Low Frequency Electromyostimulation (EMS) in Patients With Chronic Inflammatory Polyneuropathies (CIDP)

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Abstract

The main therapeutical indication for the use of low frequency electrostimulation in neurological rehabilitation is the influence on central and peripheral paresis and pain. The value of any type of electrotherapy in inflammatory diseases is discussed controversially. The results of a pilot study are presented, showing the effects of low frequency electrostimulation on patients with chronic inflammatory demyelinating polyneuropathies (CIDP).

A series of 19 indoor rehabilitation patients suffering from CIDP were investigated. Group I: 10 pts received electromyostimulation (EMS) 20-30 minutes daily, 7 times a week, impulse intensity above motor threshold, impulse duration 250 µsec, frequency range 10-90 Hz depending on the patient’s comfort. Additionally, physiotherapy was performed 5-11 times a week with 30 minutes each session. Group II served as the control group with 9 pts, receiving physiotherapy but no EMS. Parameters of outcome were the CIDP-scores following Richard and Hughes, van der Meche and Schmitz, the Barthel-Index, nerve conduction velocity (NCV) of tibial, peroneal and sural nerve.

All parameters showed and overall improvement in both groups, slightly better in the EMS-group with marginal statistical significance. Further investigations have to be done.

1. Introduction

Previous animal experiments as well as human studies could show that in cases of traumatic denervation, reinnervation mechanisms were not inhibited by electrotherapy, but even supported, particularly by the use of long rectangular bidirectional impulses (LIB). The present study was designed to look for effects of regular low frequency electromyostimulation (no LIB) in patients with CIDP. The question was whether this type of electrotherapy would show some positive influence on the clinical course of the disease and if it can be recommended in the therapy of chronic inflammatory polyneuropathies.

1.1. Previous Work

Patients:
A series of 19 indoor patients (45±16 years, 10 male, 9 female) with CIDP (course of disease 4.7±2.7 months) were investigated that underwent neurological rehabilitation. High-grade paresis predominantly of the lower extremities did not show major changes during the last two weeks before the start of rehabilitation.

Electrical stimulation/therapy:
Group I: 10 patients received electrotherapy (20-30 minutes daily, 7 times a week; impulse intensity above motor threshold, impulse duration 250 µsec, frequency range 10-90 Hz, depending on the patient’s comfort. Additionally, physiotherapy was performed 5-11 times a week with 30 minutes per session.
Group II (control group): 9 patients, as group I, including physiotherapy but without electrotherapy.
The average duration of therapy in both groups was 8.5±2.4 weeks.

Results:
The CIDP-scores following Richard and Hughes, van der Meche and Schmitz indicate the status of the abilities of daily living (ADL). All patients improved in their ADL measured by the CIDP score, and there was a slightly better improvement in the patients with electrotherapy (2.5±0.9 in group I vs. 2.0±0.8 in group II, p=0.041.
The Barthel-Index as a general ADL-score showed an overall improvement from 61±23 to 82±20. There was a slight indication for a better improvement in the electrotherapy-group, which, however, did not reach significance (p=0.079).

Nerve conduction velocities (NCV) of tibial (right), peroneal (left) and sural nerves (both sides) also showed a slightly better improvement in the electrotherapy-group. Tibial nerve: From 27±11 m/s to 43±8 m/s (group I), 30±8 - 39±5 (group II), p=0.061)
Peroneal nerve: From 34±11 m/s to 49±7 m/s (group I), 35±9 - 43±6 (group II), p=0.039)
Sural nerves: From 24±10 m/s to 38±8 m/s (group I), 28±8 - 35±7 (group II), p=0.022)

Similar results were obtained measuring the distal motor latencies (p{tib}=0.089, p{per}=0.044, p{sur}=0.052)

2. Summary and Conclusions

The first successful attempts to treat chronically denervated muscles were made at the end of the 70s of the last century by our working group [1, 2] with long, bidirectional rectangular balanced impulses (later named as “LIB”), and were then followed through the years also by other groups. These patients, however, mainly suffered from traumatic peripheral denervation. In patients with other diseases, mainly with peripheral nerve lesions due to inflammatory demyelination, the effects of any kind of electrostimulation are not very well known, and only a few data exist [3].

Several features are different in the electrotherapy of chronic denervated muscle following trauma and possibly reinnervating muscle during the course of CIDP. One of the major differences that have to be observed is the fact that in CIDP we have an inflammatory disease, which often is said to be a contra-indication of electrotherapy. During our observation time we never have seen any deterioration of the disease. Another fact is that it is not necessary and often not possible to use LIB-impulses in CIDP because of the improving sensibility during the course of disease. We found that a good contraction of the stimulated muscles was obtainable with the greatest comfort for our patients when using regular EMS-impulses of 250 µsec impulse width and a stimulation intensity just above the individual motor threshold, mostly below 60 mA. In cases, however, where no good contraction was obtainable, the influence of LIB-impulses should be investigated.

These preliminary data of an EMS with regular impulses show some slight differences (even if partially only marginal) in the therapy results of patients CIDP, indicating a better result when using electrotherapy. A follow-up study is going on.

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References