Commentary: "Current" consensus: Electrodiagnostics in eye

Visual electrophysiology is an important tool that can immensely help in the objective evaluation of optic nerve, retina, and the cortical responses. It can play an important role in ascertaining the cause of vision loss and in monitoring various visual conditions. Visual electrophysiology assumes a still bigger role in the pediatric ocular examination in a host of conditions and can help the examiner in evaluating a host of clinical conditions owing to their noninvasive nature. The electrophysiology assessment in the pediatric age group can, however, be a challenging task owing to the lack of patient cooperation.[1]

The present issue of Indian Journal of Ophthalmology (IJO) brings forward the World Society of Pediatric Ophthalmology and Strabismus (WSPOS) consensus statement for visual electrodiagnostics and eye movement recording.[2] This statement provides a holistic overview on the topic that remains largely elusive to the general ophthalmologist. Much light has been thrown on the various indications of the electrophysiological tests and the individual utility of individual tests such as electrooculogram (EOG), electroretinogram (ERG), and visual evoked response (VEP). Apart from this, valuable information has also been provided on eye movement recording (EMR), entailing a brief yet comprehensive overview of various modalities to record the eye movements.

The Arden ratio from EOG is useful in diagnosing the affection involving retinal pigment epithelium. An abnormal EOG has been shown to be an early indicator consistent with vitelliform macular dystrophy.[3] ERG records the summation of retinal response in response to a light stimulus. It assumes a great importance in pediatrics visual assessment, especially when visual dysfunction is suspected in cases with normal fundus findings. In cases of iso-ametropic amblyopia and sometimes even anisometropic amblyopia not responding to occlusion therapy, an early diagnosis from ERG findings can help establish the subclinical retinal dysfunction, which can further aid in the suitable rehabilitation of the child. A good pediatric ERG, however, requires trained staff and a conducive environment to ensure cooperation from the child. The use of sedation for ensuring pediatric cooperation has been controversial, with some studies reporting an adverse impact of anesthesia on the ERG findings. However, some studies refute this point of view.[4] The ERG involves the use of corneal skin or conjunctival electrodes to record the retinal response to light stimulus. Ocular contact electrodes are commonly used to record ERG. Skin contact electrodes can be used in children, where cooperation is an issue. This method, however, is fraught with small and variable responses. The ERG can elicit cone and rod dysfunction. It can also help in monitoring retinal disease. Apart from this, the ERG has also been found useful in recording the impact of retinotoxic drugs,[5] as well as monitoring any negative impact of such drugs on the retina. It may be a useful prognosticator for visual gain in cases of dense media opacities, where retinal functions cannot be directly assessed.

VEP is a response generated from the occipital cortex in response to visual stimuli. It is a function of central visual function and represents the function of the postretinal visual pathway. VEP can be deranged in a number of conditions such as a demyelinating disease of the optic nerve that causes increased latency of P100 wave form. On the other hand, ischemia or compression generally leads to a reduction in amplitude. A number of factors can affect VEP waveforms such as amblyopia and uncorrected refractive error, thereby limiting its clinical use. It can be used to have a rough estimate of visual acuity in the case of infants and young children, though a special protocol of SWEEP VEP developed by Smith Kettlewell Institute, San Francisco has been described to objectively evaluate the visual acuity in infants and preverbal children.[6] Apart from this, the VEP can also be used to monitor the response to neurotoxic drugs. It can also help in distinguishing malingering from a visual disability.

EMR is an important tool in diagnosing various forms of congenital and acquired nystagmus, and can serve as an adjunct to diagnose various underlying neurological conditions. It can be used to distinguish between congenital and acquired forms of nystagmus. The electronystagmography waveforms can help in distinguishing infantile nystagmus syndrome from fusional maldevelopment syndrome, thus aiding in deciding management plans. The study of foveal dynamics as expanded Nystagmus Acuity Function (NAFX) provides an objective measure of the visual function in cases of nystagmus,[7] solving the puzzle of cases having good vision in cases of some high-frequency jerk nystagmus and poor in others. Abnormalities of eye movements have been noted in diseases such as schizophrenia[8] and Parkinson's disease. Further, research and the data thus collected can provide an insight on these disease processes.

Visual electrophysiology has an important role in pediatric ophthalmology as it provides a noninvasive modality for examination. It can not only aid in diagnosing various affections of the visual pathway but can also aid in monitoring these conditions. Early diagnosis of these conditions can not only help in explaining the visual prognosis to parents but also aids in the early visual rehabilitation of the child. Further advancement and research in this area will not only aid in the early diagnosis of the disorders of visual pathways but also provide an insight into various neurological diseases.

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