Auditory Evoked Potentials (AEP) as a Diagnostic Method for Multiple Sclerosis (MS)

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SUMMARY
Auditory evoked potentials (AEP), as well as other forms of the evoked cerebral potentials (ECP), MRI of the brain and spinal cord, as well as biochemical analyses of cerebrospinal liquor are obligatory diagnostic methods in diagnosis of multiple sclerosis. The main goal in this paper is to determine the correlation between clinical examination, MRI and AEP. This study included 40 patients with clinical sings of likely multiple sclerosis who were hospitalized at Neurology Clinic during 2005 with expressed neurological symptoms: visual problems, signs of central motor neuron lesions and simptomathology of brain stem. Out of this number 37 underwent MRI scanning while three patients did not due to presence of metal particles in the body. AEP test was done for all patients. Based on our research we can conclude that AEP is still important in a diagnostic process of MS, especially in situations when MRI cannot be done.

Key words: AEP, MRI, multiple sclerosis.

1. INTRODUCTION
Multiple sclerosis (MS) is chronic, inflammatory progressive autoimmunity and demyelization disease of central nervous system, which is characterized by multifocal infectious destruction of myelin and oligodendrocytes. It affects axons in different areas of the brain's white matter and spinal cord while degenerative and disseminated changes occur. The main pathoanatomic change is hearth of demyelization that is called plaque whose characteristic is multiplicity and different age. In the areas of brain where inflammation has been developed about a million of neuron extensions are affected and when inflammation calms down, the scar od plaque is formed on that specific place. Because of the presence of multiple scars this disease was named multiple sclerosis–multiple scars. (1)

According to neurological symptoms and the period for their development, clinically Multiple sclerosis takes 4 forms:
- Relapsing – remitting form (RRMS),
- Secondary progressive form (SPMS),
- Primary progressive form (PPMS) and
- Progressive – relapsing form (PRMS).

Multiple Sclerosis is rather complex to diagnose and unfortunately there is no single diagnostic test or procedure but rather careful treatments of patients and observation in time and space has to be undertaken. The main diagnostic methods besides clinical picture are MRI, biochemical analysis of cerebrospinal liquor and different models of evoked cerebral potentials. (ECP).

Evoked cerebral potentials represent electrical response of nervous system (cortical response) to motor or sensor stimulus.
In proving the disease when anamnesis, physical and neurological test speak in favor of this. They enable application of appropriate and prompt therapy procedure.

2. PATIENTS AND METHODS

For this paper we have randomly selected 40 patients from all treated at the Neurology Clinic in Sarajevo during the 2005., who were suspected to have Multiple sclerosis with expresses neurological symptoms of brain stem, visual problems and symptoms of central motor neuron.

From this number 37 underwent MRI scanning while three patients did not due to presence of metal particles in the body. AEP test was done for all patients.

Normally all patients had neurology test with recorded finding and the type of neurological attack.

3. RESULTS

Within baseline we had significantly more female than male patients 29:11 (72.5%;27.5%). Sample was incoherent according to age, so 50% of patients were between 36 and 45 years old. Majority of patients completed high school or 52.2%.

Among neurological symptoms 50% of patients had signs of central motor neuron lesions, 28% had various visual problems and 22% patients had a simptomatology of brain stem.

Among 19 patients with the pathological MRI finding in form of plaques, 11 (57.9%) of AEP finding was pathological, 4 (21.1%) marginal, and 4 (21.1%) was completely negative. From 6 patients that had other lesions presented by the MRI, 1 (16.7%) AEP results was pathological, 3 (50.0%) marginal, and 2 (33.3%) normal.

In case of 12 normal MRI findings, AEP showed 2 (16.7%) pathological, 2 (16.7%) marginal and 8 (66.6%) normal. Among 3 patients that were not MRI scanned, AEP showed 1 (33.3%) pathological finding, and 2 (66.7%) marginal.

Table 1. Table showing the correlation between MRI and AEP

<table>
<thead>
<tr>
<th>MRI of brain</th>
<th>AEP pathological</th>
<th>AEP marginal</th>
<th>AEP normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaques 19 (47.5%)</td>
<td>11 (57.9%)</td>
<td>4 (21.1%)</td>
<td>4 (21.1%)</td>
</tr>
<tr>
<td>Other lesions 6 (15%)</td>
<td>1 (16,7%)</td>
<td>3 (50%)</td>
<td>2 (33,3%)</td>
</tr>
<tr>
<td>Negative 12 (30%)</td>
<td>2 (16,7%)</td>
<td>2 (16,7%)</td>
<td>8 (66,6%)</td>
</tr>
<tr>
<td>Not done 3 (7,5%)</td>
<td>1 (33,3%)</td>
<td>2 (66,7%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Statistical analyses of correlation between MRI and AEP by Spearman correlation matrix showed statistically significant correlation between these two diagnostic procedures with ρ=0.338 at the level of p=0.03

4. DISCUSSION

We noticed that AEP as diagnostic method is unavoidable in diagnosing it at patient with probable diagnose of multiple sclerosis, as well as the method of evaluation of success of the therapy at patients who are unable to take MRI screening (presence of foreign metal object), or subjective difficulties (claustrophobic).

In our sample at 33.3% patients AEP test was
pathological, at 66.7% was borderline. In evidencing
disease when anamnesis, physical and neurological
test are in favor of this.

If the shape of waves of AEP is regular and clear
and interweave latencies are normal, further treat-
munt of the patient in the sense of application of au-
diometric tests, CT or brain MRI is not required be-
cause in this particular disease AEP are the most
sensitive test. (5)

In the category of patients who had confirmed
lesions of demyelization on MRI, AEP were patho-
logical at more than half of such patients. (57.9% )
marginal finding was found on 21.1 % of patients
and proper finding on 21.1% of patients.

When clinical tests are unreliable and insuffi-
ciently convincing, AEP show disruption in conduc-
tivity of acoustic pathways. (2).

Given that AEP are not highly specific test for
demyelization lesions, positive finding were found
on 16,7% of examinees, being significantly lower
than on patients with multiple sclerosis.

Half of the patients had marginal finding, and
33% proper.

These values from our laboratory are in correla-
tion with AEP values obtained from the department
for Clinical Neurophysiology "Sestre Milosrdnic in
Zagrebu. (4)

5. CONCLUSIONS

Based on our research we can conclude that
AEP is still important in diagnostic process of MS,
especially in situations when the MRI cannot be
done.

AEP discover clinically non-manifestos lesions
of acoustic pathways and in combination with other
modalities ECP and neurological findings they indi-
cate multifocal process.

When clinical tests are unreliable and insuffi-
ciently convincing, AEP show disruption in conduc-
tivity of acoustic pathways. (5)

In proving the disease when anamnesis and
physical and neurological examination are in favor
of that statement.

On half of the patients with clinically unnotice-
able MP with an assistance of AEP we may discover
disturbance of conductivity. (4)

They provide for application of appropriate and
prompt therapy procedure.

Simple and painless diagnostic method, com-
fortable for patient and not health damaging.

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