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A CLINICAL STUDY OF VISUAL EVOKED POTENTIAL IN MALINGERING BLINDNESS

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ABSTRACT **Purpose:** To investigate the contributions of transient pattern-reversal visual evoked potentials in the diagnosis of ocular malingering at Government General Hospital, Guntur. **Methods:** Adult patients with suspected malingering in one or both eyes were referred for visual evoked potential testing.Data analysis included the distance optotype visual acuity based on ETDRS retroilluminated chart and the transient pattern -reversal visual evoked potential parameters of latency(milliseconds) and amplitude(microvolts) for the P100 component,using checkboards with visual subtenses of 15' and 60'. **Results:** The study subjects comprised 25 adults, including 15(60%)women, with ages ranging from 21 to 61 years (mean=45.05+/-11.76 years;median =49yrs).the age distributions of men and women were similar;men's ages ranged from 21 to 58 yrs(mean=44.44+/-11.91 years;median =49yrs) and women;s ages ranged from 30 to 61 yrs(mean=45.54=+/-12.19 years;median=49yrs).A total of 48 eyes were tested. Previous ocular or head trauma was present in 4 cases. Ten patients had an organic background for visual loss in one eye and complained of visual loss in the contralateral eye;accordingly they were classified as exaggerators.table 2 presents the demographics, visual loss complaints, informed optotype acuities, and motivations of this particular group. **Conclusion:** Normal pattern -reversal visually evoked potential parameters with suspected ocular malingering were observed in a 25 patient cohort.This electrophysiological technique appeared to be useful as a measure of visual pathway integrity in this specific population.

KEYWORDS : Evoked potentials, visual/physiology; Malingering; pattern recognition, visual; vision disorders; visual acuity

INTRODUCTION

- Functional visual loss is a condition in which the patient's subjective visual symptoms do not corroborate the results of a clinical examination and diagnostic workup.
- In general FVL is a clinical diagnosis made when the physician demonstrates that the patient's visual acuity is better than alleged.
- The terminology associated with this condition varies considerably and includes description such as non organic visual loss,psychogenic visual loss,malingering,hysterical visual loss and ocular conversion reaction.
- Decreased Visual acuity, one of the most common functional complaints,may be either psychogenic or caused by malingering;with the former,subjects are unconscious of dissembling,whereas with the latter,subjects consciously dissemble the disease.
- In order to distinguish between a potential psychogenic disorder and malingering, it is important to conduct a thorough search for evidence and establish a well documented understanding of the patient's context.
- Malingering usually occurs when the patient seeks benefits associated with illness such as an evasion of criminal prosecution, escape from military service, compensation from social security agencies or insurance companies and /or to access to unnecessary free medications or medical equipment.

AIMS AND OBJECTIVES:

To evaluate the visual evoked potential in malingering blindness.

MATERIALS AND METHODS

This prospective study was performed in patients with unexplained visual loss who are coming to Government General Hospital,Guntur.

Ethics committee approval taken -January 2023

Inclusion Criteria:

Unexplained visual loss according to findings from a previous ophthalmic exam(including visual acuity, refraction, biomicroscopy, intraocular pressure, directband indirect fundoscopy evaluations) Age >18 years.

Exclusion Criteria:

Presence of neurological disorders that might affect VEP recording (epilepsy,intracranial tumour).

Procedures

Pattern-reversal Visual Evoked Potential (PR-VEP)

Transient PR-VEP recording was performed according to the recommendations of the International Society for Clinical Electrophysiology of Vision (ISCEV)(12). PR-VEPs of each eye were obtained using electroencephalograph electrodes placed according to the 10-20 system. The active, reference, and ground electrodes were placed at Oz, Fpz, and Cz, respectively. Pattern-induced visual stimulation was provided by a pattern generator monitor with a mean luminance of 50 cd/m2. The reversal frequency of the frame-locked pattern was 1.9 Hz. At the viewing distance used in this study (100 cm), the display screen subtended angles of 17° x 17° at the eye. Black and white checks with visual subtenses of 15' and 60' were used as stimuli, and the spatial frequency in the 45o direction was calculated for both sizes of stimuli using a previously described formula. The spatial frequencies (cycles/degree) were 0.44 and 1.79 for larger and smaller checks, respectively. These spatial frequencies corresponded to checkerboard resolution visual acuity thresholds of approximately 20/1400 for larger checks and 20/300 for smaller checks. Because the resolution acuity thresholds could exceed the optotype acuity scores by up to 1 octave, the minimum visual acuity required to evoke responses to the larger and smaller checks would be 20/700 and 20/150, respectively. The contrast was set to maximum, and the luminance remained constant.

Occipital responses were averaged using the UTAS E-3000 system (LKC Technologies, Inc., Gaithersburg, MD, USA). The average response to 100 reversals was analyzed. Latencies (ms) of the major positive component (P100) and the negative peaks (N75 and N135) were determined for both stimuli. The P100 latency was compared with normal values obtained in our laboratory after setting the 97.5th percentile as the upper limit of normal(14). The Amplitude (μV) was defined as the difference in potential between the N75 and P100 peaks. For each eye and using the two checkerboard sizes, VEPs were classified as normal, reduced amplitude, prolonged latency, and non-

recordable. Normal PR-VEP parameters (P100 latency and amplitude) for both stimulus sizes and in both eyes were indicative of malingering.

To improve accuracy and compliance, a direct observation of the examined eye was performed, during which the subject was continuously asked to pay attention to the center of the stimulus monitor. In addition, evaluations were performed by experienced examiners and the developing average waveform was carefully observed.

Visual Acuity Testing

The participants' best corrected visual acuity was measured using a retro-illuminated ETDRS Chart with Tumble "E" optotypes; glasses and pinhole correction were used when necessary. Each score was recorded as the 4-m logarithm of the minimum angle of resolution (logMAR) acuity.

Statistical Analysis

An unpaired t-test was used to compare age distributions between male and female subjects, and a p value ≤0.05 was considered to be statistically significant.

RESULTS

The study subjects comprised 25 adults, including 15(60%) women,10 (40%) with ages ranging from 21 to 61 years (mean= 45.05 □} 11.76 years; median= 49 years). The age distributions of men and women were similar; men's ages ranged from 21 to 58 years (mean= 44.44 □} 11.91 years; median= 49 years), and women's ages ranged from 30 to 61 years (mean= 45.54 □} 12.19 years; median= 49 years). A total of 48 eyes were tested (2 female subject had a ocular prosthesis).

Figure 1 shows the distributions of individual PR-VEP parameters (P100 latency and amplitude) for 10 patients who met the criteria for malingering. The demographics, complaints of visual loss, informed optotype acuities, and motivations for FVL are listed in table 1. Informed optotype acuity ranged from no light perception (NLP) to 20/50. Previous ocular or head trauma was present in 3 cases. Two female patients had no apparent cause of malingering; these cases most likely involved psychogenic functional visual loss, and one patient (patient #4) was referred for psychiatric assessment. fifeteen patients had an organic background for visual loss in 1 eye and complained of visual loss in the contralateral eye; accordingly, they were classified as exaggerators. Table 2 presents the demographics, visual loss complaints, informed optotype acuities, and motivations of this particular group. For these 15 patients, the individual parameters (P100 latency and amplitude) of the eye without an organic background for visual loss are shown in figure 2. All patients in this group had a financial motivation for their visual loss. Visual acuity in the malingering eye ranged from 20/63 to NLP. In 5 cases, ocular trauma was the organic cause that led to malingering of the contralateral eye in an attempt to achieve personal gains from social security agencies.

The subject had experienced blunt trauma to his left eye and was suing his former employer for compensation benefits regarding his workplace injury.

DISCUSSION:

Table 1. Clinical Characteristics Of Patients With Malingering

ID	Sex	Age (years)	complaint of visual loss	cause	VA RE	VA LE	Motivation
1	M	58	Binocular	None	20/60	20/60	Financial
2	M	55	Binocular	None	20/120	20/60	Financial
3	F	56	Right eye	Acute myocardial infarct	20/160	20/125	Financial
4	M	45	Binocular	None	NLP	20/120	Financial
5	M	24	Binocular	blunt trauma LE	20/250	NLP	Financial
6	F	60	Binocular	None	20/160	20/120	Financial
7	F	40	Left eye	None	20/60	HM	Psychogenic
8	F	48	Binocular	Head trauma with retinal detachment	20/120	20/200	Financial
9	F	38	Binocular	Corneal burn RE	20/120	20/60	Financial
10	F	30	Binocular	Bilateral diabetic retinopathy	HM	20/160	Financial

ID=identification, VA=Visual acuity, F=Female, M=Male, RE=Right eye, LE=Left eye, NLP=no light perception; HM=Hand motion.

In this cohort of patients from a Government General Hospital,Guntur, transient PR-VEP testing was found to be highly sensitive for the identification and diagnosis of pure malingering, as all eyes tested under the suspicion of malingering yielded normal PR-VEP amplitudes and latencies. A normal VEP result indicates a normal visual pathway with no organic cause of vision loss, and consequently, suggests malingering because of a specific motivation. It is important, however, to note that normal subjects might have employed changes in accommodation, a lack of attention, or meditation to consciously alter their VEPs to mimic significant visual or neurological lesions. For example, a patient might not focus on the center of the screen or might close his/her eyes too frequently. However, these artifacts were controlled through a careful observation of patient behaviour during testing, as described in another report. In some cases, mainly those of patients who reported a lack of light perception, the use of flash VEPs might.

Table 2. Clinical Characteristics Of 15 Patients Classified As Exaggeraters, With Unilateral Organic Lesion:

ID	Sex	Age	VA RE	VA LE	Complaint	VEP RE	VEP LE	Motivation	Ocular findings
1	M	57	NLP	20/80	Monocular	Non-detectable	Normal	Financial	Right eye optic atrophy
2	F	45	20/80	20/60	Monocular	Non detectable	Normal	Financial	Right eye
3	F	34	20/320	NLP	Binocular	Normal	Not detectable	financial	infantile cataract in LE
4	F	33	HM	20/80	Monocular	Not-detectable	Normal	Financial	penetrating ocular trauma in RE
5	M	35	20/160	NLP	Binocular	Normal	Not-detectable	Financial	penetrating ocular trauma in LE
6	M	48	HM	20/160	Binocular	Non detectable	Normal	Financial	Retinal detachment in RE
7	M	54	20/100	NLP	Binocular	Normal	Nondetectable	Financial	Phthisis bulbi in LE
8	F	61	HM	LP	Binocular	Normal	Non detectable	Financial	Macular scar post chorioretinitis in LE
9	F	51	Prosthesis	20/60	Monocular	N/A	Normal	Financial	Ocular prosthesis in RE
10	M	39	HM	LP	Binocular	Normal	Non-detectable	Financial	macular scar post chorioretinitis in LE
11	F	48	20/60	Prosthesis	Monocular	Normal	Non-detectable	Financial	Ocular prosthesis in LE
12	F	60	20/400	NLP	Binocular	Normal	Non-detectable	Financial	Penetrating ocular trauma in LE
13	M	54	NLP	CF	Monocular	Non-detectable	Normal	Financial	CRVO in RE
14	F	50	HM	20/120	Binocular	Non-detectable	Normal	Financial	penetrating ocular trauma in RE
15	F	52	NLP	20/100	Binocular	Non-detectable	Normal	Financial	Phthisis bulbi in RE

ID=identification, VA=Visual acuity, F=Female, M=Male, RE=Right eye, LE=Left eye, NLP=no light perception; HM=Hand motion; LP=Light perception; CF=Counting fingers; VEP=visual evoked potential; N/A=Non-applicable; CRVO=Central retinal vein occlusion.

be considered to avoid the requirement for constant and steady eye fixation. However, flash VEPs are not sensitive to image blurring. The majority of subjects in this study reported financial motivations for their reported ocular malingering (90%). As in previous studies, reliable PR-VEP data could be recorded in all patients with no observable physical damage to the anterior visual system who were included in the present study. An earlier study of 4 children with functional visual losses and normal PR-VEP results reported psychological and social motivations as the major reasons for malingering. PR-VEP testing assesses the integrity of visual stimulus conduction through the visual pathway, and a normal PR-VEP is thought to indicate pathway integrity; in addition, it is possible to infer whether the informed acuity is or is not reliable. However, mild losses in visual acuity should be interpreted in light of clinical findings from an ophthalmic exam that includes careful anamnesis and detailed semiology. Furthermore, patients with a true reduction in visual acuity might exhibit normal VEP responses and could therefore be considered false dissemblers.

If the results of conventional tests are equivocal or an objective assessment of the visual system functional integrity is required, VEP testing can offer a more direct assessment of visual pathway integrity, particularly in the context of a simulated severe visual acuity loss such as that of light perception. Although the current study was not designed to measure objective visual acuity using ISCEV transient VEPs, such measurements could be reliably achieved using the previously described sweep-VEP technique. This type of electrophysiological assessment allows patients with complaints of unexplained reduced visual acuity to verify their complaints, assess the degree of an underlying disorder, and attempt to localize the site of the defect within the visual system. PR-VEP might thus facilitate the detection or suspicion of malingering. The major limitations of the present study were its retrospective design and its basis on a medical chart review; accordingly, the study lacked follow-up data that could confirm the subjects' malingering statuses. Furthermore, subject cooperation during the examination might have affected the PR-VEP outcomes. In this case series, many of the contributing factors associated with malingering, such as pre-existing trauma, physical illness, and pursuit of social benefits, were observed.

In conclusion, transient PR-VEP testing was found to be highly sensitive for the identification and diagnosis of pure malingering in a cohort of patients suspected of ocular malingering in a Government General Hospital,Guntur.

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