

Editorial

Vestibular testing: the current position

Quantified vestibular testing was introduced to clinical practice with the Fitzgerald-Hallpike bithermal caloric test almost fifty years ago. Since then the recording of eye movements has allowed quantification of rotation responses and the documentation of vestibular and non-vestibular eye movements. More recently quantified assessment of balance, using fixed or moving force platforms and magnetometry, has been applied to clinical research. The bithermal caloric test remains the only test in which each labyrinth is examined independently and in relative isolation from central and other factors. Other tests contribute to the understanding of the physiology of balance control, but the need for research in this area continues. Magnetic Resonance Imaging (MRI) has advanced the science of neuro-otology by providing a cross check of symptomatology and vestibular test results with precise anatomical location of lesions within the central nervous system and cranial nerves.

The vestibular system contributes to a complex system of reflexes controlled by the cerebellum. These include the vestibulo-ocular, vestibulo-collic and vestibulo-spinal reflexes. Reflexes combine with learned reference patterns of balance within a flexible strategy of control, hence the vestibular labyrinth is not essential for orientation and detection of movement. Gradual loss of vestibular function can be symptomless as other senses involved compensate for the deficiency. Any attempt to test the vestibular system must utilize these reflexes and recognize the non-vestibular factors which contribute to test results.

A careful history and examination will often give sufficient information to establish the diagnosis and guide management provided that the examination includes observation of eye movements with and without fixation, rotation and positioning tests and examination of posture and gait. It is current practice to use auditory evoked responses as the next line of investigation in both hearing and balance disorders as they are a sensitive indicator of VIIIth nerve function and the auditory tracts within the central nervous system, correlating well with MRI findings. Head scanning will not be indicated in the majority of those presenting with vertigo and imbalance and, if the condition does not resolve, vestibular assessment may give insight into both cause and extent of the problem.

Vestibular and balance tests in current use include caloric and rotation tests, electro-oculography, positional tests and posturography.

Caloric test

The most specific vestibular test in clinical use is the

bithermal caloric test observed with and without visual fixation. Ocular and central components are common to at least two of the four test conditions allowing the vestibular component for each ear to be isolated. Single temperature and simultaneous binaural caloric tests may be used as a screen but are not as vestibular specific. Air calorics are now a valid alternative to using water, but cannot be quantified and a perforation may alter the intensity of the stimulus reaching the labyrinth. Caloric tests are and should remain widely available, but care and expertise are required for valid results.

Rotation tests

These range from simply spinning the patient on an office chair to computer controlled, motor driven, rotation chairs capable of any type of rotation in any direction. Both labyrinths are stimulated but asymmetry and control of the reflex may be quantified. Although simple observation of post-rotatory nystagmus should be part of the routine examination motor driven chairs require electro-oculographic recording and a degree of sophistication found only in specialized units.

Electro-oculography [or electro-nystagmography (ENG)]

Electrical or photographic recording of eye movements and the vestibulo-ocular reflex can be useful in sorting out central from peripheral lesions and to some extent the relative contribution from each side. There are systems of various levels of sophistication available commercially which enhance the quality of the recordings and provide computer analysis. This aids interpretation of results but the specificity of the procedure is not improved as this comes from the multifactorial control of eye movements.

Positional tests

The Dix-Hallpike positioning test is part of the routine clinical examination, but tests using motor driven tables with electro-oculographic recording can enhance the information obtained. Once again interpretation of this is best undertaken in specialist centres.

Posturography and magnetometry

These quantify balance, not vestibular function, and are therefore more relevant to research and rehabilitation than diagnosis. Moving platform posturography, in which the

body's reactions to sudden movements of the support surface are studied, may give more indication of diagnosis, but requires complicated expensive systems and a time consuming protocol. They are generally confined to academic centres, but are used more widely in some countries than others.

Vestibular tests

These may be useful in the following patients, e.g.:

- (i) Those with vertigo or imbalance of unknown cause for whom a scan is not indicated or is normal.
- (ii) Congenital or progressive deafness in order to establish an aetiology and prognosis.
- (iii) Patients considered for surgical management of vertigo.
- (iv) Medicolegal cases involving possible damage to the vestibular system.
- (v) Those requiring focused rehabilitation.

The choice of vestibular test protocol for an individual patient will depend on whether a diagnosis is required, impairment is to be documented, or rehabilitation planned.

Audit

In an overstretched clinic it is tempting to request investigation as a safeguard. In this context the appropriateness and contribution of vestibular tests requires evaluation by medical audit. Comparisons between centres are difficult as the clinical practice of vestibular assessment varies

considerably between different hospitals. The Balance Interest Group of the British Society of Audiology has undertaken the task of standardizing vestibular tests and drawing up test protocols for use in British hospitals.

Some may feel that there is no longer a place for vestibular assessment now that modern imaging techniques are capable of demonstrating both the site and nature of lesions causing vertigo and imbalance. Unfortunately the majority of disorders of balance arise from problems within the inner ear which cannot be demonstrated in this way, making it necessary to select those that require imaging. Vestibular tests are necessary where clinical examination, evoked responses and CT or MRI scanning cannot provide an adequate understanding of the patient's problem. When choosing which tests should be undertaken specific questions should be set, the answers to which are required for the effective management of that patient. In deciding which tests should be available in a particular unit the needs of the population should be considered together with considerations of time, space, personnel, equipment and cost. For the majority of ENT departments it may be sensible to limit vestibular testing to the bithermal caloric test, which is the most specific test and requires the least in terms of resources. The less specific tests which are correspondingly more difficult to interpret could be limited to a smaller number of specialized units.

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