Therefore, balance might also be considered a sense. Recently, there has been great research developments in the field of vestibular science due to the evolution of new tools, new proceedings and techniques, and new ideas and paradigms. Several theories have been presented that seek to physiologically explain the different central compensation processes responsible for the recovery of the sense of balance following injury – either of vestibular, central, and/or mixed etiology. Classic vestibular compensation mechanisms of habituation, adaptation, and substitution are still well accepted as the basis of vestibular rehabilitation, as well as models of complex processes of interaction between systems – such as sensory reweighting, which combines mechanisms such as learning and memory. However, due to the numerous conclusions reached, doubts have arisen, especially regarding the choice of best protocol to be used for different pathologies and different lesion etiology.

Material and methods: Since the central question lacks a clear analysis and the interpretation of previously presented findings is uncertain, the approach chosen was first to review the available literature. The review is intended to expose the current research and clinical practices, to promote new questions, as well as promote a better understanding of the subject. Following this, a thematic discussion is presented to highlight new clinical relations and a model protocol for vestibular rehabilitation is proposed.

Conclusions: Vestibular rehabilitation can be considered as a form of sensorimotor therapy that stimulates balance-organ inputs, a process that induces central compensation mechanisms and output adjustments which promote recovery of the balance sense. It is essential to choose the correct protocol for the pathology and the patients' physical and psychological characteristics, and thus the ideal is to create a new vestibular rehabilitation protocol capable of being used for each type of vestibular dysfunction. This might involve intra-protocol modifications that allow the best stimuli and central compensation mechanisms to be selected. The complexity of the vestibular system and its associated pathologies leads us to the belief that balance rehabilitation must be done using a holistic perspective. The key to customizing a protocol lies in making small