Incentives to Enhance the Effects of Electromyographic Feedback Training in Stroke Patients

Jeffrey L. Santee, Michael E. Keister, and Kenneth M. Kleinman
Southern Illinois University, Edwardsville

The use of monetary incentives to enhance the effects of electromyographic (EMG) feedback training was studied in five stabilized stroke patients with hemiplegia. The study was divided into Baseline, EMG Feedback Training, Feedback Training Plus Incentives, and Follow-Up treatment conditions. Integrated EMG activity was recorded simultaneously from the anterior tibialis and medial gastrocnemius muscles during relaxation and dorsiflexion of the affected foot. Patients were instructed to try to increase anterior tibialis EMG activity while decreasing EMG activity in the medial gastrocnemius. Range of motion was measured both prior to and immediately following the Baseline and Feedback Training conditions. Results suggested that (a) EMG feedback training produced greater EMG control and range of motion than did unassisted practice, and (b) the addition of monetary incentives may enhance the effects of feedback training, possibly through its effect on patient motivation.

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Address all correspondence to K. M. Kleinman, Department of Psychology, Southern Illinois University, Edwardsville, Illinois 62026.
Several investigators have reported that latent neuromuscular potentials of hemipariatric muscles can be enhanced and brought under voluntary control with EMG feedback training (Andrews, 1964; Booker, Rubow, & Coleman, 1969; Johnson & Garton, 1973; Marinacci & Horande, 1960). The use of EMG feedback has also been successful in the reduction of spasticity (Amato, Hermsmeyer, & Kleinman, 1973; Brudny, Korein, Levidow, Grynbaum, Liberman, & Friedmann, 1974; Jacobs & Felton, 1969; Kleinman, Keister, Riggin, Goldman, & Korol, 1975).

It has also been observed that the motivational state of a patient can significantly influence both the speed and the quality of a patient’s recovery in an EMG training program (e.g., Brudny et al., 1974; Kleinman et al., 1975). In some cases, EMG feedback training alone may not be sufficiently reinforcing to maintain a patient’s motivation. This can become a serious consideration in biofeedback therapy, because a patient’s motivation to cooperate and follow instructions is essential to the establishment of a successful therapeutic regimen (Schwartz, 1973). In view of this consideration, it is surprising that few investigators have studied the effects of incentives in conjunction with EMG feedback training. The present study was undertaken in an attempt to determine the extent to which monetary incentives could improve EMG performance in a group of stroke patients.

METHOD

Patients

Five hemiplegic stroke patients, three females and two males, served as subjects. Three of the patients were under 20 years old, one was 22, and the oldest was 63 years of age. Three suffered strokes 3 years, one 8 years, and one 16 years prior to the inception of this study. Each patient’s condition had stabilized for at least 1 year prior to this study. All were under treatment with traditional physical therapy techniques. Each exhibited a gait characterized by a dragging of the affected foot. Patients were selected on the basis of their willingness to cooperate and ability to understand instructions (i.e., no evidence of aphasia, etc.).

Procedure

The 9-week experiment was divided into four successive treatment conditions: Baseline, Feedback Training, Feedback Training Plus