Chapter 81

Psychological Treatments of Tension-Type Headaches

Kenneth A. Holroyd, Paul R. Martin, and Justin M. Nash

In this chapter, we address the following questions: (a) What is psychological treatment? (b) How effective are psychological treatments? (c) How long do treatment improvements last? (d) Who can benefit from psychological treatments? (d) Can we increase the cost-effectiveness and availability of psychological treatments? (e) How do psychological treatments improve tension-type headache?, and (f) How can psychological and drug therapies be combined?

WHAT IS PSYCHOLOGICAL TREATMENT?

A number of psychological treatments for tension-type headache have been described including EMG biofeedback training, relaxation training, cognitive–behavioral therapy, feedback of temporal artery diameter, digital temperature biofeedback training, neurofeedback, hypnotic analgesia, and transcendental meditation. The research evidence is very limited, however, on the last five approaches, so only the first three treatments are discussed.

Relaxation Training

Progressive relaxation training (PRT) is the most frequently used form of relaxation training. The goal of PRT is to help the learner recognize and control tension as it arises in the course of daily activities. The most commonly used training procedure is an abbreviated version of procedures originally developed by Edmund Jacobson in the 1930s (6). During PRT training, the learner sequentially tenses and then releases specific groups of muscles throughout the body. PRT typically begins with 16 muscle groups, and then combines muscle groups to form 7 groups, finally combining muscle groups to form 4 muscle groups. Later stages of training involve relaxation by recall (eliminating the tense stage from tense–release exercises), cue-controlled relaxation (association of relaxation with a cue word such as *calm*), and differential relaxation (maintaining relaxation in muscles not needed for current activities). Practice of relaxation exercises at home is encouraged and audiotapes are often provided to guide this practice. As the trainee learns to recognize signs of tension and rapidly relax, they are encouraged to use their relaxation skills throughout the day to prevent and abort tension-type headaches. Table 81-1 describes a typical eclectic combination of relaxation techniques.

EMG Biofeedback Training

EMG biofeedback provides the trainee with continuous feedback about muscle activity, with the goal of helping the trainee learn to recognize and control muscle tension (46). Feedback is usually provided from the frontalis area (active electrodes placed 1 inch above the center of each eye), but may also be provided from the temporalis, trapezius, and, other muscle areas (Fig. 81-1). Training sessions typically include an adaptation phase, baseline phase, training phase where feedback is provided, and a self-control phase where the trainee practices controlling muscle tension without the aid of feedback. As biofeedback trainees learn to recognize and control muscle activity, they are encouraged to use this skill throughout the day to prevent and abort tension-type headaches.

Cognitive–Behavioral Therapy

Cognitive therapy teaches patients to identify and challenge thoughts and beliefs that generate stress and aggravate headaches (22). Thoughts are monitored in stressful situations and when headaches occur, with an eye toward

P1: KWW/KKL P2: KWW/HCN QC: KWW/FLX T1: KWW
GRBT050-81 Olesen- 2057G GRBT050-Olesen-v6.cls August 18, 2005 15:32

TABLE 81-1 Relaxation, Cognitive, and Pain Management Techniques

Relaxation	
Progressive muscle relaxation	Systematic use of muscle tension and release exercises to achieve relaxation.
Muscle stretching	Gentle stretching of neck and shoulder muscles to lengthen and relax sore and tight muscles
Imagery	Creating a relaxing mental image and focusing on the sensory experiences associated with the image (e.g., tranquil beach scene)
Relaxation by recall	Inducing relaxation without first tensing muscle groups by recalling sensations associated with muscle relaxation
Cue-controlled relaxation	Use of a cue or signal that has been repeatedly paired with relaxation to induce relaxation
Abdominal breathing	Slow, paced breathing from the diaphragm
Autogenic phrases	Use of repeated phrases to elicit sensations of relaxation (e.g., "My arm feels warm, heavy and relaxed")
Cognitive–Behavioral Therapy	
Challenging stress-generating thoughts	Use of self-talk to challenge stress-generating thoughts and develop adaptive coping statements (e.g., "I will focus just on the task in front of me instead of worrying I will not be able to complete the project until next week")
Challenging stress-generating beliefs	Identifying and evaluating core beliefs that underlie stress-generating thoughts and developing an alternative perspective (e.g., "Instead of automatically assuming my boss is unhappy with me when I have no information, I will challenge my tendency to think in this habitual way. Instead I will evaluate the evidence for my fear.")
Pain Management	
Brief relaxation	Using brief relaxation techniques to keep the emotional distress and physiologic arousal that accompany pain from further aggravating pain in a vicious cycle
Cognitive restructuring	Challenging pain-related worries (e.g., "Just because the pain has started I don't have to jump to the conclusion my whole weekend is ruined")
Attention diversion: imagery	Mentally shifting attention away from the pain to involvement in a vivid mental image (e.g., favorite vacation spot)
Attention diversion: concentration	Mentally shifting attention away from the pain to a pleasant or neutral cognitive task (e.g., recalling lyrics of a song)
Pain transformation	Use of imagery to alter or transform sensory qualities of pain (e.g. pounding pressure is imagined to be a drumbeat that becomes slower and softer over time)

identifying stress-generating thoughts. These thoughts are then examined and challenged, and alternative adaptive coping self-instructions are considered and tried out. Where stress-generating thoughts reflect dysfunctional beliefs or assumptions, beliefs also are challenged, and the pros and cons of alternate adaptive beliefs considered. A variety of exercises may be used to challenge thoughts and beliefs, including reversing positions (experimenting with adoption of another persons view of the situation), reframing (actively generating other possible views

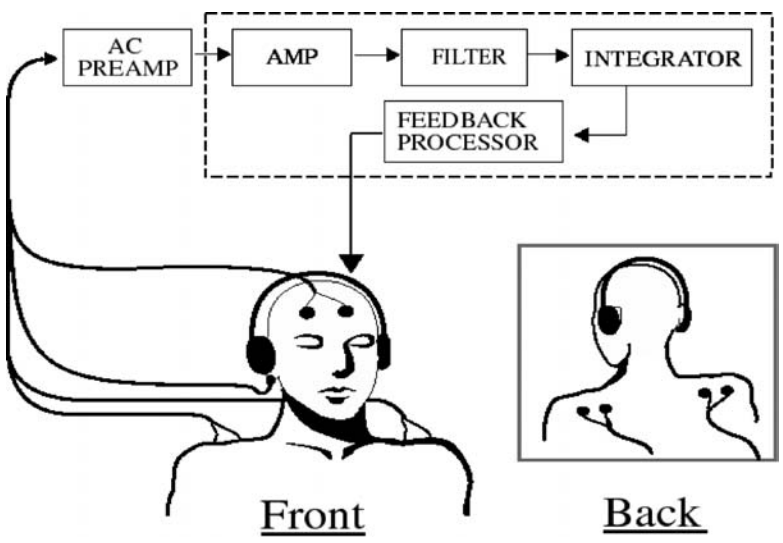

FIGURE 81-1. Schematic of EMG biofeedback training. Frontal area and trapezius muscles are being monitored with ground on the ear lobe.

P1: KWW/KKL P2: KWW/HCN QC: KWW/FLX T1: KWW
GRBT050-81 Olesen- 2057G GRBT050-Olesen-v6.cls August 18, 2005 15:32

of a situation), and reality testing (devising a behavioral experiment to test the validity of a particular belief). Table 81-1 describes common techniques employed in cognitive therapy.

Detailed descriptions of psychological treatment techniques as well as discussions of clinical issues that arise in administering psychological treatment and exemplary case studies can be found in numerous sources (4,5,8,25,26,32,33,46).

HOW EFFECTIVE ARE PSYCHOLOGICAL TREATMENTS?

Available studies have been conducted primarily in headache clinics or in specialized university or medical school settings, and generally have been small, averaging about 20 patients per treatment group (12,35). Information about the results that can be expected when relaxation/biofeedback therapies are integrated into the primary care or a general neurology setting, or when these therapies are administered conjointly with drug therapies, thus remains limited.

Meta-analytic and narrative reviews have concluded that EMG biofeedback training, relaxation training, and cognitive–behavioral therapy effectively reduce tension-type headaches (12,29,35). Table 81-2 summarizes results from 89 active treatment groups and 37 control groups where daily headache recordings were used to assess treatment outcome (daily headache recordings yield relatively conservative estimates of treatment outcome). When results are averaged across studies, EMG biofeedback training, either when administered alone or with relaxation training, and cognitive–behavioral therapy are each found to yield at least a 50% reduction in tension headache activity. Improvements reported with these three treatments as well as with relaxation training alone also are significantly larger than improvements reported with placebo control treatments, or observed in untreated patients; however, these four treatments did not differ significantly among themselves in effectiveness.

Cognitive–behavioral therapy may be particularly useful where psychological problems or environmental demands (e.g., chronic work stress, affective distress, other adjustment problems) not addressed by relaxation or biofeedback therapies aggravate headaches or prevent patients from effectively using headache management skills. Thus, in one study, patients exhibiting high levels of daily life stress (as assessed by the Hassles Scale [14]) were unlikely to improve with relaxation training alone, but were likely to improve when cognitive–behavioral therapy was added to relaxation training (49).

HOW LONG DO TREATMENT IMPROVEMENTS LAST?

Improvements achieved with psychological treatments have generally been maintained, at least for the 3- to 9-month follow-up periods that have most frequently been assessed. For example, in 22 patient samples included in one meta-analytic review, improvements reported at such short-term follow-up evaluation (54% reduction in headache activity) were larger than improvements (45% reduction) reported at immediate posttreatment evaluation (29).

Positive, but much less definitive, statements can be made about the long-term (greater than 1 year) maintenance of improvements. In five of six studies that employed daily headache recordings, reductions in tension headache activity of 50% or greater were still observed 1 to 3 years following relaxation, EMG biofeedback, or cognitive–behavioral therapy, and in one study, improvements of this magnitude were still observed 5 years following treatment (7). However, a significant proportion of patients are typically lost to follow-up in these studies, and patients who do complete the follow-up evaluation may have received other treatment during the follow-up period, so these findings must be interpreted cautiously. Booster sessions have not been found to enhance the maintenance of improvements, possibly because good maintenance has frequently been found without booster sessions (2,10). It is possible, however, that patients at high risk for relapse would benefit from booster sessions. Patients discussed in the next section might thus be reasonable candidates for booster sessions.

TABLE 81-2 Mean Percentage Improvement by Type of Treatment

	EMG Biofeedback Training	*Relaxation Training*	*Biofeedback Training + Relaxation Training*	*Cognitive–Behavioral Therapy*	*Placebo*	*Headache-Recording Control*
Mean (%) improvement	48	36	59	53	16	1
Treatment groups (*n*)	28	37	9	15	21	16
Improvement range (%)	−18 to 96	4 to 99	37 to 89	27 to 76	−70 to 74	−33 to 26

Source: Borgaards and ter Kuile (12).

P1: KWW/KKL P2: KWW/HCN QC: KWW/FLX T1: KWW
GRBT050-81 Olesen- 2057G GRBT050-Olesen-v6.cls August 18, 2005 15:32

WHO CAN BENEFIT FROM PSYCHOLOGICAL TREATMENT?

Common clinical problems that arise in administering psychological treatments are discussed herein. For the most part, the patients who require special attention in psychological treatment also require special attention when administering drug therapy.

Analgesic Use

Excessive analgesic use limits the benefits likely to be obtained from either psychological treatment or from prophylactic pharmacotherapy. In one retrospective review of patient records (37), less than one third of "high medication users" showed a 50% or greater reduction in headache activity following psychological treatment, whereas more than half of low medication users showed this level of improvement. High medication users in this study were defined by a score of 40 or greater on a weighted medication index, a score obtained by the consumption of at least six aspirin or three aspirin plus butalbital and caffeine (Fiorinal) pills per day, or equivalent medication.

If a patient's headaches are complicated by the overuse of medication, withdrawal from the offending medications is essential to effective treatment. Psychological treatments appear to help some patients control pain and distress during analgesic withdrawal, but these benefits have rarely been evaluated in controlled trials. Grazzi et al. (17) assigned patients to either EMG biofeedback training (eight sessions) plus preventive drug therapy or to preventive drug therapy alone following medication withdrawal. At a 3-year follow-up, patients who received biofeedback training recorded fewer headache days per month and less use of acute medication than patients who received only preventive drug therapy.

Near-Continuous Headaches

Patients with near-continuous headaches appear less responsive to brief relaxation or biofeedback therapies than do patients with more delimited headache episodes (11). On the other hand, results from two relatively large randomized trials (28,41,42) suggest that clinically significant reductions in headache activity may be obtained in this population. In the first study, patients ($N = 522$) were randomly assigned to multisite EMG biofeedback training (from trapezius, paracervical, and frontalis muscles), relaxation training, transcutaneous electrical nerve stimulation, or combinations of these treatments. Combined relaxation and EMG biofeedback training was highly effective in reducing tension headache activity and in maintaining improvements through 2-, 3-, and 5-year follow-up evaluations, particularly in patients who received more than 15 training sessions. Patients who completed follow-up evaluations ($n = 311$) recorded more than 31 hours of headache activity per week before treatment, but showed a 96% reduction in headache hours following relaxation and biofeedback training. Unfortunately, complete data were collected through 3-year follow-up for only 60% of the patients who began treatment, so reported results probably overestimate the long-term effectiveness of treatment. Nonetheless, these results indicate that near-continuous headaches can be effectively treated by relaxation and biofeedback training, but suggest that effective therapy may require more than 15 training sessions.

The second study examined the effectiveness of cognitive–behavioral therapy and antidepressant medication for chronic tension-type headache and found that cognitive–behavioral therapy, antidepressant medication, and their combination each produced modest but clinically significant improvements in chronic tension-type headaches (28). However, improvements with cognitive–behavioral therapy were not fully evident until the 6-month follow-up, suggesting headache management skills had to be applied for a number of months before chronic tension-type headaches were "broken up."

Comorbid Psychiatric Disorders

Clinical impressions suggest that patients with comorbid psychiatric disorders are less likely to respond to first-line drug or nondrug therapies than are patients without a comorbid diagnosis, although controlled studies evaluating this possibility are unavailable (22). The large proportion of patients with comorbid psychiatric disorders typically seen at headache centers that specialize in treating headaches that have been refractory to previous treatments is consistent with this possibility (40). Treatment outcomes might thus be improved if patients in primary care or general neurology settings were routinely screened for the most common anxiety and mood disorders, and the problems identified were appropriately addressed. The Primary Care Evaluation of Mental Disorders (Prime MD [47]), a brief measure designed to screen for the most commonly occurring psychiatric disorders seen in medical settings, is useful for this purpose. Treatments that incorporate elements of cognitive–behavioral therapy or antidepressant medications of demonstrated effectiveness in the treatment of anxiety or mood disorders deserve evaluation in this population.

Children and Adolescents

Despite the fact that tension-type headaches are one of the most common health complaints in adolescents, the effectiveness of psychological treatments have not been widely evaluated for either adolescents or children (36). Nonetheless, both narrative and meta-analytic reviews of the available studies support the effectiveness of

P1: KWW/KKL P2: KWW/HCN QC: KWW/FLX T1: KWW
GRBT050-81 Olesen- 2057G GRBT050-Olesen-v6.cls August 18, 2005 15:32

relaxation training interventions (15,22). Relaxation training for headaches also has been administered cost effectively in the school setting, raising the possibility that a school-based intervention could be an important part of a public health approach to the early identification and treatment of headache problems (31). However, in this program of studies relaxation training was less effective when administered by school nurses than by therapists with more behavioral training, suggesting the necessary elements of an effective school-based intervention have yet to be completely specified (16,31).

Older Adults

It was thought in the mid 1980s that relaxation and EMG biofeedback therapies, might be ineffective for tension headache sufferers over the age of about 50 (9,29). However, subsequent research indicated that relatively simple adjustments in the treatment procedures yielded positive outcomes (38,39). For example, treating patients who ranged in age from 60 to 78 years of age (mean, 68 years), Mosley et al. found cognitive–behavioral therapy to be more effective than relaxation training alone, with 64% of patients who received 12 sessions of cognitive–behavioral therapy showing clinically significant (greater than 50%) improvements in tension-type headache activity (38). In this study, patients were provided audiotapes and written materials designed to assist the acquisition of self-regulatory skills, and weekly phone contacts were used to answer questions and identify problems. If a detailed explanation of treatment procedures is provided, and adequate time is allowed to practice elementary skills before more advanced skills are introduced, age does not appear to limit the effectiveness of psychological treatments.

CAN WE INCREASE THE COST EFFECTIVENESS AND AVAILABILITY OF PSYCHOLOGICAL TREATMENTS?

Therapist-intensive individual treatment involving 10 to 20 treatment sessions may only be necessary for a minority of patients. For most patients, treatment can be more cost effectively administered in limited therapist contact or small group treatment format. In a limited-contact or "home-based" treatment format, headache management skills are introduced in three to four (monthly) clinic sessions, along with written materials, audiotapes, and periodic phone contact to help patients to master headache management skills at home. Therapist-intensive and limited contact treatment formats appear to yield similar outcomes in both adults and children, with the limited contact treatment format being more cost effective (18,19,43). Relaxation and cognitive–behavioral therapies also have also been effectively administered in a small group format in both clinic and school settings (22).

Initial efforts to provide relaxation and problem solving treatments over the Internet indicate that some individuals are able to effectively learn headache management skills via the Internet, but have been plagued by high dropout rates (1,48). Full use has yet to be made of the capabilities this technology has to tailor instruction to the needs of the individual user, or to provide compelling video instruction (e.g., modeling). Therefore, it remains to be determined how best to use the instructional capabilities of the Internet and who will benefit from Internet-based instruction. If only a small portion of the population with recurrent headache problems made effective use of psychological treatment delivered by the Internet, a large number of individuals might be reached in a cost-effective fashion.

HOW DO PSYCHOLOGICAL TREATMENTS IMPROVE TENSION-TYPE HEADACHES?

Efforts to understand how psychological treatments produce reductions in tension headache activity have focused primarily on EMG biofeedback training. Current models of therapeutic change that emphasize peripheral or central change mechanisms are illustrated in Figure 81-2. The model that guided the original development of EMG biofeedback training postulated that feedback from pericranial muscles enables the individual undergoing biofeedback training to acquire control of muscle activity associated with tension-type headaches and, thereby, to reduce tension headache activity (see Fig. 81-2a). Unfortunately, studies that have examined relationships between the self-regulation of pericranial EMG activity and improvement following training have provided little support for this model (3,30,34,44). Especially problematic for this model has been the finding that feedback for increasing or for maintaining constant pericranial muscle activity can be as therapeutic as feedback for reducing pericranial muscle activity under some conditions (3,30).

The second model postulates that reductions in tension headache activity are consequences of cognitive and behavioral changes set in motion by biofeedback training (see Fig. 81-2b). Studies finding that hypothesized cognitive changes better predict improvement following biofeedback training than do EMG changes (30,44) provide some support for this model. Improvements in tension-type headache activity following biofeedback training also may reflect the ability of biofeedback training to remedy deficits in central pain modulation contributing to chronic tension-type headache (see Fig. 81-2b) (45). However, attempts to test this modified model using the second exteroceptive suppression period of jaw closing muscles as an index of the integrity of supraspinal

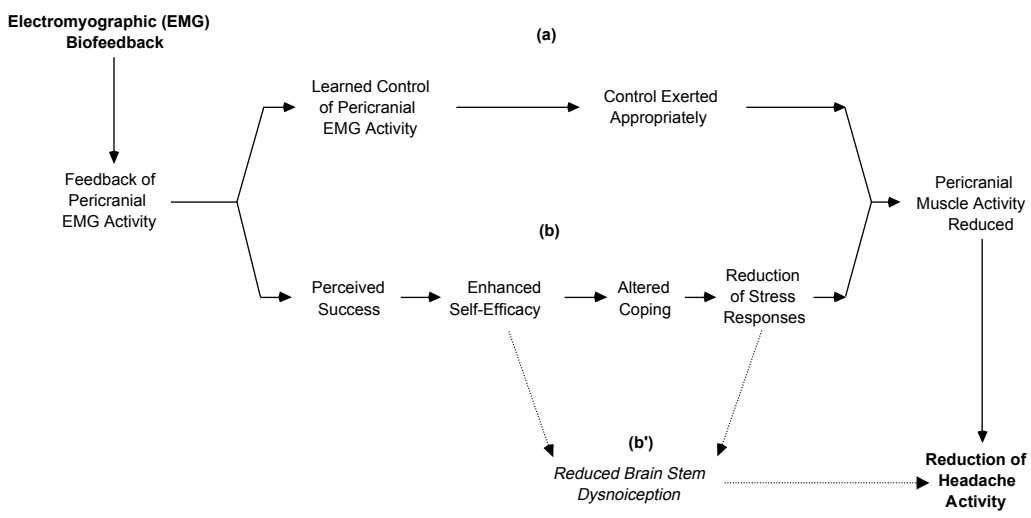

FIGURE 81-2. Therapeutic mechanisms in EMG biofeedback training. (Adapted from Ref. 30)

pain modulation systems involved in chronic tension-type headache, have yielded conflicting results (44,45).

It appears likely that different combinations of peripheral and central factors maintain tension-type headaches in different individuals. This implies that different change mechanisms may be operating in improvements shown by different individuals. Change mechanisms thus need to be evaluated separately in episodic and chronic tension-type headache sufferers, and possibly in more homogenous subgroups of patients within these two broad diagnostic categories.

HOW CAN PSYCHOLOGICAL AND DRUG THERAPIES BE COMBINED?

Surprisingly little attention has been devoted to evaluating strategies to integrate drug and nondrug treatments. In an early study (13), chronic tension headache sufferers ($N = 28$) were randomized to 16 EMG biofeedback training sessions or an individualized medical management program that included drug therapy (antidepressant medication, analgesics, muscle relaxants, sedatives), physical therapy, or combined drug and physical therapy, depending on the clinician's assessment of the patient's needs. Biofeedback training, but not medical management, yielded significant reductions in headache activity, with 54% of patients in the biofeedback training group but only 10% of patients in the medical management group, showing at least a 50% reduction in headache activity. Improvements with biofeedback training also were maintained at a 6-month follow-up. Individualized medical management may have had a poor showing in this study because patients had previously been unresponsive to medical therapies and rather severely disabled, with all patients "frequently absent from work, often for long periods, because of headaches" (p. 34). The authors (13) suggest that in this population "Drug therapy and physical therapy reinforce a tendency to dependent behavior in many headache patients, but biofeedback educates the patient to control his own well being" (p. 36).

Two studies have directly compared the effectiveness of cognitive–behavioral therapy and antidepressant medication. In the first study, patients ($N = 41$) with tension-type headaches (mean 5 headache days per week) received either cognitive–behavioral therapy (administered in a limited-therapist contact treatment format) or amitriptyline HCL (individualized dose of 25 to 75 mg/d) (27). Cognitive–behavioral therapy and amitriptyline each yielded significant improvements in headache activity, both when improvement was assessed with patient daily recordings (56% and 27% reduction, respectively) and when improvement was assessed by neurologist ratings (94% and 69% of patients rated as at least moderately improved, respectively). A more recent study ($N = 203$) (28) included four treatment groups: antidepressant medication (amitriptyline HCL; if not tolerated nortriptyline HCL), matched placebo, cognitive–behavioral therapy (administered in a limited-therapist contact format) plus placebo, and cognitive–behavioral therapy plus antidepressant medication. The three active treatments produced similar improvements in chronic tension-type headaches and similar improvements on quality of life measures (Fig. 81-3). However, patients who received the combined antidepressant medication and cognitive–behavioral therapy were more likely (64% of patients) to show substantial (>50% reduction) reductions in tension-type headache activity than were patients who received antidepressant

P1: KWW/KKL P2: KWW/HCN QC: KWW/FLX T1: KWW
GRBT050-81 Olesen- 2057G GRBT050-Olesen-v6.cls August 18, 2005 15:32

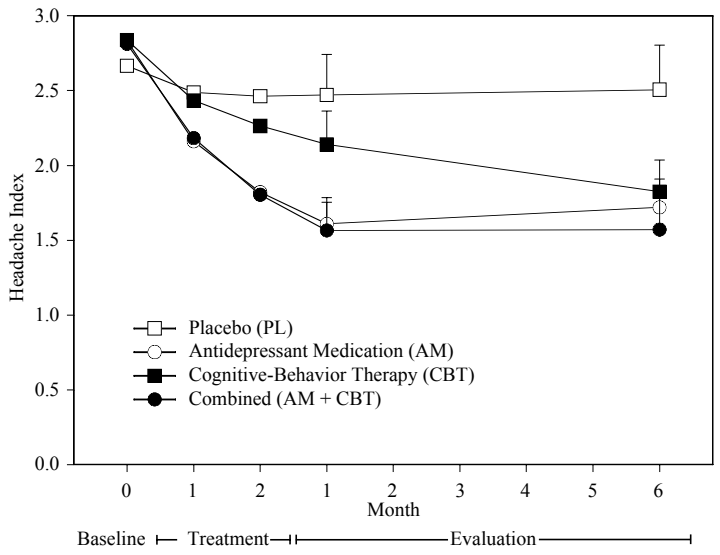

FIGURE 81-3. Headache index calculated as a mean of daily pain ratings. (Adapted from Holroyd KA, O'Donnell FJ, Stensland M, et al. Management of chronic tension-type headache with tricyclic antidepressant medication, stress-management therapy, and their combination: a randomized controlled trial. *JAMA.* 2001;285:2208–2215.)

medication (35% of patients) or cognitive–behavioral therapy alone (29% of patients).

Another study (42) ($N = 50$) examined the benefits of adding amitriptyline (dose adjustment to 75 mg/d) to EMG biofeedback training from multiple muscle sites (suboccipital, cervical, trapezius, sternocleidomastoid, and masseter) over 30 training sessions. Amitriptyline initially enhanced the effectiveness of biofeedback training; however, beginning at month 8 and continuing through the 24-month observation period, the combined treatment showed no advantage over biofeedback training alone. In fact at the 20- and 24-month observation periods, patients who received biofeedback training alone recorded significantly fewer hours of headache activity than patients who received combined amitriptyline and biofeedback training. The relatively poor result obtained with combined treatment at these two follow-up assessments probably reflects the fact that patients were weaned from amitriptyline at month 16. The authors suggest that "the patient's dependence on or expectation of taking medication may actually undermine the intensity or effort applied to learning physiological control via the biofeedback training" (p. 175), thus reducing the long-term gains that can be achieved with psychological treatment.

Holroyd et al. (25) proposed algorithms to guide the integration of drug and nondrug therapies. For tension-type headache, they suggest that combined antidepressant medication and psychological therapy be considered if tension-type headaches are unremitting or a comorbid mood or anxiety disorder is present; if neither condition is present, it is suggested that psychological therapy may be the intervention of choice. However, more intensive psychological treatment including EMG biofeedback training also deserves consideration when headaches are unremitting; and cognitive–behavioral interventions with proven effectiveness in managing mood and anxiety disorders deserve attention when anxiety or mood disorders are present.

It is likely that pharmacologic and nonpharmacologic treatments have different effect profiles, and these differences are likely to go undetected when clinical trials assess treatment outcome narrowly (21). For example, psychological treatments have been observed to produce improvement more slowly than pharmacologic treatment, to yield fewer side effects than pharmacologic treatment (but to require more time and effort to complete), and to produce psychological benefits not observed with pharmacologic treatment in some studies. To detect such differences, future clinical trials need to assess quality of life and the time course of treatment effects as well as simple reductions in headache activity.

CONCLUSION

It is now reasonably well established that psychological therapy can be of value in managing recurrent tension-type headaches. Unfortunately, psychological therapy is more likely to be available at specialized headache treatment centers than at family medicine or general neurology clinics where patients who have not yet developed chronic or intractable headache problems are seen. Psychological therapy may well, however, prove more effective in preventing the development of chronic headaches than in controlling headaches once they have become chronic. Attention thus needs to be devoted to the integration of psychological therapies into general medical practice. In this regard, future clinical trials might be conducted in general

neurology settings (as well as in psychology clinics and specialized headache treatment centers), and nurses and other health professionals (rather than psychologists) might be trained to administer psychological interventions. Future trials also need to clearly distinguish between episodic and chronic tension-type headaches when evaluating psychological treatments, because the intensity of intervention required to manage headaches in these two instances is likely to differ. The effectiveness of psychological treatments that incorporate interventions to manage mood and anxiety disorders also needs to be evaluated in patients who exhibit high levels of affective distress, because headaches in these patients may often be ineffectively managed with standard drug therapies.

ACKNOWLEDGMENTS

Support for this chapter was provided in part by National Institutes of Health grant NS32374.

REFERENCES

1. Andersson G, Lundstom P, Strom L. A controlled trial of self-help treatment of recurrent headache conducted via the Internet. *Headache*. 2003;43:353–361.
2. Andrasik F, Blanchard EB, Neff DF, et al. Biofeedback and relaxation training for chronic headache: A controlled comparison of booster treatments and regular contacts for long-term maintenance. *J Consult Clin Psychol*. 1984;52:609–615.
3. Andrasik F, Holroyd KA. A test of specific and nonspecific effects in the biofeedback treatment of tension headache. *J Consult Clin Psychol*. 1980;48:575–586.
4. Arena JG, Blanchard EB. Biofeedback and relaxation therapy for chronic pain disorders. In: Gatchel RJ, Turk DC, eds. *Psychological approaches to pain management: a practitioner's handbook*. New York: Guilford Press; 1996:179–230.
5. Bakal DA. *The psychobiology of chronic headache*. New York: Springer; 1982.
6. Bernstein DA, Borkovec TD, Hazlett-Stevens H. *New directions in progressive relaxation training: A guidebook for helping professions*. Praeger; Westport, CT: 2000.
7. Praegers Blanchard EB. Psychological treatment of benign headache disorders. *J Consult Clin Psychol*. 1992;60:537–551.
8. Blanchard EB, Andrasik F. *Management of chronic headaches: a psychological approach*. Elmsford, NY: Pergamon; 1985.
9. Blanchard EB, Andrasik F, Evans DD, et al. Biofeedback and relaxation treatments for headache in the elderly: a caution and a challenge. *Biofeed Self-Regul*. 1985;10:69–73.
10. Blanchard EB, Appelbaum KA, Guarnieri P, et al. Two studies of the long-term follow-up of minimal-therapist contact treatments of vascular and tension headache. *J Consult Clin Psychol,* 1988;56:427–432.
11. Blanchard EB, Appelbaum KA, Radnitz CL, et al. The refractory headache patient: I. Chronic, daily, high-intensity headache. *Behav Res Ther*. 1989;27:403–410.
12. Bogaards MC, ter Kuile MM. Treatment of recurrent tension headache: a meta-analytic review. *Clin J Pain*. 1994;10:174–190.
13. Bruhn P, Olesen J, Melgaard B. Controlled trial of EMG feedback in muscle contraction headache. *Ann Neurol*. 1979;6:34–36.
14. DeLongis A, Coyne JC, Dakof G, et al. Relationship of daily hassles, uplifts, and major life events to health status. *Health Psychol*. 1982;1:119–136.
15. Eccleston C, Morley S, Williams A, et al. Systematic review of randomized controlled trials of psychological therapy for chronic pain in children and adolescents, with a subset meta-analysis of pain relief. *Pain*. 2002;99:157–165.
16. Fichtel A, Larsson B. Relaxation treatment administered by school nurses to adolescents with recurrent headaches. *Headache*. 2004;44:545–554.
17. Grazzi L, Andrasik F, D'Amico D, et al. Behavioral and pharmacologic treatment of transformed migraine with analgesic overuse: outcome at 3 years. *Headache*. 2002;42:483–490.
18. Haddock CK, Rowan AB, Andrasik F, et al. Home-based behavioral treatments for chronic benign headache: a meta-analysis of controlled trials. *Cephalalgia*. 1997;17:113–118.
19. Hermann C, Kim M, Blanchard EB. Behavioral and pharmacological intervention studies of pediatric migraine: an exploratory meta-analysis. *Pain*. 1995;60:239–256.
20. Holden EW, Deichmann MM, Levy JD. Empirically supported treatments in pediatric psychology: Recurrent pediatric headache. *J Pediatr Psychol*. 1999;24:91–109.
21. Holroyd KA. Integrating pharmacologic and non-pharmacologic treatments. In: Tolison CD, Kunkel RS, eds. *Headache diagnosis and interdisciplinary treatment*. New York: Urban and Schwartzenberg; 1993.
22. Holroyd KA. Assessment and psychological treatment of recurrent headache disorders. *J Consult Clin Psychol*. 2002;70:656–677.
23. Holroyd KA, Andrasik F. Coping and the self-control of chronic tension headache. *J Consult Clin Psychol*. 1978;46:1036–1045.
24. Holroyd KA, Andrasik F. A cognitive-behavioral approach to recurrent tension and migraine headache. In: Kendall PE, ed. *Advances in cognitive-behavioral research and therapy*. New York: Academic Press; 1982:276–320.
25. Holroyd KA, Lipchik GL, Penzien DB. Psychological management of recurrent headache disorders: empirical basis for clinical practice. In: Dobson KS, Craig KD, eds. *Best practice: developing and promoting empirically supported interventions*. Newbury Park, CA: Sage; 1998:193–212.
26. Holroyd KA, Lipchik GL, Penzien DB. Behavioral management of recurrent headache disorders. In: Silberstein SD, Lipton RB, Dalessio DJ, eds. *Wolff's headache and other headache pain*, 7th ed. New York: Oxford University Press; 2001:562–598.
27. Holroyd KA, Nash JM, Pingel JD, et al. A comparison of pharmacological (amitriptyline HCl) and nonpharmacological (cognitive-behavioral) therapies for chronic tension headaches. *J Consult Clin Psychol*. 1991;59:387–393.
28. Holroyd KA, O'Donnell FJ, Stensland M, et al. Management of chronic tension-type headache with tricyclic antidepressant medication, stress-management therapy, and their combination: a randomized controlled trial. *JAMA*. 2001;285:2208–2215.
29. Holroyd KA, Penzien DB. Client variables in the behavioral treatment of recurrent tension headache: a meta-analytic review. *J Behav Med*. 1986;9:515–536.
30. Holroyd KA, Penzien DB, Hursey K, et al. Change mechanisms in EMG biofeedback training: cognitive changes underlying improvements in tension headache. *J Consult Clin Psychol*. 1984;52:1039–1053.
31. Larsson BM, Carlsson J, Fichtel A, et al. Relaxation treatment of adolescent headache sufferers: results from a school based replication series. *Headache*. 2005;45:692–704.
32. Lipchik GL, Holroyd KA, Nash JM. Cognitive-behavioral management of recurrent headache disorders: a minimal-therapist contact approach. In: Turk DC, Gatchel RS, eds. *Psychological approaches to pain management*, 2nd ed. New York: Guilford; 2002:356–389.
33. Martin PR. *Psychological management of chronic headaches*. New York: Guilford; 1993.
34. Martin PR, Mathews AM. Tension headaches: psychophysiological investigation and treatment. *J Psychosom Res*. 1978;22:389–399.
35. McCrory D, Penzien D, Hasselblad V, et al. *Behavioral and physical treatments for tension-type and cervicogenic headache*. (Report No: 2085). Des Moines, IA: Foundation for Chiropractic Education and Research; 2001.
36. McGrath P, Larsson B. Headache in children and adolescents. *Child Adolesc Clin North Am*. 1997;6:843–861.
37. Michultka DM, Blanchard EB, Appelbaum KA, et al. The refractory headache patient: II. High medication consumption (analgesic rebound) headache. *Behav Res Ther*. 1989;27:411–420.
38. Mosley TH, Grotheus CA, Meeks WM. Treatment of tension headache in the elderly: a controlled evaluation of relaxation training and

P1: KWW/KKL P2: KWW/HCN QC: KWW/FLX T1: KWW
GRBT050-81 Olesen- 2057G GRBT050-Olesen-v6.cls August 18, 2005 15:32

relaxation combined with cognitive-behavior therapy. *J Clin Geropsychol*. 1995;1:175–188.
39. Nicholson NL, Blanchard EB. A controlled evaluation of behavioral treatment of chronic headache in the elderly. *Behav Ther*. 1993;24:67–76.
40. Puca F, Genco S, Prudenzano MP. Psychiatric comorbidity and psychosocial stress in patients with tension-type headache from headache centers in Italy. *Cephalalgia*. 1999;19:159–164.
41. Reich BA. Non-invasive treatment of vascular and muscle contraction headache: a comparative longitudinal study. *Headache*. 1989;29: 34–41.
42. Reich BA, Gottesman M. Biofeedback and psychotherapy in the treatment of muscle contraction/tension-type headache. In: Tollison CD, Kunkel RS, eds. *Headache diagnosis and interdisciplinary treatment*. New York: Urban & Schwartzenberg; 1993:167–180.
43. Rowan AB, Andrasik F. Efficacy and cost-effectiveness of minimal therapist contact treatments of chronic headache: a review. *Behav Ther*. 1996;27:207–234.
44. Rokicki LA, Holroyd KA, France CR, et al. Change mechanisms associated with combined relaxation/EMG biofeedback training for chronic tension headache. *Appl Psychophysiol Biofeedback*. 1997;22: 21–41.
45. Schoenen J. Exteroceptive silent periods of temporalis muscle in headache. In: van Steenberghe D, DeLaat A, eds. *EMG of jaw reflexes in man*. Leuven: Leuven University Press; 1989:357–368.
46. Schwartz MS, Andrasik F. *Biofeedback: a practitioner's guide*, 3rd ed. New York: Guilford; 2003.
47. Spitzer RL, Williams JBW, Kroenke K, et al. Utility of a new procedure for diagnosing mental disorders in primary care: the PRIME MD 1000 study. *JAMA*. 1994;272:1749–1756.
48. Strom L, Peterson R, Andersson G. A controlled trial of self-help treatment of recurrent headache conducted via the Internet. *J Consult Clin Psychol*. 2000;68:722–727.
49. Tobin DL, Holroyd KA, Baker A, et al. Development and clinical trial of a minimal contact, cognitive–behavioral treatment for tension headache. *Cogn Ther Res*. 1988;12:325–339.