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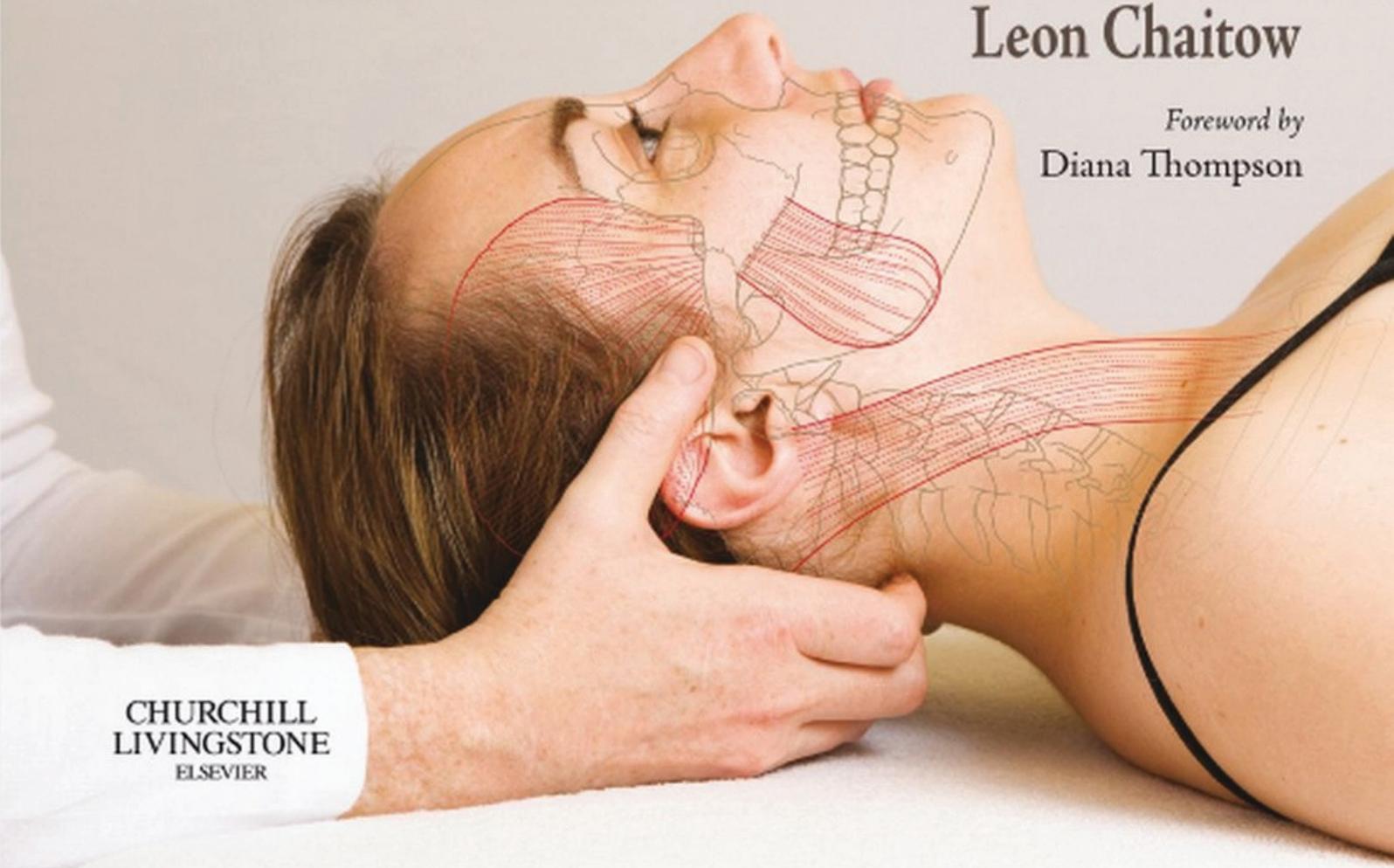
A massage therapist's guide to treating headaches and neck pain

Sandy Fritz

Leon Chaitow

Foreword by

Diana Thompson



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A MASSAGE
THERAPIST'S GUIDE TO

Treating headaches
and neck pain



To all those who suffer headaches and the Massage Therapists who reduce that suffering.

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A MASSAGE THERAPIST'S GUIDE TO

Treating headaches and neck pain



With accompanying DVD

Sandy Fritz BS MS

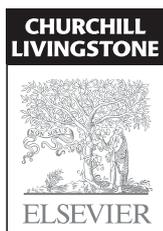
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**CHURCHILL
LIVINGSTONE**
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Foreword



I held my first “whiplash” class in 1988 in the King County Courthouse. I wanted to provide a comprehensive experience of all that a personal injury case entails, including putting massage therapists on the witness stand, defending their treatment plans and SOAP notes to a trial lawyer. The workshop addressed everything from record keeping, insurance billing, and courtroom testimony to assessment techniques and clinical decision-making. I taught a variety of massage techniques to address common dysfunctions associated with acute, subacute and chronic “whiplash” symptoms: TMJ, headaches, neck pain, acute swelling, nerve trauma, etc.

At the time, I believed all massage therapists began a session by identifying treatment goals, followed by selecting the methods or modalities that might best achieve those outcomes for the individual at hand. When it came time to mass-market my continuing education class, I found it didn’t fit into the national model. Courses popular at that time were all technique-based, so I added a dozen or so modalities to my toolbox for my own clinical practice and created a course on a more marketable technique called SOAP charting.

Fast-forward twenty years. Two provocative thinkers of our day, Sandy Fritz and Leon Chaitow, invite me to write the foreword of this book. I sit down with an advanced copy and find myself reaching for a box of tissues. As if pages of intake forms aren’t enough to make my heart go pitter-patter, I discovered that the authors are recommending a paradigm-shift from technique-based massage to outcomes-based massage. After dabbing the corners of my eyes, the only words I can find to say are, “Thank you.”

Consider the primary implication of this paradigm shift—the client becomes the focal point of the

massage relationship. For example, imagine a conversation between a massage therapist and a client seeking care. Instead of the massage therapist predominately detailing their training with a third generation Lomi Lomi master in Hawaii and the general benefits of Lomi Lomi techniques (insert any modality), the client is prompted to speak of their condition and goals for health, how symptoms are affecting their lifestyle, and the type of relief they seek. In response, the practitioner explains how they determine goals for care, integrating the client’s preferred outcomes, and suggests a range of massage techniques and self-care that might assist the client in reaching the outcomes, assuring that evaluation occurs throughout a session and treatment choices can be modified at any time. If additional information is sought, the practitioner cites research data that examines the underlying physical mechanisms of the condition and describes how the recommended techniques address the physical and emotional health concerns. The abstracts produced by the practitioner at the first session can be taken by the client to their health care provider to support their choice to pursue massage therapy as a treatment option.

Is this idealistic? I believe that, like me, many of you have always practiced this way, maybe not to the point of integrating research data, but certainly from a client-centered point of view. Reading this textbook will feel like coming home to you. Others may wonder if this concept applies to your practice. I invite you to ask you client what their desired outcomes for massage are—relaxation, wellness, injury treatment, or relief from chronic pain—and examine whether or not your favorite techniques bring you and your client closer to their goals for health. It is a valuable exercise, even if the answer is yes.

But how does this paradigm-shift influence the textbook in hand?

Information detailing headaches and neck pain is regarded from every possible vantage point, integrating definitions, diagnoses, and standard biomedical treatments with manual therapy, massage and self-care treatment options. Session design is structured, taking into consideration the current available research data and the assessment techniques available within the scope of practice of massage.

The authors consider all the information from a massage therapists' perspective. "What am I feeling

and what does it mean?" is a question explored early on that sets the tone for this book. Fritz and Chaitow possess a deep understanding of the complexity of clinical care and prompt the follow-up question, "What can I do to make it better?" OK, what they really said was, "What can I do to normalize the dysfunction?" but we know what they meant. My favorite answer is their scientific explanation of why full body massage is better for pain management than localized spot work. Brilliant. Read for yourself. Enjoy the astute inquiry into the mysteries of our profession and find your curiosities satisfied—at least for now.

Diana Thompson
2009

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A Massage Therapist's Guide to Understanding, Locating and Treating Myofascial Trigger Points (Chaitow L, Fritz S 2006 Churchill Livingstone, Edinburgh)

Figures 6.4, 6.5.

Clinical Application of Neuromuscular Techniques (Chaitow L, DeLany J 2000 Churchill Livingstone, Edinburgh)

Figures 2.1, 7.7–7.13.

Clinical Application of Neuromuscular Techniques, 2nd edn (Chaitow L, DeLany J 2008 Churchill Livingstone, Edinburgh)

Figure 9.6.

Fibromyalgia Syndrome: A Practitioner's Guide to Treatment, 2nd edn (Chaitow L et al 2003 Churchill Livingstone, Edinburgh)

Figures 9.3, 9.4.

Mosby's Fundamentals of Therapeutic Massage, 2nd edn (Fritz S 2000 Mosby, St Louis)

Figures 6.10–6.18, 7.1, 8.1.

Muscle Energy Techniques, 2nd edn (Chaitow L et al 2001 Churchill Livingstone, Edinburgh)

Figure 7.14.

Muscle Energy Techniques, 3rd edn (Chaitow L et al 2006 Churchill Livingstone, Edinburgh)

Figure 7.15.

Sports and Exercise Massage: Comprehensive Care in Athletics, Fitness, and Rehabilitation (Fritz S 2006 Mosby, St Louis; Mosby's Career Development Series)

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CHAPTER 1

Headache types and neck pain and dysfunction



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INTRODUCTION

This first chapter provides an overview of various types of headache and neck pain. The content establishes a language for discussing headache and neck pain and creates the structure for the following chapters. Since headache and neck pain often occur together it is prudent to understand, assess, and treat the conditions in unison. Massage therapy applied to address the symptoms and causes of headache and neck pain can be very beneficial so long as the treatment is based on accurate information and safe and best practices.

HEADACHE

Headache is a common symptom with a multitude of causes. Headaches can be caused by stress, muscle tension, chemical imbalance, disordered breathing syndromes, nutritional disruption, side effects from medication, vascular dysfunction, sinus disorders, tumors, and many more internal and external influences. There are two basic headache types (Figure 1.1):

- Vascular type: fluid pressure with pain experienced as throbbing from the inside of the head out, usually classified as migraine although migraine is only one type of vascular headache.
- Tension type: soft tissue shortening, typically called muscle-contraction headache, although as we will learn, headache is more complicated than a short muscle problem. This headache is experienced as a squeezing on the outside of the head.

Because the brain has no sensory innervations, headaches do not originate in the brain but in the tissues surrounding the brain and in the muscles of the shoulders, neck and scalp. The pain of a headache is produced by pressure on the sensory nerves, vessels,

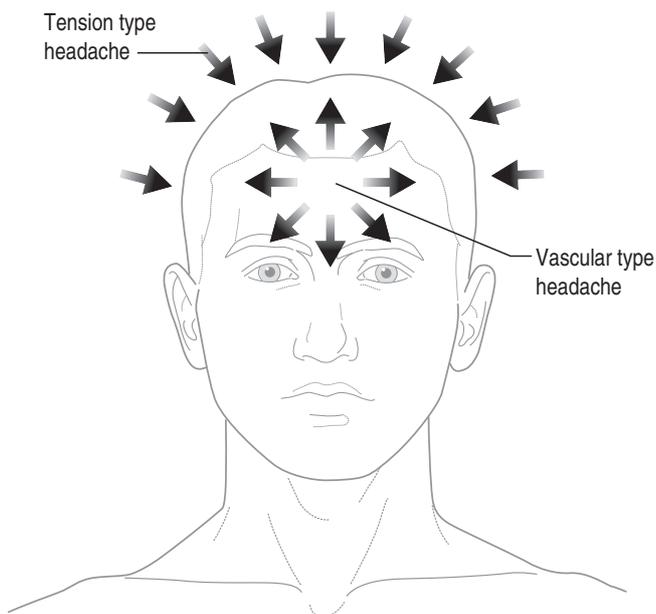


Figure 1.1 Mechanism of vascular- and tension-type headaches.

meninges, or the muscle–tendon–bone unit. This pressure is caused by two main factors:

- fluid pressure from various sources including dilation of blood vessels
- soft tissue shortening including connective tissue changes and muscle shortening.

Massage is most effective for the soft tissue shortening headache type and less so for the fluid pressure type.

Population distribution for headache

Headache is common and people of all ages and from all cultures experience headache (Box 1.1). Children often experience headache related to a vascular disruption (migraine type) or emotional problems that increase the stress response (soft tissue shortening type). Often children will have digestive upset in response to headache, i.e. they have a headache in their belly. Most can relate to being children and attempting to avoid school with a stomach ache.

Therapeutic massage provides a noninvasive and safe method for dealing with tension and stress related to headache pain.

Predisposing factors for developing headache

Three mechanisms seem to be related to developing headaches:

- A protective mechanism in response to what the body perceives as an external environmental stress. How the body responds to temperature, humidity,

and other environmental influences can predispose sensitive individuals to developing vascular headache. Common triggers of vascular headaches are stress, heat, food, or a lack of sleep. People with a predisposition to headache may have a lowered threshold of response to these external stressors.

- Response to disease due to infections caused by bacteria, viruses, and other pathogens related to the inflammatory response. Consider the muscle aching and headache typically experienced with influenza.
- Postural distortion, repetitive or sustained movement, and trigger point referred pain patterns.

HEADACHE CATEGORIES

For clinical purposes, the International Headache Society (IHS) divides headaches into two broad categories:

- *Primary* or benign (not due to an underlying cause): headaches with no organic or structural etiology, including tension headache, vascular (migraine) headache, cluster headache, and medication-overuse headache (MOH). Most primary headaches develop slowly over minutes, if not hours.
- *Secondary* (due to an underlying cause): headaches due to an underlying structural or organic disease such as related to a benign or malignant brain tumor, a brain aneurysm, hematoma, meningitis, brain abscess, cerebral hemorrhage, encephalitis or other infection, or various diseases of the brain, eye, ear, nose, etc. Fortunately, less than 5% of headaches are caused by tumors, and not all people with tumors experience headaches. Symptoms of serious headache that require immediate medical attention are a sudden, sharp, intense or severe pain, sudden lack of balance or falling, confusion, inappropriate behavior, seizures, and difficulty speaking.

Safety first

While not common it is important to recognize that headache can be a symptom of a much more serious condition that requires immediate medical attention. Individuals with a headache that involves any of the following need to be immediately referred for prompt medical care:

- sudden, severe headache
- sudden, severe headache associated with a stiff neck
- headache associated with fever
- headache associated with convulsions
- headache accompanied by confusion or loss of consciousness
- headache following a blow on the head

Box 1.1 Population distribution for headache in Japan, Turkey, and Thailand**JAPAN**

Based on the results of a questionnaire sent to 2462 high-school students, the overall headache prevalence was 41% in boys and 55.3% in girls. Headache onset was 12.8 years on average.

The prevalence of migraine without aura was 13.7% in boys and 17.5% in girls according to the modified International Classification of Headache Disorders (ICHD-II) diagnostic criteria (5.5% in boys and 6.1% in girls according to ICHD-I diagnostic criteria).

For tension-type headache, prevalence was 23.0% in boys and 30.6% in girls according to ICHD-I diagnostic criteria.

These findings are similar to past worldwide findings.

TURKEY

Headache prevalence in the Bursa province of Turkey was assessed based on a questionnaire and face-to-face interview with 2387 12- to 17-year-old students.

The prevalence of recurrent headache was 52.2%. Girls (59.8%) had significantly more recurrent headache than

boys (45.1%). The prevalence increased from 42.2% up to 60.7% with age.

Frequent episodic tension-type headache was the most common (25.9%) headache among Turkish adolescents, followed by migraine (14.5%).

THAILAND

Migraine prevalence among 1789 12- to 14-year-old students in Bangkok, Thailand was assessed using a questionnaire screening survey followed by an interview and physical examination. Among the students, migraine was diagnosed in 13.5% (44.7% boys and 55.3% girls). Six children had chronic daily headache in addition to migraine.

Twenty-seven per cent of students had a relative with migraine. Migraine triggers were reported in 33.8%, including stress from school activities (52.3%).

The study confirms that migraine prevalence in Thai students is as high as in Western countries.

The above studies were presented as abstracts at the XII Congress of the International Headache Society in Kyoto, Japan, October 9–12, 2005. Sources: Japan: Suzuki et al (2005); Turkey: Karly et al (2005); Thailand: Visudtibhan et al (2005).

For education resources, see eMedicine's Headache Center. Also, visit eMedicine's patient education articles *Causes and Treatments of Migraine and Related Headaches*, *Cluster Headache*, *Migraine Headache*, *Alternative and Complementary Approaches to Migraine and Cluster Headaches*, *Tension Headache*, and *Understanding Migraine and Cluster Headache Medications*.

Prepared by: Office of Communications and Public Liaison, National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, MD 20892.

- headache associated with pain in the eye or ear
- persistent headache in a person who was previously headache free
- recurring headache in children
- headache which interferes with normal life.
- *Daily headache*: If chronic, this type of headache should be promptly treated to avoid developing an addiction to pain-relieving drugs. It is often accompanied by depression or other emotional problems, and sleep disturbance.
- *Episodic headache*: Occurs occasionally, sometimes associated with hormone fluctuations, physical activity, or changes in sleep or food consumption.

Primary headache*Tension-type headache*

Tension-type headaches are the most common, affecting approximately 75% of all headache sufferers. The pain is typically generalized all over the outside of the head, often with accompanying neck and shoulder pain and stiffness. There appears to be a slightly higher incidence of this type of headache among women. It appears that at least one factor contributing to tension-type headache is hyper- and habitual sensitivity of spinal nerves at the dorsal horn (central sensitization) (Bendtsen 2000).

There are two kinds of tension-type headache:

Causes of tension-type headache

- Muscle–tendon strain and trigger point development at the attachment of the trapezius and deep neck muscles at the occipital bone or at the attachment of the frontalis muscle on the frontal bone (occipital or frontal headaches).
- Old injuries or trauma to the neck can create headaches many years later. Repeated strain or minor injury to the neck may be all that is necessary to precipitate the headache.

- Strain in the temporomandibular joint muscle complex. Temporomandibular joint dysfunction (TMJD) involves the muscles that move the lower jaw and the temporomandibular joints where the lower jaw connects to the skull. Physical and emotional stress is a common causal factor. Common symptoms of TMJD include pain behind the eyes, in the sinuses, and in the ears (without infection), chronic neck and shoulder pain, stuffy sensation and noise or ringing in the ears, 'locked' jaw, burning sensation in the throat, tongue and nose, and dry mouth.
- Connective tissue structures that support the head may be implicated in headache if they are shortened and pull the head or scalp into nerves, creating pain. Conversely, if connective tissue support structures are lax and fail to support the neck and head, nerve structures may be compressed as well.
- Trigger point referred pain patterns including trigger points in scalene, suboccipital, sternocleidomastoid, upper trapezius, masseter, pterygoids, temporalis, occipital frontalis and other muscles of the region (Fernández-de-las-Peñas et al 2006).

Predisposing factors include:

- headgear and hats that put pressure on pain-sensitive structures
- squinting under bright lights or in the sun
- dehydration
- blood flow changes
- overbreathing tendency
- blood sugar changes
- impact trauma that increases neck muscle tension
- changes in activity that strain upper body muscles and joints
- sleep disturbance
- teeth grinding
- emotional strain.

Vascular-type headache

Migraine. Migraine is considered a vascular headache because it is associated with changes in the size of the arteries inside and outside of the brain. Some researchers believe that migraine is an inherited disorder that somehow affects the way serotonin is metabolized in the body. Serotonin is the primary neurochemical trigger in migraine-type headache. For women, migraine tendency is also the way that serotonin interacts with female hormones.

Migraine headache pain appears to be caused by dilation of the cranial vessels when a biochemical

change in the brain, stimulates the trigeminal nerve. This triggers serotonin release in the blood vessels and the brain, which alters blood flow, bypassing the capillaries and going through shunts to the veins, resulting in distension. The nerves around the blood vessels release chemicals which cause inflammation, eliciting pain signals into the brain.

The pain is knife-like, throbbing, and usually only on one side of the head. Visual distortion, such as flashing lights, is caused by vasoconstriction preceding the vasodilation and pain. A migraine is associated with nausea; vomiting; sensitivity to light, sound, and smells; sleep disruption; and depression. Hands and feet may feel cold and sweaty. The length of a migraine attack can last from several hours to several days. These attacks can be incapacitating. During a migraine, people often prefer to rest or sleep alone in a dark, quiet room. Applying cold packs to the head or pressing on the bulging artery in front of the ear on the painful side of the head may provide temporary pain relief.

Attacks can occur at any age, but usually begin between the ages of 10 and 40 and commonly reduce in frequency and intensity after age 50. Some people experience several migraines a month, while others have only a few migraines throughout their lifetime.

Migraine types. Migraine headaches are classified according to the symptoms they produce. The two most common types are migraine with aura and migraine without aura.

- *Migraine with aura:* An aura is a group of neurologic symptoms that sometimes occurs 10–30 minutes before the head pain begins. Most auras are visual and are described as bright, shimmering lights around objects or at the edges of the field of vision, zigzag lines, wavy images, or hallucinations. Others experience temporary vision loss.

Nonvisual auras include motor weakness, speech or language abnormalities, dizziness, vertigo, and tingling or numbness (paresthesia) of the face, tongue, or extremities.

About one in five migraine sufferers experiences an aura. There is a correlation between migraine with aura and the development of cardiovascular disease.

- *Migraine without aura:* Migraine without aura is the most common type and may occur on one or both sides of the head. Fatigue and mood changes may be experienced the day before the headache. Nausea, vomiting, and sensitivity to light (photophobia) often accompany migraine without aura.

Additional migraine headache types include the following:

- Basilar artery migraine involves a disturbance of the basilar artery in the brainstem. Symptoms include severe headache, vertigo, double vision, slurred speech, and poor muscle coordination. This type occurs primarily in young people.
- Carotidynia, also called lower-half headache or facial migraine, produces deep, dull, aching, and sometimes piercing pain in the jaw or neck. There is usually tenderness and swelling over the carotid artery in the neck. This type occurs more commonly in older people.
- Ophthalmoplegic migraine begins with a headache felt in the eye and is accompanied by vomiting. The eyelid droops (ptosis) and nerves responsible for eye movement temporarily become paralyzed. Ptosis may persist for days or weeks.
- Status migraine is a rare type involving intense pain that usually lasts longer than 72 hours. Hospitalization is often required for effective treatment.
- Hemiplegic migraine is a rare but severe type of migraine with aura and often begins with temporary motor paralysis and/or sensory disturbances on one side of the body, which may be accompanied by numbness or the 'pins and needles' sensation. When the headache appears, the initial neurologic symptoms may disappear.
- Retinal migraine starts with a temporary, partial, or complete loss of vision in one eye. It is followed by a dull ache behind that eye that may spread to the rest of the head.
- Abdominal migraine is difficult to diagnose because the pain is felt in the abdomen. Nausea, vomiting and diarrhea may occur, and the pain usually occurs in the middle of the abdomen. This migraine type occurs mostly in children.
- Menstrual migraines are primarily caused by estrogen, the female sex hormone that specifically regulates the fluctuations that occur throughout the menstrual cycle. When the levels of estrogen and progesterone change, women will be more vulnerable to headaches. Menstrual migraine can occur before, during or immediately after the period, or during ovulation. Because oral contraceptives influence estrogen levels, women on birth control pills may experience more menstrual migraines.
- Premenstrual syndrome (PMS) headaches are associated with a variety of symptoms that distinguish

them from the typical menstrual migraine. The symptoms include headache pain accompanied by fatigue, acne, joint pain, decreased urination, constipation, lack of coordination, an increase in appetite and a craving for chocolate, salt, or alcohol. Emotional disturbance can occur including panic attacks, decreased sexual desire, impaired judgment or memory, sensitivity to rejection and even paranoia. These symptoms usually disappear when menstruation begins.

- Pregnancy-related headache. Pregnancy seems to protect women against migraines because the female hormones – estrogen and progesterone – remain fairly constant throughout pregnancy. However, some women do get vascular-type headaches. As this type of migraine typically occurs during the first trimester of pregnancy, when the fetus would be most susceptible to drug-induced deformities, all medications should be avoided.
- Headaches after labor and delivery. It is very common for new mothers to suffer from headaches, usually tension type. Migraine sufferers may also get postnatal migraines, although the headache will probably be milder than a typical full-blown attack. Postpartum headaches correlate with the sharp fall in estrogen and progesterone levels that follow labor and delivery.
- Menopause related. While migraines tend to become less frequent as women get older, they can also spontaneously increase or worsen during menopause. It is the drop in estrogen that triggers the migraine.
- Estrogen replacement therapy headache. Female hormones (estrogen and progesterone or estrogen alone) taken to treat menopausal symptoms may immediately worsen headaches, or prolonged use may worsen them over time. Men being treated with estrogen-type medications for prostate conditions including cancer may experience hormone-related headaches.

Additional vascular headache types. Not all vascular headaches are migraine type. The pressure causing the headache pain is caused by vasodilation but for reasons other than the influence of serotonin. Non-migraine vascular headaches include the following:

- *Benign exertion headache:* Benign exertion headache is brought on by running, lifting, coughing, sneezing, or bending. The headache begins at the onset of activity, and pain rarely lasts more than several minutes.
- *Toxic headache produced by fever:* Pneumonia, influenza, measles, mumps, and tonsillitis are among the diseases that can cause severe toxic vascular

headache. Toxic headaches can also result from the presence of foreign chemicals in the body.

- **Cluster headache:** Cluster headaches are relatively rare, affecting about 1% of the population. They are distinct from migraine and tension-type headaches with 90% of the sufferers being male. A history of heavy smoking and drinking is common, and alcohol often triggers attacks. The pain is extremely severe but the attack is brief, typically lasting no longer than 2 hours. The pain occurs around one eye, which unusually becomes inflamed and watery. There may also be nasal congestion on the affected side of the face. Cluster headaches come in groups or clusters lasting weeks or months and often occur at about the same time each day. A person can go into long periods of remission. No cause has been determined for this type of headache, but most can be controlled with adequate treatment.

Note: Referred pain from trigger points in the sternocleidomastoid, suboccipital, and various head and facial muscles can mimic vascular headache pain patterns.

Columns A and B in Box 1.2 show the symptoms commonly seen in two types of headache. Some people have

both these types of headache. It is common for a tension-type headache to accompany a vascular-type headache.

Additional headache types

While tension and vascular headaches are the most common, other headache types include rebound headache, withdrawal headache, and sinus headache.

Rebound headache. Rebound headache may occur among people with tension-type headaches as well as in those with migraines. The cause seems to be the result of taking prescription or nonprescription pain relievers daily or almost every day. If prescription or nonprescription pain relievers are overused, headache may 'rebound' as the last dose wears off, leading one to take more and more pills.

Withdrawal headache. This headache occurs as the body adjusts to a chemical change from removing a chemical substance from the body. Typically the headache occurs from changes in vascular function, muscle tone, and detoxification. Common substances that can cause withdrawal headache are elimination of caffeine, various neurotransmitter-based medications, recreational drugs, and alcohol. Withdrawal headaches subside as soon as the withdrawal process is complete.

Sinus headache. Sinuses are spaces in the bones of the face and are filled with air. Their secretions must be able to drain freely into the nose. When a sinus becomes inflamed, localized pain with pressure and throbbing in the face as opposed to the head will occur.

Box 1.2 Symptoms in tension- and vascular-type headaches

Symptom	A (Tension)	B (Vascular)
Intensity of pain		
Mild to moderate	•	•
Moderate to severe	•	•
Intense, pounding, throbbing and/or debilitating		•
Distracting but not debilitating	•	
Steady ache	•	
Location of pain		
One side of head		•
Both sides of head	•	•
Associated symptoms		
Nausea/vomiting		•
Sensitivity to light and/or sounds		•
Aura before onset of headache such as visual symptoms		•

For more information, contact the National Headache Foundation at www.headaches.org.

NECK PAIN

The neck contains many vital anatomic structures, the most critical being the airway, the spinal cord, and the blood vessels that supply the brain. The neck is a complex and crowded area where all of the structures have to be maintained in an optimal relationship to each other.

General anatomy of the neck

The neck anatomy includes the cervical vertebrae. This is an area of many joints that combine to allow flexion, extension, rotation, and many combinations of these movements (Figure 1.2). These movements orient the head and ultimately the eyes, ears, and nose in many different directions. The soft tissues in this area have to supply stability to maintain the position of the head as well as mobility for both large and small precise movements.

There are many vessels and nerves in this area, including the cervical and brachial plexus (Figure 1.3). Impingement is common, with referral patterns into the head, neck, down into the chest, and arm. If the

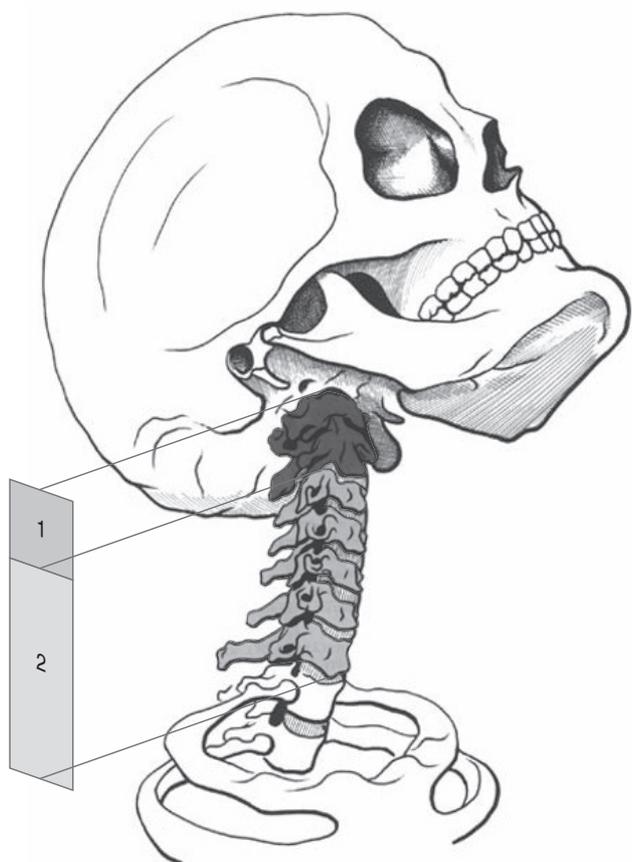


Figure 1.2 The upper and lower functional units are both anatomically and functionally distinct. (Reproduced with permission from Kapandji 1998.)

cervical plexus is impinged, the person most likely will have headaches, neck pain, and breathing difficulties. The muscles most responsible for pressure on the cervical plexus are the suboccipital and sternocleidomastoid muscles. Shortened connective tissue at the cranial base also presses on these nerves. Many cutaneous (skin) branches of the cervical plexus transmit sensory impulses from the skin of the neck, ear area, and shoulder. The motor branches innervate muscles of the anterior neck. Impingement causes pain in these areas.

The brachial plexus is situated partly in the neck and partly in the axilla and consists of virtually all the nerves that innervate the upper limb. Any imbalance that increases pressure on this complex of nerves can result in pain in the shoulder, chest, arm, wrist, and hand. The muscles most often responsible for impingement on the brachial plexus are the scalenes, pectoralis minor, and subclavius muscles. The muscles of the arm also occasionally impinge on branches of the brachial plexus. Brachial plexus impingement is responsible for thoracic outlet symptoms, which often are misdiagnosed as carpal tunnel syndrome.

Whiplash illness and injury, stingers, and burners often cause impingement on the brachial plexus.

Muscle structure of the neck

Understanding muscle location and action help one understand the way muscle dysfunction can cause neck pain.

- *Local muscles:* The local muscles produce fine precise movement and stability, and are located deep and near bone. The attachments are contained within the cervical region and base of the skull. The local muscles serve to stabilize the cervical vertebrae and guide movement, making it more precise. It is often this deeper layer of muscle that creates the tight, 'want to crack the neck' sensation.
- *Global muscles:* The global muscles, being more superficial, comprise the first and second layer of tissue and are involved in large movements, movements requiring strength and, if necessary, stability. The global muscles attach in the cervical area as well as into the head, torso, and upper limbs.

The neck has both local and global muscle patterns that can become problematic. In addition, the connective tissue structures of the area are a major factor in dysfunction.

The area consists of three or four tissue layers depending how you interpret the anatomy. The occipital base area is the transition point from the head to the neck. Transition areas usually involve fairly mobile jointed areas. The joint in this area is the atlas. Local muscles are involved in the stability of this area and consist primarily of the suboccipital group. These muscles also act as proprioceptive feedback stations on the position of the head in relationship to the rest of the body and are involved with the ocular, tonic neck, and pelvic reflexes for maintaining posture and balance. In some instances, the suprahyoid muscle may also work to balance the head, exerting a small counterforce to the suboccipital muscles.

The global muscles that can influence the occipital base are the sternocleidomastoid, platysma, semispinalis, splenius capitis, and trapezius. Local muscles include the scalenes, levator scapula, longissimus cervicis, semispinalis cervicis, iliocostalis cervicis, spinalis, longus colli, and infrahyoids, as well as the multifidi, rotatores, interspinales, and intertransversarii at each individual vertebra (Figure 1.4).

The muscles that insert on the ribs often become short with upper chest breathing patterns. The outcome of this would be chronic overbreathing and breathing pattern syndrome symptoms. Sympathetic dominance will increase muscle motor tone in the area.

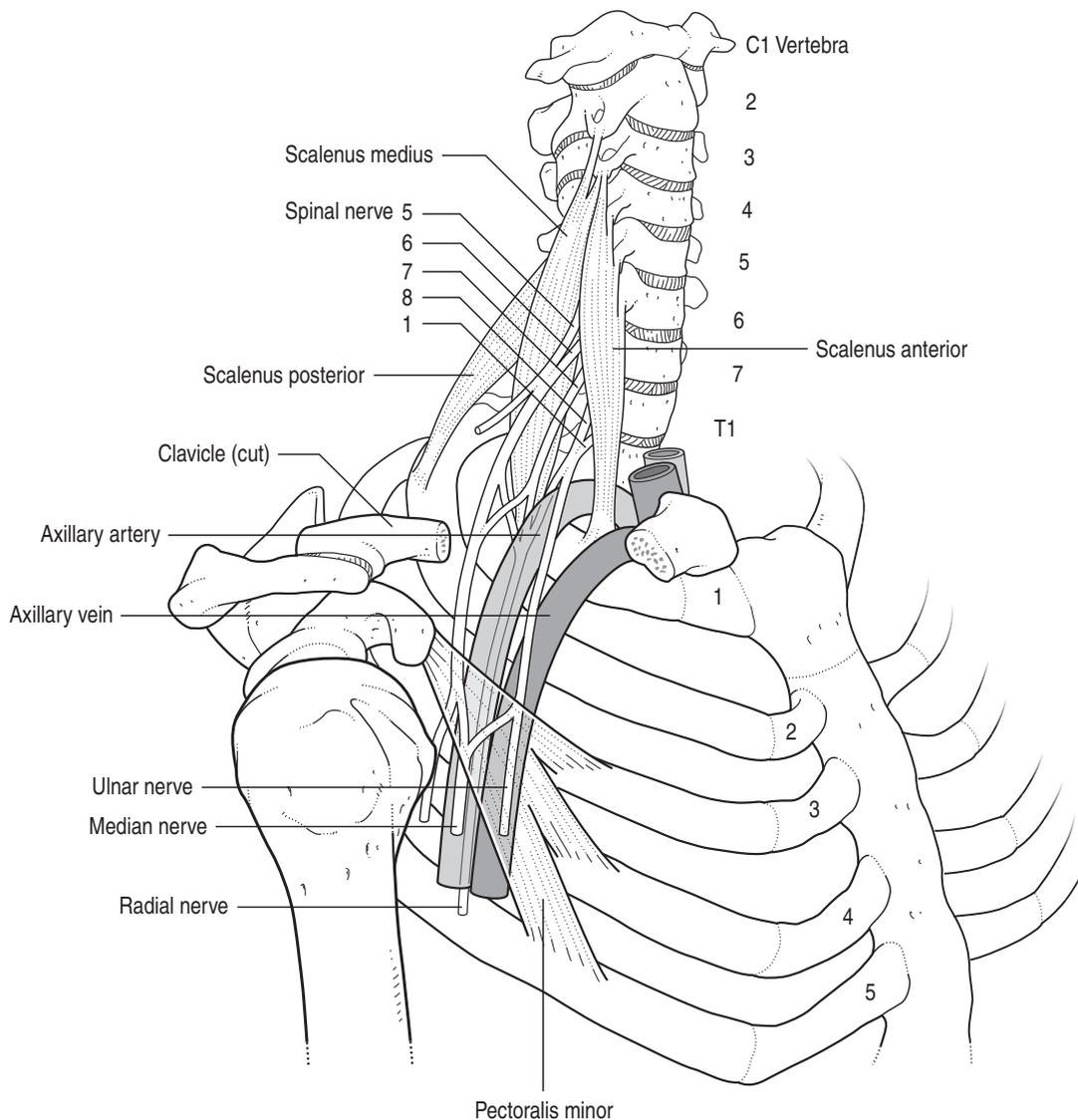


Figure 1.3 Upper aperture as the thoracic outlet/inlet. (From Chaitow 2002.)

It is difficult to list individual muscles that can influence any particular area since the body is such an interconnected structure; however, these are the main muscles that affect local joint stability and proprioceptive information and global movement of this area. These muscles often develop trigger points which can refer pain as well as be a source of localized pain and dysfunction. Trigger points develop as an adaptive mechanism and, especially in the neck, stability is a major concern. As trigger point development can contribute to stability, it is therefore important to understand the reason for trigger point development as well as the entire interaction of short and long muscle/soft tissue.

SUMMARY

National Institute of Neurological Disorders and Stroke (NINDS) health-related material is provided for information purposes only and does not necessarily represent endorsement by or an official position of the NINDS or any other Federal agency. Advice on the treatment or care of an individual patient should be obtained through consultation with a physician who has examined that patient or is familiar with that patient's medical history.

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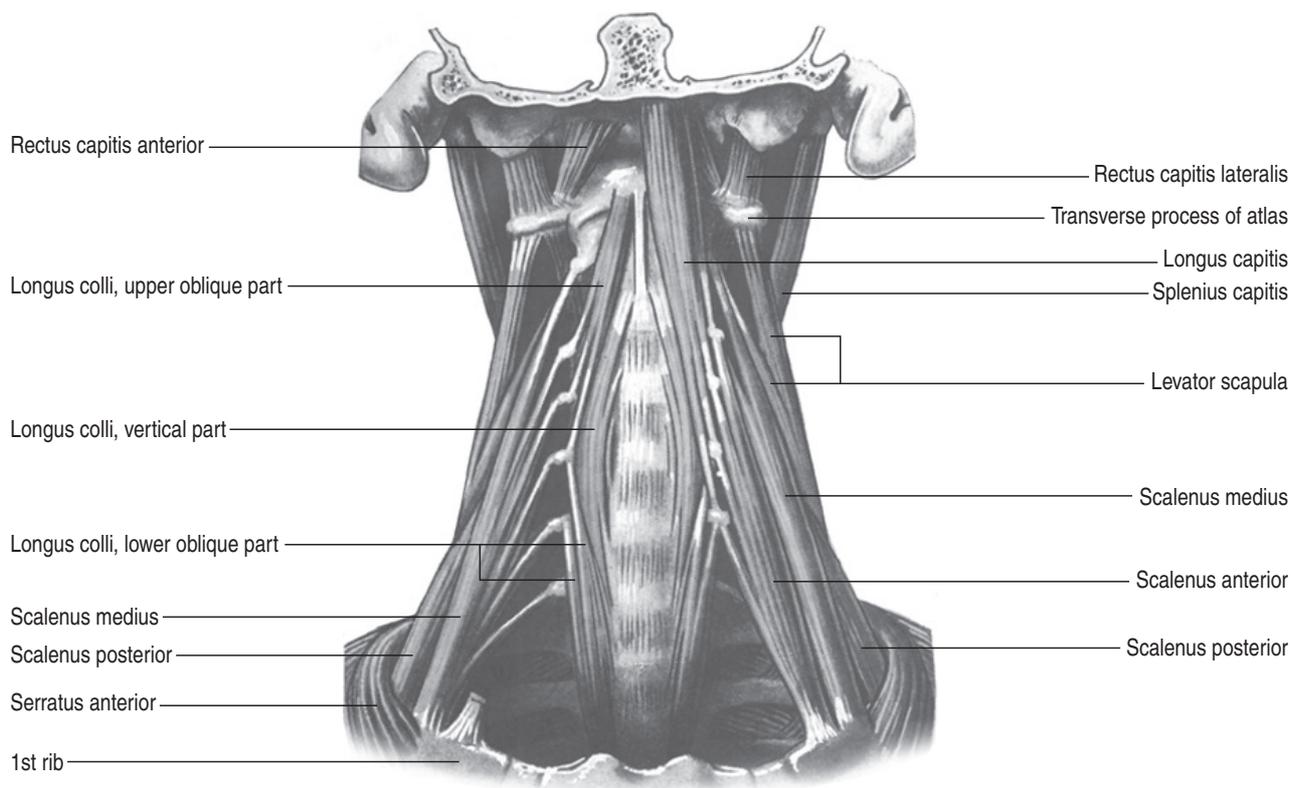


Figure 1.4 Scalenus anticus is removed from the left side of this drawing to reveal attachment of scalenus medius deep to it. The styloid process has also been removed anterior to rectus capitis lateralis. (Reproduced with permission from *Gray's Anatomy* 1999.)

KEY POINTS

Headache and neck pain are common conditions:

- Headache and neck pain often occur together and relate to each other.
- Stress is a common causal factor for headaches and neck pain.
- Headache is simply classified as vascular type and soft tissue tension type.
- Headache can be primary or secondary due to other disease and disorder.
- Primary headache can be caused by soft tissue dysfunction or vascular dysfunction.

- Many different activities, environmental factors, and changes in physiologic function can predispose one to headache.
- Neck pain can occur from traumatic or repetitive strain.
- Neck pain is usually due to postural dysfunction.
- Neck pain can be due to soft tissue dysfunction or nerve entrapment.
- Massage can address symptoms and dysfunction related to headache and neck pain.

Additional information

NINDS conducts research relating to headaches at its laboratories at the National Institutes of Health (NIH), and supports additional research through grants to major medical institutions across the country. NINDS also supports and conducts studies to improve the diagnosis of headaches and to find ways to prevent them.

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Related NINDS publications and information
21st Century Prevention and Management of Migraine
Headaches: Summary of a workshop on 21st

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- Chronic Pain: Hope Through Research*: Chronic pain information page compiled by the National Institute of Neurological Disorders and Stroke (NINDS).
- NINDS Chronic Pain Information Page*: Chronic pain information page compiled by the National Institute of Neurological Disorders and Stroke (NINDS).
- NINDS Migraine Information Page*: Migraine information sheet compiled by the National Institute of Neurological Disorders and Stroke (NINDS).

CHAPTER 2

How headaches and neck pain occur, and when is pain a sign of a serious condition?



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INTRODUCTION

In Chapter 1 headache and neck pain types were described. This chapter provides information on the causes of headache and neck pain. As presented in Chapter 1:

- Vascular headaches are thought to involve abnormal function of the brain's blood vessels or vascular system.
- Muscle-contraction headaches appear to involve the tightening or tensing of facial and neck muscles and soft tissue structures. This headache type can occur occasionally (episodic) or become chronic. Tension headache is named not only for the role of stress in triggering the pain, but also for the contraction of neck, face, and scalp muscles brought on by stressful events.

Some people have more than one type of headache (Leistad et al 2006).

HEADACHE CAUSAL FACTORS

Breathing pattern disorder

Breathing pattern disorder (BPD) can be simply defined as breathing in excess of need based on activity. The extreme of a BPD is hyperventilation syndrome (HVS), which is defined as breathing in excess of metabolic requirements. The effects of BPDs are bodywide, affecting all systems, having profound neurologic, psychological, digestive, and circulatory influences. BPDs commonly are habitual, and with a cooperative patient, usually are capable of significant improvement over a 3- to 6-month timeframe. Breathing pattern disorders can be both causal and perpetuating factors of headache (tension and vascular) and neck pain. Therapeutic massage intervention coupled

with breathing retraining is effective in breaking the cycle of headache pain and neck stiffness and aching. About 10% of all patients attending general internal medicine practice in the US are estimated to be suffering from chronic hyperventilation (Lum 1987). The author's clinical experience with this sort of problem suggests that a large patient population exists with BPDs who do not meet the criteria for hyperventilation but whose breathing patterns contribute greatly to their symptom picture.

HVS/BPD is female dominated, ranging from a ratio of 2:1 to 7:1 (peak ages 15–55 years). Women are more at risk, possibly because progesterone is a respiratory accelerator. This can also have implications for women on hormone replacement therapy. During the postovulation phase, carbon dioxide levels drop about 25% and additional stress then 'increases ventilation at a time when CO₂ levels are already low' (Damas-Mora et al 1980). The vast majority of people who chronically overbreathe experience symptoms such as fatigue, widespread pain (e.g., fibromyalgia), irritable bowel symptoms, chronic bladder problems, anxiety, allergies, chemical sensitivities, headaches, premenstrual syndromes, photophobia, and increased sensitivity to noise. In many such conditions, BPDs rarely are causal (except perhaps if anxiety is a major feature), but they almost always are contributory, and sometimes become a major obstacle to recovery.

Excessive carbon dioxide loss during overbreathing causes blood pH to rise, creating respiratory alkalosis causing sympathetic arousal and altering nerve function (including motor control). Calcium and magnesium ions are lost as the kidneys attempt to restore pH balance by excreting bicarbonate. This enhances neural sensitization, encouraging spasm and reducing pain threshold. Smooth muscle cells constrict, leading to vasoconstriction and possibly altering fascial tone, causing connective tissue to shorten. Smooth muscle constriction can lead to colon spasm and pseudo-angina. Breathing pattern disorders automatically increase levels of anxiety and apprehension (Ford et al 1995, Ramachandran et al 2006).

Due to alkalinity, the so-called Bohr effect reduces oxygen release to the cells because hemoglobin retains oxygen more effectively in an alkaline environment. This reduction in oxygen availability affects tissues and the brain, encouraging ischemia, fatigue, and pain. Ischemia encourages the development of myofascial trigger points.

Overbreathing creates biomechanical overuse stresses, particularly on the accessory breathing muscles (scalenes, sternomastoid, upper trapezius, etc.). There is evidence that the effects of BPDs interfere

with motor control, a key component in spinal (and all joint) injury prevention. Loss of motor control involves failure to control joints, commonly because of poor coordination of agonist–antagonist muscle coactivation and trigger point development (Wheeler 2004).

Blood sugar and BPD

Feelings of faintness, cold sweats, weakness, and disturbed consciousness are common to BPD, HVS and low blood sugar, and symptoms are far worse when both situations are present at the same time.

- During overbreathing, both EEG and cortical function deteriorate when glucose values are below 100 mg.
- Three minutes of hyperventilation presents mild effects when blood sugar is in the 85–90 mg range, but with blood sugar at 70–75 mg (still within normal range), gross EEG disturbances are noted.

It has also been found that fluctuating blood glucose levels, even when these stay within normal limits, can trigger HVS/BPD symptoms. People affected in this way are recommended to eat breakfast (including protein) and to avoid going without food for more than 3 hours or to follow a little-and-often or 'grazing' pattern of eating. This is particularly important to patients who experience panic attacks or seizures.

Theories on the causes of vascular headache

Since vasoconstrictors (e.g., ergot) can improve vascular headache symptoms and vasodilators (e.g., nitroglycerin) can cause a vascular headache attack, most theories about the cause of vascular headache involve blood flow to the brain.

People who get vascular headaches appear to have blood vessels that overreact to various triggers. Although many sufferers have a family history of migraine, the exact hereditary link is unknown. People who get migraines are thought to have an inherited abnormality in the neuron regulation of blood vessels. Some individuals who have migraine may have low magnesium levels in the brain and lactic acidosis, which lead to membrane instability. Some researchers have proposed that the neurotransmitters dopamine and serotonin play a role (Datta & Kumar 2006, Di Piero et al 2001, Sahai et al 2005, Sicuteri 1977, Szilagyi et al 2006).

Even though the exact causal factors for vascular headaches remain ambiguous, there is general agreement that a key element is blood flow changes in the brain. The following is a proposed sequence for development of a vascular-type headache:

- Something triggers the nervous system to respond by causing a spasm of the arteries supplying blood to the brain, including the scalp artery and the carotid or neck arteries – vasoconstriction.
- Blood flow to the brain is reduced.
- Serotonin levels increase and since serotonin is a powerful vasoconstrictor, the blood supply to the brain is further reduced, thus decreasing the brain's supply of oxygen.
- Symptoms signaling a headache, such as distorted vision or speech, may develop as a result of the decrease in oxygen supply.
- The reduced oxygen supply stimulates the arteries within the brain to dilate to meet the brain's energy needs – vasodilation.
- The dilation of the arteries triggers the release of pain-producing substances called prostaglandins and chemicals which cause inflammation and swelling, and substances which increase sensitivity to pain.
- Throbbing pain of migraine occurs.

Cluster headaches

Research studies have turned up several clues as to the cause of cluster headache but no answers. Unlike migraine headaches, cluster headaches do not appear to be the result of heredity. Studies of cluster headache patients show that they are likely to have hazel eyes and that they tend to be heavy smokers and drinkers. Interestingly, both nicotine (which constricts arteries) and alcohol (which dilates them) trigger cluster headaches. The exact connection between these substances and cluster attacks is not known.

Because the level of histamine increases in a person's blood and urine during a cluster headache, many researchers believe that histamines, which dilate or expand blood vessels, influence a cluster headache. Antihistamines have not proven, however, to be effective therapy.

Sleep disorders are associated with cluster-type headache

Vascular headache triggers

Triggers include stress and other normal emotions, as well as biological and environmental conditions. Fatigue, glaring or flickering lights, changes in the weather, and certain foods can set off migraine (Zivadinov et al 2003) (Box 2.1).

Food

Scientists believe that certain foods contain chemical substances, such as tyramine, which constrict arteries – the first step of the migraine process. Tyramine is found in red wines and most alcoholic beverages;

Box 2.1 Triggers for vascular headache

- Environmental factors (e.g., weather, altitude, time zone changes)
 - Changes in barometric pressure
 - Changes in altitude
 - Glare and flickering lights
 - Perfume and other chemical scents
- Lifestyle
 - Stress
 - Fatigue
 - Oversleeping or lack of sleep
 - Fasting or missing a meal
- Physiologic
 - Menses
 - Hormonal changes

aged cheeses and processed meats (including pizza and hot dogs); peanuts; chicken livers; pickled foods; sourdough bread; bread and crackers containing cheese; broad beans, peas, and lentils. Foods to eat in moderation include avocados, bananas, citrus fruits, figs, raisins, red plums, raspberries, and chocolate.

It is possible that foods cause headaches by setting off an allergic reaction in susceptible people. Caffeine can cause headaches as well as cure them. Heavy coffee drinkers often get headaches when they try to break the caffeine habit.

Additives

Nitrates and nitrites (usually in processed meats), yellow (annatto) food coloring, and monosodium glutamate (MSG) are well-known trigger factors.

- Repeated exposure to nitrite compounds can result in a dull, pounding headache that may be accompanied by a flushed face. Nitrite, which dilates blood vessels, is found in such products as heart medicine and dynamite, but is also used as a chemical to preserve meat.
- Eating foods prepared with MSG can result in headache. Canned or processed foods, Chinese foods, meat tenderizer, seasonings such as soy sauce, and a variety of packaged foods contain this chemical, which is touted as a flavor enhancer.
- Aspartame and other artificial sweeteners can trigger migraine.

Poisons

Headache can also result from exposure to poisons – even common household varieties such as insecticides,

carbon tetrachloride, and lead. Children who ingest flakes of lead paint may develop headaches.

Artists and industrial workers may experience headaches after exposure to materials that contain chemical solvents. These solvents (e.g., benzene) are found in turpentine, spray adhesives, rubber cement, and inks.

Medication

Drugs such as amphetamines can cause headaches as a side effect. Another type of drug-related headache occurs during withdrawal from long-term therapy with the antimigraine drug ergotamine tartrate. Oral contraceptives can perpetuate headache.

Stress

Scientists report that people can develop migraine not only during a period of stress but also afterwards when their vascular systems are still reacting. For example, migraines that wake people up in the middle of the night are believed to result from a delayed reaction to stress (Leistad et al 2006, Moschiano et al 2003, Nash & Theborge 2006, Scher et al 2004, Spierings et al 2001, Toth 2003).

MUSCLE/SOFT TISSUE CONTRACTION – TENSION-TYPE HEADACHE

People typically experience a sensation of a tight band around their head creating squeezing, pulling, or pressure sensations. The person can experience a tightness around the neck or even feel as if their head and neck were in a cast, and only certain positions seem to provide relief. The muscles between the head and neck can tighten for hours or days, creating pressure and stiffness. The pain is continuous, annoying, but not throbbing, and primarily occurs in the forehead, temples or the back of the person's head and/or neck and shoulders.

Causes

- Postures that tense head and neck muscles, such as holding one's chin down while working on the computer or tilting the head back while looking up such as when painting a ceiling, and a forward head position such as when riding a bike, prolonged driving, eye strain, holding a phone between the shoulder and ear, gum-chewing, and tight or heavy headgear can lead to headache.
- Environmental causes include excessive and/or persistent noise; bright, flickering light (usually fluorescent); and poor air quality and ventilation.

- Degenerative arthritis of the neck.
- Temporomandibular joint dysfunction (TMJD): As described in Chapter 1, TMJD is a disorder of the muscles and joint between the temporal bone (above the ear) and the mandible or lower jaw bone. The disorder results from poor bite and jaw clenching.
- Disordered breathing from using the upper chest, shoulder and neck muscles to expand the chest during inhalation is a major contributor to chronic muscle-contraction headache. As previously described, disordered breathing function is related to depression and anxiety.
- Trigger point referred pain (Alvarez & Rockwell 2003).

For many people depression and anxiety are the underlying cause of chronic muscle-contraction headaches. The chronic tension-type headache is generally the result of – not necessarily the cause of – either anxiety or depression. The person may not realize that they are feeling anxious or are in a state of depression. Depression is a serious condition that needs to be appropriately diagnosed and treated. Treatment is best provided in a multidisciplinary approach that includes medical, psychological, physical, and spiritual intervention. Depression can be the result of external events (reactive depression) or medications, or be caused by an underlying psychological illness or biochemical depression (Box 2.2). Depression and anxiety can be diagnosed and managed through medical attention (Juang et al 2000, Puca et al 1999, Strine et al 2006, Zwart et al 2003).

NECK PAIN

Most shoulder and neck pain results from injury to muscles and ligaments. The spinal cord, heart, lungs, and some abdominal organs can also cause referred pain to the neck and shoulder area. Neck troubles can bring on a host of other symptoms, including headaches, pains in the scalp, face or ears, dizziness, pressure behind the eyes, fainting, and pain or soreness in the shoulder or arm.

As neck muscles tense they shorten, thus inhibiting the head's full range of motion. The neck is an area where stability has been sacrificed for mobility, making it particularly vulnerable to postural strain and injury. Most neck pain is associated with poor posture and repetitive strain. Common are serial postural distortion patterns such as upper and lower crossed syndrome as found in Chapter 6 and development of trigger points, which is found in Chapter 7.

Box 2.2 Factors associated with anxiety or depression**PHYSICAL SYMPTOMS ASSOCIATED WITH ANXIETY OR DEPRESSION**

- Changes in sleep patterns: if headaches are related to anxiety, then the person may have trouble falling asleep or suffer from insomnia; if headaches are associated with depression, then the person may wake up frequently during the night, awoken before they wanted to in the morning, or may be sleeping excessively (hypersomnia)
- Shortness of breath
- Constipation
- Nausea
- Weight loss or gain
- Persistent fatigue
- Decreased sexual drive
- Palpitations
- Dizziness

- Unexpected crying
- Menstrual changes

EMOTIONAL SYMPTOMS ASSOCIATED WITH DEPRESSION

- Feelings of guilt
- Hopelessness
- Unworthiness
- Fear of mental or physical disease or death
- Poor concentration, little ambition, no interest in life, indecisiveness, or poor memory

JOB CONFLICTS**PERSONAL RELATIONSHIPS**

Neck strains and sprains occur from acute injury to the neck and do not involve serious injury to vital structures in the cervical area, nor are they associated with fractures or dislocations of any of the bones of the cervical spine.

Because the head, neck, and rest of the back are so closely related structurally, a person who suffers with problems in one area could possibly eventually suffer with problems in another.

Causes of neck pain

Various causes of neck pain are outlined in Box 2.3. One cause (impingement and injury) is considered in more detail below.

Impingement and injury. Nerve impingement occurs when the normal space for the nerve is reduced. Impingement can occur as a result of bone or soft tissue pressing on nerves. The cervical and brachial plexuses are

Box 2.3 Causes of neck pain

- Postural dysfunction, improper movement and static position
- Exaggerated curve in the lower back: there is natural slight 'S' curve in the spinal column, but if abdominal muscles are weak, the pelvis drops forward. As a result, the lower back develops an exaggerated lumbar curve (lordosis) to compensate, the upper back drops backward (kyphosis), and the neck goes forward
- Restrictive clothing
- Sleeping on the stomach
- Too soft or large a pillow
- Overbreathing and using auxiliary breathing muscles when not necessary
- Clenching and grinding the teeth
- Arthritis/degenerative joint disease: neck joints tend to deteriorate with age; those with a history of whiplash commonly develop joint degeneration in the neck

- Nerve injury as a result of trauma
- Disk dysfunction and nerve impingement: compressed cervical disk can cause neck pain. Disks are soft tissue bodies that provide padding between the vertebrae. When there is too much spinal stress or pressure, one or more disks can become compressed, putting pressure on the nerves that extend from the spinal cord to various other parts of the body – this is called impingement. The condition is sometimes called a pinched nerve. Pain occurs along the pathway of the nerve
- Soft tissue shortening can impinge nerves. Most common are the scalene muscles but any soft tissue in the cervical and upper shoulder region can shorten and press on nerves
- Trigger point referred pain patterns (Alvarez & Rockwell 2003)



Figure 2.1 Pure flexion–extension motion during whiplash injury. (With appreciation to AMTA Florida Chapter and artist Gaye Dell.)

often affected by impingement syndromes. Impingement can occur secondary to traumatic injury or from postural distortion and occasionally fluid retention.

Injuries to tissues that contract and move (e.g., muscles, tendons, and their attachments into bones) are called strains; injuries to the nonmoving structures (e.g., ligaments, joint capsules, nerves, bursae, blood vessels, and cartilage) are called sprains.

Injury to the cervical nerves can be caused by stretching or compression, especially when the head is flung backward (hyperextension) or forward (hyperflexion) or side to side resulting in whiplash (Figure 2.1). Auto accidents are responsible for many whiplash injuries. Injuries caused by rotation and compression (when the force of impact lands on the top of the head) can also result in neck strains or sprains.

WHEN IS PAIN A WARNING OF A MORE SERIOUS CONDITION?

Headache

The following signs and symptoms occurring in conjunction with headache indicate immediate referral for medical diagnosis and treatment:

- *Infection*: Meningitis and encephalitis headaches are caused by infections of meninges – the brain's outer covering – and, in encephalitis, inflammation of the brain itself. Infection of the sinuses, spine, neck, ears, and teeth can cause headaches.
- *Brain tumor*: Brain tumors are diagnosed in about 11 000 people every year. As they grow, these tumors sometimes cause headache by pushing on

the outer layer of nerve tissue that covers the brain or by pressing against pain-sensitive blood vessel walls. Headache resulting from a brain tumor may be periodic or continuous. Typically, it feels like a strong pressure is being applied to the head.

- *Stroke*: Headache may accompany several conditions that can lead to stroke, including hypertension or high blood pressure, arteriosclerosis, and heart disease. Headaches are also associated with completed stroke, when brain cells die from lack of sufficient oxygen.
- *Transient ischemic attacks (TIAs)*: Mild to moderate headaches are associated with TIAs, sometimes called 'mini-strokes', which result from a temporary lack of blood supply to the brain. The head pain occurs near the clot or lesion that blocks blood flow. The similarity between migraine and symptoms of TIA can cause problems in diagnosis. The rare person under age 40 who suffers a TIA may be misdiagnosed as having migraine; similarly, TIA-prone older patients who suffer migraine may be misdiagnosed as having stroke-related headaches.
- *Glaucoma*: Fluid pressure in the eye can trigger headache.
- *Spinal tap*: About one-fourth of the people who undergo a lumbar puncture or spinal tap develop a headache. Many scientists believe these headaches result from leakage of the cerebrospinal fluid that flows through pain-sensitive membranes around the brain and down to the spinal cord. The fluid, they suggest, drains through the tiny hole created by the spinal tap needle, causing the membranes to rub painfully against the bony skull. Since headache pain occurs only when the patient stands up, the 'cure' is to remain lying down until the headache runs its course – anywhere from a few hours to several days.
- *Head trauma*: Headaches may develop after a blow to the head, either immediately or months later. There is little relationship between the severity of the trauma and the intensity of headache pain. In most cases, the cause of the headache is not known. Occasionally the cause is ruptured blood vessels which result in an accumulation of blood called a hematoma. This mass of blood can displace brain tissue and cause headaches as well as weakness, confusion, memory loss, and seizures. Hematomas can be drained to produce rapid relief of symptoms.
- *Temporal arteritis*: Arteritis, an inflammation of certain arteries in the head, primarily affects people over age 50. Symptoms include throbbing headache, fever, and loss of appetite. Some patients experience blurring or loss of vision.

- *Trigeminal neuralgia*: Trigeminal neuralgia, or tic douloureux, results from a disorder of the trigeminal nerve. This nerve supplies the face, teeth, mouth, and nasal cavity with feeling and also enables the mouth muscles to chew. Symptoms are headache and intense facial pain that comes in short, excruciating jabs, set off by the slightest touch to, or movement of, trigger points in the face or mouth.

Neck

The following signs and symptoms occurring in conjunction with neck pain indicate immediate referral for medical diagnosis and treatment:

- *Severe pain from an injury*: After head or neck trauma, such as whiplash or a blow to the head. Severe pain over a bone might indicate a fracture or an injury to a ligament.
- *Shooting pain*: Pain radiating to the shoulder, between the scapulas or down the arm, or numbness or tingling in the fingers, may indicate brachial nerve plexus irritation. Neck pain from nerve irritation can last from 3 to 6 months or longer.
- *Loss of strength*: Weakness in an arm or a leg, signaled by dropping things, walking with a stiff leg and shuffling the feet, indicates the need for immediate evaluation.
- *Change in bladder or bowel habits*: Any significant change, especially a sudden onset of incontinence, could indicate a neurologic problem.
- *Broken collarbone or broken shoulder blade*: Fracture results in muscle spasm and pain into the neck.
- *Shoulder bursitis*: Can result in referred pain into the neck and a painful compensation pattern.
- *Heart attacks*: Heart attacks can cause shoulder or neck pain, known as 'referred' pain.
- *Rotator cuff injuries*: The rotator cuff is a group of muscles at the shoulder. Can result in referred pain into the neck, compensation and guarding.
- *Shoulder or acromioclavicular joint separation*: Results in referred pain, compensation and guarding.
- *Whiplash injury*: Injury to the ligamentous and muscular structures of the neck and shoulder can be caused by sudden acceleration or deceleration, as in a car accident.
- *Tendonitis*: The tendons connect the muscles to the bones. With strain, the tendons can become swollen and cause pain.
- *Gallbladder disease*: This can cause a pain referred to the right shoulder.

KEY POINTS

- People can experience multiple types of headache.
- Breathing pattern disorder is a major contributing or perpetuating factor in head and neck pain.
- Fluctuations in blood sugar can affect breathing function.
- Vascular headaches involve blood flow changes in the brain.
- Neurotransmitters can be a causal factor in migraine.
- Environment, lifestyle, and physiology can provide triggers for vascular headache.
- Tension-type headache involves more mechanical causes such as posture distortion and repetitive strain.
- Anxiety and depression are major factors in the development of tension-type headache.
- Neck pain is caused by breathing disorders, postural strain, muscle shortening, trigger points, joint dysfunction, nerve impingement, stress and injury.
- Headache and neck pain can be a symptom of more serious health conditions where medical attention is required.

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