



Case Report

Paediatric Multiple Sclerosis - A rare sub-group: Case Report evaluating the role of Visual Evoked Potentials in silent Demyelinating lesion

Sangeeta Gupta^{1*}, Gaurav Gupta², Amit Mittal³

¹Associate Professor, Department of Physiology, ²Professor, Department of Surgery, ³ Professor, Department of Radio diagnosis, Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana-Ambala, Haryana, India.

ABSTRACT

We aim to report a case with a rare presentation of multiple sclerosis (MS) as paediatric onset multiple sclerosis and also to evaluate the role of visual evoked potentials in comprehending the diagnosis. A 15-year-old boy presented with weakness in both the lower limbs since three years with a history of episodes of muscle cramps, difficulty in walking, climbing and easy fatigability in a relapsing manner with no family history. Clinical examination was performed and investigations were done including magnetic resonance imaging and visual evoked potentials. Clinical features and paraclinical studies suggested the diagnosis as multiple sclerosis, with silent optic nerve involvement diagnosed by visual evoked potentials. Hence, the diagnostic criteria for adult MS and majority of paediatric MS which rely upon clinical and MRI features, must involve visual evoked potential, a cheaper, easy and sensitive tool in elaborating and confirming the diagnosis even in the absence of visual symptoms.

KEYWORDS: Paediatric multiple sclerosis, Visual evoked potentials.

INTRODUCTION

Multiple-Sclerosis is a chronic, immune mediated disease that causes inflammatory demyelination of the central nervous system. The worldwide prevalence of MS (Multiple-Sclerosis) is 30 per 100,000 with rates varying widely in different regions[1]. The prevalence in Northern European countries and North America is 100/100,000 while it is very rare in Asian population. MS International federation has quoted a prevalence of 3/100,000 for India. Various factors like racial, ethnic, geographic and environmental influences have been suggested to play role in susceptibility of the disease.

The age of presentation of MS shows a peak incidence in the fourth decade of life (between 30-40 years of age). It is uncommon in adolescents and even rarer in younger children. Paediatric onset or childhood onset Multiple-sclerosis defines the cohort with the upper age limit of 15-21 years[2]. It has long been an under-recognised and under-reported subgroup. It accounts for only 2.2-4.4% of all MS cases[3-4]. This rare childhood form requires early

recognition and intervention in order to optimize the overall management of the physical and social impact of the disease.

There is no specific test for the diagnosis of multiple sclerosis. Diagnostic criteria include a combination of both clinical and paraclinical studies[5]. While information provided by neuro-imaging techniques is essentially related to anatomy (structural abnormalities), the neurophysiological signal is strictly related to function and has been reported to express a significant correlation with disability status[6-7]. Most commonly employed electrophysiological tests for early diagnosis of demyelinating diseases in clinical practice are Visual evoked potentials[8]. MS affect the CNS in dispersed areas, hence, the demonstration of an optic nerve lesion helps to define the disease. This study aims to report a rare case of Multiple sclerosis with a paediatric age of onset with no visual symptoms, with emphasis on the role of visual evoked potentials in complementing the diagnosis of the condition.

CASE REPORT

A 15-year-old boy presented with weakness in both the lower limbs since three years. He had a history of episodes of muscle cramps, difficulty in walking, climbing stairs and cycling with easy fatigability. The symptoms appeared in a relapsing manner with almost complete recovery thereafter, with about three such attacks in the last three years. Patient had a history of bladder dysfunction with urgency of urine. No history of any visual symptom was present. Past history was not remarkable with no episode of illness with fever and rashes or other significant disease. Family history of similar illness was absent.

On neurological examination, higher mental functions were found to be normal. Muscle tone was increased in all the four limbs with grade 5 power. Deep tendon reflexes were brisk and ankle clonus was present. Abdominal reflex was absent with extensor plantar reflex. Co-ordination was normal. No involuntary movements were found.

Figure 1 A: Sagittal T2 weighted MR image of the patient showing hyperintense lesions along calloso-septal interface.



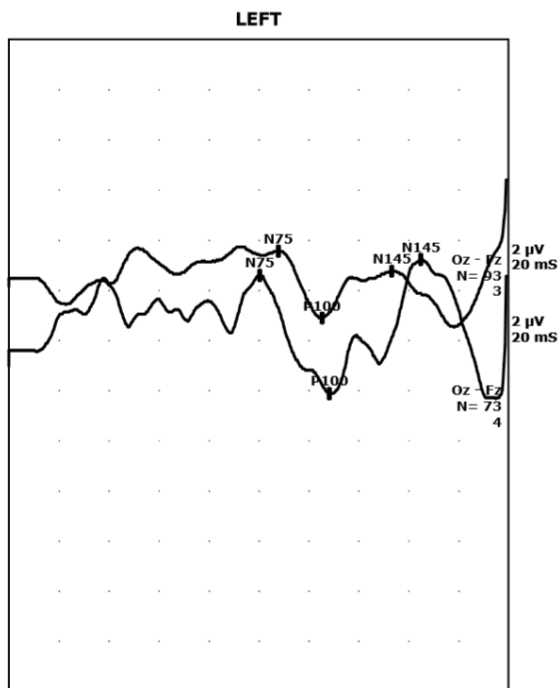
On sensory examination, vibration and proprioception sense were decreased in the distal limbs. Cranial nerve examination was normal, with normal fundus and normal pupillary responses. Investigations showed haematological tests within normal range, antinuclear antibody test was negative. Serum CPK-MB (Creatine phosphokinase-MB) was 24.42 IU/L. Visual acuity was 6/18 and 6/9 for right and left eyes respectively. Nerve conduction tests (both sensory and motor) revealed normal conduction velocities and amplitudes in upper and lower limbs. Magnetic resonance imaging showed multiple bilaterally asymmetrical T2 hyperintense periventricular, deep white matter, juxtacortical and left cerebellar hemisphere lesions with involvement of calloso-septal interface (Figure 1 A). Bilateral optic nerves were found to be normal (Figure 1 B). Dissemination in space was evident. Also, few new T2 lesions were detected compared with a reference scan done 3 months back (dissemination in time)[5].

Figure 1 B: Axial T2 weighted MR image of the patient showing normal optic nerves bilaterally.



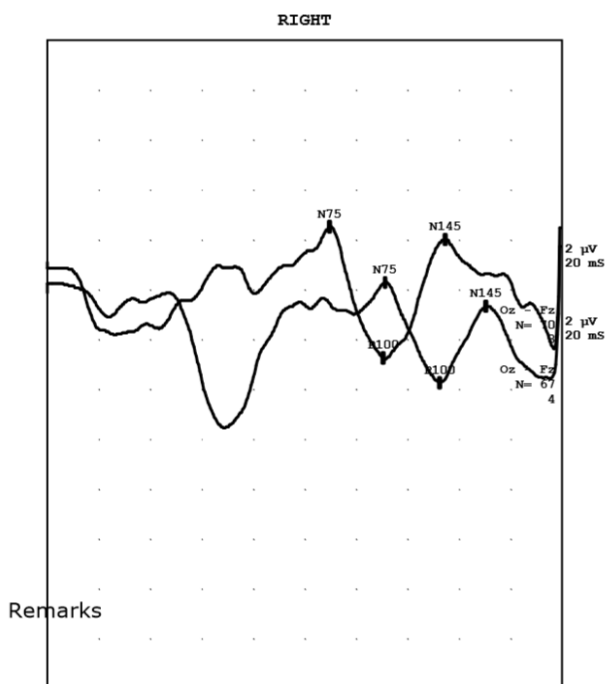
Visual evoked potentials: Pattern reversal visual evoked potentials (PRVEP) revealed delayed P100 latency, beyond 3 standard deviations with N-75-P100 amplitude within normal range, for both the eyes (normal laboratory range: 102.5 ± 5.21 ms and 5.65 ± 2.12 μ v respectively) however, for the right eye the waveform was not reproducible (Figure 2 A and B respectively).

Figure 2 A: Pattern reversal visual evoked potential of the patient (left eye) showing delayed P100 latency (beyond three standard deviations from the normal laboratory values) with N-75-P100 amplitudes within normal limits.



LEFT							
Tr	Montage	N75 (mS)	P100 (mS)	N145 (mS)	(mS)	(mS)	P100 - N75 (µV)
1	Oz - Fz						
2	Oz - Fz						
3	Oz - Fz	107.9	125.4	153.3			2.61
4	Oz - Fz	100.4	128.3	165.0			4.70
5	Oz - Fz						
6	Oz - Fz						
7	Oz - Fz						
8	Oz - Fz						

Figure 2 B: Pattern reversal visual evoked potential of the patient (right eye) showing delayed P100 latency with irreproducible waveform. N-75-P100 amplitudes were within normal limits.



RIGHT							
Tr	Montage	N75 (mS)	P100 (mS)	N145 (mS)	(mS)	(mS)	P100 - N75 (µV)
1	Oz - Fz						
2	Oz - Fz						
3	Oz - Fz	109.6	130.4	154.6			5.24
4	Oz - Fz	131.3	152.5	170.4			3.93
5	Oz - Fz						
6	Oz - Fz						
7	Oz - Fz						
8	Oz - Fz						

DISCUSSION

Paediatric multiple sclerosis, the rare subgroup of this idiopathic demyelinating illness presents with a wide variety of symptoms including sensory deficits, optic neuritis, brainstem-related deficits, motor deficits, gait disorders and fatigue. About 80% of the paediatric cases and nearly all adolescence onset patients present with attacks typical to adult MS. Approximately 97%-99% of the affected children have relapsing-remitting MS, which is characterized by

attacks or relapses followed by partial or complete recovery periods[9].

In our case, the clinical presentation was typical of adult MS, excluding the visual symptoms and co-ordination deficits. MRI scans reported lesions typical of MS with dissemination in time and space but demonstrating bilateral normal optic nerves. Visual evoked potentials, however, detected the demyelinating event in both the optic nerves

(significantly delayed P100 latencies with normal N-75-P100 amplitudes). CSF (cerebrospinal fluid) examination of the patient was not done. The sensitivity and specificity of the CSF analysis in paediatric MS has been questionable, because of variations in techniques used to identify OCBs (Oligoclonal bands). Moreover, clinical features, neuro-imaging techniques and electrophysiological test strongly suggested the presence of MS. Nevertheless, diagnosing MS in children has been reported to be more challenging because several other acute white matter diseases are more frequent in children than adults.

The most difficult differential on initial presentation is ADEM (Acute disseminating encephalomyelitis). In our case, it was excluded by the absence of a viral prodrome, absence of early-onset ataxia, calloso-septal interface lesion and no involvement of deep gray matter[10]. Neuromyelitis optica (NMO) was readily excluded owing to the absence of features of myelitis, presence of white matter lesions and PRVEP not characteristic of NMO[11]. Adrenoleukodystrophy and Metachromatic leukodystrophy resemble a progressive MS, also absence of a family history, normal nerve conduction studies, no abdominal symptoms and other Addisonian features help excluding the condition[12].

CONCLUSION

Visual evoked potentials demonstrated the demyelination in the reportedly normal optic nerves in the MRI scan, comprehending as well as confirming the diagnosis of this demyelinating condition. This might help identify dissemination in space also. Moreover, owing to its easy technique, short and cheap implementation and easy availability, they prove to be valuable in the diagnosis of MS. Early and explicit diagnosis which helps registering this condition in various parts of the country might promote a better understanding and treatment of this rare but disabling disease, the prognosis and management of which is largely understudied.

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*Corresponding author: Dr.Sangeeta Gupta
E-Mail: drsangeeta77.65@rediffmail.com