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EOS 2019

27-29 March, 2019 | Hilton Cairo Heliopolis

Electrophysiological investigations in optic neuropathy

Presented by

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Optic neuropathy

- Glaucoma.
- Demyelinating disorders.
- Traumatic.
- Ischemic.
- Compressive.
- Hereditary.
- Optic nerve head drusen.

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Whenever suspected or even confirmed by ophthalmologist referred to do VEP
(whether to confirm diagnosis , prognosis or management plan).

Is VEP enough????

Case 1

- Female, 26 years old.
- Diagnosis: multiple sclerosis.
- Had an attack of optic neuritis in her right eye.
- Received steroid treatment.
- Referred to do VEP 1 month after starting treatment.
- VA was 6/18

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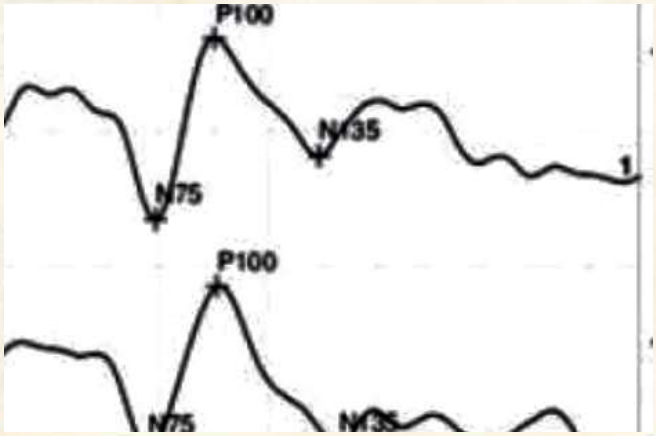
Pattern VEP of right eye:

Well formed waveform .

Average amplitude.

Moderate delay in p100 (147 ms).



Case 1

- She came again 3 months later.
- Treatment was completed.
- On examination her VA improved.
- Pattern VEP was repeated , implicit time improved to 124 ms.
- But she is still complaining of blurred vision.
- I did color vision was 3/10.

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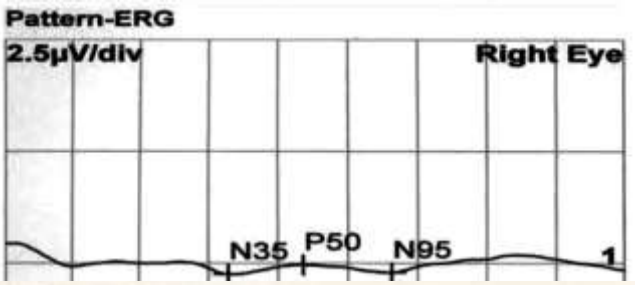
Pattern ERG of Right eye

Was poorly formed

Average implicit time

Markedly Reduced N95 component.

Mildly reduced P50 component.



- Study included 200 eyes.
- All cases were diagnosed as having Ms.
- All patients have done PVEP and PERG.
- Abnormal PERG was found in 40% of eyes.
- 85% of these eyes were having abnormal N95 without P50 involvement.
- 2eyes had abnormal PERG with normal VEP.
- VEP May improve but PERG didn't improve even after clinical recovery.
- Involvement of N95 is visual prognostic factor.
- Abnormal PERG may occur in MS patients who never had clinical optic neuritis indicating subclinical affection.

Electroencephalogr Clin Neurophysiol. 1991 Jan;78(1):18-28.

The incidence of abnormal pattern electroretinography in optic nerve demyelination.

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Abstract

This report describes the pattern electroretinogram (PERG) findings in 141 patients with optic nerve demyelination in one or both eyes. The overall incidence of PERG abnormality in the 199 eyes with abnormally delayed pattern visual evoked potential (PVEP) P100 component was 39.2%, with 84.6% of these PERG abnormalities being confined to the N95 component. The incidence of abnormal PERG was greater (53.3%) in those eyes with a history of retrobulbar neuritis than in those with sub-clinical demyelination (22.8%). The importance of stimulus parameters is noted. The value of the PERG in the improved interpretation of an abnormal PVEP is discussed.

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Conclusion

- Though VEP is very sensitive to detect optic neuritis.
- Pattern ERG must be done with VEP in initial visit and in follow up of treatment of these cases.
- Pattern ERG has two components:
  - ➢ N95 reflect function of macular ganglion cells (prognostic).
  - ➢ P50 reflect function of macular cones and ganglion cells , is shortened and reduced in severely affected cases usually recover 3-4 weeks after acute attack and indicate guarded visual prognosis.

Compressive optic neuropathy, chiasma compression and visual pathway disorders

- **Pattern ERG is important prognostic test in visual pathway disorders.**
  - **Study included 72 eyes from 36 patients having chiasmal compression.**
  - **Post operative improvement in visual function was associated with N95:P50 ratio in 65% of cases**
  - **No change was detected in 26% with normal ratio.**


Original Article

Visual prognostic value of the pattern electroretinogram in chiasmal compression

Abstract

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Case 2

- 28 years old male patient.
- Road traffic accident.
- Referred to do VEP within 3 days after trauma.
- VEP was moderately formed with average amplitude and moderate delay in implicit time 140 ms.
- Pattern ERG was poorly formed with marked reduction of P50 and N95.
- 3 months later VEP show severe delay with amplitude reduction.

Efficacy of N95 amplitude of pattern electroretinogram measured from baseline to N95 trough in the traumatic optic neuropathy.

Author information

Abstract

PURPOSE: To investigate the utility of selected pattern electroretinogram (PERG) parameters-including N95 amplitude and N95/P50 ratio, and a BL-N95 amplitude-in the analysis of visual function(s) and for predicting changes in retinal ganglion cell structures in traumatic optic neuropathy.

STUDY DESIGN: A retrospective, observational case series performed at a single center.

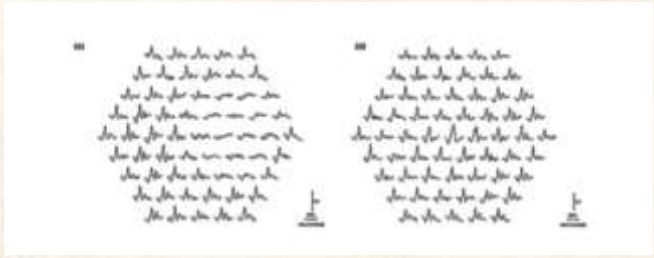
METHODS: Forty-four eyes from 36 patients diagnosed with optic neuropathy were included. A BL-N95 amplitude was defined as the amplitude measured from baseline to the trough of N95. PERG and pattern visual evoked potential (pVEP) measures were acquired within 1 week after onset of optic neuropathies. To compare functional and anatomical changes, mean temporal peripapillary retinal nerve fiber layer (pRNFL) and average and minimum ganglion cell-inner plexiform layer (GC-IPL) thicknesses were measured using optical coherence tomography.

RESULTS: Thirty-six patients (20 men, 16 women; mean age 37.5 ± 17.6 years) were evaluated. The BL-N95 amplitude was significantly smaller than the N95 amplitude (1.01 ± 0.56 μV and 2.45 ± 1.02 μV, respectively; p < 0.0001). Both the N95 (r = −0.36, p = 0.010) and BL-N95 r = −0.32, p = 0.029) amplitudes were significantly correlated with visual acuity. Although P100 latency was not correlated with all PERG parameters, the N95 (r = 0.32, p = 0.032) and BL-N95 (r = 0.41, p = 0.005) amplitudes demonstrated a positive correlation with P100 amplitude in pVEP. PERG parameters, including the N95 and BL-N95 amplitudes, and N95/P50 ratio, were not correlated with pRNFL thickness or optical coherence tomography. Only the BL-N95 amplitude demonstrated a significant correlation with GC-IPL.

CONCLUSION: The BL-N95 amplitude measured from baseline to the trough of N95 was valuable in the analysis of visual function(s) and for predicting changes in retinal ganglion cell structures in traumatic optic neuropathy.

Case 3

- 21 years old female patient.
- Complaining of right painless field defect .
- Progressive over year.
- Was initially diagnosed as optic neuropathy and referred to do VEP
- VEP show reduced amplitude without delay.
- Pattern ERG show only affection of P50 with normal N 95.
- Multifocal ERG was done.
- Finally diagnosed as AIBBES.
- **Macular dysfunction**



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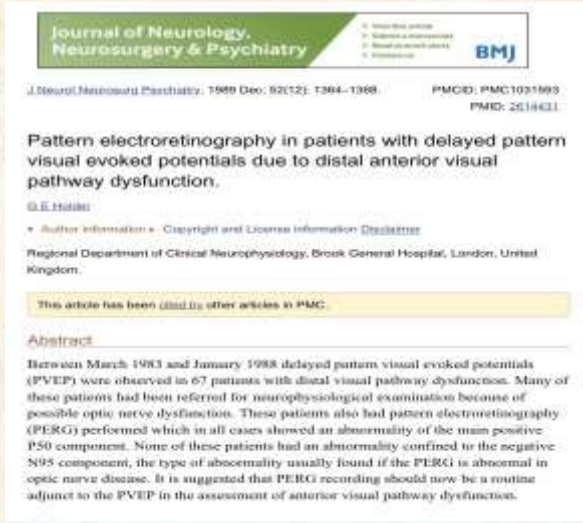
- 67 patients.
- Referred for VEP.
- Pattern ERG was done .
- Showing macular involvement.
- **Pattern ERG should be done with VEP to exclude macular causes of VEP abnormality.**



Journal of Neurology, Neurosurgery & Psychiatry

BMJ

J Neurol Neurosurg Psychiatry. 1989 Dec; 52(12): 1364–1368. PMCID: PMC1031593 PMID: 2614431

Pattern electroretinography in patients with delayed pattern visual evoked potentials due to distal anterior visual pathway dysfunction.

G E Holder

Author information ▸ Copyright and License information Disclaimer

Regional Department of Clinical Neurophysiology, Brook General Hospital, London, United Kingdom.

This article has been cited by other articles in PMC.

Abstract

Between March 1983 and January 1988 delayed pattern visual evoked potentials (PVEP) were observed in 67 patients with distal visual pathway dysfunction. Many of these patients had been referred for neurophysiological examination because of possible optic nerve dysfunction. These patients also had pattern electroretinography (PERG) performed which in all cases showed an abnormality of the main positive P50 component. None of these patients had an abnormality confined to the negative N95 component, the type of abnormality usually found if the PERG is abnormal in optic nerve disease. It is suggested that PERG recording should now be a routine adjunct to the PVEP in the assessment of anterior visual pathway dysfunction.

Home message

- Pattern ERG provide clinical measure of macular and ganglion cell layer function.
- Impaired VEP responses produced by deficit anywhere along visual pathway from retina to occipital cortex.
- VEP should be used in combination with pattern ERG to:

❖Exclude macular disorder as cause of VEP Abnormality.

❖To assess severity and prognosis of optic nerve dysfunction.

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Thank you