Columns

Literature Update:
Biofeedback and Chronic Pain

Alan H. Roberts

Early in the development of the biofeedback movement (See Roberts, Reed, Katkin and Golband, and Kewman and Roberts for brief historical accounts), it was recognized that biofeedback (BF) had "more than the usual potential" in "the treatment of painful disorders" even though these techniques were still "in the primitive stages of development" (p 171). In the 13 years since that optimistic prediction was made, BF has developed into a popular and widespread treatment modality for chronic pain. Research in this area is, however, primarily addressed to chronic headache (HA) and back pains; most literature reviews generally confine themselves to these two areas of chronic pain.

Reviews

I shall try to confine this update to reviews of the literature since 1980. The most comprehensive review of the literature prior to 1980 had concluded that studies to that time were characterized by a number of problems: lack of proper control groups; confounding BF with other strategies; or sample sizes too small. They also concluded that:

- There was some evidence that BF is better for tension HA than false feedback.
- There was some evidence that BF was no more effective than relaxation training.
- BF for migraine HA was of unproven value.
- The studies were all confounded by extraneous factors in the therapeutic situation.
- The evaluation of the specific role of BF in symptom reduction was largely absent.

What have we learned since those dismal conclusions were published?

Three years later, Turner and Chapman reviewed the research on the effectiveness of both BF and relaxation for chronic pain. They acknowledged the efficacy of BF for HA but concluded that it was no more effective than relaxation training and that the success of BF with other chronic pain problems had not been demonstrated convincingly. They were particularly concerned that BF procedures implied "a gross oversimplification of the nature of chronic pain problems" (p 16) and that these techniques might support rather than weaken pain chronicity. To my knowledge, this problem has only been addressed by those who treat chronic pain by operant methods.

In 1984 Turner, this time with Romano, again focused on the use of BF for treating chronic HA, especially on issues of assessment and the design of outcome research. They concluded that the methodological problems identified by Turner and Chapman still remained.

More recent studies and reviews have shown interest in chronic muscle pain in addition to HA. For example, Nouwen and Bush described two models to explain the relationship between paraspinal EMG and low back pain. They concluded that there is no consistent evidence that low back pain patients have elevated EMG readings or that its reduction is likely to be an "active ingredient" in the biofeedback treatment of chronic back pain.

Turk and Flor reviewed psychological theories as they apply to the etiology and psychological treatment of chronic back pain. They hypothesized that EMG BF and relaxation training might be helpful in interrupting a pain-tension-pain cycle. The goal of treatment, they felt, was to interrupt this vicious cycle and
to replace muscular overreaction with an adequate response, such as relaxation, which is incompatible with tension. In their review, they point out that BF studies are difficult to evaluate. Different methodological procedures, different patient groups, variations in the number and length of treatment sessions, and numerous design problems “make conclusions about efficacy tentative” (p 220). They concluded that studies in this area reflect “considerable methodological and design problems” (p 222) but that EMG BF is a promising treatment modality. They cautiously add, however, that the mechanism underlying the effectiveness of BF, if it is effective, may have little or nothing to do with reducing muscle tension.

Dolce and Raczynski also focused on neuromuscular activity as a possible mediator of psychological and behavioral factors in back pain. They reviewed studies that have used EMG to evaluate myogenic back pain. They noted that investigators cannot agree on the kind of EMG activity associated with back pain; both increased and decreased paraspinal muscle activity have been associated with back pain. Further, EMG BF studies have produced mixed reports concerning changes in muscle activity. They concluded that the studies overall do not support a strong relationship between EMG levels and pain ratings.

Linton reviewed studies which employed relaxation training as a treatment for chronic pain. Five of these studies used BF methods. He concluded that “data concerning biofeedback are hardly convincing, let alone conclusive evidence for its utility” (p 131). He also concluded that, while none of the studies compared relaxation training with BF, “it seems safe to say that relaxation training is at least as effective as biofeedback in producing results” (p 132).

Ince, Leon and Christidis reviewed critically studies of the relaxing effects of EMG feedback on upper extremity muscles. They felt that few valid conclusions could be drawn about the efficacy of upper extremity BF for relaxation.

A recent paper by Blanchard and Andrasik stands out as a particularly thoughtful and meticulous attempt to evaluate the efficacy of BF for vascular HA. They reviewed carefully the existing literature. They analyzed the studies in various ways, one of which they termed a meta-analysis. In general they concluded that the treatment of migraine HA with almost any form of BF or relaxation training is superior to HA monitoring alone. They did not find BF to be significantly superior to relaxation training. There were no consistent findings when various kinds of BF training were compared. Their conclusions about vascular HA other than migraine were attenuated by the relatively few studies that were available to review.

Case Study

The patient, a 51-year-old woman, was referred for inpatient consultation to help her in managing severe chronic pain secondary to progressive rheumatoid arthritis. Her symptoms occurred acutely in 1980 when she underwent surgery for Morton’s neuroma of the foot. In the recovery room, she experienced swelling of multiple joints. She was twice treated with oral penicillamine, both times discontinued because of proteinuria. There was significant improvement with injectable gold also discontinued because of side effects.

There followed five years of progressive uncontrolled arthritis with synovectomy of the left wrist, deformity of both ankles, and two bone grafts and a fusion of the left ankle. When seen, she had marked swelling of both hands, decreased grip strength bilaterally, limited use of both shoulders, chronically swollen knees, severely affected ankles, and swollen destroyed toes in her feet. Not surprisingly, her chief complaint to me was severe disabling pain.

I decided to start her on biofeedback. The initial biofeedback session recorded high EMG levels in the upper trapezius muscles and low peripheral skin temperatures. Following this single biofeedback session she reported major decreases in pain in all parts of her body. She voluntarily discontinued all prescription analgesics for the remainder of her six-day hospitalization and was discharged much improved.

It is obvious that even a single session of biofeedback can produce an enormous placebo effect.

Summary and Conclusions

Research studies on BF as a treatment for chronic pain have pretty much been confined
to chronic HA and myofascial pain syndromes, primarily back pains. In general, the studies prior to 1980 lacked proper control groups, confounded BF with other treatments, used sample sizes too small for reliable assessment, or the positive results—when they were found—could not necessarily be attributed to the BF. While the reviews since 1980 suggest some increasing sophistication in experimental design, little else has changed. The problems pointed out by Jessup, Neufeld, and Merskey still remain.

Despite the promise and potential of biofeedback written about in 1974, we seem little closer to knowing whether BF is a specific treatment for chronic pain than we did then. One finding does emerge; almost all reviewers can agree that BF does help some patients with some chronic pains. What has not emerged is evidence that BF is an essential or a specific treatment for any chronic pain problem or that it is superior to or less expensive than other treatments. Some reviewers have pointed out that biofeedback may even exacerbate pain problems in some chronic pain patients. I concur with this opinion.

As these problems persist in the face of increasingly sophisticated research studies, there has been a painful exacerbation of conflicts between the clinicians who use BF on the one hand and those who study it or interpret the meaning of the research on the other. This brief review is not the place to re-enter this debate; my intent has been to summarize briefly the critical reviews of the literature since 1980. While these reviews are unanimous in the conclusion that the efficacy of BF is not proven, the critical reader should become familiar with the views of those who disagree.

References


