Blink reflex in primary lateral sclerosis

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Since the first descriptions in the 19th century,\textsuperscript{1,2} many efforts have been made to support the existence of primary lateral sclerosis (PLS) as a distinct clinical entity.\textsuperscript{3–5} Early clinical diagnosis, important for prognostic considerations, has been always guarded because it is a diagnosis of exclusion proven only at autopsy. In recent years, however, modern diagnostic techniques and pathological verification made the clinical diagnosis of PLS more permissible. Moreover, new diagnostic criteria have been suggested\textsuperscript{6} in order to replace those put forward prior to the availability of modern diagnostic techniques.\textsuperscript{7}

Blink reflex (BR) is a sensitive neurophysiological method to detect lesions in the pons and lateral medulla or lesions elsewhere indirectly influencing the excitability of the polysynaptic connection.\textsuperscript{8}

The purpose of the present study was to examine, for the first time, BR in PLS patients. All data were compared with those of amyotrophic lateral sclerosis (ALS) patients and healthy controls.

PATIENTS AND METHODS

Ten patients (four men and six women, aged 46–66 years) with PLS were recruited after the diagnosis was first established, following nursing, at the Neurological clinic of Red Cross Hospital, Athens, Greece.

Median age of onset was 56 years. All patients underwent a 5 year follow up and extensive laboratory, radiological, and neurophysiological investigation in order to rule out known specific causes for pyramidal tract involvement. All gave oral informed consent to participation in the protocol approved by the local ethics committee. All of them fulfilled the clinical and laboratory criteria for PLS proposed by Pringle et al 1992.\textsuperscript{9}

We used 10 patients with mixed form (bulbar and spinal involvement) of ALS and 30 healthy volunteers as controls matched for age and sex.

All patients declared that they had developed symptoms for a maximum of 6 months. Neither patients nor the healthy controls received any medication prior to BR testing.

A typical evoked potential study of the BR was employed (intensity stimulus 10–12 mA, square wave pulse duration 0.2 msec, BPF 20 Hz–3 kHz).

Both patients and controls were stimulated on the right side of the head and recorded on both sides. Eight recordings were made for each side—the time interval between successive trials being more than 30 seconds to reduce the possibility of habituation. Finally, mean values were calculated for each side. We compared latency (msec) and peak-to-peak amplitude (µV) of R1, R2, and R3\textsuperscript{9} between patient groups and healthy controls, and between PLS and ALS patients.

Comparison between controls, PLS, and ALS patients was made using Mann-Whitney U test. Follow up data were analysed with linear regression analysis.

RESULTS

All PLS and ALS patients had statistically significantly lower amplitude of ipsilateral R2 and contralateral R3\textsuperscript{9} when compared with controls (p<0.001). In contrast, there were no statistically significant differences in BR responses (p>0.1) with PLS compared with ALS patients.

R1, R2, and R3\textsuperscript{9} latencies, as well as R3\textsuperscript{1} amplitude, were normal in all patients. Table 1 demonstrates the values of R1, R2, and R3\textsuperscript{9} components in the PLS group versus the ALS and the healthy control groups. As already mentioned, all PLS patients were re-tested at least every year during the 5 year follow up. For this period, however, clinical follow up findings and BR data did not significantly worsen.

Conversely, electrophysiological follow up data from ALS patients revealed that BR abnormalities did progress with time. With the quick process of the disease (based on our clinical follow up findings), R2 and R3\textsuperscript{9} latencies were prolonged, and finally BR components disappeared, beginning with R3\textsuperscript{9} followed by R2 and R1. At the late stage of the disease (locked-in state) we were not able to record BR.

DISCUSSION

Adults with slowly progressive non-inherited gait disorders may show no abnormalities on examination other than signs implicating the corticospinal tract. That is the syndrome of PLS, a clinical diagnosis that has been guarded because it is a diagnosis of exclusion proven only at autopsy. The clinical features are limited to those associated with dysfunction of the descending motor tracts and include spastic quadriparesis, pseudobulbar affect, spastic dysthria, hyper-reflexia.

Abbreviations: ALS, amyotrophic lateral sclerosis; BR, blink reflex; PLS, primary lateral sclerosis
and bilateral Babinski signs. Muscular atrophy and fasciculations are uniformly absent. 6

It is well known that changes of R1 component may imply lesions directly affecting the reflex pathways per se, as in the case of Wallenberg syndrome, or lesions elsewhere indirectly influencing the excitability of the polysynaptic connections. 6

BR studies may show absent or markedly diminished R2 and R2' components with normal or nearly normal R1 in patients with hemispheric lesions, pseudobulbar palsy, etc. 6

BR responses are mediated through pons and lateral medulla and the possibility to be compromised by the PLS degenerative process is high. Based on this hypothesis, we studied, for the first time, BR in a group of patients in which the diagnosis of PLS was permissible as they fulfilled the clinical and laboratory criteria suggested by Pringle et al. 6

Our results demonstrate that BR is abnormal (significantly lower values of R2 and R2' amplitude) in the PLS and ALS groups compared with healthy controls. Few papers concerning BR in ALS have been published. 9 Lower amplitudes and prolonged latencies of R2 and R2' have been reported. We confirmed these results in our paper, except that prolonged latencies were observed only in a later stage. Recently it was confirmed these results in our paper, except that prolonged latencies of R2 and R2' were observed only in a later stage. Recently it was confirmed these results in our paper, except that prolonged latencies of R2 and R2' were observed only in a later stage.

**REFERENCES**


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### Table 1: Latency and amplitude of R1, R2, and R2' components of BR in the PLS group (n = 10) vs ALS group (n = 10) and controls (n = 30). Values are mean (SD).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Patients</th>
<th>Controls</th>
<th>ALS</th>
<th>PLS</th>
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<tr>
<td>Ipsilateral responses</td>
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<tr>
<td>R1 latency (msec)</td>
<td>10.6 (1.1)</td>
<td>10.2 (0.5)</td>
<td>10.1 (0.5)</td>
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<tr>
<td>R1 amplitude (μV)</td>
<td>250 (48.2)</td>
<td>232.4 (41.8)</td>
<td>231.5 (46.4)</td>
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<tr>
<td>R2 latency (msec)</td>
<td>31.1 (2.2)</td>
<td>30.8 (1.6)</td>
<td>30.6 (1.5)</td>
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</tr>
<tr>
<td>R2 amplitude (μV)</td>
<td>345 (81.2)</td>
<td>158.6 (50.3)*</td>
<td>151.2 (48.8)*</td>
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<td>Contralateral responses</td>
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<td>R1 latency (msec)</td>
<td>31.3 (2.3)</td>
<td>31.25 (1.6)</td>
<td>30.9 (1.5)</td>
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<tr>
<td>R1 amplitude (μV)</td>
<td>296.2 (62.3)</td>
<td>92.7 (22.2)*</td>
<td>91 (21.6)*</td>
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*p<0.001 vs healthy control group and p<0.01 vs other patient group.

AML, amyotrophic lateral sclerosis; PLS, primary lateral sclerosis.