Chapter 82

Physiotherapy of Tension-Type Headaches

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Physiotherapy is often used in the treatment of tension-type headache (TTH) despite limited scientific evidence demonstrating efficacy. In the field of preventive treatments for headache, the interventions studied were confined to pharmacologic and cognitive-behavioral therapies and mostly to the study of migraine. Only a few studies have assessed the effectiveness of traditional physiotherapy in properly classified TTH patients (13,40) as most have been conducted in mixed, not properly classified headache groups (20,32,35) or in a cervicogenic headache population (12).

Furthermore, most prior studies examining physiotherapy interventions for headache have consisted of case reports or uncontrolled or comparative designs. In TTH as well as in other pain disorders, it is extremely important to consider the placebo effect. Future treatment studies should therefore strive to utilize a randomized and controlled design.

The underlying rationale for physiotherapy, the applied methods, and the available research results will be discussed in the following sections.

In the field of pain management, physiotherapy as a discipline focuses primarily on the assessment and treatment of biomechanical dysfunction in an attempt to mediate or alleviate pain due to stress or strain on musculoskeletal structures. This approach works very well when treating headache associated with biomechanical dysfunction of the cervical spine (28,31,39). However, in the case of TTH, the approach differs. While the cause of TTH is still being debated, it is the current view that this disorder, especially the chronic form, is largely centrally mediated, as opposed to a primary disorder of the musculoskeletal system (4,6,9). Therefore, physiotherapy approaches to TTH focus more on mediating chronic adverse input into the central nervous system (CNS). For example, there is evidence that ongoing input to the CNS from muscular tension may in part be responsible for the evolution from episodic TTH (ETTH) to chronic TTH (CTTH) (see also Chapter 78), and physiotherapy may play a role in preventing this conversion (6,9,22). Thus, the physiotherapist must include a thorough evaluation of the musculoskeletal system in the TTH patient to rule out musculoskeletal factors that may be contributing to this centrally mediated disorder. This is especially true given the frequent coexistence of several headache diagnoses (43).

PRETREATMENT ASSESSMENT

The patient history is designed to elucidate any factors that may suggest musculoskeletal triggers for pain, as well as any strategies the patient may have already adopted for reducing his or her pain. The physical examination expounds on these findings, confirming or ruling out discrete musculoskeletal dysfunction such as joint hypomobility or irritability or myofascial trigger points (TrPs). It also helps to confirm the generalized pericranial tenderness found in TTH (4,9,28,35,39) (Table 82-1).

Careful palpation can differentiate the generalized tenderness of pericranial muscles found in TTH from the referred pain patterns found in myofascial TrPs. Increased tenderness of pericranial muscles revealed by manual palpation is one of the most consistent abnormal findings in patients with TTH (8,23–27), and to get a more precise quantification of tenderness a palpometer can be used (7). With a palpometer the investigator can perform palpation with the usual small finger movements and yet keep control over the palpation pressure (7). While this increased sensitivity of the pericranial muscles may represent some centrally mediated sensitization of the tissues, myofascial TrPs more likely represent a peripheral component. Myofascial TrPs are tender nodules embedded in taut bands of muscle tissue that, when palpated, refer pain to a distant site. There is increasing evidence that a TrP represents a

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TABLE 82-1 Key Points of Patient History

A. What brings on the pain/what makes it worse? (helps to determine biomechanical problems or stress-mediated exacerbations)
B. What can you do to make it better? (may give ideas about treatment)
C. Was the onset related to a specific event (traumatic or otherwise)?
D. What kind of activities do you do during the day?
E. What are your work duties?

Patient Examination

A. Inspection of the patient and observation of the facial expression (wrinkling the forehead, narrowing the eyes, or clenching the jaw)
B. Observation of how the patient stands, sits, and moves, especially the positioning of the head and shoulders
C. Muscle palpation to determine presence of trigger points, increased muscle tone, or generalized tenderness in the pericranial muscles
D. Active and passive mobility testing to look for biomechanical dysfunction involving the cervical spine or related musculature
E. Evaluation of the masticatory system

dysfunctional motor endplate, with increased spontaneous electrical activity (36–38), whereas others have been unable to demonstrate this finding (Couppe et al., personal communication).

An active TrP is one that, when palpated, reproduces all or some of a patient's primary pain complaint. TrPs so defined are rarely noted in the literature concerning TTH. Thus, their presence or absence needs to be determined by the individual evaluator, as treatment strategies will differ depending on the results of the TrP examination. Objective and reliable methods for identifying TrPs are not well established (7,23), but there is some evidence of interrater reliability in examiners with experience and training (16,17). In a very recent blinded and controlled study, active TrPs were identified in 85% of the CTTH patients in contrast to only 30% of healthy controls (Couppe et al, submitted 2004), suggesting a significant presence in this disorder.

Active and passive neck mobility should also be screened, as restrictions can point to shortened muscles, increased muscle tone, or joint dysfunction and hypomobility.

Increased tone of cervical muscles (due to poor posture or anxiety) may promote cranial muscle tension because of functional continuity between shoulder, neck, and scalp musculature (13). Both the Cybex equipment and the goniometer measure neck mobility in degrees and are simple and reliable (44).

The masticatory system must also be examined. Bruxism and other muscular hyperactivity of pericranial and masticatory muscles have been considered as causes of tenderness and pain (26). Jaw clenching is often combined with a protrusive posture of the head that gives rise to increased tone in the neck muscles. Several studies have reported an association between TTH and dysfunction of the masticatory system but the cause–effect relation is unclear (2,3,34).

TREATMENT

Nonpharmacologic Pain Control

The therapeutic efforts in physiotherapy are primarily designed to educate patients in strategies of muscle relaxation to prevent or minimize nociceptive input from the periphery nervous system to the CNS.

Many patients with TTH tend to increase their intake of analgesics, which paradoxically can increase the pain (see also Chapter 118). As a result, nonpharmacologic methods are often a preferable approach. The first step is to wean the patient from analgesic medication gradually or abruptly, substituting with such treatments as active exercises, heat or cold application, and relaxation. The patient is instructed to use these techniques daily at home in an individually adapted regimen.

Relaxation Techniques

It is not known whether pericranial muscle tenderness is a cause or an effect of TTH or whether tenderness reduction is a cause or an effect of pain relief (22,40). Nonetheless, techniques designed to produce muscle relaxation have become conventional therapy for TTH (18). The aim of all relaxation techniques is to make the patients aware of the difference between tense and relaxed muscles. The patient is instructed to start the training in a comfortable, recumbent position in a darkened environment, eventually performing the training while sitting in a substantially less peaceful environment. Finally, the TTH sufferer must learn to practice relaxation in everyday life. The patient must be aware of the way he or she stands, sits, and walks and how he or she lies when sleeping. The patient must adopt a new and more economical pattern of muscle use, being aware that all muscles that are not essential for the task of the moment are in a state of relaxation. This applies to work settings such as use of computers or speaking on the telephone, as well as to leisure activities such as watching television or sports. A simple method of helping the patient to notice any warning sensation of muscle tension is to place a piece of tape on the skin over the area of unwanted muscle contraction. When the muscle starts to contract, the patient feels the movement of the tape and can voluntarily stop the contraction and relax the muscle. The importance of short breaks during a day's work, irrespective of what kind of work, cannot be overly emphasized. A study by McLean et al. supports the use of frequent postural breaks during the work day (29).

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TABLE 82-2 Autogenic Relaxation Program During a Short Break (30 Seconds)

A. Sit down on a chair with firm support for your back; put your hands on your knees and your feet on the floor.
B. Lean your head against the wall.
C. Lower your shoulder.
D. Relax your jaw so that there is a small gap between the molar teeth.
E. Close your eyes and breathe calmly and rhythmically.
F. Feel how your whole body becomes relaxed from your toes up to your forehead.
G. Use an individually chosen cue word (e.g., "relax") and subvocalize at each inhalation (induces a deeper state of relaxation).

After 30 seconds:

A. Open your eyes.
B. Take a deep breath and end with a big yawn and stretch.

The autogenic relaxation program listed in Table 82-2 is also recommended. Electromyogram (EMG) biofeedback can also be used in relaxation training (1,34). EMG surface electrodes are placed over the musculature. The electrodes are connected to a small EMG recorder, which transforms the incoming EMG signals into sound or light signals, the strength of which is proportional to the recorded muscle activity. The patient utilizes the exterosensory signal to learn to reduce muscle tension by acquiring strategies to decrease the strength of the signal. Relaxation training alone or combined with EMG biofeedback has been shown to be superior to no treatment or placebo treatment in the treatment of TTH (1,2,30,34). However, it is difficult to predict treatment outcome from clinical variables (30).

Home Exercise

Several home-based, self-regulatory programs involving relaxation training and strategies for cognitive stress coping have been developed. Such a program can consist of audiotapes or CDs supplemented with a manual, containing therapeutic instructions that are similar to therapist-assisted regimens (30). The program has to be easy to accept and to apply (Table 82-2 and 82-3). Several controlled studies and a meta-analysis have shown that self-regulatory treatments adapted to minimal therapist contact produce comparable or even superior results when compared to clinic-based treatments (18,30,40).

TABLE 82-3 Progressive Relaxing Exercises for the Jaws, Eyes, Forehead, and Shoulders

A. Open your mouth and clench your teeth alternately. Relax.
B. Move your jaw sideways five times in each direction. Relax.
C. Raise your eyebrows as high as you can, and then lower them. Relax.
D. Wrinkle your eyebrows. Relax.
E. Close your eyes tightly. Relax.
F. Raise your shoulders as high as you can, and then let them fall. Relax.

When the patient has learned how to prevent, eliminate, and/or manage TTH, it is time to build up the patient's physical condition, including muscle strength, coordination, flexibility, and fitness. The training must be planned according to an individually adapted program, which can be executed by the patient. Certainly, if any biomechanical factors were identified on the examination as contributory to the headache, specific exercises and techniques designed to correct the dysfunction should be included in the home program.

Ergonomics and Antistress Training

An ergonomic analysis of the individual's work-related posture and movements is often helpful. Many working positions produce a static load on the neck and shoulder muscles. A hyperextended position of the neck with an upward turning of the face often coexists with a forward-flexed position of the shoulders in a person who sits working at a desk. During the course of the day's stress, this may progressively give rise to cramping, excessive tone, or even trigger points in the neck and shoulder muscles. The symptoms can have many different expressions: headache, dizziness, and pain in the neck with or without decreased range of movement. An important part of the physical therapy program is to make the patient aware of positions that may lead to or aggravate pain and spasm, and that frequent variation between static and dynamic activity is very important.

Although an unfavorable physical load is an essential factor, psychosocial factors at work or at home may contribute to the development of TTH. To that end, the physical therapist can assist the patient in promoting awareness of the relationship between emotional stress and muscle tension.

Massage, Heat/Cold Application, and Transcutaneous Electronic Nerve Stimulation

Massage is a traditional therapy that has been widely prescribed in diverse cultures for centuries. Although its precise mechanism of action has not been defined, massage is known to relieve spasm and to decrease pain, perhaps through spindle receptor stimulation and reflex muscle relaxation. Massage includes stroking (which soothes and relaxes deep muscles) and compression (in which kneading relaxes muscles, decreases edema, and mobilizes tissue adhesions). Only a few very small studies have examined massage for TTH (5,32,33). Therapeutic heat or cold modalities may be useful adjuncts to massage but there is as yet no scientific evidence for their use.

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Most transcutaneous electronic nerve stimulation (TENS) devices use two frequency areas: high-frequency TENS at 50 to 100 Hz and low-frequency TENS at 1 to 4 Hz (19). A third type of stimulation gives high-frequency sequences repeated at a low frequency (subcutaneous train stimulation). Patients with headache are most suitably treated with high-frequency or train stimulation on the pericranial and neck musculature because a pure low-frequency stimulation requires high intensity to be effective, which in turn can cause unpleasant muscle contractions (19). A recommended stimulation time is 20 to 30 minutes, which can be repeated three times per day or as required. TENS is contraindicated if the patient has a cardiac pacemaker. Unfortunately, there are no scientific evaluations of the efficacy of massage, heat/cold application, and TENS in the treatment of TTH.

Manipulation

Manipulation is a technique in which joints are moved a few degrees beyond the physiologic range to free the joint from restrictive elements. The therapist positions the joints at the end of normal range, and then imparts a rapid, low-amplitude thrust. It is a treatment that is contraindicated in patients with underlying arthritis or vertebral artery disease. According to most studies (10–12,20,21,42) manipulation seems to be better than no treatment, some types of mobilization, and/or ice treatment (11,12,21,41). Nevertheless the studies are not quite comparable as both inclusion criteria and outcome parameters varied among studies (12,20,31). The effect of cervical manipulation appears equivalent to amitriptyline in the treatment of TTH but has a greater durability and fewer side effects (10). Cervical mobilization and manual therapies have also been shown to produce both a central mechanism of action and disinhibition of weak muscles after mobilization of the appropriate spinal segment, resulting in improved muscular control (35).

Balance Disorders and Oculomotor Disturbances

Patients with TTH often describe a feeling of unsteadiness either spontaneously or when they move in specific positions (13). There may be an association between disequilibrium and the disturbances of oculomotor function observed in patients with TTH consisting of reduction in saccadic velocity and decreases in the smooth pursuit velocity gain (14,15). It has been argued that the oculomotor abnormalities are caused by pathologic proprioceptive signals from the tense scalp and neck muscles (15). Treatment of the balance disorder associated with TTH therefore includes physiotherapy techniques aimed at decreasing neck and cranial muscle tension. The patient should be trained to focus his gaze on a stationary object when experiencing the symptoms of disequilibrium.

Combination Therapy

The form of physical therapy chosen depends on the presumed underlying etiology of the headache and the presence or absence of any biomechanical dysfunction. In daily clinical practice, a combination of active treatments, such as relaxation and ergonomic instruction, and passive treatments, such as massage, is often applied, but scientific evidence to support such treatment remains elusive. A combined home-based treatment program including relaxation and an active exercise program has recently been evaluated in a randomized, controlled study comprising 26 patients with frequent ETTH and 24 with CTTH (40). After a 4-week run-in period, they were randomized to either standardized physiotherapy or to an observation period followed by an identical course of physiotherapy. All patients were followed for a 12-week follow-up period. The frequency of headache was reduced in 25% of the patients receiving physiotherapy compared to the run-in period, whereas severity and duration of headache as well as drug consumption were unchanged. Surprisingly, the positive effect was more significant among patients with CTTH than patients with ETTH and for females compared to males (40). In a second, uncontrolled study, Hammill et al. treated 20 TTH patients with a combined regimen that included posture and ergonomic education, stretching exercises, and soft tissue massage (19). A significant reduction in the frequency and intensity of the headache was maintained at a 12-month follow-up (19).

Despite methodologic limitations of such clinical studies, they demonstrate the feasibility of further controlled studies of physical therapy for TTH. They also reveal the potential for a standardized physical therapy program to effect positive treatment outcome for TTH (40). Active treatment strategies are also much more likely to contribute to an improvement than passive treatment, but proper evidence is still lacking.

In conclusion, it appears that although physical therapy is a routine component of most treatment programs for TTH patients, the evidence is still fairly scarce. Controlled studies have recently been conducted and demonstrate a significant effect of the active treatment strategies when relaxation and active exercises are combined in the treatment of TTH. Despite widespread use, there is no convincing evidence of a significant therapeutic effect of passive treatment strategies such as massage and hot/cold packs for TTH, so these strategies should not form the mainstay of a treatment program. Most importantly, the treatment of TTH should include patient education regarding the nature and behavior of musculoskeletal pain and identification of factors that provoke and exacerbate the headache. Combined home-based exercise programs and relaxation

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training alone or combined with EMG biofeedback are additional components to a comprehensive approach to the management of TTH.

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