

Visual Evoked Potential in Idiopathic Intracranial Hypertension

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Abstract

Purpose: To study the rule of Visual Evoked Potential (VEP) in evaluation of patient with Idiopathic Intracranial Hypertension (IIH).

Methods: The study was carried out on fifty-nine patients presented with IIH from February 2017 to the end November of 2018. All patients were subjected to complete medical, Ophthalmological and neurological history and examination, Lumbar Puncture (LP), VEP, perimetry and MRI brain and MRV were done.

Result: We found that 35.59% of patients had prolonged P100 latency of VEP and 22.03% of patients had abnormal visual field. Also there were significant correlation between P100 latency of VEP and duration of disease, opening CSF pressure, and result of perimetry.

Conclusion: We concluded that VEP is simple sensitive noninvasive method for evaluation of visual function in patients with ICH.

Keywords: Neurophthalmology; Visual Evoked Potential (VEP); Idiopathic Intracranial Hypertension (IIH); Papilledema; Pseudo tumor cerebri

Introduction

Idiopathic intracranial hypertension (IIH) is a syndrome characterized by increased intracranial pressure (ICP) of cerebrospinal fluid (CSF) due to unidentified causes [1]. Annual incidence of IIH in general population and obese women of childbearing age is 1 to 2 and 19 to 20 per 100,000, respectively [2]. Patients may have variable clinical presentation, which can be a challenge for timely diagnosis and treatment [3]. Papilledema with subsequent visual field loss is the most feared clinical consequence [4,5]. Although papilledema is a powerful tool in primary diagnosis, it remains a limited method in producing quantitative data to evaluate longitudinal optic disc changes in patients with IIH [6,7]. If untreated, long-standing pressure from inside the brain, by putting pressure on the optic nerves commonly results in irreversible optic neuropathy with visual field loss, colour desaturation or even total loss of colour vision [8]. Visual loss can occur anytime along the course of the disease but is often insidious and as central vision is spared until late in the course of the illness the visual loss is often asymptomatic until profound [3]. The first step in the neurological examination of a suspected IIH patient is funduscopy, a quick, simple and accessible bedside test in the emergency room. Test of vision and especially visual field by perimetry are also essential [9,10]. Objective measures that accurately assess the function of the injured neurons could serve as an alternative or additional clinical marker upon which to base treatment decisions [11].

Electrophysiological tests evaluate the visual system from the retinal pigment epithelium to the occipital cortex. Pattern Visual evoked potential (VEP) test shows the response of the cortical cells against a pattern stimulus [12]. VEP is a sensitive and non-invasive method for evaluation of visual function [13]. It is used in evaluation of the vision loss and the optic nerve damage which is the most important complication of IIH [14].

Aim of Study

This study was prospective study amid at study the rule of VEP in evaluation of patients with IIH.

Patients and Methods

The study was carried out on fifty-nine patients presented with IIH attended the Neurology and ophthalmology Departments of Aljadaan Hospital during the period from February 2017 to the end November of 2018. This study has been approved by ethical committee of Aljadaan Hospitals. IIH was diagnosed according to Dandy criteria (1-4) below:

1. Symptoms and signs that may be associated with a high intracranial pressure (headache, papilledema, etc.);
2. Documented increased CSF opening pressure higher than 25 cm H₂O, with normal CSF composition;
3. No abnormal neurological findings except a sixth nerve palsy;
4. Absence of any space occupying lesions on neuroradiological imaging [15].

All patients were subjected to detailed medical history including age, gender, weight, height, BMI, contraception pills, chronic medication hypothyroidism and any other medical disease. Detailed neurological history including onset, course and duration is taken. Neurological examination including mental state, cranial nerves, motor, sensory systems and cerebellum had been taken. Complete ophthalmologic examination included Snellen visual acuity, ophthalmoscopic examinations and perimetry were performed for all patients. All patients underwent magnetic resonance imaging of the brain and veins (MRI and MRV). Lumbar puncture (LP) was done for all patients while patient lying to one side. Normal range of CSF pressure in adults (in lying to the side position) varies in different reports 90–180 mm-H₂O [16,17]. Positive LP was defined as an opening intracranial pressure (in mm-H₂O) of over 190 lying to one side [1]. According to International Society for Clinical Electrophysiology of Vision (ISCEV) standards [18], VEP were recorded using Neurowark EMG 17-NWEMG-5960 equipment (Sigma, Medzin, Technik, Germany). The latency of the P100 peak was measured. Responses were considered abnormal if the P100 latencies exceeded 110.85 ms in any eye [19,20].

Results

Appropriate statistical methods were applied and the results were tabulated presented accordingly. $p < 0.05$ was considered significant.

The study was carried out on fifty-nine patients (8 male and 51 female) with mean age 29.59 ± 9.18 years, presented with IIH with mean duration of disease was 3 ± 2.39 months. The mean of BMI of patients was 29.04 ± 3.99 and mean of opening CSF pressure 27.89 ± 3.79 . VEP was done for both eyes of all patients and P 100 latency was prolonged on 42 eyes (35.59%) with mean 108.32 ± 9.8 ms on right side 109.38 ± 8.99 ms on left side. Also perimetry was done for both eyes of all patients and it was abnormal visual field in both eyes of 5 patients (8.47%), right eye of 6 patients (10.17%) and left eye of 2 patients (3.39%). MRI brain and MRV showed 29 patients (49.15%) had normal MRI brain and MRV, 14 patients (23.72%) had empty sella syndrome and 21 patients (35.59%) had stenosis of venous sinuses. There were no significant correlation between P 100 latency of VEP and age of patients, sex, presenting symptom, BMI or MRI brain and MRV finding while there were significant correlation between P 100 latency of VEP and duration of disease, opening CSF pressure and results of perimetry (Table 1).

Variables	Number	Percent
Sex		
Male	8	13.56%
Female	51	86.44%
Presentation		
Headache	49	83.05%
Visual symptom	10	16.95%
Age (years) (M + SD)	29.59 ± 9.18	
BMI (M + SD)	29.04 ± 3.99	
Duration month (M + SD)	3 ± 2.39	
Opening pressure (M + SD)	27.89 ± 3.79	

VEP of right eye (M + SD)	108.32 ± 9.8	
VEP of left eye (M + SD)	109.38 ± 8.99	
Abnormal VEP		
Right eye	20	33.90%
Left eye	22	37.29%
Total	42	35.59%
Abnormal visual field		
Right eye alone	6	10.17%
Left eye alone	2	3.39%
Both eyes	5	8.47%
Total	13	22.03%
MRI finding		
Normal	29	49.15%
Empty sella syndrome	14	23.72%
Stenosis of venous sinus	21	35.59%

Table 1: Demographic data of the studied patients.

Discussion

Idiopathic intracranial hypertension (IIH), is a challenging condition with raised intracranial pressure (ICP) in the absence of identifiable cause [10,21]. Headache is present in around 93% of patients at the time of diagnosis [3,22]. Headache was presenting symptom in 83.05% of our patients. At time of diagnosis various degrees of visual impairment are present in up to 90% of patients with IIH [23]. Other studies reported that about 10–24% of patients progressed to severe and permanent visual impairment [23,24]. Also study was done by Kesler [14] on twenty patients with chronic IIH, he reported visual fields were abnormal in six cases (in four bilaterally). Our study reported 22.03% of patients had abnormal visual fields either in one eye or both eyes (Tables 2 and 3).

Variables	VEP (M ± SD) (108.32 ± 9.8)	P Value
Age	29.59 ± 9.18	0.577
BMI (M + SD)	29.04 ± 3.99	0.12
Duration of disease (M + SD)	3 ± 2.39	0.001
Opening pressure (M + SD)	27.89 ± 3.79	0.001

Table 2: Correlation between P 100 latency of VEP and demographic data.

The incidence of prolonged VEP responses in patients with IIH is debated and depends both on the time point of the examination and the technique used [14]. Verplanck et al. [25] examined VEP responses in 15 women presented with acute onset IIH and found abnormal results in only a small number (5 out of 30 eyes 17%), while Rizzo et al. [26] and Sorensen et al. [27] found abnormal responses in 28 and 31%

of their patients, respectively. Others studies [28,29] using more elaborated techniques, reported prolonged responses in 55%, and in most of their IHH patients, respectively. Kesler et al., [14] reported 55% of patients with chronic IHH had prolonged P100 latency of VEP.

Variables	VEP (M ± SD)	p-value
Visual field		
Normal	106.49 ± 7.45	0.001
Abnormal	122.88 ± 7.33	
MRI finding		
Normal	110.15 ± 10.28	0.936
Empty sella syndrome	107.4 ± 6.73	
Stenosis of venous sinus	108.2 ± 12.15	

Table 3: Correlation between P 100 latency of VEP demographic data.

In the present study, we determined 35.59% of patients had prolonged P100 latency of VEP responses. The variation in results of different studies may related to difference of duration of disease and techniques of VEP. In the present study, the prolongation of P100 latency of VEP insignificantly correlated to age of patients, sex, presenting symptom or MRI brain and MRV finding but it significantly correlated to duration of disease, opening CSF pressure and results of abnormal visual fields. This may suggest that VEP may be a sensitive reflection of damage to the nerves. Kesler et al. [14] reported that, there was poor relationship between the VEP abnormalities and clinical abnormality except abnormal visual fields, patients with abnormal visual field tended to have more prolonged VEP latencies.

Conclusion

Patients with IHH may go on to develop visual loss at any time along the course of the disease, and therefore should be followed at regular intervals to detect early evidence of optic neuropathy. VEP is simple sensitive noninvasive test for evaluation of visual function in patients with IHH.

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