



Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com



Original Article

The value of VEP in the diagnosis and post-operative monitoring of Pituitary macro-adenoma

Ruchi Kothari*, Ramji Singh, Smita Singh, Pradeep Bokariya

Assistant Professor, Department of Physiology, Mahatma Gandhi Institute of Medical Sciences, SEVAGRAM, Wardha (Maharashtra)- 442102

ARTICLE INFO

Keywords:

Pattern reversal
Macro adenoma
P100 latency

ABSTRACT

Visual evoked Potentials (VEPs) to checkerboard pattern reversal were recorded from a patient with complaints of severe and sudden headache and unexplained unilateral diminution of vision over 2 years. Since the VEP recordings showed markedly delayed response and severely reduced amplitude of P100 wave form from the left eye, a compressive lesion of the optic nerve was suspected. Computerized tomographic scan gave the evidence of suprasellar extension of pituitary macroadenoma. Follow-up recording of PVEP helped in better and cost effective assessment of visual function of the subject post-operatively.

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1. Introduction

The sellar region is a site of various types of tumors. Pituitary adenomas are the most common. They arise from epithelial pituitary cells and account for 10-15% of all intracranial tumors[1]. A pituitary macroadenoma is a benign (non-cancerous) growth in the pituitary gland that is larger than 10 millimeters in size.

In general, women of childbearing age are diagnosed more frequently with pituitary adenomas than men. Incidence increases with age, peaking between the third and sixth decades of life. At first they usually cause unilateral visual loss but eventually result in a bilateral loss of vision. Depending upon the size and location of the tumour, the ocular signs and symptoms may include visual field abnormalities, optic atrophy, papilledema, diplopia and proptosis.

Since Pattern visual evoked potential (PVEP) is a particularly sensitive method of evaluating chiasmal function the authors considered that the PVEP can prove to be valuable method of assessing pituitary tumours with regard to suprasellar extension and that follow-up recording of PVEP could help in the early detection of tumour recurrence.

2. Case report

This case report highlights the value of visual evoked potentials (VEP) in a patient with unexplained unilateral progressive loss of vision over 2 years. The patient was a 32 year female with a height of 158 cms and weighed 54 kgs. She developed a severe and sudden headache, nausea, vomiting and visual deterioration or falling vision. These are the earliest and outstanding symptoms of Macro Adenoma of Pituitary for which, the patients see the ophthalmologist first. She was diagnosed to be suffering from Migraine and Age Related Macular Degeneration and was treated for variable periods of time.

On ocular examination, aided visual acuity of the patient for Rt. eye (RE) was 6/9 and for left eye (LE) was 6/36 with no pinhole improvement. Fundus examination of both the eyes was normal and fullness of lids was evident.

Few pigmentation changes were observed at macula. The intraocular pressure for RE was 13 and for LE was 14 mm Hg. Colour vision was defective for the left eye and normal for the right eye.

* Corresponding Author : Ruchi Kothari
Assistant Professor,
Department of Physiology,
Mahatma Gandhi Institute of Medical Sciences,
SEVAGRAM, Wardha (Maharashtra)- 442102
E.mail: prachi1810@yahoo.com

2543

The pattern visual evoked potential (PVEP) study was then opted by the ophthalmologist and the patient was referred to the Neurophysiology Unit of the Department of Physiology of our institute.

For electrophysiological investigation we have used the visual evoked potentials as an index of conduction in the retrobulbar visual pathway, a useful tool in the quantification of chiasmal function and detection of subclinical demyelination. VEPs were measured using pattern stimulus (checkerboard). Recorded parameters were N70 latency (ms), and P100 amplitude (mV) and latency (ms) and N155 latency (ms).

The N70 latency was 91.3 ms for LE and 71.9 ms for the RE. The P100 latency for LE was 125.6 msec and P100 amplitude was 1.66 V. The P100 latency for RE was 104.4 msec and amplitude was 7.8 V. The N155 latency was 180 ms for LE and 146.3 ms for the RE. This implies that the latencies of all the three waves were markedly prolonged on left side as compared to right side.

As a result of a markedly delayed response in the VEP and severely reduced amplitude of P100 wave form recorded from the left eye, a compressive lesion of the optic nerve was suspected. That prompted the referring ophthalmologist to request a MRI scan which led to the diagnosis of pituitary macro-adenoma.

MRI Brain revealed a well defined midline mass with typical figure of eight on sagittal sequence in sellar region extending to suprasellar cistern compressing the suprasellar optic chiasma suggestive of pituitary macroadenoma.

VEP test correlated with examinations of visual acuity, color perception, and visual fields and with computerized tomographic scan evidence of suprasellar extension of the tumor. The patient was then referred for surgical intervention.

Following the subtotal removal of the suprasellar macroadenoma, the remaining vision in the right eye improved and the latency of the VEP returned to the normal range. However, the VEP from the affected eye (left) did not show any measurable response either pre- or postoperatively.

In follow up MRI in this operated case of pituitary macroadenoma revealed complete removal of mass lesion in pituitary fossa.

3. Discussion

The purpose of the VEP recording in this case of pituitary macroadenoma was to determine the presence of visual system compression by the tumor and thus contribute to the decision of whether surgery was necessary. This patient who had suprasellar extension of the tumor sufficient to produce a visual field abnormality also had an abnormal VEP. Thus, the VEP provided earlier evidence of suprasellar extension causing visual system compromise than did conventional visual tests. However the electrophysiological findings were correlated with clinical assessment, perimetry, CT scan, angiography and operative findings.

Some previous workers[2] have also used the pattern visual evoked potential (PVEP) for the evaluation of one hundred and three patients with pituitary tumours which were examined both pre- and postoperatively with follow-up periods of up to 10 years. Their study also fostered the significance of PVEP in the assessment of pituitary tumours.

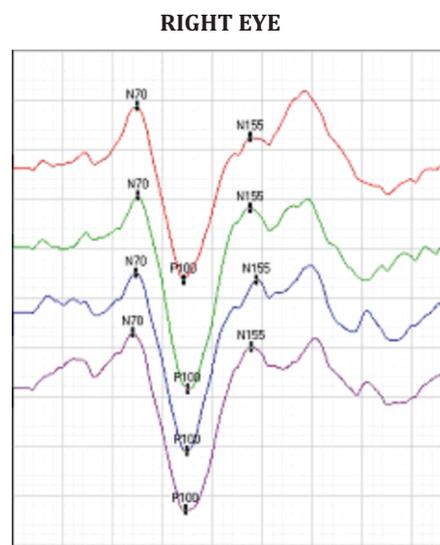
In another study[3], the visual outcome of 22 patients undergoing trans-sphenoidal excision of pituitary macroadenomas with intraoperative visual evoked potential (VEP) monitoring (Group A) was compared with a non-randomized group of 14 patients who had undergone similar operations without VEP monitoring (Group B). Tumour size, preoperative visual acuity, peripheral fields, and latencies and amplitudes of P1 and P2 were analysed to ascertain the best predictor of postoperative visual function. It was found that patients in Group A had a significantly greater improvement in field defects than those in Group B.

Changes of the pattern reversal visual evoked potentials (VEPs) to half-field stimulation in 50 patients with compressive lesions of the optic chiasm were studied by Brecelj[4]. Temporal half-field stimulation yielded abnormal responses in 85% of the eyes, showing non-recordable P100 in 50% of eyes, while in 35% the P100 was significantly attenuated or delayed. This study adds new evidence that half-field stimulation can be an important adjunct for assessing the function of optic chiasm.

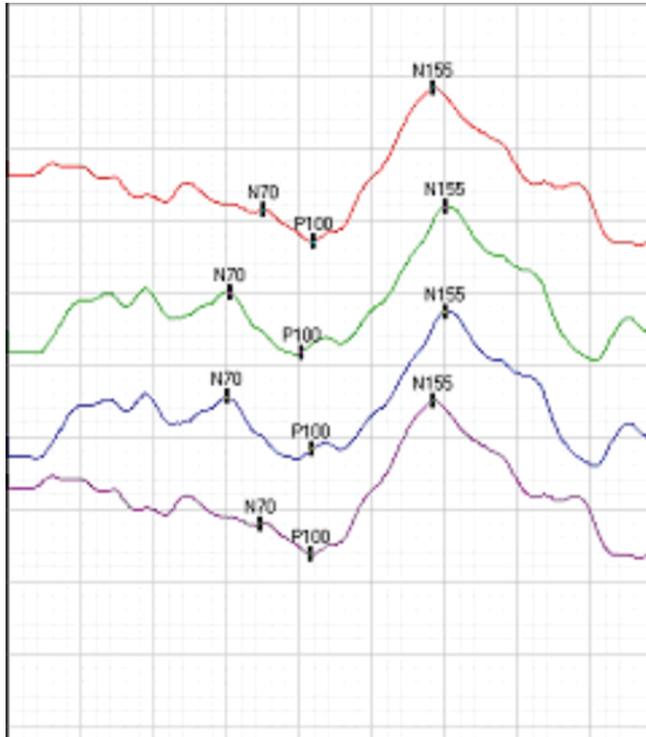
Previous studies have showed that the latencies of P100 recorded bilaterally were correlated ($p < 0.01$) with the pattern of visual field loss, in each hemifield. Pattern VEP are more accurate in measuring the changes of optic pathway. The changes in P100 latency appear earlier than the visual field losses detected by automated perimetry[5].

Legend

Figure 1. VEP wave forms in the right and left eye recordings.



LEFT EYE



4. Conclusion

Visual evoked responses (VERs) to checkerboard pattern reversal were recorded from this patient with tomographically documented pituitary tumor. Experience with this patient suggests that early recognition of optic nerve compression is vital to an optimal outcome and the VEP technique, which is much more cost-effective than MRI, is clinically useful for detecting such compressive lesions.

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