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Treatment of Tension and Migraine Headaches With Biofeedback Techniques

THE HISTORY OF MEDICINE dating from early Greek and Roman manuscripts testifies to the fact that headache has been and is today a primary complaint of many patients. The modern physician has a substantial armamentarium of drugs capable of providing relief for headache sufferers. Nevertheless, there continues to be a definite need for further therapeutic advances to treat patients with longstanding, repetitive and severely disabling head pain recalcitrant to current psychopharmacological therapies.

Biofeedback is the autoregulation of physiologic visceral processes through behavioral conditioning and electronic monitoring of internal states.[1, 2] This technique offers new and challenging therapeutic perspectives by means of voluntary control over unconscious (autonomic) functions.[3, 4] Indeed, a wide variety of visceral responses are directly modifiable by contingent reinforcement.[5-7] However, there is a need for further study of the relationship and therapeutic value of programs based on classical and instrumental paradigms. Comparison of biofeedback with alternative therapies and the elaboration of laws governing this new type of learning situation are confounded by powerful placebo effects, spontaneous fluctuations and individual response pattern.

Biofeedback training may not be a psychosomatic panacea. However, much has been written in recent years on the therapeutic value of biofeedback mediated electromyographic (EMG) relaxation training in alleviating musculo-skeletal tension headaches. A second biofeedback method of therapeutic import involves simultaneous management of somatic and mental functions by a technique introduced by Sargent *et al*[4] called autogenic bioelectric feedback. Using a biofeedback monitor in conjunction with procedures developed by Schultz and Luthe,[8] a patient can learn to control and reinforce autonomic nervous system functions previously assumed to be beyond the realm of conscious control.

Particular attention is directed here to the application of biofeedback training to the management of tension and migraine headaches. This paper reports results of treating patients suffering from three common types of stress-related headaches: the musculo-skeletal or tension headache, the typical migrane or vascular headache and the mixed vascular tension headache.

Using principles of contingent reinforcement, patients learn by operant conditioning to respond to myoelectric signals and, thus, to modify muscular activities in such a fashion as to reduce musculo-skeletal tension. The EMG unit employed utilizes the latest operational amplifier technology to provide accurate description of extremely low levels of EMG activity which occur during deep muscle relaxation. Audible feedback is provided to the patient in the form of a pulsating tone whose repetition rate decreases with a decrease in muscular activity.

Although the origin of migraine attacks remains unknown, accumulated evidence supports the view that migrainous symptoms are, at least in part, related to disturbance in cerebral vascular circulation. It is postulated that focal symptoms of migraine are produced by vasoconstriction of the intracranial circulation while migrainous headache results from vasoconstriction and subsequent vasodilation of extracranial blood vessels.[9-18] Using a biofeedback monitor called a temperature trainer, patients learn to control or reinforce changes in peripheral blood flow. Temperature trainers are electronic instruments designed to detect minute changes in skin temperature that result from changes in vascular flow. They give the patient information feedback when there is an increase in his blood flow to the hands. This feedback is in two forms: a digital display of the absolute temperature at the site being monitored and an audible tone which decreases in frequency as the temperature rises. Based on the studies of Sargent *et al*,[4] temperature regulation of the hands seems a useful adjunct in the treatment of migrainous headaches.

Clinical applications of bioelectric information feedback systems are described by the authors who cite a definite need for further therapeutic methods to treat patients with repetitive and disabling head pain. Dr. Lamberti and Ms. Sneed are from the Department of Psychiatry, University of Missouri School of Medicine. Formerly from that Department, Dr. Fried is now in the private practice of psychiatry in Medford, Ore.

Methods and Materials

In this paper, we report on six female patients referred to the University of Missouri Medical Center (UMMC) Department of Psychiatry Biofeedback Training Center for treatment of long-standing disabling headaches that did not respond to medical or psychiatric treatment or both. All six patients had undergone intensive differential studies which included careful, systematic medical history and thorough physical and neurological examinations, including selected laboratory tests and psychological evaluation when appropriate.

Biofeedback treatment was offered as an adjunct to the primary physicians' prescribed treatment and not as an alternate or substitute form of therapy. At UMMC, a combination of biofeedback mediated electromyographical relaxation[19] and autogenic feedback[20] training are employed to assist patients suffering from tension and migraine headaches. One patient was diagnosed by the referring physician as suffering from tension headache, three from vascular headaches and two from mixed vascular tension headaches. Each patient was interviewed by a psychiatrist who obtained additional biographical and clinical data and classified the patient's headache type.[21] Each patient was given data collection sheets to keep in her possession in order to monitor the frequency and duration of headaches for two weeks prior to the commencement of treatment. Patients were instructed to continue monitoring the frequency and duration of headaches over the treatment period, which extended according to each patient's needs from one month to one year.

During the initial sessions, the psychiatrist explained the philosophy and rationale of biofeedback training to the patients who were encouraged to take an active role in the process of promoting their own health. A resting EMG level was established for each patient, and each was given a relaxation tape containing autogenic phrases to practice relaxation while listening at home two times daily. At the end of two weeks, another EMG level was obtained for comparison to the previous baseline. The patients then were provided with temperature trainers and audio tapes to facilitate daily practice at home and were encouraged to use the biofeedback training center facilities on at least a weekly basis. Individual responses to biofeedback adjunctive therapy are listed in Table 1. Very little or questionable benefit is defined as 1+ relief; better than 50% improvement is defined as 2+ relief; and greater than 75% improvement is defined as 3+ relief. Clinical judgment of each patient's success or failure was compared with subjective judgments made by the patients and plotted along regression lines of three scales: (1) severity of headaches, (2) drug potency and (3) number of drugs used to control the headache pain. Each clinician's global assessment of failure or success was reviewed by an independent rater.

Results are reported in Table 1.

Discussion

An examination of some of the common problems encountered in the management of headache patients discloses that we are not able to predict how well a given patient will respond to biofeedback treatment prior to a trial of therapy. Patient #1 was a quiet, reserved housewife who did not appear especially motivated. Before treatment, she complained of daily nagging headaches. Although she was not expected to respond well to biofeedback, she turned out to be one of our greater successes.

Patient #4 was extremely competitive. The excessive demands she made upon herself to do better than anyone else seemed to interfere with any progress. After ten weeks, she terminated treatment.

Literature relating to the psychotherapy of individuals suffering from chronic, debilitating, long-term headaches is often nihilistic and reflects attitudes which anticipate failure. Patients are often felt to be lacking the motivation necessary to profit from psychological intervention. Home practice appears to be important to success in biofeedback treatment. Therefore, patients' willingness to devote time and effort to regular home practice sessions may influence outcome. However, attempts to measure motivation for change as a predictor of success or failure in biofeedback-mediated treatment is not warranted and diverts our interest from the more trenchant questions concerning an indi-

TABLE 1

TREATMENT RESULTS

Patient	*Headache Type*	*Age*	*Improvement‡* HEADACHE INTERFERENCE*	ANALGESIC POTENCY†
#1	Tension, migraine	41	3+	3+
#2	Tension, migraine	47	1+	2+
#3	Tension	31	3+	3+
#4	Migraine	34	1+	1+
#5	Migraine	46	1+	3+
#6	Migraine	31	3+	2+

*** Headache interference is measured daily. The rating is tabulated on a scale where 0 represents no interference with daily activities, 1—Interference with activities, 2—Requires bed rest, 3—Treatment at doctor's office or emergency room, 4—Needs to be hospitalized.**

† Analgesic Potency is a score representing the total number of individual units of medication multiplied by the rating of analgesic strength assigned to each drug.

‡ Results are tabulated on a scale where 1 represents little or questionable improvement, 2—50-75% improvement, and 3 —greater than 75% improvement.

$$\frac{\text{Pre-treatment Score—Post-treatment Score}}{\text{Pre-treatment Score}} \times 100 = \%\ \text{Improvement}$$

vidual's psychophysiological capacity to change.

Patients suffering from tension and migraine headaches can be helped with biofeedback techniques judiciously administered as an adjunct to ongoing medical therapy. Although biofeedback training may result in fewer headaches and less severe ones, it is not a positive cure for migraine headaches nor does it preclude the need for aggressive clinical investigation and treatment of the patient presenting with chronic headache.

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