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Research Article

Early Diagnosis of Pathological Changes in Visual System of Prolactinoma Patients Using Visual Evoked Potential

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Abstract

Aim

Prolactinoma is the most Pituitary adenomas that affect young women at fertile age. Visual impairment is a common presentation of this condition. Visual pathway mainly optic nerve maybe affected in these patients. Visual evoked potential is one of the techniques to screen the visual pathway. The aim of present work is to search for probable adverse effect of Prolactinoma on visual pathway using visual evoked Potentials.

Patients and Method

Fifteen female patients with age range of 20-40 years were selected. The patients had healthy visual system as far as visual acuity, field of vision & magnetic resonance of imaging of brain were concerned. The latency and amplitude of visual evoked potential, P_{100}

peak was recorded for this patients & 15 age and sex matched controls with healthy visual system.

Results

The mean age was 29.4±6.68 and 29.13±6.82 is case and control group respectively. The mean visual acuity in case was 0.00±0.00 (Log MAR) and 0.00±0.00 (Log MAR) in control group. The difference in values were not statistically significant as for as age (P=0.967) and visual acuity (P=1) were concerned. The values obtained for latencies were 101.13 ±5.95 and 98.06 ±4.01 for case and control groups respectively. In case of amplitude the values were 8 ±1.96 and 7.93 ±2.06 in case and control groups. The values for visual evoked potential were statistically significant for latency between case and control groups (P=0.036) , where as in case of amplitude the difference between two groups i.e., case and control groups were not significant (P=0.756)

Conclusion

Prolactinoma might have adverse effect on visual pathway mainly optic nerve despite normal visual acuity, field of vision and brain magnetic resonance imaging which can be diagnosed by latency of pattern visual evoked potential VEP, P_{100} peak.

Keywords: Prolactinoma; Visual pathway; Visual evoked potential

1. Introduction

Prolactin is a hormone made by the pituitary gland, a small gland at the base of the brain. Prolactin causes the breasts to grow and make milk during pregnancy and after birth. Prolactin levels are normally low for men and non-pregnant women, but its level may increase during pregnancy and amenorrhea. Increase in prolactin or Hyperprolactinemia includes the symptoms such as infertility, oligomenorrhea, headache, breast tenderness, galactorrhoea, sexual dysfunction, visual field defects and etc [1]. Prolactinomas may affects the visual system. Vision loss, visual field defects, double vision, eyelid dropping and enlarged pupil are among the ocular problems observed in these patients [2-5]. Visual pathway mainly optic nerve, chiasma or optic tract is a part of visual system that maybe affected in this connection too [6,7]. There are several diagnostic techniques to reveal the visual pathway disorders. Magnetic resonance imaging or MRI is an imaging technique which is mostly used in this respect [8,9]. Visual evoked potential (VEP) is an electrophysiological technique which can screen the visual pathway in different pathological cases. In a recent work Fatemeh Ojani and her colleagues worked on visual pathway of the patients with Bardet-Bidle syndrome (BBS). They used VEP technique to look for visual pathway disturbances in BBS patients. The result was abnormal VEP, P100 peak of the patients in comparison to normal population [10]. Another research work was done by SMM Shushtarian et al. on 2017. They worked on 50 workers from a textile factory segment with machinery creating high levels of vibration. They reported adverse effect of occupational vibration on visual system mainly visual pathway using VEP technique [11]. Base on the above literature research was planned to work on visual pathway of the patients suffering from prolactinoma using visual evoked potential.

2. Patients and Methods

In this case control study fifteen female patients (30 eyes) with prolactinoma were selected as the case group. They were in age range of 20-40 years. The patients were tested for visual system i.e., visual acuity,

perimetry and brain magnetic resonance imaging (MRI) which were all normal. In fact, the patients were selected with fully healthy visual system. Visual evoked potential test with checkerboard simulation method was performed to evaluate the visual pathway of patients. Latency (msec) and amplitude (µv) of VEP, P100 peak was measured for all participants using Mangoni machine. In summary three electrodes were used to connect the machine to the patients. Active, reference and ground electrodes were attached to occipital, vertex and forehead of patients respectively. The same procedure was repeated for 15 age and sex matched healthy (visual) individual (30 eyes) as control group. The results obtained in two groups were compared for probable differences between two groups.

3. Results

Table 1 shows the demographic findings in the case and control groups and there is no statistically significant difference between the two groups regarding the age (P=0.967) and visual acuity (P=1).

Variable	Number of participants	groups (Mean ± SD)		P value*
		Control	Case	
Age	15	29.13±6.82	29.4±6.68	0.967
Visual Acuity (LogMar)	15	0.00±0.00	0.00±0.00	1

*Based on Mann-Whitney U Test

Table 1: Demographic findings in the case and control groups.

Variable	Number of participants	groups (Mean ± SD)		P value*
		Control	Case	
Latency (msec)	15	98.06 ±4.01	101.13 ±5.95	0.036
Amplitude (µv)	15	7.93 ±2.06	8 ±1.96	0.756

*Based on Mann-Whitney U Test

Table 2: Measurement of mean latency and amplitude of VEP, P100 peak in the case and control groups.

4. Discussion

Prolactinoma is a disease of pituitary gland which may affect visual system too. Research was planned to look for early diagnosis of pathological changes in visual system using visual evoked potential. According to result of present study we could not observe significant changes in control and case group as far as demographical aspect, i.e., age, sex, and visual acuity was concerned. VEP results in two groups also didn't show any significant changes as far as amplitude of VEP, P100 peak in two case and control groups was concerned, however, there is statistically significant difference in latency of VEP, P100 peak between case and control groups. (P= 0.036). The characteristics of present work is the change in VEP parameter i.e., latency despite the normal visual acuity, field of vision and MRI of the patient which indicate the sensitivity of VEP in comparison to other technique such as perimetry and MRI. The results of present work may be supported by following references in this respect. Joushua L Barton et al. worked on the electrophysiological assessment of visual function in multiple sclerosis. They compared the efficiency of VEP and MRI for better diagnosis of multiple sclerosis.

Finally for particular segment of visual pathway i.e., optic nerve they stated that VEPs demonstrate greater sensitivity in detecting damage to the optic nerve than MRI [12]. It is a well-known fact that VEP waveforms are extracted from the electro-encephalogram (EEG) by signal averaging. VEP are used primarily to measure the functional integrity of visual pathway. VEPs better quantify functional integrity of optic pathway than scanning techniques such as magnetic resonance imaging (MRI). Any abnormality that affects visual pathway or visual cortex in the brain can affect the VEP. Examples are optic atrophy, stroke and compression of optic pathway by tumours [13,14]. Badiu et al. proved the usefulness of VEP in the detection of optic chiasma syndrome of tumoral etiology. In their study the pattern reversal VEP were recorded in 22 healthy and 32 patients with optic chiasma syndrome (OCS) produced by tumours of hypothalamic-pituitary area mainly pituitary adenoma with suprasellar extension. The main results showed that the latencies P100 recorded bilateral were correlated with the types of visual field deficiency in each hemifield. The changes in P100 latency are more sensitive than the evolution of visual field deficiency by compimetry [15]. One of the supporting documents of present work is old research done by OS Gutt. They worked on 83 patients with tomographically documented pituitary tumour. The result was the correlation between VEP and visual acuity, colour perception and visual field, i.e., each of the patients who had suprasellar extension of the tumour sufficient to produce a visual field abnormality also had an abnormal VEP. In addition, some patients with suprasellar extension had normal visual fields but abnormal VEP

5. Conclusions

Prolactinoma might have adverse effect on visual pathway mainly optic nerve despite normal visual acuity, field of vision and brain magnetic resonance imaging which can be diagnosed by latency of VEP, P100 peak of pattern reversal visual evoked potential.

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