

THE USE OF MODULATED ENERGY CARRIED ON A HIGH FREQUENCY WAVE FOR THE RELIEF OF INTRACTABLE PAIN

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Summary: Ten volunteer patients with chronic neck/shoulder or back pain had been taking analgesics, and using conventional transcutaneous electrical nerve stimulation (TENS) with no significant pain relief. On entry to the trial, they were requested to stop taking their analgesics for two days prior to the study and for two days after starting to use the Liss Bipolar Body Stimulator for 20 min 3-5 times daily. Resumption of medication was then allowed. The stimulator (15,000 Hz carrier wave with a double modulation of 15 and 500 Hz) was connected to two adhesive electrodes placed so that the current field encompassed the trigger points, and used at a current that was just threshold for perception (1-4 mA). A visual analogue pain score was recorded before the study, and each evening of the month's study. The pain showed an overall highly significant rapid reduction of -62% ($p < 0.001$), and all but two of the patients received substantial benefit throughout the study. We conclude that the Liss Bipolar Body Stimulator usually causes a substantial reduction of pain even in patients not helped by conventional TENS devices.

Introduction

Myofascial pain syndromes are common. They are characterized by a chain of latent and active trigger points along a single muscle or a group of muscles, and can be identified by a special palpation technique (1). Active trigger points show marked tenderness to palpation, and they can be responsible for clinical pain that patients may describe as constant or associated with muscular activity. An active trigger point will produce pain

in its reference zone which may be local or remote (2).

The neurophysiological mechanisms underlying this pain are not fully understood. Hypotheses include the presence of fibrositic nodules, non-articular rheumatism, and muscle hardening (3). Independent of the underlying pathophysiological processes, there may be continuous activation of visceral-pain afferent fibres through noxious feedback pathways which link a trigger point and its pain reference zone in a vicious circle (1).

Transcutaneous electrical nerve stimulation (TENS) has been used for many years in pain treatment (4). There is convincing evidence that in some patients stimulation of trigger points with TENS effectively relieves several pain conditions.

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The duration of relief is often much longer than the period of stimulation and can occasionally last for days or even weeks (5). However, some patients may not respond adequately or even at all to this treatment. Conventional TENS devices produce frequencies of less than 300 Hz, and they have no high-frequency carrier wave to help entry of the electrical energy into the body. In contrast, the Liss Body Stimulator model SBL202B produces a bipolar signal with 15- and 500-Hz modulations of a high frequency (15,000 Hz) carrier wave.

This paper is the first publication on pain treatment with the Liss bipolar device, although research has been reported on the predecessor (15/15,000 Hz) stimulator (4). Effective pain relief occurs even at currents that cannot be felt, and for periods of only 10 or 20 min two or three times a day rather than the sometimes continual use of conventional TENS at a level that itself produces discomfort or even pain.

Patients and methods

The aim of the present experiments was to evaluate the Liss Bipolar Body Stimulator in an open study on patients treated in the Pain Clinic of Mölndal Hospital, Sweden. They had severe chronic pain that was not controlled by other treatments including conventional TENS devices and drugs.

The ten volunteers were patients with chronic neck/shoulder or back pain undergoing treatment with aspirin, paracetamol or opiate analgesics; all had used conventional TENS devices for at least two months, with no significant pain relief. They were requested to stop taking analgesics for two days prior to the study and for two days after starting to use the stimulator. Resumption of medication was then allowed.

Electrical stimulation was carried out by the patients at home for 20 min, 3-5 times daily for one month. The two outputs of the device were

connected by wires to adhesive electrodes that were placed so that the current field encompassed the trigger points. Intensity of the stimulating current was just at the threshold for perception (1-4 mA), usually experienced as a slight tingling sensation. A visual analogue pain score (VAS) was recorded before the study, and each evening for a global assessment of the whole day after the last use of the stimulator on that day. The results were analysed using Student's test for paired data (2-tailed).

Results

Eight out of 10 patients showed a substantial reduction of pain, even in the absence of drugs. The overall VAS score for the two pretreatment days was 6.8 ± 0.3 (mean \pm S.E.) as compared to 2.6 ± 0.3 in the two days after the start of treatment ($p < 0.001$). This improvement was maintained in the 8 benefited patients throughout the month of treatment, and their consumption of analgesics was reduced.

It was found after the trial that one of the patients who received no benefit had just switched on the device but had not increased the current output above the zero level. When she then used the device correctly, dramatic pain relief occurred. The overall benefit should therefore have been even greater than shown by the trial readings.

Discussion

Treatment of myofascial pain should be directed primarily at active trigger points where pain originates, rather than at reference zones where pain is felt. Therapy is traditionally based on dry needling of active trigger points or injection of a local anaesthetic sometimes combined with a corticosteroid (6, 7). However, stimulation with the Liss device, which has a unique wave form and carrier wave that facilitates the entry of electrical energy to the

tissues, usually causes the effective relief of pain and has the added advantages that it is noninvasive and can be self-administered.

The mechanism of action of TENS is thought to be closure of the 'pain gate' by afferent nerve stimulation. Cranial stimulation using the Liss device (a position used for example in headache treatment, ref. 8) results in higher levels of the pain modulators β -endorphin and serotonin in the blood (9) and cerebrospinal fluid (10). It remains to be determined whether this second mechanism contributes to pain relief by peripheral stimulation.

We conclude that in patients not helped by treatment with conventional TENS devices, the Liss Body Stimulator usually caused a substantial reduction of pain.

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