CHAPTER 4

Pain

CHAPTER CONTENTS

INTRODUCTION

The common factor in headache and neck pain is pain. The massage therapist must understand pain and use massage methods effectively to manage pain. The massage professional especially needs to understand the mechanisms of pain.

To understand treatment processes that target the pain it is necessary to delve deeper into pain mechanisms and pain management. Pain is a universal experience. The degree to which a person reacts to pain comes from biological, psychological and cultural makeup. Past encounters with painful illness and injury can influence pain sensitivity. People who are prone to recurring illness and injury in the same area can experience increasing pain sensation for the same or even lesser degrees of pathology.

Headache and neck pain are extremely common and the ability to influence the pain symptom is a major aspect of treatment. Massage can be an extremely effective option for pain management, used either as a supportive treatment in conjunction with other treatments as described in Chapter 3, or as a primary treatment method.

WHAT IS PAIN?

Pain is caused by the stimulation of nociceptors. These receptors are usually stimulated by chemicals such as substance P, bradykinin, and histamine, which excite the nerve endings. Pain is elicited by three different classes of stimuli: mechanical, chemical, and thermal. Soft tissue pain is caused by the chemicals released from illness, injury, or from mechanical irritation caused by cumulative stress, microinflammation, or extreme heat or cold. Emotional or psychological stress, called autonomic disturbances, can trigger pain by causing an increase in

motor tone of muscles – changes in fascial tone and shifts in fluid flow affecting oxygen and nutrient delivery and waste removal.

Pain of somatic origin and from the viscera sends impulses to the limbic and hypothalamic areas of the brain and may be responsible for emotional reactions of anxiety, fear, anger, and depression. In addition, the brain inhibits or enhances a reaction to pain. This can explain why people can sometimes ignore pain and why fear and anxiety can exaggerate pain. How a person responds to pain is called *pain tolerance*. How a person interprets the pain sensation increases or decreases tolerance. Intervention that changes perception and meaning of pain can increase tolerance, allowing an individual to have better coping strategies in response to pain stimuli. This is a very important point for how people learn to cope with the chronic pain associated with headaches and neck dysfunction.

Pain receptors are found in almost every tissue of the body and may respond to any type of stimulus. Because of their sensitivity to all stimuli, pain receptors perform a protective function by identifying changes that may endanger the body. When stimuli for other sensations, such as touch, pressure, heat, and cold, reach a certain intensity, they stimulate the sensation of pain as well. Excessive stimulation of a sensory organ causes pain. Additional stimuli for pain receptors include excessive distension or dilation of a structure, prolonged muscular contractions, muscle spasms, inadequate blood flow to tissues, or the presence of certain chemical substances. Pain receptors can become sensitized, which results in fewer stimuli necessary to cause pain sensation.

Sensitization = fewer stimuli = creates more pain.

Injured tissue may release prostaglandins, making peripheral nociceptors more sensitive to the normal pain response (hyperalgesia). Aspirin and other nonsteroidal anti-inflammatory drugs (often referred to as NSAIDs) inhibit the action of prostaglandins and reduce pain.

The point at which a stimulus is perceived as painful is called the *pain threshold*. This varies somewhat from individual to individual. One factor affecting the pain threshold is perceptual dominance, in which the pain felt in one area of the body diminishes or obliterates the pain felt in another area. Not until the most severe pain is diminished does the person perceive or acknowledge the other pain. This mechanism is often activated with massage application that produces a 'good hurt'.

Pain tolerance refers to the length of time or intensity of pain that the person endures before acknowledging it and seeking relief. Unlike the pain threshold, pain tolerance is more likely to vary from one individual to another. A person's tolerance to pain is influenced by a variety of factors, including personality type, psychological state at the onset of pain, previous experiences, sociocultural background, and the meaning of the pain to that person (e.g., the ways in which it affects the person's lifestyle). Factors that decrease pain tolerance include repeated exposure to pain, fatigue, sleep deprivation, and stress; warmth, cold, distraction, alcohol consumption, hypnosis, and strong spiritual beliefs or faith all act to increase pain tolerance.

ORIGINS AND CLASSIFICATION OF PAIN

The origins of pain can be divided into two types, somatic and visceral. Somatic pain arises from stimulation of receptors in the skin (superficial somatic pain) or from stimulation of receptors in skeletal muscles, joints, tendons, and fascia (deep somatic pain). Visceral pain results from stimulation of receptors in the viscera (internal organs).

Pain is usually classified as acute, chronic, intractable, phantom, and referred. Pain basically results from a series of exchanges involving three major components: peripheral nerves, spinal cord, and brain.

- Acute pain is an appropriate response to injury or illness. It is easy to control with short-term use of medication, ice, heat, or counterirritants (i.e., medical-based ointments).
- Chronic pain is an inappropriate and ongoing perception of pain. It can be managed with careful use of medication but is best addressed using a multidisciplinary approach supporting lifestyle changes from dependency and side effects.
- Intractable pain is dominant and very hard to control.
- Phantom pain is experienced in an area of amputation.
- Referred pain is when an organ or other tissue projects pain sensation to another area of the body. Trigger point pain is a type of referred pain (Figures 4.1 and 4.2).

Peripheral nerves

Peripheral nerves encompass a network of nerve fibers that branch throughout the body. Attached to some of these fibers are special nerve endings (nociceptors) that can sense an unpleasant stimulus, such as a cut, burn, or painful pressure.

There are millions of nociceptors in the skin, bones, joints and muscles, and in the protective membranes around the internal organs. Nociceptors are

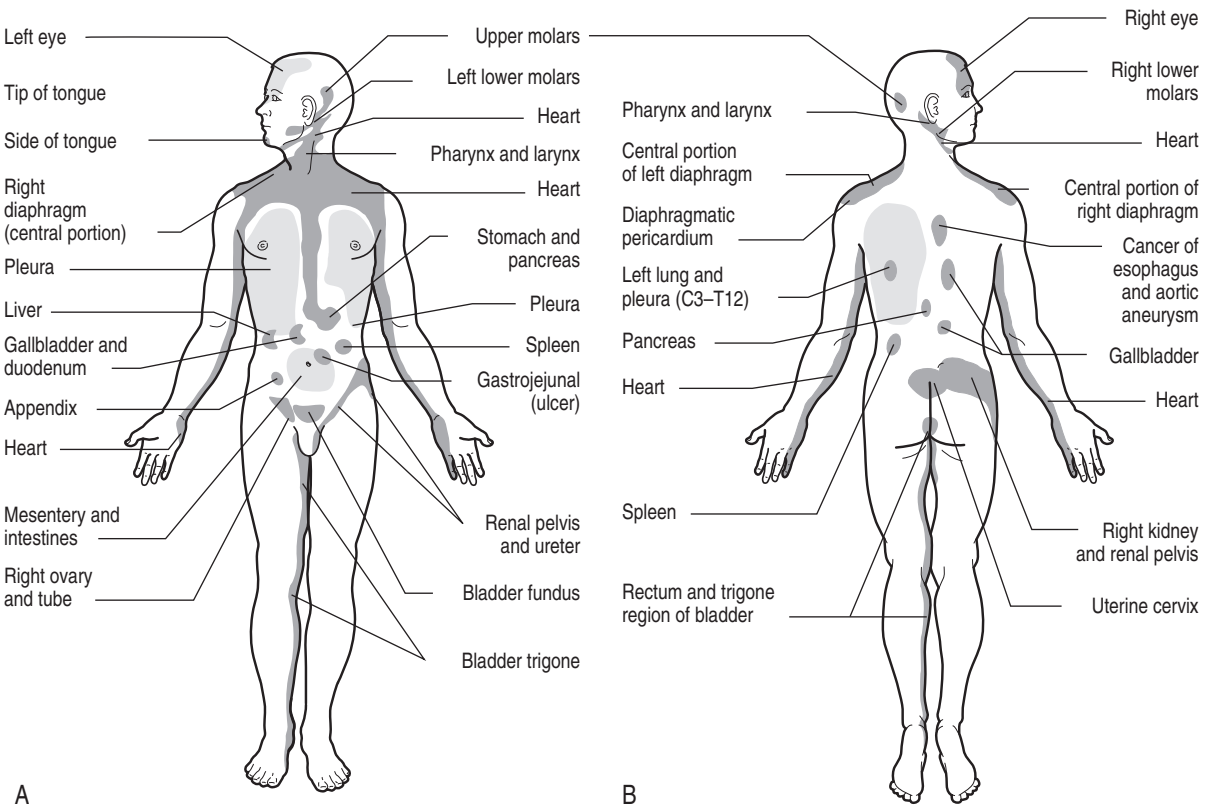

Figure 4.1 Pain referred from viscera. A: Anterior view. B: Posterior view. (Adapted from Rothstein et al 1991.)

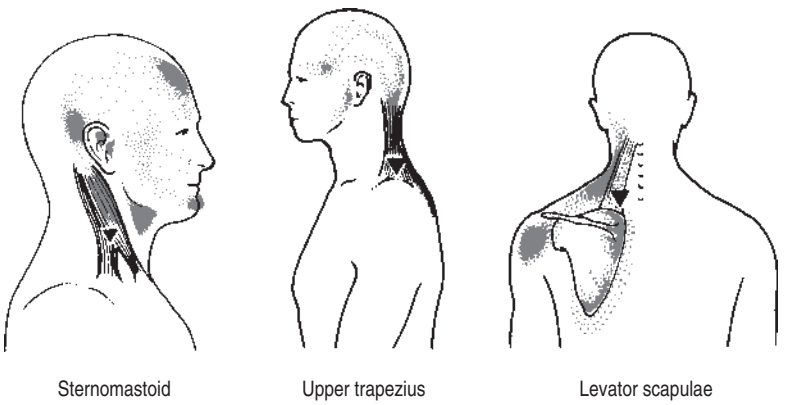

Figure 4.2 Some common trigger points and their target areas. (From Chaitow 2003.)

concentrated in areas more prone to injury, such as the fingers and toes. There may be as many as 1300 nociceptors in just 1 square inch of skin. Skin stimulation during massage that is intense enough to stimulate the 'good hurt' response causes the nociceptors to fire. This is one of the mechanisms of counterirritation. This is also a major component of massage benefits for pain management.

Muscles, protected beneath the skin, have fewer nerve endings. Internal organs, protected by skin, muscle and bone, have even less. Some nociceptors sense sharp blows, others heat. One type senses pressure, temperature, and chemical changes. Nociceptors can also detect inflammation caused by injury, disease or infection. Massage that addresses these receptors must have enough depth of pressure to elicit a response.

When nociceptors detect a harmful stimulus, they relay their pain messages in the form of electrical impulses along a peripheral nerve to the spinal cord and brain. Sensations of severe pain are transmitted almost instantaneously. Dull, aching pain – such as an upset stomach, earache, or joint aching – is relayed on fibers that transmit at a slower speed.

Spinal cord

When pain messages reach the spinal cord, they meet up with specialized nerve cells that act as gatekeepers, which filter the pain messages on their way to the interpretive areas of the brain where the pain is felt, understood and coping strategies are developed.

For severe pain linked to bodily harm, the 'gate' is wide open and the messages take an express route to the brain. Nerve cells in the spinal cord also respond to these urgent warnings by triggering other parts of the nervous system into action, especially the motor nerves, to signal muscles to move away from harm, a process described as a reflex arc. Weak pain messages, however, such as from a scratch, may be filtered or blocked out by the gate entirely.

Within the spinal cord, the messages can also change. Other sensations may overpower and diminish the pain signals. This is called counterirritation or hyperstimulation analgesia. Again, massage is an effective intervention to create counterirritation or hyperstimulation analgesia to suppress pain sensation.

Nerve cells in the spinal cord also release chemicals such as endorphins that diminish or substance P that amplifies the strength of a pain signal that reaches the brain for interpretation. Massage appears to influence these chemical responses, although research has not yet identified the exact mechanism (see Chapter 5).

Brain

When pain messages reach the brain, they are first processed by the thalamus, which is a sorting and switching station. The thalamus quickly interprets the messages as pain and forwards them simultaneously to three specialized regions of the brain: the physical sensation region (somatosensory cortex), the emotional feeling region (limbic system), and the thinking (cognitive) region (frontal cortex). Awareness of pain is therefore a complex experience of sensing, feeling, and thinking. Pain tolerance comes from the interplay of these functions. Massage influences all these areas – somatic sensation through nerve stimulation, limbic system by calming sympathetic dominance and nurturing, and the cognitive areas through education, reframing, and providing symptom relief.

The brain responds to pain by sending messages that trigger the healing process. Signals are sent to the autonomic nervous system, which then sends additional blood and nutrients to the original site of pain transmission.

Pain-suppressing chemicals send 'stop-pain' messages. The use of pain-suppressing medication that mimics the body's own chemicals is controversial and may even slow healing. However, the stress of severe acute pain can slow the healing process and intractable chronic pain suppresses the immune system. In these cases, pain medication is appropriate.

PAIN SENSATION

Pain comes in many forms of physical sensations: sharp, jabbing, throbbing, burning, stinging, tingling, nagging, dull and aching. Pain also varies from mild to severe. Severe pain grabs your attention more quickly and generally produces a greater physical and emotional response than mild pain. Severe pain can be incapacitating, making it difficult or impossible to function.

The location of pain can affect the response to it. A headache that interferes with the ability to focus on work may be more bothersome than, for example, arthritic pain in the ankle. Therefore the headache would receive a stronger pain response.

The emotional and psychological state, memories of past pain experiences, upbringing, and attitude about pain can also affect how people interpret pain messages and tolerate pain.

When pain persists beyond the time expected for healing, pain can become a chronic, nonproductive condition. No longer is the pain just the symptom of another disease, but a separate condition unto itself.

ACUTE AND CHRONIC PAIN

Acute pain is triggered by tissue damage. It is the type of pain that generally accompanies illness and injury, including surgery, and is location specific. Acute pain may be mild and last just a moment, such as from an insect sting, or it can be severe and last for weeks or months, such as from a burn, pulled muscle or broken bone. In a fairly predictable period, and with treatment of the underlying cause, acute pain generally fades away. Massage targets acute pain with symptom management and healing support. It is fairly easy to treat.

Chronic pain is different. It lingers after the illness has resolved or the injury is healed. The pain may remain constant, or it can come and go. The original illness or injury shows every indication of being healed, yet the pain remains – and may be even more intense. Chronic pain may also be caused by vascular conditions that alter blood flow to an area of the body.

Vascular headache is one of the most common types of headache. Chronic pain caused by damage to the central nervous system (i.e., brain, brainstem, or spinal cord) or peripheral nervous system is called neurogenic pain. Central pain syndrome, trigeminal neuralgia, and phantom pain are types of neurogenic pain.

Chronic pain can also occur without any indication of illness or injury. The cause of chronic pain is not well understood and there may be no evidence of disease or damage to the body tissues that doctors can link directly to the pain. This is extremely frustrating for the medical team and patient. Chronic pain that is not related to physical disease or injury, or other physical cause, is called psychogenic pain. This type of pain is also referred to as pain disorder with psychological factors. Mental and emotional disorders may cause, increase, or prolong pain. Headache, muscle pain, back pain, and stomach pain are the most common types of psychogenic pain. Physicians and mental health specialists work together to treat patients with this disorder.

PSYCHOSOCIAL CONTRIBUTIONS TO PAIN

The most common psychosocial risk factors that contribute to headache and neck pain are outlined in Box 4.1 (Hoogendoorn et al 2000, Linton 2000).

Massage and pain

Massage is one of the more effective interventions for managing chronic pain. Touch, vibration, and joint and muscle movement stimulate mechanoreceptors, and by stimulating the gate mechanisms can decrease the pain information received by the brain. Massage stimulates the entire region of the body being worked on, along with localized pain areas. The large number of mechanoreceptors are stimulated, dramatically reducing the discomfort of working deep somatic tissues. This is why full body massage is better for pain management than localized spot work.

ASSESSMENT OF PAIN

Pain varies from person to person and is hard to measure. It is necessary to rely on an individual description of symptoms to better quantify the person's pain experience. Although difficult to generalize, the following symptoms usually predict the anatomic structures injured:

- Cramping, dull, aching pain may indicate that muscles may be injured.
- Sharp, shooting pain could be injury to a nerve root.
- Sharp, lightning-like pain may show that a nerve is injured.
- Burning, stinging pressure may indicate sympathetic nerve injury.
- Deep, nagging, dull pain could be injury to a bone.
- Sharp, intolerable, severe pain could indicate a fracture.
- Throbbing, diffuse pain may be injury to blood vessels.

Nonverbal behaviors such as facial grimacing, flinching, tearing, abnormal gait or posture, comprehensive muscle tension, and guarding of the body are common indicators of pain. Verbal and emotional signals indicating pain may include crying, moaning, groaning, irritability, sadness, and changes in voice tone.

Box 4.1 Psychosocial risk factors contributing to headache and neck pain

- Stress – feelings of being overwhelmed by the demands of life, time pressures, etc.
- Distress – a combination of feelings of helplessness and unhappiness
- Anxiety – an exaggerated level of concern and fear. Possibly involving 'catastrophizing', where the future is seen as bleak, and almost always involving altered (usually 'upper chest') breathing patterns that contribute to lowered pain threshold and altered muscle tone (Chaitow et al 2002, Nixon & Andrews 1996)
- Depression – a profound unhappiness and sense of existence being pointless
- Cognitive dysfunction – misunderstanding and/or misinterpretation of facts
- Pain behavior – avoiding normal everyday activities that it is feared might aggravate the pain problem
- Job dissatisfaction – blaming the job for the problem, or simply unhappiness in the work situation
- Mental stress at work or in the home – interpersonal tensions, time (or other) pressures that make working and/or home environments unsatisfying or actively unpleasant.

Treatment for many of these psychosocial factors include patient education, stress management, counseling, and cognitive behavioral therapy (see Box 4.2).

Box 4.2 Cognitive behavioral therapy (CBT)

AIMS OF CBT

Modern pain management programs commonly use cognitive behavioral therapy (CBT) to reverse, or change, 'illness behavior'.

If an activity is painful, stopping that activity may relieve the pain in the short term but this may condition the person to avoidance of pain by doing less and less, leading to a belief that pain is an indication of increased harm. This leads to deconditioning, and usually does little to improve the pain problem.

If the person with pain is observed by a family member, or friend, to be having difficulty doing something, that person might perform the task instead. This can 'teach' the person in pain to avoid particular activities, because it becomes preferable to let someone else perform the task.

These examples of changed behavior in response to pain are known as operant conditioning and CBT methods are designed to reverse these negative behavior patterns (Wall & Melzack 1989).

The message that 'hurt does not necessarily mean harm' is one of the important lessons the person in pain needs to learn. To achieve this, CBT methods (Bradley 1996, Turk et al 1983) focus on:

- Education – learning about the painful condition: what it is and what it isn't.
- Skills training – learning to use the body more efficiently and less stressfully.
- Skills rehearsal and feedback – learning to become familiar with and to apply these new skills.
- Generalization of skills taught to use in everyday situations, and in novel situations – learning how to use new skills in a variety of settings, some unexpected.

OBJECTIVES OF CBT

The objectives of interdisciplinary pain management and CBT are to:

- assist patients to modify their belief that their problems are unmanageable and beyond their control
- inform patients about their condition
- assist patients to move from a passive to an active role in the management of their condition
- enable patients to become active problem-solvers to help them cope with their pain through the development of effective ways of responding to pain, emotion and the environment
- help patients to monitor thought, emotions and behaviors, and identify how these are influenced by internal and external events
- give patients a feeling of competence in the execution of positive strategies in the management of their condition
- help patients to develop a positive attitude to exercise and personal health management
- help patients to develop a program of paced activity to reduce the effects of physical deconditioning
- assist patients to develop coping strategies that can be developed once contact with the pain management team or health care provider has ended.

Only the person can determine the degree of severity. Pain is rarely the same at all times. It is felt (perceived) differently over time and differs with various precipitating and aggravating factors. Pain can range from excruciating to mild and may be difficult for the client to verbalize. Pain scales, such as a 1–10 scale or mild, moderate, and severe (see Figure 6.1), are helpful for measuring necessary pain perception.

MEDICAL TREATMENT OF PAIN

Treatment for pain depends on the cause and on the individual needs of the patient. Complete pain relief is not always possible, and it is important for patients and physicians to work together to find the best treatment plan.

- Brain stimulation may be used to treat widespread, severe pain. This invasive procedure involves surgically implanting electrodes in the brain, which the patient controls by means of an external transmitter.
- In transcutaneous electrical nerve stimulation (TENS) brief pulses of electricity are applied to nerve endings to block pain transmission. This procedure has proven effective for many different types of chronic pain, and is safe and noninvasive. The feeling is described as a buzzing, tingling, or tapping feeling. The small electric impulses seem to interfere with pain sensations. The current can be adjusted so that the sensation is pleasant and relieves pain. Pain relief lasts beyond the time that the current is applied.
- Surgery (e.g., joint replacement, tumor excision, diskectomy) may eliminate some types of chronic pain. Cordotomy may be used in severe cases of lower body pain when other treatments are

ineffective. This procedure involves severing the nerve fibers on one or both sides of the spinal cord, eliminating the sensations of pain and temperature.

- Medications: Over-the-counter (OTC) analgesics (e.g., aspirin, ibuprofen, acetaminophen) may be used to treat pain. These medications should not be used to relieve pain for longer than 10 days without consulting a physician. Side effects of nonsteroidal anti-inflammatories include nausea, abdominal pain, dizziness, and rash. When OTC medications are ineffective, stronger prescription medications may be used. Medications commonly used to treat chronic pain include the following:
  - Muscle relaxants: May cause drowsiness, dry mouth, and constipation.
  - Nonsteroidal anti-inflammatories: May cause increased tendency to bleed, indigestion, diarrhea, and stomach pain.
  - Opioids: May lead to tolerance, dependence, and addiction. Duragesic® (fentanyl transdermal system) delivers the opioid analgesic fentanyl through a patch that is worn on the skin. It is used to treat moderate to severe chronic pain that does not respond to other medications and provides continuous pain relief for 72 hours. Duragesic may cause life-threatening hypoventilation (reduced breathing rate and depth of breathing). Repeated administration may result in tolerance and physical and psychological dependence. Other side effects of opioids include confusion, constipation, dry mouth, excessive sleepiness (somnolence), excessive sweating, high blood pressure (hypertension) or low blood pressure (hypotension), and nausea and vomiting.
- Adjuvant medication (used to increase or support effect) may be used to treat chronic pain that does not respond to other pain relievers and to reduce the side effects of other medications. Adjuvant drugs include antidepressants, anticonvulsants, and corticosteroids.

Pain treatment not using medication

Psychosocial intervention

Psychosocial interventions for pain management should be introduced early as part of a multimodal approach to pain management. Because of the many misconceptions regarding pain and its treatment, education about the ability to control pain effectively and correction of myths about pain should be included as part of the treatment plan for all patients.

Placebo

As many as 35% of patients may respond favorably to treatment with a placebo (e.g., sugar pill, saltwater injection). Precisely how a placebo works is unknown. Pain relief may result from the power of suggestion, distraction, or optimism, or from a neurochemical reaction in the brain. Similar mechanisms are activated by relaxation and behavior modification therapy, meditation, hypnosis, and biofeedback.

Biofeedback

With the help of special machines, people can learn to control certain body functions such as heart rate, blood pressure, and muscle tension. Biofeedback is sometimes used to help people learn to relax.

Imagery

Imagery is using imagination to create mental pictures or situations. The way imagery relieves pain is not completely understood. Imagery can be thought of as a deliberate daydream that uses all senses – sight, touch, hearing, smell, and taste. Some people believe that imagery is a form of self-hypnosis.

Distraction

Distraction means turning attention to something other than the pain. People use this method without realizing it when they watch television or listen to the radio to 'take their minds off' a worry or their pain. Distraction may be used alone to manage mild pain or used with medicine to manage brief episodes of severe pain, such as pain related to procedures. Any activity that occupies attention can be used for distraction. Distractions can be internal (e.g., counting, singing, praying, or repeating statements such as 'I can cope') or external (e.g., doing crafts such as needlework, puzzles, or painting). Reading, going to a movie, watching television, and listening to music are also good distraction methods. Slow, rhythmic breathing can be used as distraction as well as relaxation.

Hypnosis

Hypnosis is a trance-like state of high concentration between sleeping and waking. In this relaxed state, a person becomes more receptive or open to suggestion. Hypnosis can be used to block the awareness of pain, to substitute another feeling for the pain, and to change the sensation to one that is not painful. Hypnosis is provided by a person trained in hypnosis, often a psychologist or psychiatrist. People can easily be taught, by a hypnotherapist, to place themselves in a hypnotic state, make positive suggestions to themselves, and to leave the hypnotic state.

Exercise

Proper exercise can strengthen muscles throughout the body, improve bone strength, reduce the risk for injuries, and enhance feelings of wellbeing.

Physical therapy
Physical therapy and massage therapy can reduce pain, improve function, and prevent recurrences.

Manipulation
Spinal manipulation (adjustment) can be used to relieve chronic pain caused by musculoskeletal conditions and nerve compression.

Acupuncture
Acupuncture, which involves inserting and manipulating fine needles under the skin at selected points in the body, may be used to relieve chronic pain. Each point controls the pain sensation of a different part of the body. When the needle is inserted, a slight ache, dull pain, tingling, or electrical sensation is felt for a few seconds. Once the needles are in place, no further discomfort should be experienced. The needles are usually left in place for between 15 and 30 minutes, depending on the condition being treated. No discomfort is felt when the needles are removed. Acupuncture should be performed by a licensed acupuncturist. Patients who choose to have acupuncture for pain management should be encouraged to report new pain problems to their health care team before seeking palliation through acupuncture.

Cold or heat
Heat often relieves sore muscles and is comforting. Cold lessens pain sensations by numbing the painful area and reducing inflammation. Many people with prolonged pain use only heat and have never tried cold. Some people find that cold relieves pain faster, and relief may last longer. Heat and cold can be alternated for added relief

Precautions
- Do not use a heating pad on bare skin. Do not go to sleep with the heating pad turned on.
- Do not use heat over a new injury because heat can increase bleeding – wait at least 24 hours.
- Avoid heat or cold over skin that is fragile.
- Do not use heat or cold over any area where circulation or sensation is poor.
- Do not use heat or cold application for more than 10–15 minutes before allowing the temperature to return to normal and then repeat.

Menthol- and/or capsicum-based rubs
Many preparations are available for pain relief. There are creams, lotions, liniments, or gels that contain menthol or capsicum. When they are rubbed into the skin, they increase blood circulation to the affected area and produce a warm (sometimes cool), soothing feeling that lasts for several hours to produce counter-irritation. The essential oil peppermint is often used for headaches and is rubbed on the temples and back of the neck.

Precautions. Do not rub product near eyes, over broken skin, a skin rash, or mucous membranes (such as inside the mouth, or around the genitals and rectum).

MASSAGE AND PAIN MANAGEMENT

The massage professional, as part of a health care team, can contribute valuable manual therapy in various pain conditions using direct tissue manipulation and reflex stimulation of the nervous system and the circulation. As a therapeutic intervention, massage may help reduce the need for pain medication, thus reducing the side effects of medication.

All medications, including OTC medication available without a prescription, have some side effects. Obviously, with clients in extreme pain, the massage therapy must be monitored by a doctor or other appropriate health care professional. Most people experience pain in less severe forms occasionally throughout life. Massage may provide temporary symptomatic relief of moderate pain brought on by daily stress, replacing OTC pain medications or reducing their use.

As acute pain and chronic pain are managed somewhat differently, it is important to make the distinction between the two. Intervention for acute pain is less invasive (nonspecific/generalized) and focuses on supporting a current healing process. Chronic pain is managed with either symptom relief or a more aggressive healing and rehabilitation approach that incorporates a therapeutic change process.

Various mechanisms influencing pain are affected during massage: the neurotransmitters that perpetuate and inhibit the pain response are affected by massage application. The neurochemical most recognized by clients is endorphin. Endorphins are part of a group of peptides that act as the body's internal pain modulator – like morphine. Endorphins have become recognized as part of the "runners' high" phenomenon. Actually, a combination of neurotransmitters and hormones works together to alter pain perception, both inhibiting it and/or enhancing it. Massage seems to alter the chemical interaction (see Chapter 5). The pain-inhibiting chemicals influenced by massage are from the entire endorphin class, as

well as serotonin, GABA, and dopamine. The pain-facilitating chemicals influenced by massage are adrenaline, noradrenaline, cortisol, and substance P. The research is still scant on just how this all works, but what we understand is sufficient for strategic development and justification of massage for pain modulation.

- Massage influences the nervous system, both central and peripheral (somatic and autonomic). Application of massage that results in counterirritation and hyperstimulation analgesia functions by activating the gate control for transmission of pain signals.
- Reducing mechanical pressure on peripheral somatic nerves by increasing pliability in the tissues modulates pain sensation. Stimulation of nociceptors in tissues can be reduced by massage.
- Massage can inhibit the proprioceptors. When this occurs, joint function and the muscle tension/length relationship normalize, decreasing pain.
- Massage supports parasympathetic dominance, increasing pain tolerance.
- Massage can reduce hydrostatic pressure of edema using lymphatic drain application to move interstitial fluid and decrease pressure on pain receptors.
- Massage can reduce tissue density by using connective tissue methods to increase ground substance pliability or to reduce adhesion from random connective tissue fiber distribution.
- Massage exerts a powerful influence on blood movement. Both arterial and venous circulation is involved and massage can target normalization.
- Pain can also occur if circulation is not appropriate. Ischemic tissues are sensitized to pain.
- Massage can also have a compassionate and comforting quality that can increase pain tolerance.

Pain management massage strategies

Massage application targeted to pain management incorporates the following principles:

1. General full-body application with a rhythmic and slow approach as often as feasible with 45- to 60-minute durations.
   Goal: Parasympathetic dominance with reduced cortisol.
2. Pressure depth is moderate to deep with compressive broad-based application. No poking, frictioning, or application of pain-causing methods.
   Goal: Serotonin and GABA support and reduction of substance P and adrenaline.
3. Drag is slight unless connective tissue is being targeted. Drag is targeted to lymphatic drain and skin stimulation.
   Goal: Reduce swelling and create counterirritation through skin stimulation.
4. Nodal points on the body that have a high neurovascular component are massaged with a sufficient depth of pressure to create a 'good hurt' sensation but not defensive guarding or withdrawal. These nodal points are the location of cutaneous nerves, trigger points, acupuncture points, reflexology points, etc. The feet, hands, and head, as well as along the spine, are excellent target locations.
   Goal: Gate control response, endorphin and other pain-inhibiting chemical release.
5. Direction of massage varies, but deliberately targets fluid movement.
   Goal: Circulation support.
6. Mechanical force introduction of shear, bend, torsion, etc. are of an agitation quality to 'stir' the ground substance and not create inflammation.
   Goal: Increased tissue pliability and reduced tissue density.
7. Mechanical force application of shear, bend, and torsion is used to address adhesion or fibrosis but needs to be specifically targeted and limited in duration.
   Goal: Reduce localized nerve irritation or circulation reduction.
8. Muscle energy methods and lengthening are applied rhythmically, gently, and targeted to shortened muscles.
   Goal: Reduce nerve and proprioceptive irritation and circulation inhibition.
9. Stretching to introduce tension force is applied slowly, without pain, and targeted to shortened connective tissue.
   Goal: Reduce nerve and proprioceptive irritation.
10. Massage therapists are focused, attentive, and compassionate, but maintain appropriate boundaries.
    Goal: Support entrainment, bioenergy normalization, and palliative care.

Additional methods that modulate pain sensation and perception that can be incorporated into the massage are simple applications of hot and cold hydrotherapy, analgesic essential oils, calming and distracting music, and (maybe) north-side magnet application.

KEY POINTS

- Pain is a major symptom of headache and neck dysfunction.
- Pain is a subjective experience.
- Pain is caused by the stimulation of nociceptors. These receptors are usually stimulated by chemicals such as substance P, bradykinin, and histamine, which excite the nerve endings.
- Pain is elicited by three different classes of stimuli: mechanical, chemical, and thermal.
- Pain can be chronic or acute.
- Pain management can be achieved with medication, and physical and cognitive interventions.
- Massage is an effective pain management strategy alone or in combination with other methods.

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CHAPTER 5

Justifying massage as treatment

CHAPTER CONTENTS

INTRODUCTION

Chapter 1 defines headache and neck pain, Chapter 2 describes causes for these conditions, Chapter 3 investigates how conventional medicine diagnoses and treats head and neck pain, and Chapter 4 discusses pain as a major treatment focus. This chapter looks at the current research to discover if scientific investigation supports the use of massage to help those who experience various types of headache and neck pain.

RESEARCH CONTENT

The most commonly used complementary modalities in the research were:

- chiropractic
- massage therapy
- acupuncture
- mind–body relaxation techniques.

If adaptation processes (Box 5.1) are the primary cause of head and neck pain, then whatever treatment is offered should achieve one of three things:

- Removal or reduction in the stress load to which the local tissues (or the body as a whole) are adapting.
- Improvement in the way(s) the local tissues (or the body as a whole) are coping, adapting.
- Symptomatic treatment to make the recovery period more comfortable – without adding to the adaptive load.

Sometimes all three elements can be achieved, sometimes only one.

Since healing is a self-generated function (cuts heal, broken bones mend, etc.) the important element in any treatment choice is that it should be safe, should not add to the load, and should hopefully help

Box 5.1 Adaptation

Adaptation represents the story of the contest between the 'load' and the tissues handling the load.

Tissues adapt to the load imposed on them. Think of athletic or weight training as easy examples. To run a marathon, or perform high jump or any other specialized task or activity (gardening, working on a production line, painting ceilings, etc.), particular muscles and joints have repetitive demands imposed on them.

After an initial acute phase (alarm phase of the local or general adaptation syndromes – LAS or GAS) when stiffness and soreness may be experienced, the tissues start to adapt and no longer react with stiffness and soreness. This is the adaptation phase of LAS (involving a local area, such the shoulders or knees) or GAS (involving the whole person), which continues until the load (the stress demands) or the tissues themselves can no longer adapt (like a piece of tired elastic), at which time the 'breakdown' or 'exhaustion' phase of LAS or GAS starts – and symptoms of pain and dysfunction become apparent.

recovery to be more rapidly achieved, and if not more rapidly, more comfortably.

Massage seems able to offer a number of these features, with education and rehabilitation exercises doing the rest in most cases.

RESEARCH INDICATIONS

Research is mixed for the efficacy of massage for headache and neck pain. Generally massage for headache and neck pain was not found to be a definitive treatment on its own but was supportive of many other interventions, either enhancing effects or managing side effects of other treatments. Massage was found to be generally safe. Some benefits of massage related to other conditions such as low back pain can be logically applied to neck pain. This is helpful in justifying massage for headaches and neck pain since more studies have involved low back pain and massage (Chaitow & Fritz 2006). Other researchers have looked at massage for pain in general and others have delved into the general benefits of massage.

Based on an internet search using the terms 'massage', 'massage therapy', 'therapeutic massage', 'headache', 'neck pain' and 'pain', the following is the summation of the research presented. Since research is an evolving process, the studies and conclusions presented can be either confirmed or questioned as new research becomes available. The massage professional needs to remain current with advances in the understanding of the benefits of massage.

The search process for this text involved mainly internet search using the Massage Therapy Foundation database, Google Scholar, MedlinePlus and PubMed (Box 5.2). Representative studies, especially meta-analyses, were analyzed and the content of one of these reports – *Manipulative and Body-Based Practices: An Overview*, which is one of five background reports on the major areas of complementary and alternative medicine undertaken by the National Center for Complementary and Alternative Medicine – is illustrated in Box 5.3.

General massage benefits and safety

When looking at any treatment, safety is a primary concern – i.e., do no harm. If harm is possible then the benefits must exceed the harm, usually by a large measure. While research into massage safety concludes that massage is generally safe, massage is not entirely risk free. Fortunately, serious adverse events are uncommon. The majority of adverse effects from massage were associated with exotic and invasive types of manual massage or massage provided by inadequately trained people. Serious adverse effects were associated mostly with massage techniques other than massage-type application which uses stroking, kneading, and compression as the main mode of application (Ernst 2003).

Box 5.2 Internet resources

- The Massage Therapy Foundation advances the knowledge and practice of massage therapy by supporting scientific research, education and community service: http://www.massagetherapyfoundation.org
- Google Scholar: http://scholar.google.co.uk
- MedlinePlus for Complementary and Alternative Medicine (CAM): http://www.nlm.nih.gov/medlineplus/complementaryandalternativemedicine.html
- PubMed: http://www.ncbi.nlm.nih.gov/pubmed

Box 5.3 Manipulative and Body-based Practices: An Overview

INTRODUCTION

Under the umbrella of manipulative and body-based practices is a heterogeneous group of complementary and alternative medicine (CAM) interventions and therapies. These include chiropractic and osteopathic manipulation, massage therapy, Tui Na, reflexology, rolfing, Bowen technique, Trager bodywork, Alexander technique, Feldenkrais method, and a host of others (a list of definitions is given at the end of this report). Surveys of the U.S. population suggest that between 3 and 16% of adults receive chiropractic manipulation in a given year, while between 2 and 14% receive some form of massage therapy.[1–5] In 1997, US adults made an estimated 192 million visits to chiropractors and 114 million visits to massage therapists. Visits to chiropractors and massage therapists combined represented 50% of all visits to CAM practitioners.[2] Data on the remaining manipulative and body-based practices are sparser, but it can be estimated that they are collectively used by less than 7% of the adult population.

Manipulative and body-based practices focus primarily on the structures and systems of the body, including the bones and joints, the soft tissues, and the circulatory and lymphatic systems. Some practices were derived from traditional systems of medicine, such as those from China, India, or Egypt, while others were developed within the last 150 years (e.g., chiropractic and osteopathic manipulation). Although many providers have formal training in the anatomy and physiology of humans, there is considerable variation in the training and the approaches of these providers both across and within modalities. For example, osteopathic and chiropractic practitioners, who use primarily manipulations that involve rapid movements, may have a very different treatment approach than massage therapists, whose techniques involve slower applications of force, or than craniosacral therapists. Despite this heterogeneity, manipulative and body-based practices share some common characteristics, such as the principles that the human body is self-regulating and has the ability to heal itself and that the parts of the human body are interdependent. Practitioners in all these therapies also tend to tailor their treatments to the specific needs of each patient.

SCOPE OF THE RESEARCH

Range of studies

The majority of research on manipulative and body-based practices has been clinical in nature, encompassing case reports, mechanistic studies, biomechanical studies, and clinical trials. A cursory search in PubMed for research published in the last 10 years identified 537 clinical trials, of which 422 were randomized and controlled. Similarly, 526 trials were identified in the Cochrane database of clinical trials. PubMed also contains 314 case reports or series, 122 biomechanical studies, 26 health services studies, and 248 listings for all other types of clinical research published in the last 10 years. On the other hand, for this same time period, there have been only 33 published articles of research involving in vitro assays or employing animal models.

Primary challenges

Different challenges face investigators studying mechanisms of action than those studying efficacy and safety. The primary challenges that have impeded research on the underlying biology of manual therapies include the following:

- Lack of appropriate animal models
- Lack of cross-disciplinary collaborations
- Lack of research tradition and infrastructure at schools that teach manual therapies
- Inadequate use of state-of-the-art scientific technologies

Clinical trials of CAM manual therapies face the same general challenges as trials of procedure-based interventions such as surgery, psychotherapy, or more conventional physical manipulative techniques (e.g., physical therapy). These include:

- Identifying an appropriate, reproducible intervention, including dose and frequency. This may be more difficult than in standard drug trials, given the variability in practice patterns and training of practitioners.
- Identifying an appropriate control group(s). In this regard, the development of valid sham manipulation techniques has proven difficult.
- Randomizing subjects to treatment groups in an unbiased manner. Randomization may prove more difficult than in a drug trial, because manual therapies are already available to the public; thus, it is more likely that participants will have a pre-existing preference for a given therapy.
- Maintaining investigator and subject compliance to the protocol. Group contamination (which occurs when patients in a clinical study seek additional treatments outside the study, usually without telling the investigators; this will affect the accuracy of the study results) may be more problematic than in standard drug trials, because subjects have easy access to manual therapy providers.
- Reducing bias by blinding subjects and investigators to group assignment. Blinding of subjects and investigators

(Continued)

Box 5.3 Manipulative and Body-based Practices: An Overview—cont'd

may prove difficult or impossible for certain types of manual therapies. However, the person collecting the outcome data should always be blinded.
- Identifying and employing appropriate validated, standardized outcome measures.
- Employing appropriate analyses, including the intent-to-treat paradigm.

SUMMARY OF THE MAJOR THREADS OF EVIDENCE

Preclinical studies

The most abundant data regarding the possible mechanisms underlying chiropractic manipulation have been derived from studies in animals, especially studies on the ways in which manipulation may affect the nervous system.[6] For example, it has been shown, by means of standard neurophysiological techniques, that spinal manipulation evokes changes in the activity of proprioceptive primary afferent neurons in paraspinal tissues. Sensory input from these tissues has the capacity to reflexively alter the neural outflow to the autonomic nervous system. Studies are underway to determine whether input from the paraspinal tissue also modulates pain processing in the spinal cord.

Animal models have also been used to study the mechanisms of massage-like stimulation.[7] It has been found that antinociceptive and cardiovascular effects of massage may be mediated by endogenous opioids and oxytocin at the level of the midbrain. However, it is not clear that the massage-like stimulation is equivalent to massage therapy.

Although animal models of chiropractic manipulation and massage have been established, no such models exist for other body-based practices. Such models could be critical if researchers are to evaluate the underlying anatomical and physiological changes accompanying these therapies.

Clinical studies: mechanisms

Biomechanical studies have characterized the force applied by a practitioner during chiropractic manipulation, as well as the force transferred to the vertebral column, both in cadavers and in normal volunteers.[8] In most cases, however, a single practitioner provided the manipulation, limiting generalizability. Additional work is required to examine interpractitioner variability, patient characteristics, and their relation to clinical outcomes.

Studies using magnetic resonance imaging (MRI) have suggested that spinal manipulation has a direct effect on the structure of spinal joints; it remains to be seen if this structural change relates to clinical efficacy.

Clinical studies of selected physiological parameters suggest that massage therapy can alter various neurochemical, hormonal, and immune markers, such as substance P in patients who have chronic pain, serotonin levels in women who have breast cancer, cortisol levels in patients who have rheumatoid arthritis, and natural killer (NK) cell numbers and CD4+ T-cell counts in patients who are HIV-positive.[9] However, most of these studies have come from one research group, so replication at independent sites is necessary. It is also important to determine the mechanisms by which these changes are elicited.

Despite these many interesting experimental observations, the underlying mechanisms of manipulative and body-based practices are poorly understood. Little is known from a quantitative perspective. Important gaps in the field, as revealed by a review of the relevant scientific literature, include the following:

- Lack of biomechanical characterization from both practitioner and participant perspectives
- Little use of state-of-the-art imaging techniques
- Few data on the physiological, anatomical, and biomechanical changes that occur with treatment
- Inadequate data on the effects of these therapies at the biochemical and cellular levels
- Only preliminary data on the physiological mediators involved with the clinical outcomes

Clinical studies: trials

Forty-three clinical trials have been conducted on the use of spinal manipulation for low back pain, and there are numerous systematic reviews and meta-analyses of the efficacy of spinal manipulation for both acute and chronic low-back pain.[10–14] These trials employed a variety of manipulative techniques. Overall, manipulation studies of varying quality show minimal to moderate evidence of short-term relief of back pain. Information on cost-effectiveness, dosing, and long-term benefit is scant. Although clinical trials have found no evidence that spinal manipulation is an effective treatment for asthma,[15] hypertension,[16] or dysmenorrhea,[17] spinal manipulation may be as effective as some medications for both migraine and tension headaches[18] and may offer short-term benefits to those suffering from neck pain.[19] Studies have not compared the relative effectiveness of different manipulative techniques.

Although there have been numerous published reports of clinical trials evaluating the effects of various types of massage for a variety of medical conditions (most with positive results), these trials were almost all small, poorly designed, inadequately controlled, or lacking adequate statistical analyses.[20] For example, many trials included co-interventions that made it impossible to evaluate the

Box 5.3 Manipulative and Body-based Practices: An Overview—cont'd

specific effects of massage, while others evaluated massage delivered by individuals who were not fully trained massage therapists or followed treatment protocols that did not reflect common (or adequate) massage practice.

There have been very few well-designed controlled clinical trials evaluating the effectiveness of massage for any condition, and only three randomized controlled trials have specifically evaluated massage for the condition most frequently treated with massage – back pain.[21] All three trials found massage to be effective, but two of these trials were very small. More evidence is needed.

Risks

There are some risks associated with manipulation of the spine, but most reported side effects have been mild and of short duration. Although rare, incidents of stroke and vertebral artery dissection have been reported following manipulation of the cervical spine.[22] Despite the fact that some forms of massage involve substantial force, massage is generally considered to have few adverse effects. Contraindications for massage include deep vein thrombosis, burns, skin infections, eczema, open wounds, bone fractures, and advanced osteoporosis.[21,23]

Utilization/Integration

In the United States, manipulative therapy is practiced primarily by doctors of chiropractic, some osteopathic physicians, physical therapists, and physiatrists. Doctors of chiropractic perform more than 90% of the spinal manipulations in the United States, and the vast majority of the studies that have examined the cost and utilization of spinal manipulation have focused on chiropractic.

Individual provider experience, traditional use, or arbitrary payer capitation decisions – rather than the results of controlled clinical trials – determine many patient care decisions involving spinal manipulation. More than 75% of private payers and 50% of managed care organizations provide at least some reimbursement for chiropractic care.[24] Congress has mandated that the Department of Defense (DOD) and the Department of Veterans Affairs provide chiropractic services to their beneficiaries, and there are DOD medical clinics offering manipulative services by osteopathic physicians and physical therapists. The State of Washington has mandated coverage of CAM services for medical conditions normally covered by insurance. The integration of manipulative services into health care has reached this level despite a dearth of evidence about long-term effects, appropriate dosing, and cost-effectiveness.

Although the numbers of Americans using chiropractic and massage are similar,[1–5] massage therapists are licensed in fewer than 40 states, and massage is much less likely than chiropractic to be covered by health insurance.[2] Like spinal manipulation, massage is most commonly used for musculoskeletal problems. However, a significant fraction of patients seek massage care for relaxation and stress relief.[25]

Cost

A number of observational studies have looked at the costs associated with chiropractic spinal manipulation in comparison with the costs of conventional medical care, with conflicting results. Smith and Stano found that overall health care expenditures were lower for patients who received chiropractic treatment than for those who received medical care in a fee-for-service environment.[26] Carey and colleagues found chiropractic spinal manipulation to be more expensive than primary medical care, but less expensive than specialty medical care.[27] Two randomized trials comparing the costs of chiropractic care with the costs of physical therapy failed to find evidence of cost savings through chiropractic treatment.[28,29] The only study of massage that measured costs found that the costs for subsequent back care following massage were 40% lower than those following acupuncture or self-care, but these differences were not statistically significant.[30]

Patient satisfaction

Although there are no studies of patient satisfaction with manipulation in general, numerous investigators have looked at patient satisfaction with chiropractic care. Patients report very high levels of satisfaction with chiropractic care.[27,28,31] Satisfaction with massage treatment has also been found to be very high.[30]

DEFINITIONS

Alexander technique: Patient education/guidance in ways to improve posture and movement, and to use muscles efficiently.

Bowen technique: Gentle massage of muscles and tendons over acupuncture and reflex points.

Chiropractic manipulation: Adjustments of the joints of the spine, as well as other joints and muscles.

Craniosacral therapy: Form of massage using gentle pressure on the plates of the patient's skull.

Feldenkrais method: Group classes and hands-on lessons designed to improve the coordination of the whole person in comfortable, effective, and intelligent movement.

Massage therapy: Assortment of techniques involving manipulation of the soft tissues of the body through pressure and movement.

(Continued)

Box 5.3 Manipulative and Body-based Practices: An Overview—cont'd

Osteopathic manipulation: Manipulation of the joints combined with physical therapy and instruction in proper posture.

Reflexology: Method of foot (and sometimes hand) massage in which pressure is applied to 'reflex' zones mapped out on the feet (or hands).

Rolfing: Deep tissue massage (also called structural integration).

Trager bodywork: Slight rocking and shaking of the patient's trunk and limbs in a rhythmic fashion.

Tui Na: Application of pressure with the fingers and thumb, and manipulation of specific points on the body (acupoints).

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FOR MORE INFORMATION

National Center for Complimentary and Alternative Medicine (NCCAM) Clearinghouse

The NCCAM Clearinghouse provides information on CAM and on NCCAM, including publications and

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searches of Federal databases of scientific and medical literature. The Clearinghouse does not provide medical advice, treatment recommendations, or referrals to practitioners.

Toll-free in the U.S.: 1-888-644-6226
TTY (for deaf and hard-of-hearing callers): (+1)-866-464-3615
Web site: http://nccam.nih.gov
E-mail:info@nccam.nih.gov

About this series

Manipulative and Body-based Practices: An Overview is one of five background reports on the major areas of complementary and alternative medicine (CAM):

- Biologically Based Practices: An Overview
- Energy Medicine: An Overview
- Mind–Body Medicine: An Overview
- Whole Medical Systems: An Overview

The series was prepared as part of the NCCAM's strategic planning efforts for the years 2005 to 2009. These brief reports should not be viewed as comprehensive or definitive reviews. Rather, they are intended to provide a sense of the overarching research challenges and opportunities in particular CAM approaches. For further information on any of the therapies in this report, contact the NCCAM Clearinghouse.

Benefit of treatment

Another important concern involves mechanics influencing treatment benefit. Information provided by Moyer and colleagues (2004) indicates that massage is effective as treatment in some instances but they did not investigate why. The reasons why massage works remain elusive but there are recurring findings indicating possible physiologic mechanisms for massage benefit. A majority of the studies done by Tiffany Field and her associates at the Touch Research Center at the University of Miami are particularity relevant for the topic of this text since they deal with the effect of massage on serotonin, which is associated with vascular headache. In 2004 and 2005, Diego and colleagues conducted research indicating that massage needs to be applied with sufficient compressive force to stimulate an anti-arousal response and that massage that is considered light can be arousing. This information provides clues about how massage would need to be provided to support its use in the management of head and neck pain.

Stress, anxiety, and depression

As described in previous chapters, it is common to find a correlation between stress, anxiety, and depression and head and neck pain. Multiple research studies indicate that massage is helpful in management of these conditions. Massage appears to have a mood-enhancing effect, as well as effecting positive changes in global tenseness, restlessness, depressed mood, and neck/shoulder tension. In some instances research indicated that massage is as effective as, but no more effective than, other relaxation interventions. However, an important finding is that people liked massage which supports compliance with treatment (Ahles et al 1999, Fellows et al 2004, Hanley et al 2003, Muller-Oerlinghausen et al 2004).

Massage benefits for pain management

Pain management is a major outcome for massage targeting head and neck pain. Multiple studies considered massage benefits for pain management; however, the mechanisms of benefit are not fully understood. One plausible explanation is that massage stimulates the mechanoreceptors that activate the 'nonpainful' nerve fibers, preventing pain transmission from reaching consciousness. Research also identified that pain management benefits of massage are short lived; however, so are the benefits of pain medication and massage has fewer potential adverse effects. Because analgesic medication can produce serious side effects, methods that can influence pain but do not involve chemical agents are valuable. Interestingly, the perception of pain reduction tends to last longer with massage than medication and to generalize more into psychological domains influencing anxiety and depression. Fortunately, many studies identify the benefits of massage and pain management in a variety of situations that can be considered relevant to the topic of this text. Massage is a very effective and safe intervention for pain conditions (Ernst 2004, Hasson et al 2004, Katz et al 1999,

Mok & Woo 2004, Norrbrink Budh & Lundeberg 2004, Plews-Ogan et al 2005, Walach et al 2003, Wang & Keck 2004, Wright & Sluka 2001).

Low back studies relevant to head and neck pain

There are more studies that investigated massage intervention for low back pain than head and neck pain. However, the similarities of causal factors and experience of pain between low back pain and neck pain make these studies relevant. Cherkin and colleagues (2003) conducted a summary of all good research on the subject since 1995, in which different methods were compared in treatment of back and/or neck pain. They found 20 research studies that were of a standard to include in their review; however, only three evaluated the benefits of massage. The findings of these studies were that 'massage therapy is both safe and effective for subacute and chronic back pain'.

They also found that there was evidence that spinal manipulation produced small clinical benefits that are equivalent to those of other commonly used therapies, but that the effectiveness of acupuncture remains unclear for these problems.

Importantly, they found that there is evidence that massage, but not acupuncture or spinal manipulation, may reduce the costs of care after an initial course of therapy in treatment of back pain.

In a straight comparison of massage and acupuncture in treating back pain, Cherkin and colleagues also found that those receiving massage used the least medications and that:

> Therapeutic massage was effective for persistent low back pain, and apparently providing long-lasting benefits. Traditional Chinese Medicine acupuncture was relatively ineffective. Massage might be an effective alternative to conventional medical care for persistent back pain.

Güthlin & Walach (2000) conducted a study of patients with 'non-inflammatory rheumatic pain' (not just back pain) who received either 10 sessions of classic massage or usual medical care for 5 weeks. By the end of this period, both groups had improved similarly, but at the 3-month follow-up more pain relief had occurred in the massage group.

Another research review (Furlan et al 2000) compared massage with detuned laser therapy as the placebo, and with various other physical treatments such as acupuncture or spinal manipulation. The results showed that massage is superior to placebo, relaxation treatment, acupuncture, or self-care education, but that it is inferior to manipulation, shiatsu, or transcutaneous electrical nerve stimulation, and no different from treatment with corsets or exercise in the care of back pain. The authors concluded that massage 'might' be beneficial for subacute and chronic nonspecific low back pain.

Researchers at the Touch Research Institute, Miami School of Medicine, evaluated the benefits of massage when treating low back pain (Hernandez-Reif et al 2001). They summarized the research outcome as follows:

> Adults with low back pain, with a duration of at least 6 months received two 30-minute massage, or relaxation therapy, sessions per week for 5 weeks. Participants receiving massage therapy reported experiencing less pain, depression, anxiety and their sleep improved. They also showed improved trunk flexion performance.

The conclusions of the various researchers are similar – that massage can be effective – but many of the results indicated that benefits were often short lived and mechanisms are not understood.

Specific research for massage and head and neck pain

The studies that speak specifically to the topic of this text – headache and neck pain – indicate similar conclusions to those of the low back studies. Chronic tension-type headache responded to treatment of trigger points that referred pain into the head. Massage intervention was most effective for individuals with difficult headaches which do not respond well to medical treatment, when anxiety and coping strategies are modified by the headaches, and those who abuse medication for the treatment of their headaches.

Multiple researchers found it difficult to make specific recommendations for massage addressing neck pain. More studies are needed to characterize massage treatment (frequency, duration, number of sessions, and massage technique).

Wolsko et al (2003) identified that chiropractic, massage, and relaxation techniques were the most commonly used complementary treatments for back or neck pain and were rated 'very helpful' by those that received this type of care. Chiropractic, massage, relaxation techniques, and other complementary methods all play an important role in the care of patients with back or neck pain.

LOGICAL CONCLUSIONS

The evidence from these reviews and studies indicates that when massage is compared with other treatment methods such as acupuncture, manipulation, relaxation and ultrasound:

- massage is at least as helpful in treating typical muscle pain as other modalities
- massage reduces use and therefore costs of medication when treating muscle skeletal pain
- massage as a treatment of back and neck pain is safe if applied by trained practitioners
- massage relaxes the mind as well as the musculature, and in many instances of chronic head and neck pain, emotion and stress are possible key features.

Additionally:

- massage increases the pain threshold, possibly through endorphin release
- massage can also enhance local blood flow and this could increase the clearance of local biochemical substances that increase pain.

Massage application provided by trained individuals appears to be a justifiable intervention for headache and neck pain. It is necessary to avoid the dangers of inappropriate treatment and include massage within comprehensive care, including interventions such as manipulation, medication, nutrition, and cognitive behavior therapy, as well as physical rehabilitation such as core stability and balance training, to provide the best benefit. It is also important to incorporate into the massage various soft tissue manipulation methods such as trigger point deactivation, muscle energy, positional release, and myofascial release techniques (as described in later chapters) to be truly effective. Head and neck pain are complicated conditions best treated in a multidisciplinary care process.

KEY POINTS

- Research is sparse for a specific and direct connection between massage intervention and headache and neck pain treatment.
- There are many studies that indirectly indicate massage efficacy for headache and neck pain based on studies related to stress, pain, and low back.
- A logical argument can be made for massage efficacy as part of a multidisciplinary care plan for those experiencing head and neck pain.
- Therapeutic massage needs to be provided by trained massage professionals that understand multidisciplinary care and have received additional training in soft tissue methods that incorporate into the general massage session.

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CHAPTER 6

Assessment strategies and selected interventions

CHAPTER CONTENTS

Assessment is a process of asking relevant questions and performing activities and tests to answer those questions. Once a person has been able to obtain an accurate diagnosis of the headache or neck pain and massage is recommended, then the massage therapist needs to perform assessment to determine the dysfunctional aspects that best respond to massage as well as to determine how massage will be delivered to support other treatments. Since massage has been shown both through clinical experience and scientific research to have beneficial outcomes for those with headache and neck pain, it is important to be able to assess accurately for the factors that can be addressed by massage and to know when to refer the person for necessary medical treatment.

SIGNS AND SYMPTOMS

This content has been described in earlier chapters. Following will be a review of signs and symptoms relevant to the massage therapist.

- *Muscle tension/contraction headache*: This headache type includes referred pain from trigger point activity, nerve impingement, muscle tension, connective tissue changes, and muscle guarding. Pain is experienced as pressure from the outside of the head pushing in and may feel like a tight band around the head. This headache type is effectively managed with massage.
- *Vascular headache*: In general the vascular or fluid pressure headache type includes sinus headache, hormone, migraine, cluster, caffeine withdrawal, and toxic headache. Pain is experienced as ache/pressure from the inside of the head pushing out. The head may feel like it will blow up. This headache type is difficult to manage with massage

but general pain management strategies (see Chapter 4) can help and massage can address accompanying muscle tension-type headache.

THE ASSESSMENT PROCESS

During assessment it is important to determine as many 'minor' signs and features of dysfunction as feasible rather than seeking one single 'cause'. The rationale for this process is that headache and neck pain are usually multicausal and massage is typically more beneficial for managing some factors more than others. By determining the multiple factors involved in the condition, massage intervention can be focused to those areas best suited for massage application. Following are questions that will need to be answered:

- What's short?
- What's tight?
- What's contracted?
- What's restricted?
- What's weak?
- What's out of balance?
- What firing sequences are abnormal?
- What has happened, and/or what is the patient doing, to aggravate these changes?
- What relieves symptoms?
- What can be done to help these changes to normalize?

The focus of massage intervention is to reduce the adaptive burden that is making demands on the structures of the head and neck and, at the same time, to enhance the functional integrity of the area so that the structures and tissues involved can better handle the abuses and misuses to which they are routinely subjected.

Assessing pain

Verbal rating scale (VRS)
The simplest measuring device, the verbal rating scale (Figure 6.1A), records on paper or a computer what a patient reports – whether there is 'no pain', 'mild pain', 'moderate pain', or 'severe pain'.

Numerical rating scale (NRS)
A numerical rating scale (Figure 6.1B) uses a series of numbers (zero to 100, or zero to 10): no pain would equal zero; worst pain possible would equal the highest number on the scale. The patient is asked to apply a numerical value to the pain and this is recorded along with the date.

Using a NRS is a common and fairly accurate method for measuring the intensity of pain, but does not take account of the 'meaning' the patient gives to the pain.

Visual analog scale (VAS)
This widely used method (Figure 6.1C) consists of a 10-centimeter line drawn on paper, with marks at each end and at each centimeter. The zero end of the line equals no pain at all; the 10-centimeter end equals the worst pain possible. The patient marks the line at the level of their pain.

The VAS can be used to measure progress by comparing the pain scores over time. The VAS has been found to be accurate when used for anyone over the age of five.

Questionnaires

A variety of questionnaires exist, such as the McGill Pain Questionnaire (Figure 6.2) and the Short-form McGill Pain Questionnaire (Figure 6.3). The shorter

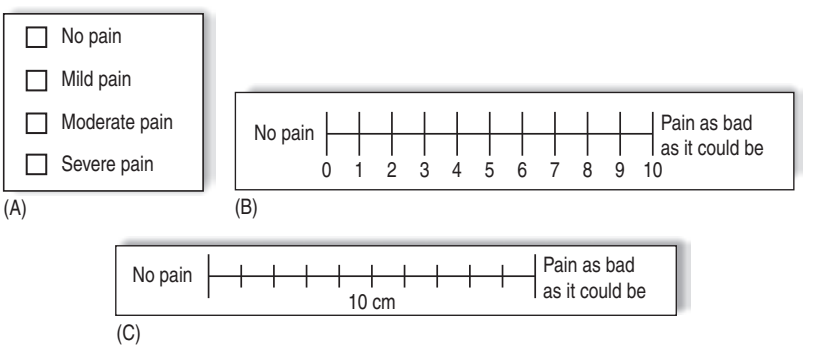


Figure 6.1 A: A verbal rating scale. The patient is instructed to mark the verbal description that best represents their pain. B: A numerical rating scale. The patient is instructed to mark the numbered vertical line as appropriate. C: A horizontal visual analog scale for pain intensity. (Reproduced with permission from Kolt & Andersen 2004.)

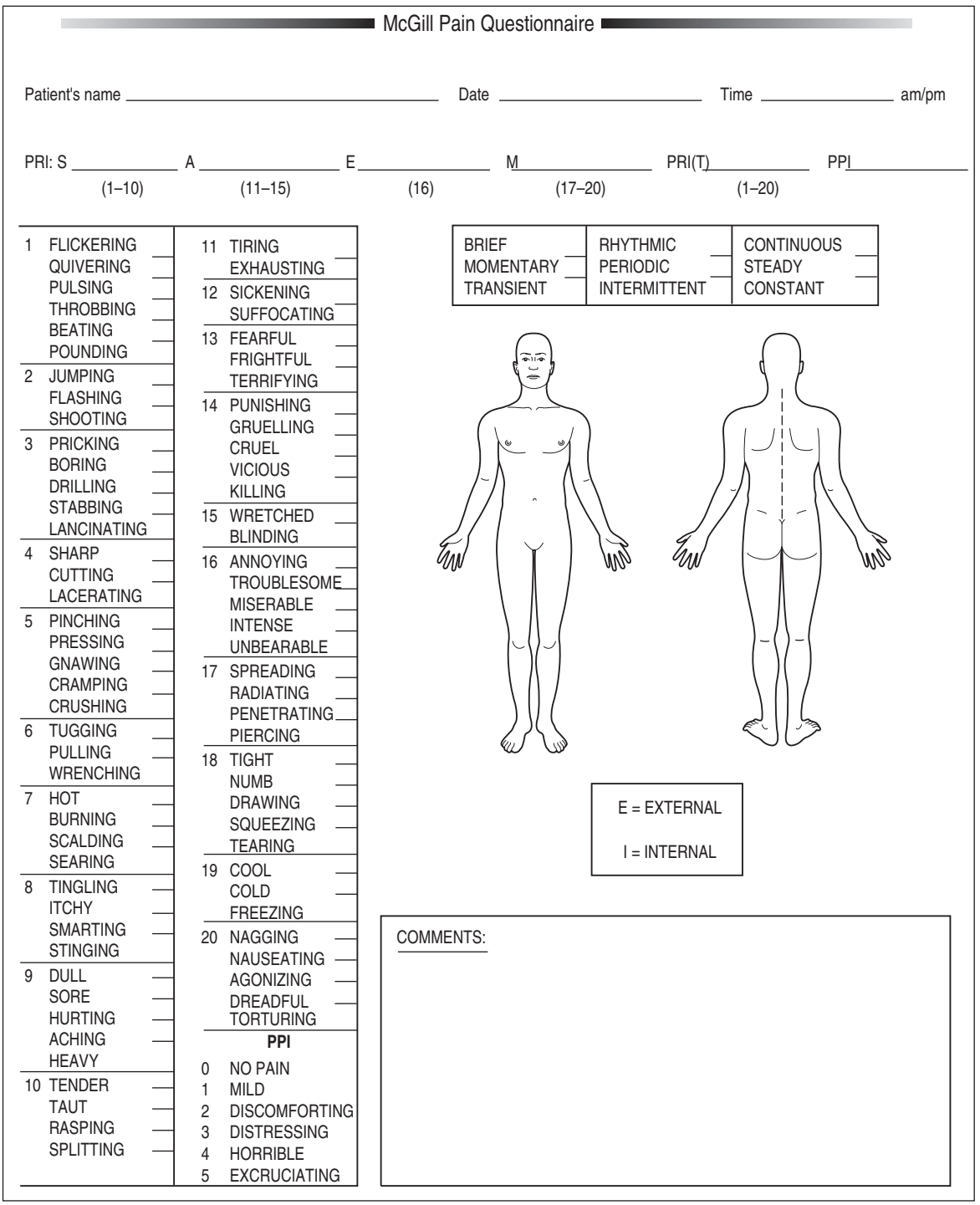


Figure 6.2 McGill Pain Questionnaire. The descriptors fall into four major groups: sensory, 1–10; affective, 11–15; evaluative, 16; and miscellaneous, 17–20. The rank value for each descriptor is based on its position in the word set. The sum of the rank values is the pain rating index (PRI). The present pain intensity (PPI) is based on a scale of 0–5. (Reproduced with permission from Melzack 1975.)

Short-form McGill Pain Questionnaire

Ronald Melzack

Patient's name _____ Date _____

	NONE	MILD	MODERATE	SEVERE
THROBBING	0)_____	1)_____	2)_____	3)_____
SHOOTING	0)_____	1)_____	2)_____	3)_____
STABBING	0)_____	1)_____	2)_____	3)_____
SHARP	0)_____	1)_____	2)_____	3)_____
CRAMPING	0)_____	1)_____	2)_____	3)_____
GNAWING	0)_____	1)_____	2)_____	3)_____
HOT-BURNING	0)_____	1)_____	2)_____	3)_____
ACHING	0)_____	1)_____	2)_____	3)_____
HEAVY	0)_____	1)_____	2)_____	3)_____
TENDER	0)_____	1)_____	2)_____	3)_____
SPLITTING	0)_____	1)_____	2)_____	3)_____
TIRING-EXHAUSTING	0)_____	1)_____	2)_____	3)_____
SICKENING	0)_____	1)_____	2)_____	3)_____
FEARFUL	0)_____	1)_____	2)_____	3)_____
PUNISHING-CRUEL	0)_____	1)_____	2)_____	3)_____

No pain ——————— Worst possible pain

PPI

0 NO PAIN _____
1 MILD _____
2 DISCOMFORTING _____
3 DISTRESSING _____
4 HORRIBLE _____
5 EXCRUCIATING _____

Figure 6.3 The Short-form McGill Pain Questionnaire. Descriptors 1–11 represent the sensory dimension of pain experience and 12–15 represent the affective dimension. Each descriptor is ranked on an intensity scale of 0 = none, 1 = mild, 2 = moderate, 3 = severe. The present pain intensity (PPI) of the standard long-form McGill Pain Questionnaire and the visual analog scale are also included to provide overall pain intensity scores. (Reproduced with permission from Melzack 1987.)

version lists a number of words that describe pain (such as throbbing, shooting, stabbing, heavy, sickening, fearful).

Use of such questionnaires requires training so that accurate interpretation can be made of the patient's answers; therefore, apart from acknowledging that they can be very useful, the McGill (and other) questionnaires will not be discussed in this book.

There are a number of ways of obtaining further information, the simplest being to conduct a web search using 'McGill questionnaire' as the key words.

Pain drawings

It can be useful for the patient to color the areas of their pain on a simple outline of the human body using a red pencil (Figure 6.4A). The patient should write single-word descriptions of the pain in different areas (e.g., throbbing, aching, etc.), or a simple code can be used, for example: xx = burning pain, !! = stabbing pain, oo = aching, and so on. This record of both the location and the nature of the person's pain can be compared with similar records at future visits.

The shaded or colored areas can be very useful when searching for trigger points, in combination with the body maps provided earlier in this chapter.

A single sheet of paper can easily contain a VAS and a shortened McGill Questionnaire, as well as a series of simple questions such as those illustrated in Figure 6.4B.

Pain threshold

Applying pressure safely requires sensitivity. We need to be able to sense when tissue tension/resistance is being 'met' as we palpate, and when tension is being overcome.

When applying pressure you may ask the patient: 'Does it hurt?' or 'Does it refer?' To make sense of the answer it is important to have an idea of how much pressure you are using. The term 'pain threshold' is used to describe the least amount of pressure needed to produce a report of pain, and/or referred symptoms, when a trigger point is being compressed.

It is important to know how much pressure is required to produce pain, and/or referred symptoms, and whether the amount of pressure being used has changed after treatment, or whether the pain threshold is different the next time the patient comes for treatment. It would not be very helpful to hear: 'Yes it still hurts' only because we are pressing much harder!

When testing for trigger point activity, we should be able to apply a moderate amount of force, just enough to cause no more than a sense of pressure (not pain) in normal tissues, and to be always able to apply the same amount of effort whenever we test in this way. We should be able to apply enough pressure to produce the trigger point referral pain, and know that the same pressure, after treatment, no longer causes pain referral.

How can a person learn to apply a particular amount of pressure, and no more? It has been shown that, using simple technology (such as bathroom scales), physical therapy students can be taught to accurately produce specific degrees of pressure on request. Students are tested applying pressure to lumbar muscles. After training, using bathroom scales, the students can usually apply precise amounts of pressure on request (Keating et al 1993).

Algometer

A basic algometer is a hand-held, spring-loaded, rubber-tipped, pressure-measuring device (Figure 6.5A) that offers a means of achieving standardized pressure application.

Using an algometer, sufficient pressure to produce pain is applied to preselected points, at a precise 90-degree angle to the skin. The measurement is taken when pain is reported. An electronic version of this type of algometer (Figure 6.5B) allows recording of pressures applied; however, these forms of algometer are used independently of actual treatment to obtain feedback from the patient (e.g., to register the pressure being used when pain levels reach tolerance).

A variety of other algometer designs exist, including a sophisticated version that is attached to the thumb or finger with a lead running to an electronic sensor that is itself connected to a computer (Figure 6.5C). This gives very precise readouts of the amount of pressure being applied by the finger or thumb during treatment.

Baldry (1993) suggests that algometers should be used to measure the degree of pressure required to produce symptoms 'before and after deactivation of a trigger point, because when treatment is successful, the pressure threshold over the trigger point increases'.

If an algometer is not available, and in order to encourage only appropriate amounts of pressure being applied, it may be useful to practice simple palpation exercises.

Crossed syndrome patterns (Box 6.1)

As compensation occurs due to overuse, misuse, and disuse of muscles of the head and neck, some muscles become overworked, shortened, and restricted, with others becoming inhibited and weak, and body-wide postural changes take place that have been

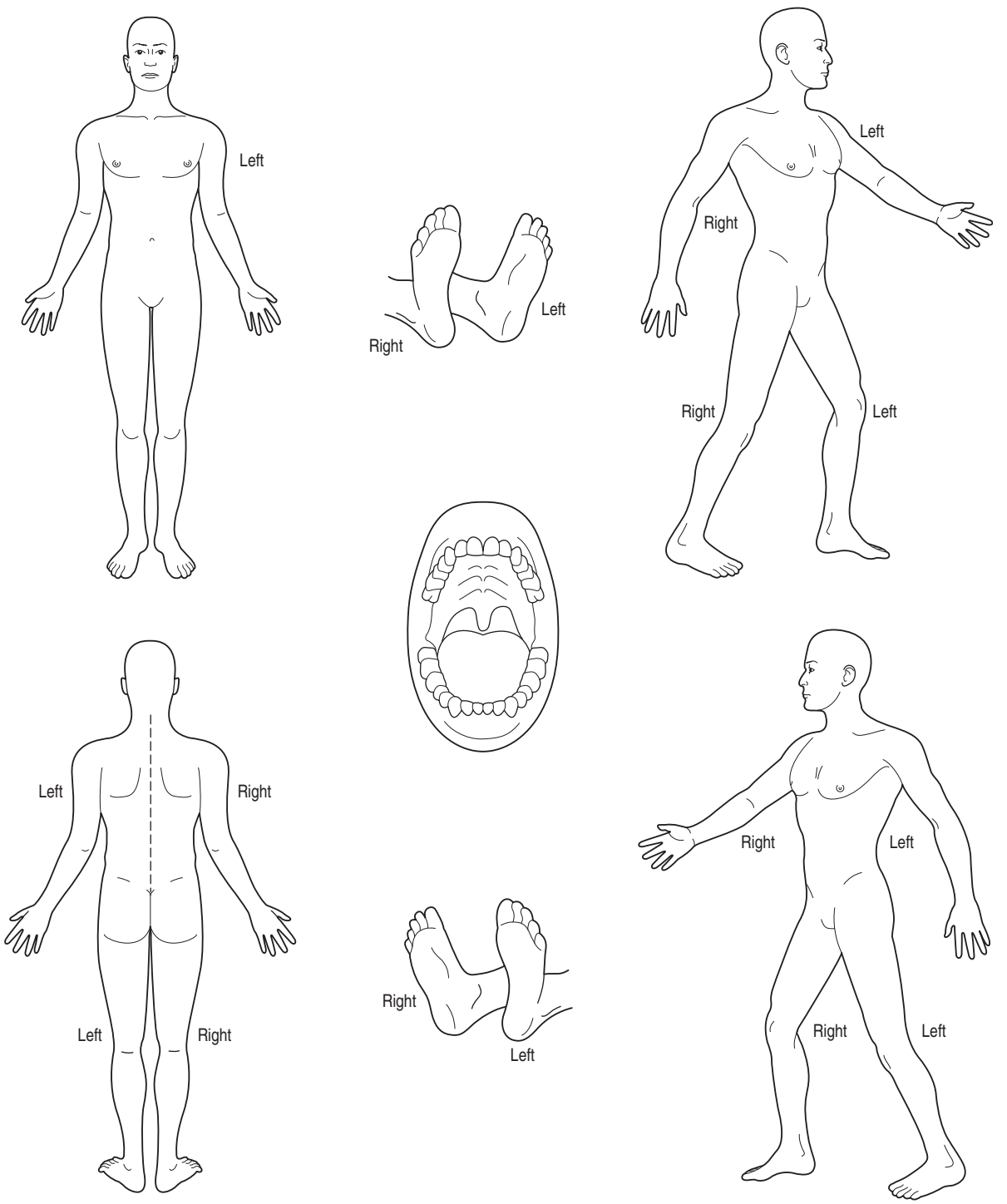


Figure 6.4A Outlines of human body onto which the patient sketches patterns of pain.

NAME _____ DATE _____

Please tick any of the words that describes your pain under the column that describes it's intensity.

	None	Mild	Moderate	Severe
Throbbing				
Shooting				
Stabbing				
Cramping				
Gnawing				
Hot-Burning				
Aching				
Heavy				
Tender				
Splitting				
Tiring-Exhausting				
Sickening				
Fearful				
Punishing-Cruel				

Your Pain is:

On Most Days ..... No Pain Mild
Discomforting Distressing
Horrible Excruciating

At It's Worst ..... No Pain Mild
Discomforting Distressing
Horrible Excruciating

At It's Best ..... No Pain Mild
Discomforting Distressing
Horrible Excruciating

TODAY No Pain Mild
Discomforting Distressing
Horrible Excruciating

How many hours of the day are you in pain? .....
How many days per week are you in pain? .....
How many weeks per year are you in pain? .....
What Drugs Have You Taken Today? .....

.....

Your Pain Today - Tick along scale below

No Pain [_____ **] Worst Possible Pain**

PLEASE DRAW YOUR PAIN

xxx	Burning	= =	Numbness
!!	Stabbing	**	Cramping
oo	Arching	?	Other

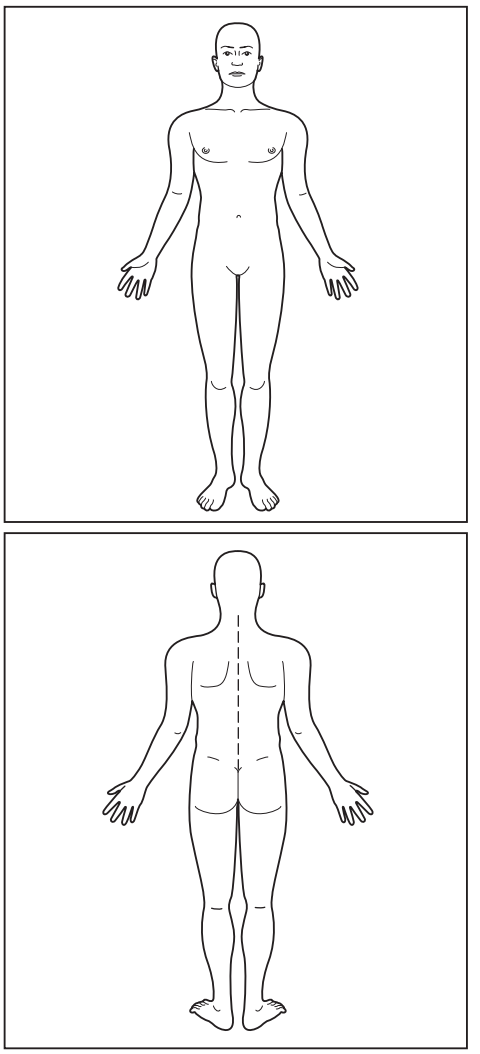


Figure 6.4B Pain chart for gathering descriptive terms from the patient, and for sketching pain patterns.

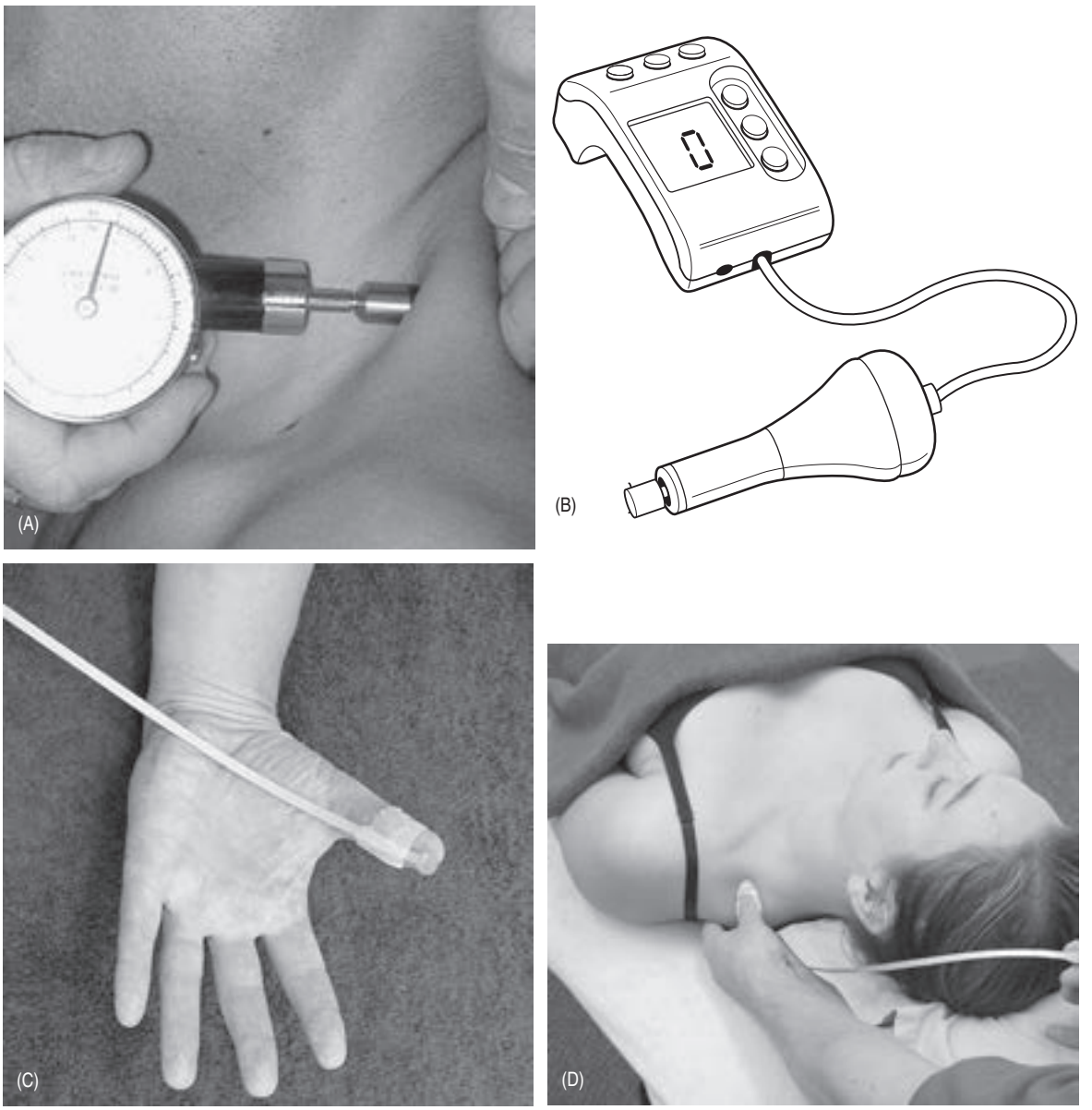


Figure 6.5 A: Mechanical pressure algometer being used to measure applied pressure. B: A version of an electronic algometer. C: Electronic algometer pressure pad attached to thumb (and to computer). D: Electronic algometer being used to evaluate pressure being applied to upper trapezius trigger point.

characterized as 'crossed syndromes' (Lewit 1999a). These crossed patterns demonstrate the imbalances that occur as antagonists become inhibited due to the overactivity of specific postural muscles.

The effect on muscles of the temporomandibular joint and cervical spine is a cause of muscle-contraction headache. One of the main tasks in rehabilitation of such pain and dysfunction is to normalize these imbalances, to release and stretch whatever is over-short and tight, and to encourage tone in those muscles that have become inhibited and weakened (Liebenson 1996).

In the upper crossed syndrome pattern we see how the deep neck flexors and the lower fixators of the

Box 6.1 Crossed syndrome patterns

Among the commonest bodywide stress influences are postural patterns such as the upper and lower crossed syndromes (Janda 1996).

UPPER CROSSED SYNDROME PATTERN

The upper crossed syndrome involves a round-shouldered, chin-poking, slumped posture that crowds the thorax and prevents normal breathing (Figure 6.6).

The chest, neck, shoulder and thoracic spine are all likely to be sites of pain and restriction as a result.

The associated muscles, most particularly upper trapezius, levator scapulae, pectoralis major and minor, and sternomastoid as well as most of the cervical and spinal muscles of the upper back, will either shorten, or weaken and lengthen (particularly deep neck flexor muscles), depending on their classification as postural or phasic.

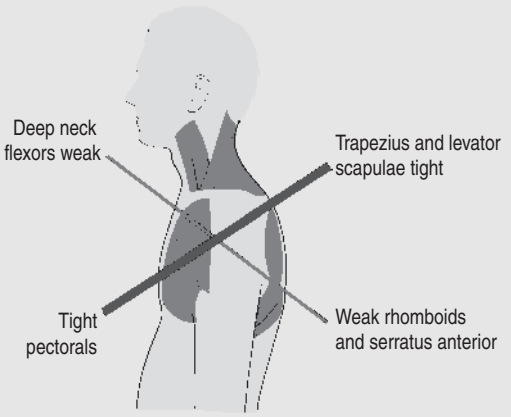


Figure 6.6 The upper crossed syndrome, as described by Janda. (From Chaitow 2001.)

LOWER CROSSED SYNDROME PATTERN

The lower crossed syndrome involves a typical 'sway-back' posture with slack abdominal and gluteal muscles, and over-tight erector spinae, quadrates lumborum, tensor fascia lata, piriformis and psoas (Figure 6.7).

Trigger points are found in abundance in both postural and phasic muscles, but more abundantly in postural ones.

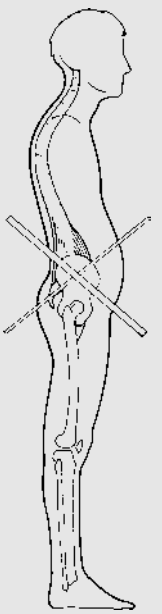


Figure 6.7 The lower crossed syndrome, as described by Janda. (From Chaitow 2001.)

shoulder (serratus anterior, lower and middle trapezius) have weakened (and possibly lengthened), while their antagonists the upper trapezius, levator scapulae and the pectorals will have shortened and tightened. Not shown in Figure 6.6, but also short and tight, are the cervical extensor muscles, the suboccipitals, and the rotator cuff muscles of the shoulder.

In the lower crossed pattern, which is often found in conjunction with the upper crossed pattern, we find that the abdominal muscles have weakened, as have the gluteals, and at the same time psoas and erector spinae will have shortened and tightened. Not shown in Figure 6.7, but also short and tight, are tensor fascia lata, piriformis, quadratus lumborum, hamstrings, and latissimus dorsi.

Muscle function

Postural and phasic muscles

There are basically two types of muscle in the body – those that have stabilization as their main task, and those that have movement as their main task (Engel & Banker 1986, Woo & Buckwater 1987). These are known, in one of the many classification systems (Janda 1982), as:

- postural (also known as Type I, or 'slow twitch red') and
- phasic (also known as Type II, or 'fast twitch white').

It is not within the scope of this book to provide detailed physiologic descriptions of the differences

between these muscle types, but it is important to know that:

- all muscles contain both types of fiber (Type I and Type II) but the predominance of one type over the other determines the nature of that particular muscle
- postural muscles have very low stores of energy-supplying glycogen but carry high concentrations of myoglobulin and mitochondria. These fibers fatigue slowly and are mainly involved in postural and stabilizing tasks, and when stressed (overused, underused, traumatized) tend to shorten over time
- phasic muscles contract more rapidly than postural fibers, have variable but reduced resistance to fatigue, and when stressed (overused, underused, traumatized) tend to weaken and sometimes to lengthen over time
- evidence exists of the potential for adaptability of muscle fibers. For example, slow twitch can convert to fast twitch, and vice versa, depending upon the patterns of use to which they are put and the stresses they endure (Lin et al 1994). An example of this involves the scalene muscles, which Lewit (1999b) confirms can be classified as either postural or phasic. If stressed (as in asthma), the scalenes will change from phasic to become postural muscles
- trigger points can form in either type of muscle in response to local situations of stress
- postural muscles are those muscles that shorten in response to dysfunction and include:
  - trapezius (upper), sternocleidomastoid, levator scapulae and upper aspects of pectoralis major, in the upper trunk; and the flexors of the arms
  - quadratus lumborum, erector spinae, oblique abdominals and iliopsoas, in the lower trunk
  - tensor fascia lata, rectus femoris, biceps femoris, adductors (longus brevis and magnus) piriformis, hamstrings, semitendinosus, in the pelvic and lower extremity region
- phasic muscles are those muscles that weaken in response to dysfunction (i.e., are inhibited) and include:
  - the paravertebral muscles (not erector spinae), scalenes, the extensors of the upper extremity
  - the abdominal aspects of pectoralis major
  - middle and inferior aspects of trapezius
  - the rhomboids, serratus anterior, rectus abdominis
  - the internal and external obliques, gluteals, the peroneal muscles and the extensors of the arms.

Box 6.2 is provided to chart changes (shortening) in the main postural muscles.

Box 6.2 Postural muscle assessment sequence

NAME: _____

KEY:

E = Equal (circle both if both are short)

L or R is circled if left or right is short

Spinal abbreviations – indicating areas of flatness during flexion, and therefore reduced ability to flex, suggesting shortened erector spinae:

LL = low lumbar
LDJ = lumbodorsal junction
LT = low thoracic
MT = mid thoracic
UT = upper thoracic

01. Gastrocnemius	E	L	R
02. Soleus	E	L	R
03. Medial hamstrings	E	L	R
04. Short adductors	E	L	R
05. Rectus femoris	E	L	R
06. Psoas	E	L	R
07. Hamstrings:			
(a) upper fires	E	L	R
(b) lower fires	E	L	R
08. Tensor fascia lata	E	L	R
09. Piriformis	E	L	R
10. Quadratus lumborum	E	L	R
11. Pectoralis major	E	L	R
12. Latissimus dorsi	E	L	R
13. Upper trapezius	E	L	R
14. Scalenes	E	L	R
15. Sternocleidomastoid	E	L	R
16. Levator scapulae	E	L	R
17. Infraspinatus	E	L	R
18. Subscapularis	E	L	R
19. Supraspinatus	E	L	R
20. Flexors of the arm	E	L	R
21. Spinal flattening:			
(a) seated, legs straight	LL	LDJ	LT	MT	UT
(b) seated, legs flexed	LL	LDJ	LT	MT	UT
(c) cervical spine extensors short?		Yes	No		

Palpation skills

The ability of a therapist to regularly and accurately locate and identify somatic landmarks, and changes in function, lies at the heart of palpation skills.

Greenman (1996) has summarized the five objectives of palpation. You, the therapist, should be able to:

- detect abnormal tissue texture
- evaluate symmetry in the position of structures, both physically and visually
- detect and assess variations in range and quality of movement during the range, as well as the quality of the end of the range of any movement ('end feel')
- sense the position in space of yourself and the person being palpated
- detect and evaluate change, whether this is improving or worsening as time passes.

Perspectives

Stone (1999) describes palpation as the 'fifth dimension':

> Palpation allows us to interpret tissue function ... a muscle feels completely different from a ligament, a bone and an organ, for example. There is a 'normal' feel to healthy tissues that is different for each tissue. This has to be learned through repeated exploration of 'normal' as the [therapist] builds his/her own vocabulary of what 'normal' is. Once someone is trained to use palpation efficiently, then finer and finer differences between tissues can be felt ... one must be able to differentiate when something has changed from being 'normal' to being 'too normal'.

Maitland (2001) has commented:

> In the vertebral column, it is palpation that is the most important and the most difficult skill to learn. To achieve this skill it is necessary to be able to feel, by palpation, the difference in the spinal segments – normal to abnormal; old or new; hypomobile or hypermobile – and then be able to relate the response, site, depth and relevance to a patient's symptoms (structure, source and causes). This requires an honest, self-critical attitude, and also applies to the testing of functional movements and combined physiological test movements.

Kappler (1997) explains:

> The art of palpation requires discipline, time, patience and practice. To be most effective and productive, palpatory findings must be correlated with a knowledge of functional anatomy, physiology and pathophysiology. ... Palpation with fingers and hands provides sensory information that the brain interprets as: temperature, texture, surface humidity, elasticity, turgor, tissue tension, thickness, shape, irritability, motion. To accomplish this task, it is necessary to teach the fingers to feel, think, see, and know. One feels through the palpating fingers on the patient; one sees the structures under the palpating fingers through a visual image based on knowledge of anatomy; one thinks what is normal and abnormal, and one knows with confidence acquired with practice that what is felt is real and accurate.

ARTT

In osteopathic medicine the locality of a dysfunctional musculoskeletal area is noted as having a number of common characteristics, summarized by the acronym ARTT (sometimes rearranged as TART). This process is effectively adapted to the massage therapist. These characteristics describe the basis of osteopathic palpation when assessing for somatic dysfunction (Gibbons & Tehan 2001):

- A relates to Asymmetry: This evaluates functional or structural differences when comparing one side of the body with the other.
- R relates to Range of motion: Alteration in range of motion can apply to a single joint, several joints, or a muscle. The abnormality may be either restricted or increased mobility, and includes assessment of range as well as quality of movement and 'end feel'.
- T relates to tissue Texture changes: The identification of tissue texture change is important in the diagnosis of somatic dysfunction. Palpable changes may be noted in superficial, intermediate, and deep tissues. It is important for a therapist to be able to distinguish 'normal' from 'abnormal', even if the nature of the change or the cause(s) remains unclear.
- T relates to tissue Tenderness: Unusual levels of tissue tenderness may be evident. Pain provocation and reproduction of familiar symptoms are often used to localize somatic dysfunction such as trigger points.

Tissue 'levels' – palpation exercise

Pick (1999) has useful suggestions regarding the levels of tissue that you should be able to feel by application of pressure. He describes the different levels of tissue you should be aiming for to be used in assessment and treatment:

- *Surface level*: This is the first contact, molding to the contours of the structure, no actual pressure. This is just touching, without any pressure at all and is used to start treatment via the skin.
- *Working level*: 'The working level ... is the level at which most manipulative procedures begin. Within this level the practitioner can feel pliable counter-resistance to the applied force. The contact feels noninvasive ... and is usually well within the comfort zone of the recipients.'
- *Rejection level*: Pick suggests this level is reached when tissue resistance is overcome, and discomfort/pain is reported. Rejection will occur at different degrees of pressure, in different areas, and in different circumstances.

So how much pressure should be used?

- When working with the skin – surface level
- When palpating for trigger points – working level
- When testing for pain responses, and when treating trigger points – rejection level.

When you are at the rejection level there is a feeling of the tissues pushing you away, and you have to overcome the resistance to achieve a sustained compression.

Skin assessment and palpation

Changes in the skin, above areas of dysfunction ('hyperalgesic skin zones'), where the tissues may be inflamed, or where there is increased hypertonicity or spasm, or where there have been trigger point changes, are easily palpated.

- The skin adheres to the underlying fascia more efficiently, and is therefore more resistant to movements such as sliding (on underlying fascia), lifting, or rolling.
- The skin displays increased sympathetic activity, resulting in increased hydrosis (sweat). This sudomotor activity brings about a noticeable resistance during light stroking with (say) a finger. This resistance is known in clinical shorthand as 'skin drag'.
- The skin appears to be more 'compacted', resisting effective separation, stretching, and lifting methods.
- The skin displays altered thermal qualities, allowing for some discrimination between such areas and normal surrounding tissue (Bischof & Elmiger 1960, Licht et al 1988).

Tests

The three methods described below do not need to be used during the same treatment session, although they can be. The methods described can support or replace each other, with some therapists having a preference for one or the other.

Note: It is easier to displace skin against underlying tissue in slim individuals with little fatty tissue. Obese individuals have a higher fat and water content subcutaneously, making displacement more difficult.

Method 1: Skin on fascia displacement

- The patient lies prone with the therapist standing to the side, at hip level, contacting the patient with both hands (or the pads of several fingers of each hand) flat against the skin bilaterally. Only enough pressure should be used to produce adherence between the fingertips and the skin (no lubricant should be used at this stage).
- The skin and subcutaneous tissues should be lightly moved ('slid') towards the head, simultaneously on each side, against the fascia by small pushing movement of the hands, assessing for the elastic barrier.
- It is important that areas on both left and right of the spine are examined at the same time. The two sides should be compared for symmetry of range of movement of the skin and subcutaneous tissue, to the elastic barrier.
- The pattern of testing should be performed from inferior to superior.
- The degree of displacement possible should be symmetrical if the deeper tissues are normal.
- It should be possible to identify local areas where skin adherence to underlying connective tissue reveals restriction, as compared to the opposite side. This is likely to be an area where the muscles beneath the skin being tested house active myofascial trigger points (TrPs), or tissue that is dysfunctional in some other way, or hypertonic.
- It is often possible to visualize these reflex areas as they may be characterized by being retracted or elevated, most commonly close to the lower thoracic border of the scapula and over the pelvic and gluteal areas.

Method 2: Skin stretching assessment. *Note*: At first this method should be practiced slowly. Eventually, it should be possible to move fairly rapidly over an area that is being searched for evidence of reflex activity (or acupuncture points).

- Choose an area to be assessed, where you identified abnormal degrees of skin on fascia adherence (Method 1).

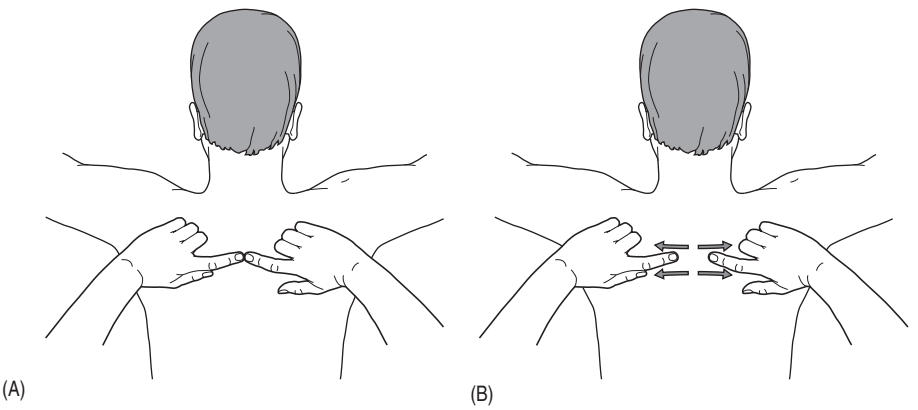


Figure 6.8 A: Fingers touch each other directly over the skin to be tested – very light contact only.
B: Pull apart to assess degree of skin elasticity – compare with neighboring skin area. (From Chaitow 1996.)

- To examine the neck, shoulder, and midback region, place your two index fingers next to each other, on the skin, side by side or pointing toward each other, with no pressure at all onto the skin, just a contact touch (Figure 6.8A).
- Lightly and slowly separate your fingers, feeling the skin stretch to its 'easy' limit, to the barrier where resistance is first noted (Figure 6.8B). It should be possible – in normal tissue – to 'spring' the skin further apart, to its elastic limit, from that barrier.
- Release this stretch and move both fingers 0.5 cm (between 1/4 and 1/2 inch) to one side, or below, or above, the first test site, and repeat the assessment again, using the same direction of pull as you separate the fingers. Add a spring assessment once the barrier is reached.
- Perform exactly the same sequence over and over again, until the entire area of tissue has been searched, ensuring that the rhythm you use is neither too slow nor too rapid. Ideally one stretch per second should be performed.
- When the segment of skin being stretched is not as elastic as it was on the previous stretch a potential dysfunctional area will have been identified. This should be marked with a skin pencil for future attention.
- Light digital pressure to the center of that small zone may identify a sensitive contracture which, on sustained pressure, may radiate or refer sensations to a distant site.
- If such sensations are familiar to the patient, the point being pressed is an active trigger point.

Method 3: Drag palpation assessment. Sweat glands, controlled by the sympathetic nervous system, empty directly on the skin, creating increased hydrosis (sweat) presence, changing the behavior (e.g., elasticity) and 'feel' of the skin (Adams et al 1982, Lewit 1999b). Lewit suggests that reflex activity should be easily identified by assessing the degree of elasticity in the overlying skin (see Method 2), and comparing it with surrounding tissue.

The change in elasticity occurs at the same time as increased sweat activity. Before the days of electrical detection of acupuncture points, skilled acupuncturists could quickly identify 'active' points by palpation using this knowledge. Measuring the electrical resistance of the skin can now find acupuncture points even more rapidly. Because the skin is moist it conducts electricity more efficiently than when it is dry.

- Using an extremely light touch ('skin on skin'), without any pressure, a finger or the thumb is stroked across the skin overlying areas suspected of housing dysfunctional changes, such as TrPs (Figure 6.9).
- The areas chosen are commonly those where skin on fascia movement (see Method 1) was reduced, compared with surrounding skin.
- When the stroking finger passes over areas where a sense of hesitation, or 'drag', is noted, an area of increased hydrosis/sweat/sympathetic activity will have been identified.
- A degree of searching pressure into such tissues, precisely under the area of drag, may locate a taut band of tissue, and when this is compressed a painful response is common.

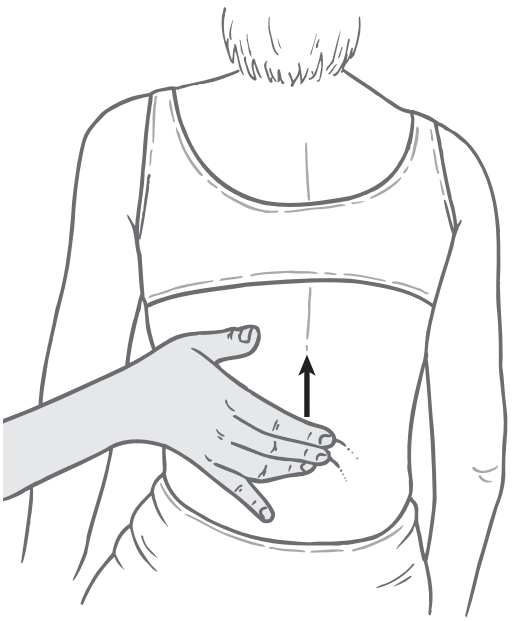


Figure 6.9 Assessing variations in skin friction (drag, resistance). (From Chaitow 1996.)

- If pressure is maintained for 2–3 seconds a radiating or referred sensation (possibly pain) may be reported. If this sensation replicates symptoms previously noted by the patient, the point located is an active TrP.

Summary of skin palpation methods

1. Movement of skin on fascia – resistance indicates general locality of reflexogenic activity, a 'hyperalgesic skin zone' such as a trigger point.
2. Local loss of skin elasticity – refines definition of the location.
3. Light stroke, seeking 'drag' sensation (increased hydrosis), offers pinpoint accuracy of location.

Therapeutic use of skin changes (Figure 6.10)

Method 1: Releasing skin changes by stretching

- Return to a hyperalgesic skin zone identified by one of the methods described above. Gently stretch the skin to its elastic barrier and hold it at the elastic barrier for 10–15 seconds, without force. You should feel the skin tightness gradually release so that, as you hold the elastic barrier, your fingers separate.
- If you now hold the skin in its new stretched position, at its new barrier of resistance, for a few seconds longer, it should release a little more.
- This is, in effect, a mini-myofascial release process. The tissues beneath the 'released' skin will be more pliable and have improved circulation. You will have started the process of normalization.
- Larger areas, superficial to short tissues in the anterior thorax, for example, can be treated in much the same way as the small skin areas described above (Figure 6.11). Using a firm contact, place the full length of the sides of both hands, from the little fingers to the wrist, onto an area of skin overlying tense muscles. Separate the hands slowly, stretching the skin with which they are in contact, until an elastic barrier is reached.
- After 15 seconds or so there should be a sense of lengthening as the superficial tissues release.
- If you then palpate the underlying muscles and areas of local tension you should be able to confirm that there has been a change for the better.

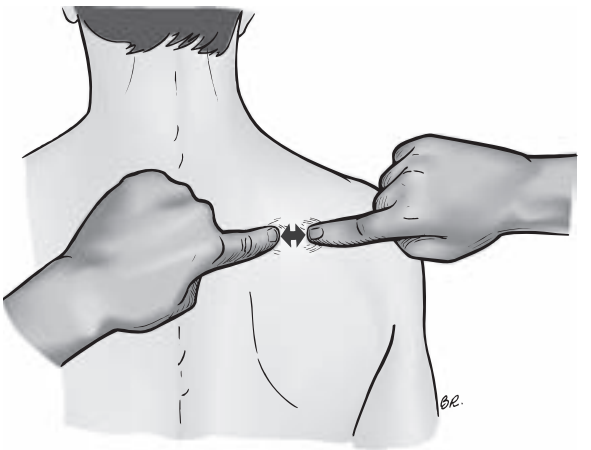


Figure 6.10 Skin change by stretching. (From Fritz 2009.)

Method 2: Adding an isometric contraction

- If you had asked the patient to lightly contract the muscles under your hands for 5–7 seconds before starting the myofascial release, the tissues would probably have responded more rapidly and effectively.
- The technique you would have been using is called muscle energy technique (MET), which is described in the next chapter.

Method 3: Positional release method

- Locate an area of skin that tested as 'tight' when you evaluated it using one of the assessment methods described earlier.
- Place two or three finger pads onto the skin and slide the skin superiorly and then inferiorly on the underlying fascia. In which direction did the skin slide more easily and further?

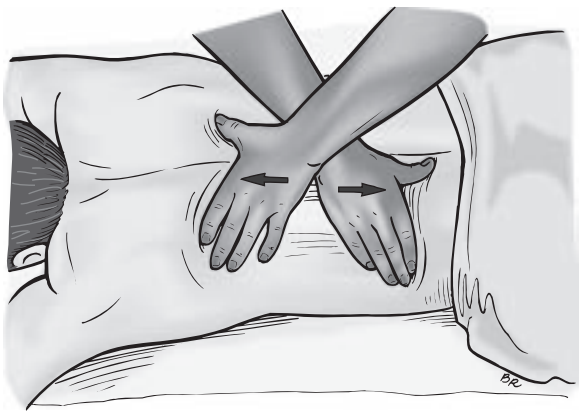
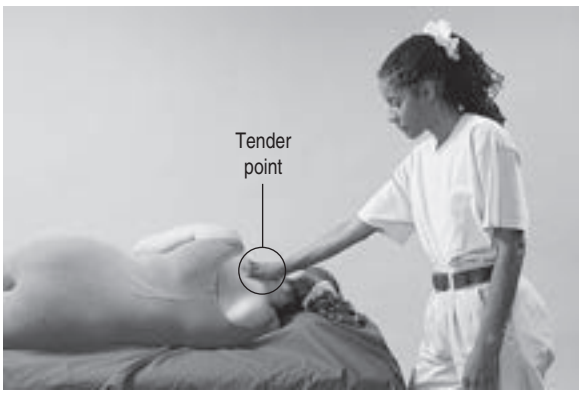


Figure 6.11 Light compressive force is applied, molding the hand to the skin. The hands are then separated without adding additional compressive force, providing for a fascial stretch.

- Slide the skin in that direction and, while holding it there, test the preference of the skin to slide medially and laterally. Which of these is the 'easier' direction?
- Slide the tissue toward this second position of ease.
- Now introduce a gentle clockwise and anticlockwise twist to these tissues. Which way does the skin feel more comfortable as it rotates?
- Take it in that direction, so that you are now holding the skin in three 'stacked' positions of ease. Hold this for not less than 20 seconds.
- Release the skin and retest; it should now display a far more symmetrical preference in all the directions which were previously 'tight' and the underlying tissues should palpate as softer, less tense.



A Step 1. Locate the tender point. Step 2. Gently initiate the pain response with direct pressure. Remember, the sensation of pain is a guide.

B Step 3. Slowly position the body until the pain subsides. Ease off the pressure. Step 4. Wait at least 30 seconds or longer until the client feels the release.

C Step 5. Slowly reposition into the extended position.

Figure 6.12 Procedure for generalized positional release. Repeat steps 1 through 5 until normal full resting length is obtained.

Findings. You have now established that holding skin at its barrier (unforced) changes its function, as the skin releases. You will also have discovered that by adding a very light isometric contraction before the stretch it is even more effective.

This last example will have shown you that moving tissues away from the barrier into ease (positional release technique) can also achieve a release. This last approach is more suitable for very painful, acute situations. The positional release method can also be used by repositioning the body to identify the ease position (Figure 6.12).

Neuromuscular technique assessment and treatment methods

The palpating hand(s) needs to uncover the locality, nature, degree and, if possible, the age of dysfunctional soft tissue changes that may have taken place, and as we palpate we need to ask:

- Is this palpable change acute or chronic (or, as is often the case, an acute phase of a chronic condition)?
- If acute, is there any inflammation associated with the changes?
- How do these palpable soft tissue changes relate to the patient's symptom pattern?
- Are these palpable changes part of a pattern of stress-induced change that can be mapped and understood?
- Are these soft tissue changes painful and, if so, what is the nature of that pain (constant, intermittent, sharp, dull, etc.)?
- Are these palpable changes active reflexively and, if so, are active or latent trigger points involved (i.e., do they refer symptoms elsewhere and, if so, does the patient recognize the pain as part of their symptom picture)?
- Are these changes present in a postural or phasic muscle group?
- Are these palpable changes the result of joint restriction ('blockage', subluxation, lesion) or are they contributing to such dysfunction?

In other words, we need to ask ourselves: 'What am I feeling, and what does it mean?'

Palpating for trigger points

In osteopathic medicine (works for massage as well) the acronym STAR is used as a reminder of the characteristics of somatic dysfunction, such as myofascial trigger points.

- S relates to Sensitivity (or 'tenderness'): This is the one feature that is almost always present when there is soft tissue dysfunction.
- T relates to tissue Texture change: The tissues usually 'feel' different (e.g., they may be tense, fibrous, swollen, hot, cold or have other 'differences' from normal).
- A relates to Asymmetry: There will commonly be an imbalance on one side, compared with the other, but this is not always the case.
- R relates to Range of motion reduced: Muscles will probably not be able to reach their normal resting length, or joints may have a restricted range.

If two or three of these features are present this is enough to confirm that there is a problem, a dysfunction. It does not, however, explain why the problem exists, but is a start in the process toward understanding the patient's symptoms.

Research (Fryer et al 2004) has confirmed that this traditional osteopathic palpation method is valid. When tissues in the thoracic paraspinal muscles were found to be 'abnormal' (tense, dense, indurated) the same tissues (using an algometer) were also found to have a lowered pain threshold. Less pressure was needed to create pain (see Figure 6.5) (Simons et al 1999).

While the 'tenderness', altered texture, and range of motion characteristics, as listed in the STAR (or TART) acronym, are always true for trigger points, additional trigger point changes have been listed by Simons and colleagues (1999).

- The soft tissues housing the trigger point will demonstrate a painful limit to stretch range of motion – whether the stretching is active or passive (i.e., the patient is stretching the muscle, or you are stretching the muscle).
- In such a muscle there is usually pain or discomfort when it is contracted against resistance, with no movement taking place (i.e., an isometric contraction).
- The amount of force the muscle can generate is reduced when it contains active (or latent) trigger points – it is weaker than a normal muscle.
- A palpable taut band with an exquisitely tender nodule exists, and this should be found by palpation, unless the trigger point lies in very deep muscle and is not accessible.
- Pressure on the tender spot produces pain familiar to the patient, and often a pain response ('jump sign').

Treatment of trigger points is outlined and discussed in the next chapter.

TESTS FOR MUSCLE WEAKNESS AND FIRING SEQUENCE

There are usually a number of 'causes' and aggravating factors, as well as different structures, involved in any case of head and neck pain, rather than just one cause.

The first objectives are to identify what these factors and tissues are, and to use treatment to enhance function and reduce the adaptive load.

Functional tests (e.g., shoulder abduction) demonstrate through observation and palpation which muscles are being overused, misused, or disused and are therefore likely to be shortened and/or weakened. These patterns of imbalance create crossed syndromes that can be recognized by observation (see Box 6.1). Box 6.3 describes the most commonly used assessment procedures and the intervention for altered firing patterns.

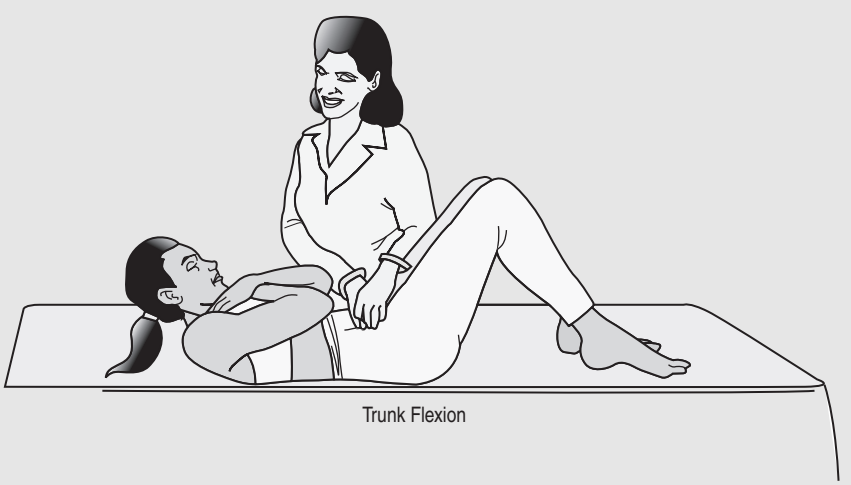
Various assessment processes help to determine the appropriate course of action:

- Tests for weakness indicate which muscles require toning – either through exercise, or through removal of inhibition from antagonists, or both.
- Tests for shortness indicate which muscles require releasing, relaxing, and stretching.
- Palpation methods using the STAR ingredients offer a useful way of identifying local dysfunction.
- Tests for the presence of trigger points help to locate and identify those in need of deactivation (active points).
- Breathing pattern disorders can disturb motor control of the spine and encourage neck problems and resulting headaches. There are also chemical changes that occur with disordered breathing that can either cause or perpetuate headache.
- By restoring balanced muscle activity, reducing tightness, increasing tone in weak structures, encouraging better breathing, and deactivating

Box 6.3 Common muscle firing patterns

Trunk flexion

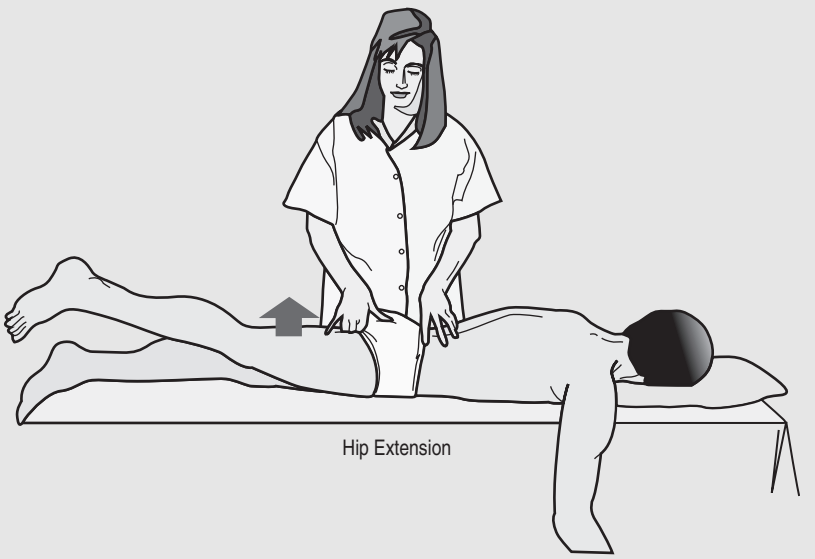
1. Normal firing pattern
   - a. Transverse abdominis
   - b. Abdominal obliques
   - c. Rectus abdominis
2. Assessment
   - a. Client is supine with knees and hips at 90 degrees.
   - b. Client is instructed to perform a normal curl up.
   - c. Massage practitioner assesses the ability of the abdominal muscles to functionally stabilize the lumbar–pelvic–hip complex by having the client draw the abdominal muscle in (as when bringing the umbilicus toward the back) and then do a curl just lifting the scapula off the table while keeping both feet flat. Inability to maintain the drawing-in position and/or to activate the rectus abdominis during the assessment demonstrates an altered firing pattern of the abdominal stabilization mechanism.
3. Altered firing pattern
   - a. Weak agonist – abdominal complex
   - b. Overactive antagonist – erector spinae
   - c. Overactive synergist – psoas, rectus abdominis
4. Symptoms
   - a. Low back pain
   - b. Buttock pain
   - c. Hamstring shortening



Trunk Flexion

(Continued)

Box 6.3 Common muscle firing patterns—cont'd

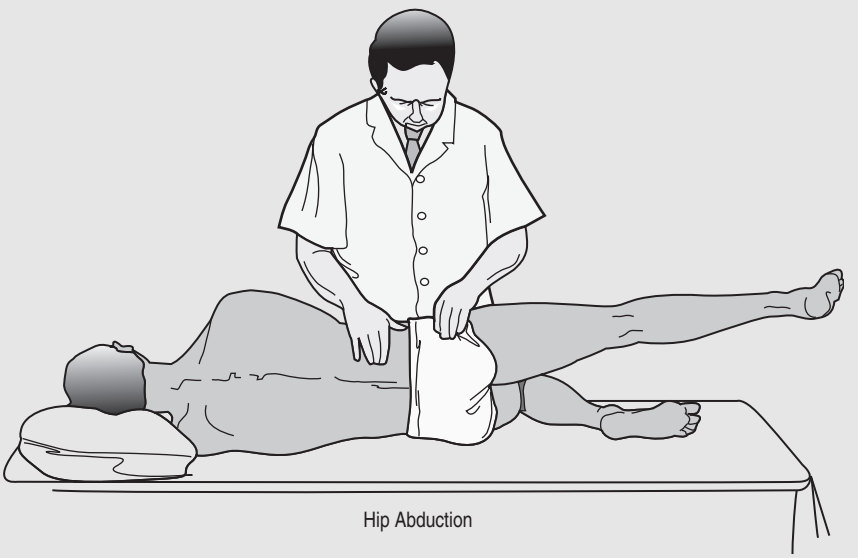


Hip Extension

Hip extension

1. Normal firing pattern
   - **a.** Gluteus maximus
   - **b.** Opposite erector spinae
   - **c.** Same side erector spinae and hamstring

   OR
   - **a.** Gluteus maximus
   - **b.** Hamstring
   - **c.** Opposite erector spinae
   - **d.** Same side erector spinae
2. Assessment
   - **a.** Client is prone.
   - **b.** Massage practitioner palpates the erector spinae with the thumb and index finger of one hand while palpating the muscle belly of the gluteus maximus and hamstring with the little finger and thumb of the other hand.
   - **c.** Client is instructed to raise the hip more than 15 degrees off the table.
3. Altered firing pattern
   - **a.** Weak agonist – gluteus maximus
   - **b.** Overactive antagonist – psoas
   - **c.** Overactive stabilizer – erector spinae
   - **d.** Overactive synergist – hamstring
4. Symptoms
   - **a.** Low back pain
   - **b.** Buttock pain
   - **c.** Recurrent hamstring strains

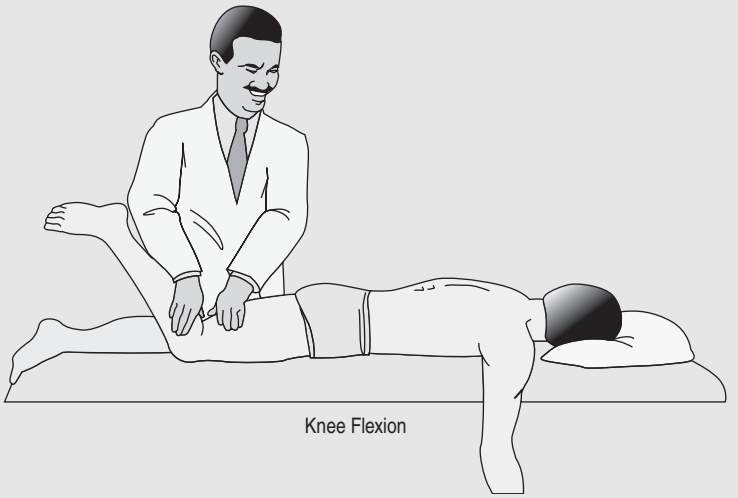


Hip Abduction

Box 6.3 Common muscle firing patterns—cont'd

Hip abduction

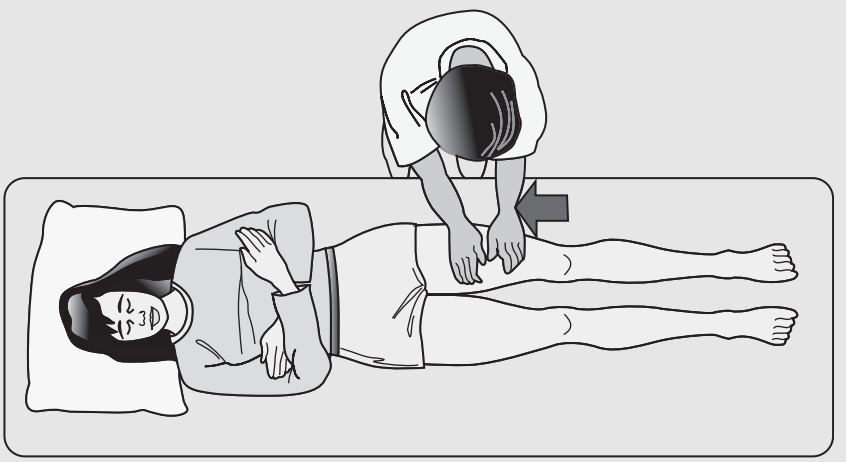
1. Normal firing pattern
   - a. Gluteus medius
   - b. Tensor fasciae latae
   - c. Quadratus lumborum
2. Assessment
   - a. Client is in side-lying position.
   - b. Massage practitioner stands next to the client and palpates the quadratus lumborum with one hand and the tensor fasciae latae and gluteus medius with the other hand.
   - c. Client is instructed to abduct the leg from the table.
3. Altered firing pattern
   - a. Weak agonist – gluteus medius
   - b. Overactive antagonist – adductors
   - c. Overactive synergist – tensor fasciae latae
   - d. Overactive stabilizer – quadratus lumborum
4. Symptoms
   - a. Low back pain
   - b. Sacroiliac joint pain
   - c. Buttock pain
   - d. Lateral knee pain
   - e. Anterior knee pain



Knee Flexion

Knee flexion

1. Normal firing pattern
   - a. Hamstrings
   - b. Gastrocnemius
2. Assessment
   - a. Client is prone.
   - b. Massage practitioner places fingers on the hamstring and gastrocnemius.
   - c. Client flexes the knee.
3. Altered firing pattern
   - a. Weak agonist – hamstrings
   - b. Overactive synergist – gastrocnemius
4. Symptoms
   - a. Pain behind the knee
   - b. Achilles tendinitis



Knee Extension

(Continued)

Box 6.3 Common muscle firing patterns—cont'd

Shoulder flexion

1. Normal firing pattern
   a. Supraspinatus
   b. Deltoid
   c. Infraspinatus
   d. Middle and lower trapezius
   e. Contralateral quadratus lumborum
2. Assessment
   a. Massage practitioner stands behind seated client with one hand on the client's shoulder and the other on the contralateral quadratus area.
   b. Client is asked to abduct the shoulder to 90 degrees.
3. Altered firing pattern
   a. Weak agonist – levator scapula
   b. Overactive agonist – upper trapezius
   c. Overactive stabilizer – ipsilateral quadratus lumborum
4. Symptoms
   a. Shoulder tension
   b. Headache at the base of the skull
   c. Upper chest breathing
   d. Low back pain

INTERVENTION FOR ALTERED FIRING PATTERNS

Use appropriate massage application to inhibit the dominant muscle. Then, strengthen the weak muscles.

Box 6.4 Nijmegen Questionnaire

	Never 0	Rare 1	Sometimes 2	Often 3	Very often 4
Chest pain					
Feeling tense					
Blurred vision					
Dizzy spells					
Feeling confused					
Faster or deeper breathing					
Short of breath					
Tight feelings in chest					
Bloated feeling in stomach					
Tingling fingers					
Unable to breathe deeply					
Stiff fingers or arms					
Tight feelings round mouth					
Cold hands or feet					
Palpitations					
Feelings of anxiety					

Total: /64*

*Patients mark with a tick how often they suffer from the symptoms listed. A score above 23/64 is diagnostic of hyperventilation syndrome.

trigger points, normal function is encouraged. Stages of care should include:
- relieving pain (massage, trigger point deactivation, ice, etc.)
- easing adaptive demands (better posture and use patterns)
- improving function (exercise, improved stability, etc.).

ASSESSMENT FOR BREATHING FUNCTION

The Nijmegen Questionnaire is a simple questionnaire that is internationally accepted as being over 90% accurate in suggesting that hyperventilation syndrome (HVS) exists as a contributory feature of a person's symptom picture. This noninvasive test is a simple and accurate indicator of acute and chronic hyperventilation.

Signs indicating breathing pattern disorder (BPD) include the following:

- Restlessness (type A, 'neurotic'): Look for rapid, fidgety behavior and movement.
- 'Air hunger' and sighing: 'Air hunger' describes an attempted inhalation performed almost as a gasping effort, trying to force air into lungs that have not exhaled.
- A rapid swallowing rate (aerophagia), often resulting in bloating.
- Poor breath-holding times: Shown by an inability to comfortably (i.e., without strain) hold the breath in for more than 10–15 seconds. This suggests poor carbon dioxide tolerance, as 'normal' is considered to be around 30 seconds.
- A perceptible rise of the shoulders on inhalation suggests chronic overactivity and shortening of the accessory respiratory muscles and the likelihood they will contain active trigger points.
- Obvious paradoxical breathing ('hi-lo' test) with a hand on the chest and a hand on the stomach (the upper hand moves first on inhalation, demonstrating an inappropriate pattern). Abdomen moves out on inhale and in during exhale.
- Visible 'cord-like' sternomastoid muscles, suggesting overuse of the accessory breathing muscles.
- A rapid breathing rate: over 18 per minute (although this may not be obvious).
- Symptoms including muscular stiffness and aching (particularly of the neck and shoulders), fatigue, brain fog, irritable bowel syndrome, chronic pain, anxiety, panic, phobias, cold extremities, paresthesia, photophobia/hyperacusis, and comments such as, 'I can't take a deep breath.'
- A positive Nijmegen Questionnaire test.

Observe and palpate for overuse of upper chest breathing muscles during normal relaxed breathing. In addition, the following assessments are easily incorporated into the massage:

- The massage therapist stands behind the seated client and places the hands over the upper trapezius area so that the tips of the fingers rest on the top of the clavicles.
- As the client breathes, determine if the accessory muscles are being used for relaxed breathing. If the shoulders move up and down as the client breathes it is likely that accessory muscles are being recruited. In normal relaxed breathing the shoulders should not move in this way. The client will be using accessory muscles to breathe if the chest movement is concentrated in the upper chest instead of the lower ribs and abdomen.
- Any of the accessory muscles used for breathing results in an increase in tension and tendency toward the development of trigger points. These situations can be identified with palpation. Connective tissue changes are common since this breathing dysfunction is often chronic. The connective tissues are palpated as thick, dense, and shortened in this area.
- Have the client inhale and exhale and observe for a consistent exhale that is longer than the inhale. Normal relaxed breathing consists of a shorter inhalation phase in relationship to a longer exhalation phase. The ratio of inhalation time to exhalation is one count inhale to four counts exhale. A reverse of this pattern indicates a breathing pattern disorder. The ideal pattern would range between 2 and 4 counts during the inhalation and between 8 and 10 counts for the exhalation. Targeted massage and breathing retraining methods can be used to restore normal relaxed breathing.
- Have the client hold their breath without strain to assess for tolerance to carbon dioxide levels. They should be able to comfortably hold the breath for at least 15 seconds, with 30 seconds being ideal.
- Palpate and gently mobilize the thorax to assess for rib mobility. This is done in supine, prone, sidelying and seated positions. The ribs should have a springy feel, and be a bit more mobile from the 6th to the 10th ribs.

Suggested strategies and treatment sequence for HVS/BPD

The following sequence is based on the professional practice of Dr Chaitow and while it represents only one approach for treatment of disordered breathing, it does contain the elements necessary for a successful restoration of normal breathing. Treatment and retraining commonly involve 8–12 weekly sessions, followed by treatment every 2–3 weeks, for approximately 6 months. An educational component should be included at each session.

Massage therapists can increase the effectiveness of massage by incorporating these strategies into the general full body massage approach.

First two treatments (not less than weekly)
Release and/or stretch of upper fixators of the shoulders/accessory breathing muscles (upper trapezius, levator scapulae, scalenes/sternocleidomastoid, pectorals, latissimus dorsi) as well as attention to trigger points in these; soft tissue (neuromuscular technique, muscle energy technique, positional release technique, etc.), attention to the diaphragm area (anterior intercostals, sternum, abdominal attachments, costal margin, quadratus lumborum/psoas), as well as attention to trigger points in these.

Retraining: Pursed lip breathing, as well as guidance as to restricting shoulder rise during inhalation.

Sessions (weeks) 3 and 4
As above, plus mobilization of thoracic spine and ribs (as well as lymphatic pump/drainage methods), plus address fascial and osseous links (cranial, pelvic, limbs).

Retraining: Anti-arousal breathing, plus specific relaxation methods, stress management, autogenic training, visualization, meditation, counseling.

Sessions (weeks) 5–12
As above, plus focus on other body influences (ergonomics, posture).

Retraining: Additional exercises as appropriate.

Sessions (weeks) 13–26
Review and treat residual dysfunctional patterns/tissues.

Throughout: As indicated; incorporate nutrition, psychotherapy and adjunctive methods, such as hydrotherapy, tai chi, yoga, Pilates, massage, acupuncture, etc.

Successful breathing retraining

There have been many reports and studies showing the value of breathing rehabilitation (Han et al 1996). Lum (1987) reported on a study in which more than 1000 anxious and phobic patients were treated using breathing retraining, physical therapy, and relaxation. Symptoms were usually abolished in 1–6 months, with some younger patients requiring only a few weeks. At 12 months, 75% were free of all symptoms and 20% had only mild symptoms; however, about 1 patient in 20 had 'intractable symptoms'.

Instructions for anti-arousal/pursed lip breathing
Place yourself in a comfortable (seated or reclining) position, and exhale slowly and fully through pursed lips (as though you are blowing through a drinking straw), with your lips just barely separated. Imagine that a candle flame is about 10 inches from your mouth and exhale (blowing a thin stream of air) in such a way as to not blow this out, but to just make it flicker. When you have exhaled fully, without strain, close your lips and pause for a count of one and then inhale through your nose. The complete exhalation will have created a 'coiled spring' so you do not have to try to control how you inhale. Then, without pausing to hold the breath, exhale fully and slowly through pursed lips once again, blowing the air in a thin stream until you feel the need to inhale. Close your lips, pause for a count of one, and then inhale freely through the nose again. Repeat the inhalation and exhalation for not less than 30 cycles of in and out. Practice this exercise morning and evening. You might feel light-headed after the 30 cycles, so rest for a few minutes before resuming normal activities.

Shoulder restraint
Methods need to be taught to encourage the restraining of shoulder movement (accessory muscle activation) during breathing using one of a variety of methods. For example:

- The patient is seated at the edge of a chair with arms hanging down, palms facing forward.
- On inhalation, the patient gently turns the arms so the thumbs point slightly backwards, and on exhalation this is released and relaxed.
- The rhythmic breathing pattern, along with this gentle restraint of accessory breathing muscles, starts the process of separating the act of inhalation from their overactivity.

KEY POINTS

- It is useful to have a record of the level of a patient's pain from the first visit, so that comparisons can be made over time.
- There are variety of ways of achieving a record, ranging from simple questions and answers, to use of various scales and questionnaires.
- The algometer (pressure gauge) is a tool that provides information as to how much pressure is needed to produce pain.
- It is possible to develop sensitive palpation skills that allow a uniform amount of pressure to be used when testing the sensitivity of a patient, or a local point.
- Various tests such as firing sequence strength/short or long assessment can be used to obtain data relevant to the condition.
- Information can and should be recorded so that progress (or no progress) can be measured accurately.

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