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Original Article

Visual Evoked Responses (VERS) in Assessment of Optic Nerve Injury in Head Injury Patients

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Abstract
As we are getting more industrialised and travelling is becoming more frequent, incidence of fatal road side accident resulting in head injury is also increasing. It is difficult to assess the visual status/ state of optic nerve of patients with head injury. In light of this we conducted the study on 75 patients with head injury with suspected optic nerve injury to evaluate the role of VERs in assessment of optic nerve injury. Complete ocular examination was done. VERs was recorded in every patient. Patients were re evaluated after 7-10 days and repeat VERs were recorded. It was concluded that VERs did help in establishing in diagnosis of optic nerve injury and predicting the visual outcome.
Keywords: *Head injury, Optic nerve injury, VERs, Visual recovery.*

Introduction

Trauma is a leading cause of death in youth and early middle age. Incidence of fatal road traffic accident and industrial accident is increasing day by day. Most of these accidents result in serious head injuries. following head injury visual problems may be troublesome ranging from decrease vision to complete blindness.[1] In most of the cases ophthalmological opinion is sought late after more serious life threatening complications are taken care of. Any patient with history of head injury, loss of consciousness or suspected intra-cranial haemorrhage needs a complete ocular examination to detect deficit in visual status of the patient, as blindness is one of the greatest handicaps a person can have.

Early diagnosis of optic nerve injury is of decisive importance as it ensure rapid onset of treatment. This is especially seen in severe cranio-cerebral injury where patients' state of unconsciousness makes an early diagnosis difficult and thus onset of treatment is delayed. Evaluation of visual evoked response in confused and comma tossed patients with head injury can contribute much to the early diagnosis of neurological deficit due to optic nerve injury.[2] VERs recorded within few days after injury in comatose patient correlate well with the dysfunction noted by neuro ophthalmological examination done months later when patients are responsive. VERs can be correlated with the patients prognosis more closely than with the diagnosis. Severe depression

/absence of an evoked response recorded early after head injury is suggestive of permanent dysfunction of the visual pathway tested. [3]Therefore a study was undertaken to find out the role of visual evoked responses in assessment of optic nerve injury in head injury patient.

Aim and objective

- To evaluate the role of VERs in visual prognosis in the patients of head injury in optic nerve injury.

Materials and Method

75 patients with head injury with suspected optic nerve injury were taken up for the study. Complete ocular examination was done. Visual acuity was recorded wherever possible. visual evoked responses were recorded in each patient within 72 hours of initial evaluation and then repeated after 7-10 days. Two types of visual stimuli were used to elicit VERs flash method and pattern reversal method.

Flash method: this was used in unconscious or uncooperative patients. A bright light was placed in front of patient's eye and flashed at frequencies of 1-20/second and response was recorded from occipital EEG leads which showed waves corresponding to each flash of light.

Pattern reversal method: this was used in conscious or cooperative patients who were able to fixate the gaze at the central referral point of the checker board screen. VERS were produced by sudden change of viewed checker board pattern.

Analysis of evoked potential wave latency, amplitude was done and accordingly VERs were categorized as normal, abnormal and absent. After 7-10 days patients were revaluated and repeat VERs were recorded. Results of VERs were correlated with the visual outcome.

Results and Observation

In the present study maximum patient that is 51 out of 75 patients (68%) were in the age group of 20-40 yrs of age. 70 patients out of 75 (93.33%) were male and only 5 patients (6.67%) were female. Road side accident was found to be most common cause of head injury (93.33%). Other causes were found to be fall from height (4%) and rest miscellaneous causes. In the study optic nerve injury was found to be unilateral in 71 cases (94.67%) and bilateral in rest 4 patients (5.33%). 53 patients out of 75 patients (70.66%) were unconscious at the time of initial evaluation.

At the time of initial evaluation visual acuity could not be assessed in 53 patients (70.66%0 because of patient being unconscious or in critical condition. 12 patients (16%) had no vision ie. PL –ve. 10 (13.33%) patients had vision ranging from PL +ve or better. 23 patients (30.66%) had normal VERs while in 48 patients (64%) VERs were absent. In 4 (5.33%) patients VERs recording were abnormal with increased latency and decreased amplitude.

Patients were reassessed after 7-10 days. out of total 75 patients studied 43 patients (57.33%) had no vision ie. PL –ve. Whereas 32 patients (42.66%) had vision better than PL, PR. 27 patients (36%) had normal VERs, 3 patients (4%) abnormal VERs and rest 45 patients (60%) didn't show any response in VERs.

Correlation of VERs and visual status: in the present study, all 23 patients having initial normal VERs had subsequent normal VERs and good visual recovery (table 1). 4 patients with abnormal initial VERs had repeat normal VERs and good visual recovery.

Out of 48 patients with absent VERs I, in 3 patients there was improvement in VERs II with corresponding visual improvement. 45 patients initial as well as repeat VERs were absent. 43 patients out of these 45 patients (95.5%) had no vision. Remaining 2 patients had partial vision recovery.

Correlation of VERs and visual status

Table 1

No. of patients	VER I	Visual status I	VER II	Visual status II
23	Normal	Either not assessed or present	Normal	Same or improved
04	Abnormal	Either not assessed or present	Normal	Improved
03	Absent	Either not assessed or present	Abnormal	Improved
43	Absent	Either not assessed or absent	Absent	PL -ve
02	Absent	Not assessed	Absent	Improved

Discussion

Blunt head injury may cause loss of vision as a result of optic nerve injury which is often neglected in critical multi traumatic events. Patient's state of unconsciousness makes an early diagnosis difficult. Visual evoked responses are an important test in establishing the integrity of visual pathway and may prove instrumental in early diagnosis and subsequent treatment thereby predicting the visual outcome. In the present study all 23 patients having initial normal VERs had subsequent normal VERs and good visual recovery. It is in accordance with study by Greenberg and Becker (1977) reported all patients except one with normal VERs having full visual recovery.[4] Mahapatra AK, Bhatia R reported out of 45 patients 5 patients had normal VERs with good visual recovery.[5] So with initial normal VERs we can predict good visual prognosis.

In the present study 4 patients with abnormal initial VERs had repeat normal VERs and visual recovery. Many other studies have also shown that if initial VERs was abnormal, subsequent may become normal or show improvement and vision may improve. Shaked A et al in 1982 reported a case of head injury with loss of vision and abnormal VERs , repeat VERs came normal and visual recovery occurred. [6] Mahapatra AK reported abnormal VERs in 43 out of 50 patients. All these patients showed vision improvement and improvement in VERs.[7] So if there is vision loss after head injury and initial VERs is abnormal there is good chance of recovery of vision.

In the present study out of 48 patients having absent VERs I, in 3 patients there was improvement in VERs II with reappearance of wave formation and corresponding vision improvement. This is consistent with many studies. Mahapatra AK et al in 1992 reported absent VERs in 40 out of 100 patients, 8 patients showed subsequent wave formation and partial vision recovery.[8] So in some cases with initial absent VERs there is hope for visual recovery.

In our study in 45 patients initial as well as repeat VERs were absent. 43 out of these had no visual recovery. Remaining 2 patients did have partial vision recovery. Richard AL et al in 1982 reported a case with loss of vision following head injury. Vision was PL +ve. VERs showed no response. Thus it was found that +ve value of VERs is more significant than negative VERs in diagnosis of optic nerve injury and predicting the visual outcome.[9]

Conclusion

From the present study it can be conclude that in head injury cases in addition to thorough ocular examination VERs recording is an essential diagnostic as well as prognostic investigation to access the state of optic nerve and thereby the vision status. So VERs can predict the visual recovery to quiet an extent.

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