2015 AAO Annual Meeting Course Outline

The Potential for Electrodiagnosis in Glaucoma Diagnosis and Management

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I. Visual evoked potential (VEP)
   A. Definition
      a. An objective measure of visual function that assesses the electrical activity of the cerebral cortex while the subject views standardized visual stimuli
   B. Equipment
      a. Diopsys NOVA-LX©
         i. Clinically accessible technology that allows for fast and repeatable VEP measurement in office
         ii. Automated protocol for easier test administration, normative comparison, and progression detection
         iii. Cost, reimbursement, and billable ICD-9 codes
   C. Set-up
      a. Electrode placement
      b. Testing distance
      c. Monocular testing
      d. Patient instructions
   D. Testing
      a. Stimulus presentation
         i. Reversing 32 x 32 checkerboard pattern presented at both high (85%) and low (15%) contrast levels
   E. Interpretation
      a. Normal VEP
         i. Waveform
            1. N75- negative trough that occurs around 75ms
            2. P100- positive peak that occurs around 100ms, amplitude is measured from the trough of the N75 to the peak of the P100
            3. N135- negative trough that occurs around 135ms
         ii. Printout interpretation
            1. Reliability
            2. Displays monocular P100 amplitude and latency at high and low contrast levels
            3. Comparison to normative database and inter-eye symmetry comparison
      b. VEP in glaucoma
         i. Pillai et al.
            1. Evaluated the ability of the short duration transient VEP (SD-tVEP) to discriminate between healthy eyes and eyes with early to advanced glaucomatous visual field loss
            2. Overall sensitivity of 91.1% and specificity of 93.3%
            3. Low contrast latency demonstrated the highest accuracy for discrimination
         ii. Sponsel et al.
            1. Evaluated the rates of abnormal SD-tVEP amplitude and latency findings in adults with chronic glaucoma
2. High contrast latency was more sensitive than low contrast latency and amplitude for glaucoma detection and diagnosis of severity based on visual field mean deviation
3. SD-tVEP amplitude abnormality is rare even in patients with severe glaucomatous visual field loss

iii. Derr et al.
1. Evaluated SD-tVEP parameters on patients with pre-perimetric glaucoma
2. Significant difference in low contrast latency between eyes with pre-perimetric glaucoma and normals

II. Electroretinogram (ERG)

A. Definition
   a. The steady-state pattern ERG (pERG) is a non-invasive measure of the electrical responsiveness of retinal ganglion cells to contrast reversing visual stimuli

B. Equipment
   a. Diopsys NOVA©
      i. Clinically accessible technology that allows for fast and repeatable ERG measurement in office
      ii. Automated protocol for easier test administration and progression detection
      iii. Cost, reimbursement, and billable ICD-9 codes

C. Set-up
   a. Electrode placement
   b. Testing distance
   c. Monocular testing
   d. Patient instructions

D. Testing
   a. Contrast Sensitivity fixed protocol
   b. Stimulus presentation
      iv. Reversing 64 bar pattern presented at both high (85%) and low (15%) contrast levels

E. Interpretation
   a. Normal pERG
      i. Waveform
         1. Three equally spaced sinusoidal-like peaks
         2. Magnitude values greater than 1.2 uV
         3. Similar Magnitude and MagnitudeD values
      ii. Printout interpretation
         1. Reliability
         2. Displays monocular Magnitude (uV) and MagnitudeD for high and low contrast levels
   b. pERG in glaucoma
      i. Urgiles et al.
         1. Evaluated the ability of pERG to discriminate between healthy, glaucoma suspect, and glaucomatous eyes
         2. pERG discriminated glaucoma suspect eyes from normal eyes with 54% sensitivity and 80% specificity
         3. pERG discriminated mild glaucomatous eyes from normal eyes with 87% sensitivity and 93% specificity
References:
The ABCs of VEP office based visual evoked potential: descriptions, methods and applications. 2nd Ed. 2013.


Hood DC. Objective measurement of visual function in glaucoma. Curr Opin Ophthalmol 2003;14:78–82.


