TEMPERATURE FEEDBACK FOR THE CONTROL OF MIGRAINE

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Summary—The following case studies describe the treatment of two patients who were first treated with EMG feedback training without positive response and who were treated later with the "temperature trainer" with positive response.

The migraine headache syndrome (Wolff, 1963) is characterised by periodic headache pain, which begins unilaterally but may become generalised. The headache may be associated with nausea, photophobia, and vomiting, and may be preceded by scotomata, hemianopia and unilateral paresthesia. There is a high probability that other members of the patient's family (siblings or parents) have similar headaches. The headaches may start at any age but most frequently during adolescence. The headache is reported to be associated with "cold extremities" (Wolff, 1963, p. 676) and the pain is produced primarily by distension of cranial arteries.

Muscle contraction headache appears to respond favorably to EMG feedback training (Budzynski, Stoyva and Adler, 1969; Wickramaskera, 1973a, and Wickramaskera, 1973b) but the migraine syndrome is apparently unresponsive to this procedure. Sargent, Green and Walters (1972a,b) reported on the successful use of autogenic feedback training in the treatment of migraine and tension headaches. Their procedure basically consisted of the use of a "temperature trainer" which indicated the differential temperature between the mid-forehead and the right index finger. The subjects were also required to learn certain autogenic phrases (Schultz and Luthe, 1969). The patients were told to attempt to increase the temperature of their hands in comparison to their forehead. The investigators found that a positive response was always associated with warmth in the hands but no apparent change in head sensations.

PATIENTS
The two patients described here were first treated with EMG feedback training without positive response, and later with the "temperature trainer"† with success. M. (age 45 yr) had suffered from chronic daily headaches since adolescence. F. (age 46 yr) had suffered from headaches since about 30. Both were school teachers, and both had previously received psychotherapy and chemotherapy several times, and had been examined and treated at leading medical clinics, all without positive outcome. Both patients had become quite resentful and skeptical, particularly after the EMG feedback procedure was unsuccessful. It was probably only the intensity and frequency of their headaches and the ineffectiveness of the chemical analgesics that motivated the patients to try another feedback procedure. They clearly had other types of problems (such as poor interpersonal and marital relations) but they were unwilling to work on them.

With the EMG feedback training procedure we use (Wickramaskera, 1972a), the male patient (M) had completed 16 EMG feedback sessions in the consulting room and had been requested to practice relaxation at home for about 20 min at least once a day. The female patient (F) had completed 18 feedback training

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†A commercially available feedback system. For technical information and specifics of training procedure please contact author.
sessions plus instructions to practice relaxation. In both there was only a slight reduction in the intensity of headache. The frequency of headache remained unchanged. The patients were told that another feedback training procedure for headaches was available but that we were uncertain about its effectiveness. Both were initially reluctant, but M reenlisted for training after a 2-month break and F reenlisted reluctantly after considering our offer for about 3 weeks.

METHODS

Both patients had at the outset received careful screening on a variety of psychological and medical tests (including an EEG and skull X-rays) by a psychologist, an internist and a consulting neurologist. The method we used was essentially that described by Sargent, Green and Walters (1972) omitting the autogenic phrases. The patients were simply told to try to concentrate on increasing the temperature of their hands while remaining seated on a large padded recliner in a comfortable consulting room. The same facilities had been used for the EMG feedback training. The “head” thermistor in connected to the center of the forehead and the hand thermistor to the middle finger of the dominant hand. It is important that the subject not move the dominant hand during training. The temperature trainer has a “shaping” feature which provides feedback at two levels of sensitivity (high and low). When the instrument is in the high sensitivity mode, very small changes in temperature are reflected on the meter readout unit (visual feedback). The patients practiced the handwarming skill both with and without feedback in the Clinic and in addition practiced at home without feedback.

RESULTS

After another 3-week baseline period during which headache activity (frequency and intensity) was monitored and recorded, the temperature feedback training procedure was started. The temperature feedback data showed that the handwarming skill was acquired quite rapidly. It would be interesting to know if the rapid acquisition was related to the previous EMG feedback training. We have observed several migraine patients who did not receive prior EMG feedback training but who have also acquired the handwarming skill quite rapidly. Apparently the speed of acquisition of handwarming skill is generally greater than that of frontalis relaxation skill.

The frequency and intensity of the headache activity of these two patients appeared to decline as they increased their skill in warming their
hands. During both the baseline and training periods there was no significant changes in consumption of analgesics. But at follow-up 3 months after training both patients reported that they had reduced their consumption of analgesics to occasional aspirin for non-headache-related events.

DISCUSSION

This study confirms the earlier report of Sargent et al. that temperature feedback to increase warmth (and blood flow) in the extremities can be useful in the treatment of migraine headache. The main implication is that feedback training must be tailored to fit the type of headache—that is, temperature feedback is effective for migraine, but feedback-assisted muscle relaxation is not (though the latter seems useful for muscle contraction headache). This observation supports the idea that temperature training in some way acts on the causal mechanism involved in migraine headache, rather than having some global placebo-suggestion effect. Also against interpreting the results as a placebo response is the fact that the two patients had been afflicted by the headaches for many years, and during that time exposed to a variety of other treatments without success.

If the ability to increase hand temperature is useful for aborting migraine headache pain, then it would be interesting to know if training migraine patients to reduce hand temperature would increase the probability of migraine attacks. It would be interesting to investigate this question. It is likely that influencing sympathetic nervous system function is the critical event and that increasing blood flow to the hands is simply a correlated event. If increasing blood flow to the hands were the critical event then it should be possible to induce or to abort migraine attacks by placing one's hands in buckets of water at suitable temperatures (e.g. to induce a migraine attack use ice cold water and to abort a migraine attack use warm water). As far as I know nobody has conducted this experiment.

The biofeedback technique is a relatively direct procedure for studying the interaction of psychological and physiological responses. Biofeedback research may make many of the phenomena previously subsumed under “suggestion”, “placebo”, “hypnosis” etc. amenable to scientific methods of study. The application of the scientific method to the study of these phenomena may enable us to control and predict them and possibly eventually to increase their generality and power (Wickramaskera, 1972, 1973c). It is also possible that biofeedback may lead to a technology for creating more powerful and reliable placebos. Biofeedback training in general appears to involve aspects of both operant conditioning and skill learning (Woodworth and Schlosberg, 1961). Future double blind and factorial studies should investigate parameters which have been found to be relevant to these two bodies of literature (e.g. delay of reinforcement, massed and distributed practice).

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