

Contraindications

- ◆ Do not work deeply during a tension headache. Avoid vigorous techniques or deep pressure when treating hyperirritable trigger points, since “kick-back” pain may result. Kick-back pain is a recurrence of the client’s symptoms hours or days after treatment. This is especially true if ischemic compressions are applied too quickly and deeply, released too quickly and not followed by either a passive stretch and heat or slow, full active free range of motion and heat.

- ◆ There may be associated postural dysfunctions. Temporomandibular joint dysfunction may be present.

Differentiating Other Headaches

- ◆ With new headaches that begin later in adult life, especially after age 50, the client should be referred to a physician. New primary headache is rare in the elderly; the headache may be secondary to an underlying pathology (*Davidoff, 1995*).
- ◆ See the migraine chapter for differentiating other types of headaches.

Treatment Considerations

HEALTH HISTORY QUESTIONS

- ◆ Does the client have a history of tension headaches?
- ◆ When was the onset of the headaches and how often do they begin? Many patients have a history of tension headaches.
- ◆ Was there a trauma associated with the onset of the headache?
- ◆ Does the client have any other medical conditions?
- ◆ Does the client experience any other symptoms?
- ◆ What is the location of the pain?
- ◆ What are other symptoms?
- ◆ What is the duration of the headache?
- ◆ What was the time of day when the headache occurred?
- ◆ What relieves the headache?
- ◆ What aggravates the headache?

SPASM

Contraindications

- ◆ **Do not** attempt to completely eliminate reflex muscle guarding that is splinting an acute injury.
- ◆ **Avoid passively stretching an acutely spasmodic muscle** because this may tear fibres of the muscle and further injure the client. This is especially true when inflammation is present, as stretching will increase the pain and muscle guarding, resulting in greater tissue damage (*Kisner, Colby, 1990*).
- ◆ Hot hydrotherapy applications are contraindicated with a muscle spasm resulting from an acute injury.
- ◆ Massage is locally contraindicated with deep vein thrombosis or thrombophlebitis of the calf. A medical referral is indicated. With venous thrombosis, the client may complain of calf cramping or tightness, exhibit local tenderness, heat, pallor, swelling and have a diminished or absent dorsalis pedis pulse (*Alexander, 1992*). This is an important consideration for clients who have had a recent fracture or surgery, for clients who are pregnant or for clients over 50 years of age.

Testing

- ☞ The **AF ROM** of the joint crossed by the affected muscle is reduced. There is pain on active movement, especially at the end ranges when the affected muscle is being stretched or shortened.
- ☞ **PR ROM** that lengthens the affected muscle reveals a muscle spasm end feel with pain and decreased range.
- ☞ **AR submaximal isometric testing** reveals decreased strength with pain on contraction with an intrinsic muscle spasm. Strength testing of an acutely spasmodic muscle is contraindicated.

Special Tests

- ☞ **Ramirez’s test** is positive with deep vein thrombosis. **Homan’s sign** is also positive, but may not always detect DVT. Either positive test contraindicates local massage.

Treatment Goals Treatment Plan

Break the pain-spasm cycle and decrease the spasm.

- ☞ **Positioning** of the client depends on the location of the affected muscle and the client’s comfort.
- ☞ The therapist can intervene in the pain-spasm cycle in several ways. The task is to choose the appropriate modality or combination of modalities to break this cycle and decrease the spasm. Encouraging **diaphragmatic breathing** and relaxation decreases the sympathetic nervous system firing. **Hydrotherapy** applications depend on the type of spasm that is present. With reflex muscle guarding in response to acute injury, local **cold** applications, such as an ice pack or ice massage, are used for an analgesic effect to break the cycle (*Kraus, 1988*). With an intrinsic muscle spasm that is occurring in chronically

EDEMA

Fiona Rattray

Edema is a local or general accumulation of fluid in the interstitial tissue spaces.

Edema is the result of altered physiological function in the body. It is not in itself a disease. Edema may result from a local release of histamine following an injury. It may be a result of a systemic disease such as heart failure or it may occur after an obstruction of the lymphatic vessels. It is, therefore, important to determine the cause of edema before developing a treatment plan (*Harris, 1994*), since it may not be appropriate to reduce the edema.

In order to understand how to treat edema, it is necessary to understand the function and anatomy of the lymphatic system. Blood is largely composed of red and white blood cells and various proteins suspended in fluid. In the circulatory capillaries, slightly more fluid is pumped through the arterial ends into the interstitial spaces than is absorbed at the venous ends. The excess clear, watery interstitial fluid is collected, filtered and returned to the circulation by the lymphatic system. Once in the lymphatic system, the fluid is called lymph. The lymphatic system returns between one per cent and 10 per cent (*Guyton, 1986*) of the total interstitial fluid to circulation. The average volume of lymphatic fluid returned to the circulatory system is 2.4 litres per day (*Guyton, 1986*). The lymph also contains white blood cells, plasma proteins, fats and debris such as cell fragments, bacteria and viruses. An equilibrium is maintained as long as the fluid entering the interstitial tissues via the arterioles equals the fluid leaving through the venules and the lymphatics. Edema results if this equilibrium is upset.

Although the lymphatic system is often called passive compared to the circulatory system, the lymphatic vessels have a minor contractile capability and a pulse of one to 30 beats per minute (*Wittlinger, Wittlinger, 1990; Immen, 1995*). This minor contraction is stimulated by stretching the vessels, either internally, by the vessels filling, or externally, by light massage.

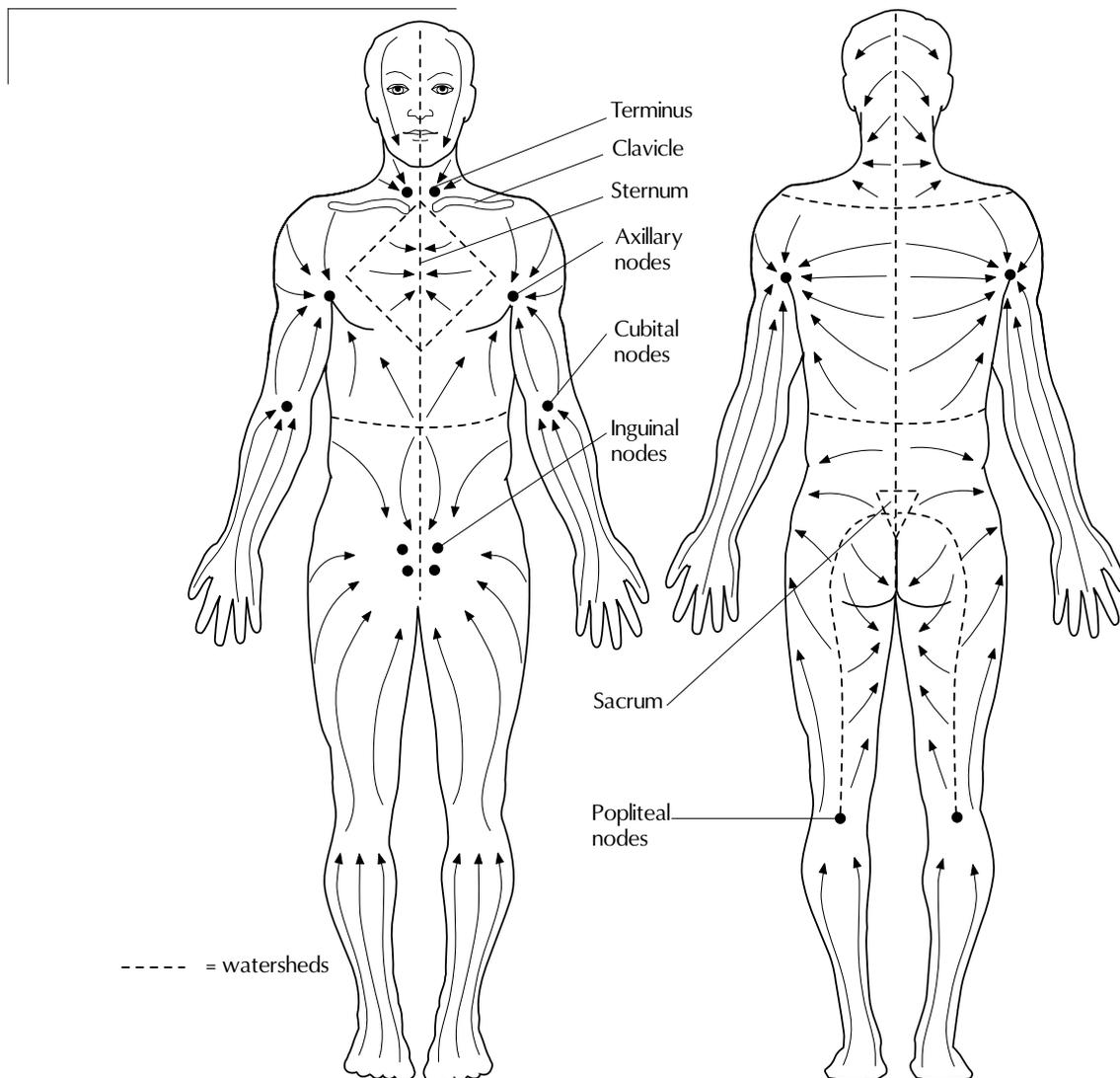


Figure 18.2 Superficial lymphatic drainage patterns of the body showing watersheds.

Causes of edema are:

- **increased permeability of the capillaries** resulting from inflammation, tissue trauma, immune response or burns (*Porth, 1990*);
- **obstruction of the lymphatic flow** due to infection, parasites in the lymphatic system, lymphatic disease, surgical removal of the lymph nodes, radiation treatment, scarring or a congenitally reduced number of lymph vessels. Obstruction of the lymphatics (lymphostasis) leads to a retention of plasma proteins, which, in turn, attracts more fluid. This is called a low-flow, high-protein edema (*Casley-Smith, Casley-Smith, 1986*);
- **increased capillary pressure** (or venous pressure) from heart failure, thrombophlebitis, pregnancy or a generalized allergic response such as hives. Edema forms in the extremities in hot weather due to capillary dilation and sodium retention. An increase in sodium retention leads to premenstrual edema (*Cawson et al., 1982; Porth, 1990*). There is also gravity-induced (orthostatic) edema from prolonged standing or sitting

exercise (Foldi et al., 1985).

Manual lymphatic drainage techniques have been found more effective in draining chronically edematous limbs than machines designed to reduce edema (Swedborg, 1985; Casley-Smith, Casley-Smith, 1986).

Symptom Picture

- ◆ There is increased interstitial fluid in the affected body part. The edema varies in texture and temperature according to the cause. Edema due to trauma is local or sometimes distal to the injury site. It looks taut and firm. The tissue is hot in the acute stage and, as healing progresses, the temperature decreases. In the case of chronic edema, the tissue may be cool due to ischemia.
- ◆ **Lymphedema** due to **general systemic conditions** affects the entire body. The edema frequently results in puffy and congested tissue.
- ◆ **Lymphedema** due to **local lymphatic obstruction** usually involves the whole limb distal to the edema site. It can be taut and firm (with parasitic infection or thrombophlebitis) or puffy and congested (following a lymphectomy) depending on the cause of the obstruction. The temperature may be cool due to ischemia or warm due to congestion.
- ◆ With **lymphedema resulting from surgery**, there may be a latent period following the operation where the tissue appears to return to normal. Weeks or years after the surgery, an apparently insignificant injury – a bruise, a cut, a sprained ankle, the pinprick of a diabetes blood sugar test or even an insect bite (Brennan, Weitz, 1992) – may provoke lymphedema distal to the scar.
 - It is possible that, during the latent period, excess fibrin not completely removed during the inflammatory repair process allows a gradual build up of plasma proteins in the distal tissue, leading to a state of “edemic readiness” (Harris, 1996). The addition of even a small amount of plasma proteins in the inflammatory response following a bruise or cut may tip the equilibrium towards lymphedema (Brennan, Weitz, 1992; Casley-Smith, Casley-Smith, 1986).
- ◆ **Non-pitted edema** is firm and discoloured. It results from coagulation of serum proteins in the interstitial spaces, usually following local trauma or infection (Porth, 1990).
- ◆ **Pitted edema** is boggy to the touch. The tissue retains an indentation after pressure is applied. In this type of edema, usually found with a chronic pathology, accumulation of the interstitial fluids exceeds their absorption rate (Porth, 1990; Wittlinger, Wittlinger, 1990).
- ◆ Pain or a feeling of discomfort or fullness is present in the affected body part. This may be local, as with a trauma, or diffuse, with chronic edema (Casley-Smith, Casley-Smith, 1986).
- ◆ There can be a decreased range of motion of an edematous limb. To the client, the limb may feel stiff or heavy.
- ◆ Local edema due to trauma follows a release of histamines. As part of the inflammatory process and tissue repair, fibrin and then adhesions form in the tissue. With a moderate or severe trauma, a hematoma may be present.
- ◆ An increase in lymphatic return prevents excess scar tissue formation (Wittlinger, Wittlinger, 1990).

Objective Information

Observations

- 👉 Edema due to trauma is local and sometimes distal to the injury site. The area looks taut and firm. The edema usually increases with the severity of the injury. The amount of edema present in the acute stage diminishes as healing progresses through the early and late subacute stages. It is usually absent in the chronic stage but, with repeated injuries, edema may remain local to the lesion site.
- 👉 Edema due to local lymphatic obstruction involves the whole limb distal to the lesion site. The limb can be taut and firm or puffy and congested depending on the cause of the obstruction.
- 👉 Edema due to general systemic conditions affects the entire body. It is usually noted in all the extremities and may also appear on the face and around the eyes. Swollen areas appear puffy and congested. This edema may be mild, as with pregnancy or premenstrual sodium retention, or severe, as with chronic congestive heart failure or advanced kidney pathologies.
- 👉 Reddening of the skin in the edematous area may indicate infection, either bacterial (streptococcus) or fungal (mycosis) (Kurz, 1990).

Palpation

- 👉 Edema due to trauma is tender, hot, firm and local to the injury in the acute stage. These signs diminish as the healing progresses through the subacute and chronic stages. See the appropriate musculoskeletal chapter for more details.
- 👉 In the case of local or general chronic edema that is not trauma related, the tissue may be cool due to ischemia or warm due to congestion. It may be boggy or taut in texture. Tenderness may or may not be present.

Testing

- 👉 **AF** and **PR ROM** of the edematous limb are reduced. The amount of limitation increases with the severity of the edema.

Special Tests

- 👉 The extent of the edema is assessed with the **swelling or edema girth measurement**. A bilateral comparison is made with the unaffected limb.
 - With an acute injury, if a swelling occurs rapidly, a hematoma is indicated and the client should be referred for emergency medical attention.
- 👉 A **pitted edema** test is positive if chronic pitted edema resulting from a pathology is present.

223

General Tests

Swelling or Edema Girth Measurement

To assess for the extent of any swelling or edema present:

- Use a tape measure to record the **swelling or edema girth**, or the circumference of the limb where the swelling or edema is located.
- To ensure that the girth is measured at the same location each time, record the distance from a bony landmark to the point of girth measurement. This same distance is used in each subsequent girth assessment. For example, with a thigh injury, the head of the fibula or the anterior superior iliac spine may be used as a landmark.

Swelling and edema should be differentiated from each other:

- ◆ A painful **swelling** that occurs between a few minutes and an hour after an acute injury often indicates a **hematoma** (Hertling, Kessler, 1990; Brukner, Khan, 1993).
- ◆ **Swelling** that takes eight to 24 hours to develop following an acute injury to a joint may indicate **synovial effusion** (Magee, 1992). Both these conditions indicate referral for **immediate medical attention**.
- ◆ **Edema** is an accumulation of fluid in the interstitial spaces of the tissue and may present with acute or chronic conditions.

Pitted Edema Test

To assess for the presence of chronic pitted edema:

- Apply firm finger pressure to the edematous area for 10 to 20 seconds, then release

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Subjective Information

HEALTH HISTORY QUESTIONS

- ◆ What is the client's overall health history? Is there a history of cardiac, liver or kidney pathologies that may be causing the edema? Does the client have a local thrombophlebitis?
- ◆ Is the edema caused by a local or general infection (bacterial, viral, fungal or parasitical)? These conditions necessitate treatment modifications or contraindicate lymphatic drainage and massage, and medical referral if the client has not already seen a physician. Is the client on any medication for the above conditions, such as antibiotics?
- ◆ Has the client had surgery that may disrupt the lymphatics? Has the client had a portion of the lymphatic nodes removed due to a pathology?
- ◆ Does the client have a peripheral nerve lesion that may cause edema; for example, a median nerve lesion?
- ◆ Is the edema due to pregnancy or premenstrual sodium retention?
- ◆ Is the edema caused by position (standing for long periods of time or using a wheelchair) or by a rise in the temperature outdoors?
- ◆ Has there been a history of recurrent edema?
- ◆ How long has the edema been present? There is a greater possibility of fibrosis and hardening of the tissue with resultant tissue dysfunction the longer the edema has been present (*Harris, 1994*).
- ◆ If the edema is caused by an injury, when did the injury occur? What was done at the time of injury? What first aid applied? Was there swelling or hematoma or joint effusion within minutes to one hour of injury to a joint. The conditions.
- ◆ Did the client see a physician? Is the client on any medication?
- ◆ If the edema is traumatic, what was the mechanism? This includes self-massage.
- ◆ Is the client taking any diuretics?
- ◆ Is the client using any compression garments?
- ◆ Does the edema intensify with activity?
- ◆ What aggravates or relieves the edema? Is there any sprain, while elevating the limb?

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Contraindications

- ❖ Avoid full-body lymphatic drainage techniques or elevation of the limbs above the level of the heart with chronic congestive heart failure. A sudden increase in the volume of lymphatic fluid or venous return through compromised tissues and organs has potentially serious results, such as pulmonary edema (*Wittlinger, Wittlinger, 1990*).
- ❖ Local or distal techniques are contraindicated with edema that is due to thrombophlebitis or deep vein thrombosis, since there is a danger of embolism.
- ❖ Lymphatic drainage techniques are contraindicated with untreated or metastasizing neoplasms, including melanomas (*Wittlinger, Wittlinger, 1990; Kurz, 1990*). However, with edema that is a result of medical treatment (for example, following lymph node removal or radiation therapy), lymphatic drainage and massage techniques may proceed with a physician's approval.
- ❖ Local lymphatic drainage and hydrotherapy are contraindicated if the edema results from bacterial, viral or fungal infection. In the acute or subacute stage, these modalities will promote the spread of toxins and are to be avoided. Hot hydrotherapy is also contraindicated with lymphedema where the tissue is already congested (*Kurz, 1990*).
- ❖ In the case of chronic inflammation, such as sinusitis or bronchitis, lymphatic drainage should initially be performed for shorter periods of time and not on site. In the case of sinusitis, work is done only on the neck, not the face. The client is monitored for signs of a flare-up of the condition. If this occurs, lymphatic drainage is discontinued. If no flare-up occurs, the time spent performing drainage work is slowly increased and the site of the infection is gradually included (*Kurz, 1990*).
- ❖ Lymphatic obstruction due to parasites (filariis) contraindicates lymphatic techniques and Swedish techniques which increase the circulation (*Kurz, 1990*).
- ❖ With acute tuberculosis, any lymphatic drainage is contraindicated. If the client has had tuberculosis affecting the lymphatic nodes, **local** lymphatic techniques are contraindicated because the techniques may activate the encapsulated tuberculosis bacteria (*Kurz, 1990*).
- ❖ Lymphatic drainage is contraindicated with toxoplasmosis, a lung infection that can be associated with AIDS, since it may cause a flare-up of the infection (*Kurz, 1990*).
- ❖ Lymphatic drainage performed on low-protein edemas such as those accompanying liver and kidney pathologies or starvation will have no effect, because the forces causing the edema will overwhelm the effects of the techniques (*Wittlinger, Wittlinger, 1990*).
- ❖ **On-site** lymphatic drainage techniques are contraindicated in the acute and early subacute stages of trauma. They are used proximally only.
- ❖ **Distal** to the lesion site, lymphatic techniques and Swedish circulatory techniques are contraindicated in the acute or early subacute stage. The edema can function as a bottleneck (*Casley-Smith, Casley-Smith, 1986*), painfully congesting the distal limb if the therapist attempts to move the circulation through the lesion site. These techniques are only used once the edema has been reduced sufficiently to allow the lymph and blood to flow through local vessels.
- ❖ In the case of edema arising from trauma, avoid using hot or warm hydrotherapy immediately proximal to inflamed tissue, as this can draw the distal circulation towards the heart, congesting the lesion site.
- ❖ See the chapter on contraindications for specific conditions and medications for more information.

Treatment Goals Treatment Plan

👏 Specific lymphatic drainage techniques are described in the chapter on non-Swedish techniques. The therapist spends 15 to 20 minutes on lymphatic techniques to treat an edematous limb.

Reduce the edema if safe to do so. Decrease pain or discomfort.

Decrease sympathetic nervous system firing.

Acute

👏 If the initial treatment goal is to decrease the edema, lymphatic drainage is performed first, before any general work to compensating structures or specific local massage. This greatly reduces the pain and congestion.

👏 If the initial goal is to accustom the client to the therapist's touch, to decrease the sympathetic nervous system firing and to treat compensatory structures, Swedish massage begins on the trunk or the contralateral limb, followed by lymphatic drainage of the edematous limb and Swedish massage treatment for the specific condition.

👏 In the case of edema resulting from an acute trauma, the positioning of the client depends on the location of the edema and the client's

comfort. If the edema is in a limb, the affected limb is elevated **in a pain-free range** and pillowed securely. If the edema is in the trunk, the client is positioned so the edema is uppermost. In all cases, a **cold hydrotherapy** application such as an ice pack or a gel pack is applied to the edematous area.

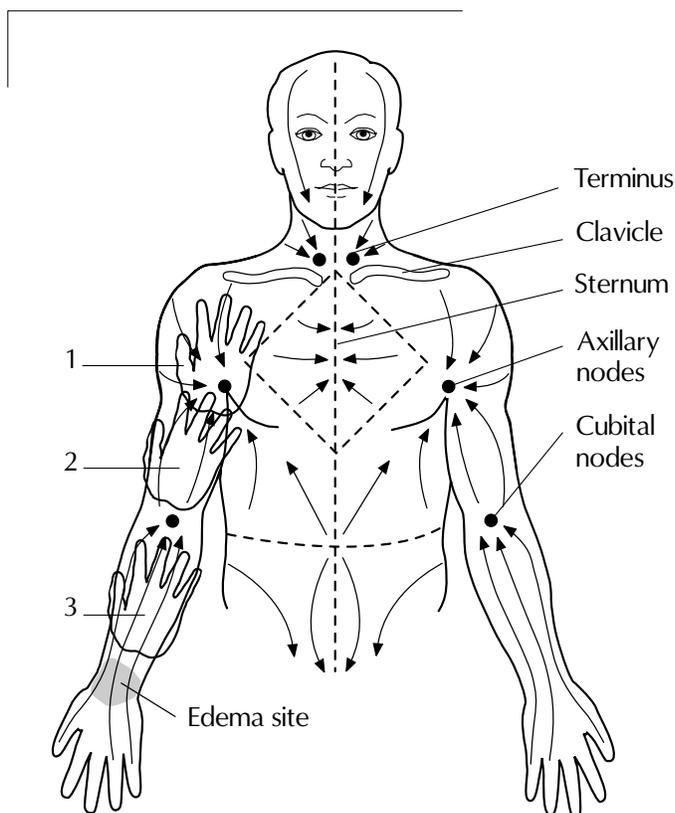


Figure 18.3
Sequence of hand positions for lymphatic drainage, starting proximally and working distally towards the edema.

Specific Treatment

👏 The client is directed to do **diaphragmatic breathing** throughout the treatment to facilitate lymphatic return. All work is performed in a slow, soothing manner to reduce pain perception.

👏 Assuming that the initial treatment goal is to reduce edema, the therapist begins with nodal pumping at the terminus, then the proximal lymph nodes of the injured limb (Kurz, 1989; Casley-Smith, Casley-Smith, 1986). Following the drainage patterns of the lymphatic vessels, stationary circles and the local lymphatic technique are used proximal to the edema (Figure 18.3).

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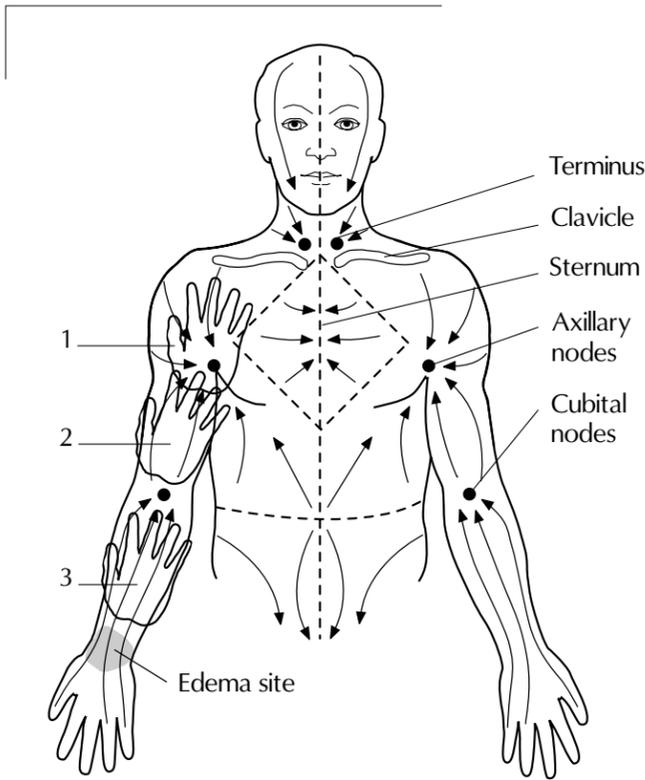


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greatest effect on Wittlinger, 1990; Casley-Smith, 1986). In the study, the initial work took five seconds to refill (Bjorlin, 1985). Therapy, a combination of manual lymphatic drainage and remedial exercises, is used for edema (Foldi et al., 1985). This encourages lymph flow and helps to remove excess fibrin and metabolic waste.

adaption of some of the MLD techniques following the principles for pressure, repetition, direction and speed outlined above (Wittlinger, Wittlinger, 1990).

The following techniques can be used to treat the entire body or just localized areas. To treat the local edema present at the acute or subacute stage of an injury, lymphatic drainage techniques are applied first. The therapist works from proximal to distal towards the localized edema. Deeper Swedish techniques are applied next, since these temporarily collapse the superficial lymphatic capillaries and inhibit the removal of edema. In treating chronic edema, the approach changes. Deeper Swedish and fascial techniques are applied proximal to the edematous site to release soft tissue restrictions that may inhibit lymphatic flow. In order for the lymphatic drainage to be most effective, a few minutes should elapse after the deeper Swedish techniques and before lymph drainage techniques are applied to allow the superficial lymphatic capillaries to refill.

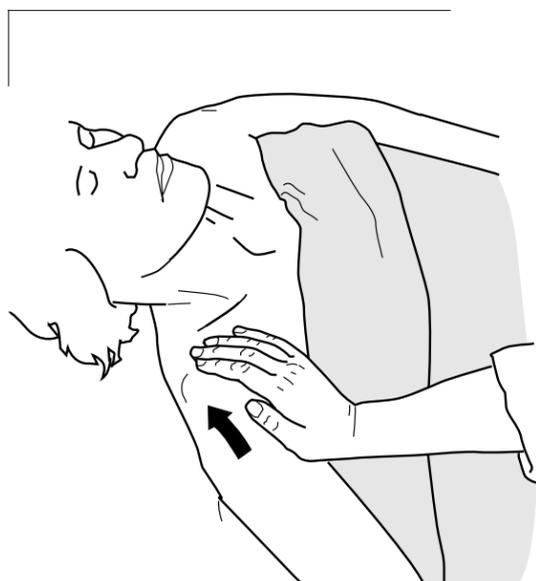


Figure 4.1 Lymphatic drainage techniques: Axillary nodal pumping.

In treating acute, subacute or chronic edema, nodal pumping or compression is applied to the lymphatic nodes of the most proximal part of the limb that has the edematous tissue. These nodes are also closest to the thoracic and right lymphatic ducts, which return lymph to the venous system. In the arm, these are the axillary lymph nodes (Figure 4.1). In the leg, these are the inguinal lymph nodes. To massage the nodes, the palmar surface of the hand is used and pressure is applied in a wave-like motion, from just distal to the node in a proximal direction. This action compresses the capillaries

Self-care Goals

Educate the client about proper self-care and preventative edema strategies where appropriate.

Self-care Plan

- ☞ Hydrotherapy is chosen that is appropriate for the stage of healing.
- ☞ Self-massage is very helpful. The client is instructed to comfortably elevate the affected area and to use nodal pumping, light unidirectional effleurage and stroking. The client should clearly understand that pressure is light, unidirectional and towards the heart, starting proximally and working distally. The client is also made aware that only the limb proximal to the edema is treated to avoid the bottleneck effect.
- ☞ If the edema is local and chronic and is due to proximal scarring and fascial restrictions, careful skin rolling over the scar tissue can be done prior to elevation and drainage.
- ☞ Diaphragmatic breathing is encouraged to aid in lymphatic return.
- ☞ Remedial exercise is dependent on the stage of healing and the severity of the injury.
- ☞ In the acute and subacute stages, the client is asked to perform pain-free active free range of motion with the distal and proximal joints, and pain-free isometrics in the edematous tissue.
- ☞ In addition to the above, in the late subacute and chronic stage for lower limb edema, **Buerger's exercise** may help to temporarily increase circulation and lymphatic return in the lower limbs. The client lies supine in bed with the legs flexed at the hips to 45 degrees and supported in this position with pillows until the skin blanches. This may take up to two minutes. The client then sits up and allows the feet to hang over the edge of the bed for three minutes or until the skin congests. Next, the client lies flat until circulation in the legs is normal. This cycle is repeated four or five times, three times per day (*Kisner, Colby, 1990*).
- ☞ Clients with lymphedema, especially of the upper limb, should be encouraged to perform moderate active free range of motion exercises without overexercising. Isometric resisted exercises are also indicated (*Stillwell, 1969*).
- ☞ Clients with lymphedema may also be referred to a manual lymphatic drainage specialist for treatment such as someone trained and certified in Vodder's Manual Lymph Drainage and Combined Decongestive Therapy.

Treatment Frequency and Expected Outcome

More frequent treatments — for example, a half hour three times a week — will address the inflammatory process in the acute and subacute stages.

See stress reduction, musculoskeletal concerns, scars, pregnancy, deep vein thrombosis, conditions of the peripheral nervous system and spinal cord injuries in this text for related treatments.

Ongoing treatments are required with chronic edema, especially following lymph node removal and with peripheral nerve lesions.

The outcome is variable, depending on the nature of the underlying cause of the edema (for example, edema following a trauma, as opposed to edema due to surgical removal of lymph nodes). Outcome will also depend on the client's age, general health and compliance with the self-care program.

Contraindications

- ❖ In the acute stage, testing other than pain-free AF range of motion is contraindicated to prevent further tissue damage.
- ❖ Avoid removing the protective muscle splinting of acute sprains.
- ❖ Distal circulation techniques are contraindicated in the acute and early subacute stages to avoid increasing congestion through the injury site.
- ❖ With Grade 3 sprains that are casted, avoid hot hydrotherapy applications to the tissue immediately proximal to the cast to prevent congestion under the cast.
- ❖ With Grade 3 sprains where the ligaments have been surgically repaired, do not restore full range of motion of the affected joint in the direction that will stretch the repaired ligament. Where the ligaments have not been surgically reduced, joint play of the unstable joint is contraindicated.
- ❖ Frictions are contraindicated if the client is taking anti-inflammatories or blood thinners.

Treatment Goals Treatment Plan

Assess the severity of the injury and refer for medical attention if moderate or severe.

Reduce inflammation.

Reduce pain. Decrease sympathetic nervous system firing.

Treat any compensating structures.

Acute

 **The injury is treated with RICE:** Rest, Ice, Compression and Elevation.

 **Positioning** depends on the location of the sprain and the client's comfort. The limb is elevated and pillowed securely.

 **Hydrotherapy** is cold such as an ice pack or a gel pack applied to the injured area.

General Treatment

 If the initial treatment goal is to decrease the edema, lymphatic drainage on the affected limb is performed first before any compensatory work.

 If the initial goal is to accustom the client to the therapist's touch and to decrease sympathetic nervous system firing in the context of a relaxation massage, the client is directed to do **diaphragmatic breathing** throughout the treatment.

 The trunk and uninjured limb are treated using effleurage and slow petrissage, such as palmar kneading, fingertip kneading and C-scooping. The focus of the work depends on the muscles that are compensating. For example, the shoulders and back are treated if crutches are used.

PATELLOFEMORAL SYNDROME

Fiona Rattray

Patellofemoral syndrome, also called patellofemoral tracking disorder, describes various painful degenerative changes to the articular cartilage on the underside of the patella.

Sixty-five per cent of patellofemoral pain is due to tracking or instability problems (*Larson, Grana, 1993*).

The patella is a sesamoid bone that covers the anterior portion of the knee joint. It attaches superiorly to the quadriceps tendon and inferiorly to the patellar tendon. The patella is stabilized medially and laterally by the patellar retinacula.

The patella and its articulating surfaces, the femoral condyles, the patellar tendon and its attachment to the tibia, the retinaculum, the synovium and the quadriceps muscle, make up the extensor mechanism of the knee. When the knee is extended, the patella glides superior to the femoral condyles. When the knee is flexed, the patella glides inferior to the condyles. This gliding occurs along the longitudinal axis of the femur in response to the contraction of the quadriceps muscle. The pull of the patellar tendon is along the longitudinal axis of the tibia. Due to the slight valgus angulation that most knee joints assume when the knee is in extension, the long axis of the femur and the long axis of the tibia are at a slight angle to each other (*Figure 41.1*). This angle is called the Q (quadriceps) angle (*Hertling, Kessler, 1990*).

The Q angle results in a slight lateral pull on the patella. The lateral femoral condyle and the patellar groove on the femur help to prevent this lateral movement. When the knee is in flexion, the quadriceps muscle pulls the patella tightly into the femoral groove. However, as the knee approaches full extension, the patella glides in a superior direction into the shallower portion of the femoral groove. Both the vastus medialis obliquus and the medial retinaculum must function to prevent the patella from tracking laterally. This is especially important when the knee is bearing a load.

Subjective Information

HEALTH HISTORY QUESTIONS

- ◆ Standardized forms, such as the Vernon-Mior Neck Pain and Disability Index or the Revised Oswestry Low Back Pain Questionnaire (*Chapman-Smith, 1996*) can be used to measure the client's initial symptoms.
- ◆ What are the type, onset and location of pain and other symptoms? What are the client's activity levels?
- ◆ How long has the current episode lasted?
- ◆ Have there been any previous injuries to the affected area with cervical involvement, such as whiplash?
- ◆ With the low back, is there a history of episodes of back pain, perhaps a sensation of the back locking? Has there been a history of injuries to the lower limbs that would alter gait or posture, creating biomechanical imbalances? Has the client experienced surgery, such as abdominal surgery, that would create scar tissue, again affecting biomechanics?
- ◆ What factors aggravate and relieve the symptoms? Does coughing or sneezing aggravate the symptoms? Does walking or lying down relieve symptoms?
- ◆ Has the condition been medically diagnosed? Has the client had surgery for this condition? Is the client taking any medication or parallel therapies?

Objective

Observation

- ☞ A p
- ☞ Wit
- ☞ pos
- ☞ (ant
- ☞ pos
- ☞ Mu
- ☞ Wit
- ☞ rota
- ☞ lord
- ☞ sco

Palpation

- ☞ Palp
- ☞ fasc
- ☞ leve

- ☞ With acute disc herniation, tenderness, heat, spasm and active trigger points are likely present in muscles that cross the affected areas.

Testing

Degenerative Disc Disease

- ☞ **AF and PR ROM** of either the cervical or lumbar spine may reveal reduced ranges in AF and PR ROM, with PR ROM having more available range. In both, cervical and lumbar spine extension is most restricted. Stiffness is likely. Pain may or may not be present, depending on numerous factors including stage of degeneration. The end feel is likely capsular in the affected areas.
- ☞ **AR isometric testing** may reveal weakness in affected muscles, depending on the stage of degeneration.

⁶²⁷ *Acute Herniation*

- ☞ **AF and PR ROM** in either the cervical or lumbar spine reveal ranges limited by pain and muscle spasm, passive range less so than active.
- ☞ In the lumbar spine, **active free flexion** may have a deviation to one side. If the movement is away from the painful side, vertebral joint derangement may be present; if the movement is towards the painful side, an entrapped or adhered nerve root may be present (*McKenzie, 1989*). Another source states that if sidebending away from the painful side increases the symptoms, the problem may be a disc herniation medial to the nerve root, or it may be muscular or articular in origin. If sidebending towards the painful side increases the symptoms, disc herniation is lateral to the nerve root, or the lesion is inside the vertebral joints (*Magee, 1992*).
- ☞ **With posterior or posterolateral herniations that are contained by the annular fibres:** movements can reduce the symptoms; flexion is limited and symptoms peripheralize with movement; extension is also limited and symptoms centralize with movement.
- ☞ **With a complete annular rupture and sequestered nucleus:** movement cannot relieve the symptoms as the hydrostatic disc mechanism is no longer intact.

Special Tests

- ☞ Key findings for **nerve root impingement** are motor weakness and dermatomal sensory changes such as paresthesia or sensation loss in the distribution for the specific affected vertebral level. Decreased ability to perform straight leg raising, dermatomal radiating pain and depressed deep tendon reflexes may be associated with referred pain from facet joints, interspinous ligaments and spinal muscles as well as the disc; therefore, they are not considered true signs of lumbar nerve root compression (*Kisner, Colby, 1996*).
- ☞ A cervical disc herniation may give positive results with **upper limb tension tests, Spurling's, Valsalva's** and **deep tendon reflex tests**. Specific **active resisted** and

Treatment Goals Treatment Plan

- **Eye movement** can be incorporated by having the client look up with inhalation and contraction, and look down with exhalation and relaxation. Intermittent applications of cold can be added to the relaxation phase.

☞ An **agonist contraction** stretch has the client contract the internal rotators against resistance, allowing no movement. After the muscles are relaxed, the hip is pulled into internal rotation.

☞ A **supine stretch** used with an otherwise healthy client requires the hip and knees to be flexed. The client's anterior thigh of the affected side rests on the abdomen. This knee is then slowly extended and adducted. A more gentle supine stretch has the hip and knee extended on the unaffected side. On the affected side, the hip and knee are flexed and the foot is placed on the lateral side of the opposite extended knee. The therapist stands on the side to be stretched. While stabilizing the hip on the same side with one hand, the thigh is abducted — pushed away from the therapist — with the other hand.

Reduce edema, if present.

☞ Lymphatic drainage techniques are applied to the leg, including sacral and popliteal pumping, unidirectional effleurage and stationary circles.

Improve tissue health and circulation.

☞ The entire lower limb and buttock are massaged using effleurage and petrissage techniques. Passive movement is performed at the knee and ankle.

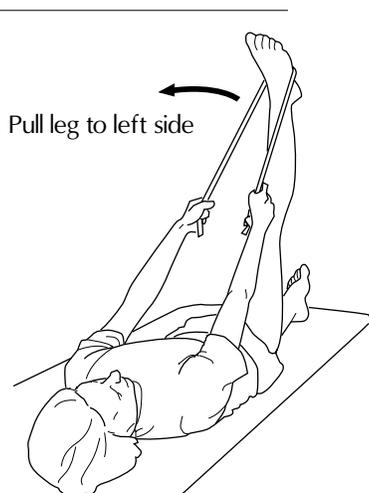
Self-care Goals Self-care Plan

☞ Remedial exercise is an essential component to treating piriformis syndrome.

Stretch tight, short muscles.

☞ The client can perform a self-stretch for the piriformis muscle using a belt or rope (*Figure 70.3*). The client lies supine on the floor with the rope looped around the foot of the affected side. The ends of the rope are held in the opposite hand. On the side to be stretched, the knee is extended and the hip is flexed to approximately 90 degrees. The hips are kept stable on the floor while the leg is drawn away from the side to be stretched towards the opposite hip. The stretch is held for 30 seconds. The leg is then drawn farther towards the opposite hip, placing an additional stretch on the piriformis muscle.

Figure 70.3
Stretching the piriformis using a rope or belt.



☞ For a standing self-stretch, the client places the foot of the affected side on a chair, with the hip flexed to 90 degrees and the thigh parallel to the floor. The client

Quick Reference for Appendix C

Head and Neck Tests:

anterior neck flexors strength, AR	1069	rhomboids strength	1080
anterolateral neck flexors strength, AR	1070	shoulder adductors length	1079
posterolateral neck flexors strength, AR	1070	shoulder apprehension, AF	1075
atlanto-axial articulation, PR ROM	1067	shoulder apprehension, PR	1076
atlanto-occipital articulation, PR ROM	1067	Speed's	1078
cervical compression	1068	subscapularis strength, AR	1078
cervical distraction	1068	supraspinatus strength, AR	1077
first rib mobility	1069	Travell's variation on Adson's	1072
orbicularis oris strength, AR	1071	upper limb tension	1073
scalene cramp	1066	Wright's hyperabduction	1072
scalene relief	1067	Yergason's	1078
sinus transillumination	1071		
Spurling's	1068		
swallowing	1066		
temporomandibular joint, AF ROM	1065		
three-knuckle	1066		
vertebral artery	1064		

Arm, Wrist and Hand Tests:

abductor pollicis brevis strength, AR	1085
Cyriax's variation on Phalen's	1081
degree of Dupuytren's contracture	1080
extensor tendinosis	1084

Shoulder Tests:

acromioclavicular shea
adhesive capsulitis abd
Adson's
Apley's scratch
costoclavicular syndrom
drop arm
Eden's
Hawkins-Kennedy imp
infraspinatus strength, /
middle trapezius streng
Neer impingement
painful arc
pectoralis major length
pectoralis minor length

Appendix C: SPECIAL ORTHOPEDIC TESTING

- Stand at the head of the table and grasp the client's head in both hands at the temporal region, while flexing the cervical spine to end range. This locks the lower cervical spine in flexion, eliminating any rotation from these vertebrae.
- While flexion is maintained, rotate the head fully to both sides.
 - ◆ A **positive** result, indicating a rotational restriction, is palpated as a leathery end feel in either left or right rotation (*Greenman, 1989*).

Spurling's Test

To assess for compression of a cervical nerve root or for facet joint irritation in the lower cervical spine:

- Place the client in a seated position.
- Stand behind the client.
- Instruct the client to slowly extend, sidebend and rotate the head to the affected side.
- Carefully apply compression downward on the client's head. The combined action of the client's head position and the downward pressure compresses the intervertebral foramen, the nerve root and the facet joints on that side.
 - ◆ A **positive** test is indicated by radiating pain or other neurological signs in the arm on the affected side. The distribution of the pain indicates which nerve root is involved. Pain remaining local to the neck or shoulder indicates cervical facet joint irritation on the side being tested (*Gerard, Kleinfeld, 1993*).
- **Do not** perform this test if the vertebral artery test is positive.

Cervical Compression Test

A variation, the **cervical compression test**, is used when the client cannot rotate or extend the head:

- Position the client as above.
- Stand behind the client.
- With the client's head in a neutral position, carefully apply compression downward on the client's head.
 - ◆ A **positive** test is indicated by radiating pain or other neurological signs in the affected arm. Pain remaining local to the neck or shoulder indicates cervical facet joint irritation on the side experiencing pain (*Hoppenfeld, 1976*).

Cervical Distraction Test

To relieve pressure on the cervical nerve roots (particularly following Spurling's or cervical compression test):

- Place the client in a seated or supine position.
- Grasp the client's head at the occiput and temporal areas.
- Return the head to the anatomically neutral position.
- Apply a slow traction in a superior direction, maintaining traction for at least 30