

Original Article

Need for Visual Pathway Examination of the Patient Prior to Bone Marrow Transplantation

Maryam Naser*, Seyed Mohammad Masoud Shushtarian

Tehran Medical Sciences Branch, Islamic Azad University, Tehran, Iran

***Corresponding Author:** Maryam Naser, Tehran Medical Sciences Branch, Islamic Azad University, Tehran, Iran; E-mail: Dr.mary.n2020@gmail.com

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Abstract

Aim: Bone Marrow Transplantation is a treatment procedure usually applied for the patients suffering from leukemia. It is observed that some of these patients complain from partial vision loss few months after the operation whereas the routine visual examination of these patients are normal, therefore the aim of present work is to examine the visual pathway of these patients to search for the probable visual pathway degeneration of these patients using visual evoked potential (VEP).

Method: 10 patients following bone marrow transplantation were selected randomly. These patients had this operation for at least one year before. Routine ophthalmological examination of them was normal or at most they had refractive error

problem which could be corrected by suitable spectacles. Visual evoked potential was recorded in these patients. Latency (msec) and amplitude (μV) of VEP, P100 Peak was noted for each patient. Beside these patients, 10 people with healthy visual system were selected to compare the result of VEP in patients with healthy group following VEP recording.

Result: It is observed that 4 patients had abnormal VEP pattern which was reflected either in latency or amplitude of VEP, P100 Peak.

Conclusion: From the result of present work, one can conclude that VEP examination of patients following bone marrow transplantation is necessary prior to operation so that if any unexplained visual loss is observed after operation, the medical staff can

follow the case for the probable reason for this malfunction.

Keywords: Bone Marrow Transplantation (BMT); Visual Pathway; Visual Evoked Potential

Introduction

A patient with visual fall referred to Basir Eye Polyclinic for screening visual system to find out his vision problem. The medical history of patient indicated that he was following Bone Marrow Transplantation (BMT) last 2 years. The routine visual examination was normal. Medical history of patient showed that he was taking Cyclosporin A medication which is normally prescribed for this type of patients. Visual Evoked Potential (VEP) was tested because it is reported that Cyclosporin produces bilateral neuropathy [1]. The latency of VEP, P100 Peak was delayed. We asked the patient to stop using Cyclosporin A, because it is reported that termination of this medication recover the defect. The patient consulted after six month having the same visual problem. We considered two possibilities, either he had visual pathway problem before BMT, like Multiple Sclerosis or it can be malignancy in different parts of visual system post BMT treatment. Therefore, if the patient was tested for VEP before BMT the correct and certain diagnosis would be possible. The following literature re- view may be useful for the purpose of present study. leukemia is a group of cancers that usually begins in the bone marrow and results in high numbers of abnormal white blood cells. Bone Marrow Transplantation (BMT) has become widely used in the treatment of leukemia. Ocular complication usually are described as a secondary after organ transplantation [2]. It may be produced

due to several reasons which are going to be explained as follow, The patients may have visual pathway atrophy like multiple sclerosis which was in it's silent condition before BMT and after a certain period of time, visual pathway deficiency shows it's effect and the patient observes malfunction in the visual system [3,10]. Other reason for ocular problems may be because of incidence and risk factors for the development of new malignancies occurring after stem-cell transplantation. In this connection, Baker KS., *et al.* reported risk of post-transplant malignancies, specially solid tumors continues to increase even 20 years after transplant [4]. Somehow similar work is reported by Curtis RE., *et al* [5]. This condition may be also observed in visual system [6]. Finally, the ocular complication can be caused secondary to post-transplantation medication. Avery R., *et al.* reported eight cases of optic disc edema in patients taking Cyclosporin after allogenic bone marrow transplantation [7]. Walter SH., *et al.* reported bilateral optic neuropathy after bone marrow transplantation and Cyclosporin A therapy [1]. From the above four possibilities for ocular complication in the leukemia patients post bone marrow transplantation, it is clear that precise diagnosis seems difficult. In this regard there is one work, the authors could find out regarding the exact diagnosis of ocular complication, i.e. cystoid macular edema. Ketan V., *et al.* ruled out different mentioned possibilities and came to accurate diagnosis of macular edema of the leukemia patients after bone marrow transplantation [8]. For better diagnosis of ocular complication mainly the optic neuropathy usually observed in these patients.

Method

The patients suffering from leukemia were selected for the purpose of present study. They were selected from the leukemia patients with normal and healthy visual system. These patients were candidates for bone marrow transplantation. They were informed from the research project and the agreement form was completed by them. Visual Evoked Potential (VEP) refers to electrical potentials, started by brief visual stimuli, which are recorded from the scalp overlying visual cortex and is useful to check optic and brain nerve transmission ability [9]. We used Mangoni, an electrophysiological to record VEP pattern reversal checkerboard stimulator was used to screen the visual pathways of the patients. Patients were connected to the machine by three electrodes. Active, reference and ground electrodes were attached to the occipital, vertex and forehead of the patients respectively. Latency (msec) and amplitude (μV) of VEP, P100 Peak were measured for each patient. The patients had all normal VEP otherwise discarded and a new patient with normal VEP was used for present work. About after two years of bone marrow transplantation, the patients were tested for VEP examination again. It was observed that four out of ten patients have abnormal VEP. The abnormality was observed in latency of VEP, P100 Peak, i.e. delay of the peaks.

Results

Latency (msec) and amplitude (μV) VEP, P100 Peak was measured in ten leukemia patients before and after bone marrow transplantation. The values for mean latency \pm S.D and amplitude \pm S.D before operation were 93 ± 5.1 and 5.2 ± 2.1 respectively. The values for mean latency \pm S.D and amplitude \pm S.D of four patients with abnormal VEP after two years of operation were 115 ± 8.2 and 4.38 ± 2.61 .

The difference between latency of VEP, P100 Peak was statistically significant ($p < 0.05$) however the difference between amplitude before and after operation was not statistically significant.

Discussion

In the present research work, four out of ten patients had abnormal VEP, P100. The aim of this study was to find a correct and accurate diagnosis of the ocular complication mainly the optic neuropathy in the leukemia patients following bone marrow transplantation. The first option was that these patients have optic neuropathy before the operation, but the selection of patients prior to operation roll out this probability because they had normal VEP before transplant operation. The patients were under Cyclosporin medication. We asked all 4 patients to terminate the medication, because it is a well-known fact that this treatment causes optic neuropathy [1,7]. Three of the patients recovered from optic neuropathy and even the VEP turned to be normal which shows that it was the side effect of drug that resulted in visual acuity problems in these patients. Finally, last left patient with visual loss and abnormal VEP may be due to development of malignancy in the optic nerve because it is already reported that these type of patients are more susceptible to such conditions [4].

Conclusion

From the result of the present work, one can conclude that VEP is a good technique to diagnose the visual loss in leukemia patients post bone marrow transplantation and it is to be taken into consideration that VEP should be measured in these patients to facilitate the diagnosis of visual complications specially when optic neuropathy is concerned.

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