

r e d u c e
KNEE PAIN
through massage

By Patricia J. Benjamin

Most therapists have at least a few clients suffering from knee pain. When the proper techniques are employed, massage can be very effective in alleviating this discomfort.





The knee is the largest, most mechanically complex weight-bearing joint in the body. It is the most vulnerable, too. Because of its function and structure, the knee is inherently unstable. It depends almost entirely on ligaments and the strong muscles that cross it to hold it together and carry the weight of the body in motion.

What can you do to help a client seeking relief from knee pain? A review of the structure of the knee, and the common sources of knee pain, reveals ways that massage therapy can be of benefit.

Mechanical Marvel: Inside The Knee

The knee is actually two joints. One is a modified hinge joint formed by the articulation of the femur and the tibia. The second is a gliding joint formed by the posterior surface of the patella (kneecap) and a depression in the anterior femur. A number of ligaments hold the joint together (e.g., collateral and cruciate). The structure of the knee permits flexion, extension to 180 degrees, and a limited amount of rotation.

Muscles cross the knee from above and below, producing movement of the leg. The major muscles of the thigh often implicated in knee pain include the large extensor (quadriceps) and flexor (hamstrings) muscles; adductors that attach medially at the pes anserinus (translation: goose foot, which is the point of attachment of the sartorius, gracilis and semitendinosus tendons on the medial tibial plateau. Inflammation of the pes anserinus bursae is common with knee injuries.); and the abductor tensor fascia latae muscle and its iliotibial band (the iliotibial band attaches at the lateral tibial

tubercle). Crossing the knee from below are the gastrocnemius and popliteus muscles. A space behind the knee called the popliteal fossa is an endangerment site where major blood vessels and nerves are relatively superficial and unprotected.

The patella is a unique structure that increases the effectiveness of the quadriceps muscle group. It is a sesamoid bone embedded in the quadriceps tendon, which crosses the front of the knee and attaches to the tibial tubercle. The patella moves within a groove between the condyles of the femur, and seems to disappear into the space when the knee is flexed. Its primary function is to improve the angle of pull of the quadriceps on its tibial attachment.

The Q angle is an important feature of the knee. It is the angle of the femur from the anterior superior iliac spine (ASIS) of the pelvis to the midpoint of the patella. Excessive Q angle puts stress on the knee and can lead to patellar tracking disorders.¹ Women tend to have larger Q angles, a factor associated with a greater incidence of knee problems in females.

Several buffering mechanisms in the knee minimize friction between moving parts and cushion impact during weight-bearing locomotion. These mechanisms include auricular cartilage covering the ends of the femur and tibia bones, dense cartilage-type pads called menisci, fluid filled cushioning sacs called bursae, and synovial fluid in the joint capsule. The lateral cross section of the knee in Figure 1 (below) shows some of the knee's important cushioning structures.

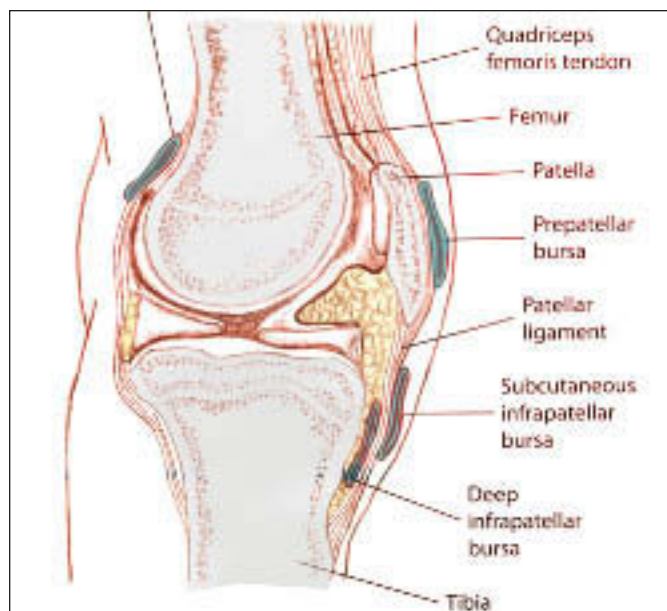


Figure 1. Lateral cross-section of the knee showing anatomical structures. Image used with permission from the *Trail Guide to the Body*, second edition, by Andrew Biel.

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Common Sources Of Knee Pain

Most knee pain is caused by damage to the musculoskeletal structures (bones, ligaments, muscles, tendons); inflammatory conditions (tendonitis, bursitis, arthritis); or the degeneration of buffering mechanisms causing friction and grinding in the joint. Some combination of these pain-producers is usually found in stiff, sore knees.

Damage to knee structures from sudden trauma takes the form of sprained ligaments, strained muscles and torn menisci. Wear and tear on the structures occurs over time with repetitive strain, high-impact activities and lack of flexibility. Poor body mechanics can damage the knee, for example, during controversial exercises like deep knee bends and the hurdler's stretch. Extreme bending in the knee can lead to twisted and compressed kneecaps, stretched ligaments and crushed menisci.²

Patellofemoral syndrome (PFS) describes anterior knee pain caused by the thinning of auricular cartilage with overuse, or from improper tracking of the patella in its groove. PFS symptoms include pain felt in the anterior part of the knee, stiffness after long periods of immobility, difficulty walking down stairs and crackling grinding noise with movement.³ Chondromalacia patellae—which also causes anterior knee pain—is arthritis and softening of the inferior side of the kneecap. Iliotibial band (ITB)

syndrome, a common source of lateral knee pain in athletes, is caused by repeated friction of the ITB against the lateral condyle of the femur.

Osteoarthritis is an inflammatory condition characterized by swelling, stiffness and pain. In its acute stage, there may be redness and warmth around the knee. The inflammation is most often caused by grinding and irritation that occurs with damaged cartilage. Osteoarthritis is associated with older people, but is also found in younger people who have suffered knee trauma from accidents or sports. Tendonitis and bursitis are inflammation of specific structures, usually from friction and overuse.

Chronic tension and trigger points in the muscles surrounding the knee can cause aching, stiffness, weakness and pain at points of attachment. Some trigger points (e.g., in the popliteus muscle) refer directly into the knee.⁴

A predisposition to knee problems can be inherited. Structural factors like a wide Q angle or being overweight put additional strain on the knee. The older you are, the greater the opportunity for wear and tear on the knees over the years. Figure 2 (right) shows the anatomical locations of common sources of knee pain.

Massage Contraindications And Precautions

Before applying massage to a sore knee, rule out any contraindications. Clients with severe pain or significant swelling should see a doctor for diagnosis before receiving massage therapy. Call a doctor if any of the following symptoms are present:

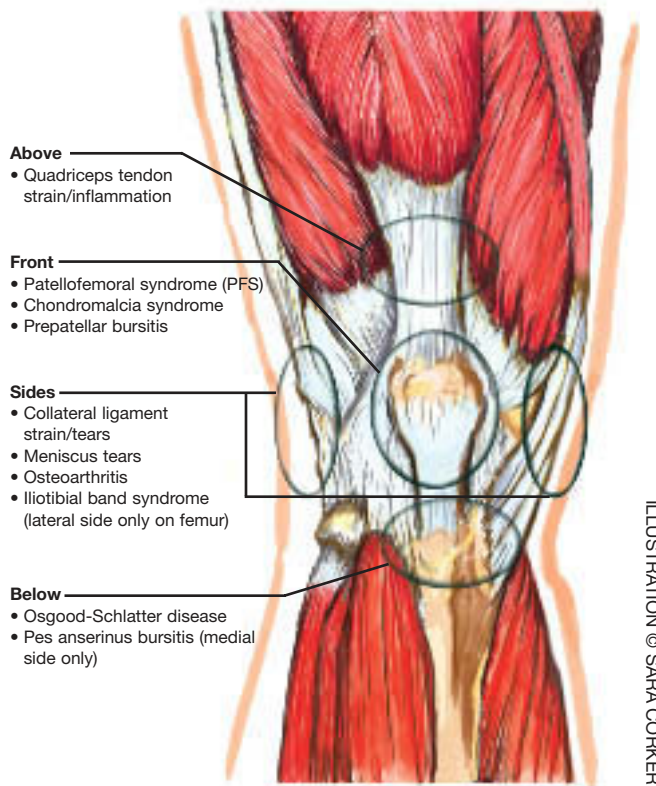


Figure 2. Locations of common sources of knee pain.

TABLE 1. COMPREHENSIVE MASSAGE THERAPY FOR HEALTHY KNEES

Therapeutic Goals	Massage Applications	Target Structures
Reduce swelling	Effleurage, lymphatic drainage massage, elevation with bolsters, cold pack	Areas of swelling in knee
Relax hypertonic muscles	Petrissage, deep effleurage, jostling	Quadriceps, hamstrings, abductors, adductors, gastrocnemius
Deactivate trigger points	TrP Therapy (Ischemic compression)	TrPs in quadricep, hamstring, abductor, adductor and popliteus muscles
Free adhesions in surrounding ligaments and tendons	Deep transverse friction	Collateral and patellar ligaments, all tendons that attach at the knee
Free adhesions in surrounding musculoskeletal structures	Myofascial release techniques	All muscles that cross the knee
Improve flexibility	Mobilizing techniques, stretching	Kneecap and entire joint, muscles of flexion and extension at the knee



Photo 1. Effleurage with flat of the hand over medial side of swollen knee; legs elevated to assist drainage toward torso.



Photo 2. Broadening of the quadriceps muscles to normalize biomechanical balance around the knee.

- You cannot bear weight on the knee; severe pain even when not bearing weight;
- Knee buckles, clicks or locks; knee is deformed or misshapen;
- If you develop a fever, redness, warmth or significant swelling around the knee;
- You have pain, swelling, numbness, tingling or bluish discoloration in the calf below the sore knee;
- You still have pain after three days of home treatment.⁵

Wait until acute inflammation has subsided before applying massage. After knee surgery, get the doctor's permission to apply massage therapy. Once healing is underway, massage is indicated for the restoration of tissues.

Ask clients if they have taken anti-inflammatory or pain medication recently. If they have, do not rely on their feedback about pain. Act conservatively to avoid tissue damage.

A serious potential complication after knee surgery is the development of deep vein thrombosis (DVT), the formation of a blood clot in a deep vein of the thigh or calf. DVT is caused by prolonged immobility, coagulation and damage to veins walls during surgery. Classic signs of DVT are lower leg discomfort, edema, distended veins and foot pain. Although in some cases the patient may be symptom free,⁶ massage is contraindicated in the area of DVT.

Osgood-Schlatter Disease (OSD) is a condition almost exclusive

to adolescent athletes. It involves irritation and inflammation around the point of attachment of the patellar tendon on the tibial tuberosity. Avoid massage in the presence of acute inflammation. Otherwise, massage can be useful in alleviating symptoms by reducing quadriceps tension that pulls on its point of attachment on the tibia.⁷

Orthopedic tests can be used to identify or rule out specific pathological conditions. Massage therapists specializing in orthopedics or working with active clients like athletes will find these assessment tools invaluable.⁸ Clients with conditions beyond your scope or training should be referred appropriately to massage therapists specializing in orthopedic massage, physical therapists, chiropractors or orthopedic physicians.

Acute Conditions And Massage

In the intake interview, determine whether the client's knee pain is caused by an acute or a chronic condition. Your massage approach will differ depending on the situation.

For example, acute conditions have quick onset from a sudden blow or twist. These include sprains and strains (mild, moderate or severe), tears and fractures. Chronic conditions develop more slowly with wear and tear in the joint. Acute conditions require first aid and referral to a health-care provider if the condition appears to be severe or prolonged.

The RICES formula (Rest, Ice, Compression, Elevation and

Stabilizing) is the first order of business for acute knee injuries. Recommend that the client avoid activities that aggravate the pain. Ice may be applied four to six times a day for 15 minutes at a time to reduce swelling. Elevate the knee as much as possible, including sleeping with a pillow under the knees. Over-the-counter drugs like aspirin, acetaminophen and ibuprofen can help reduce pain and swelling.

Massage is used in acute situations to reduce swelling that can result in secondary injury to tissues around the knee. In the book *Massage For Orthopedic Conditions*, author Thomas Hendrickson advises: "In acute problems your intention is to reduce muscle spasms, increase the joint ROM, and stimulate normal muscle firing." Massage therapy for acute conditions is more conservative and gentle since tissues are damaged and are in the healing process.

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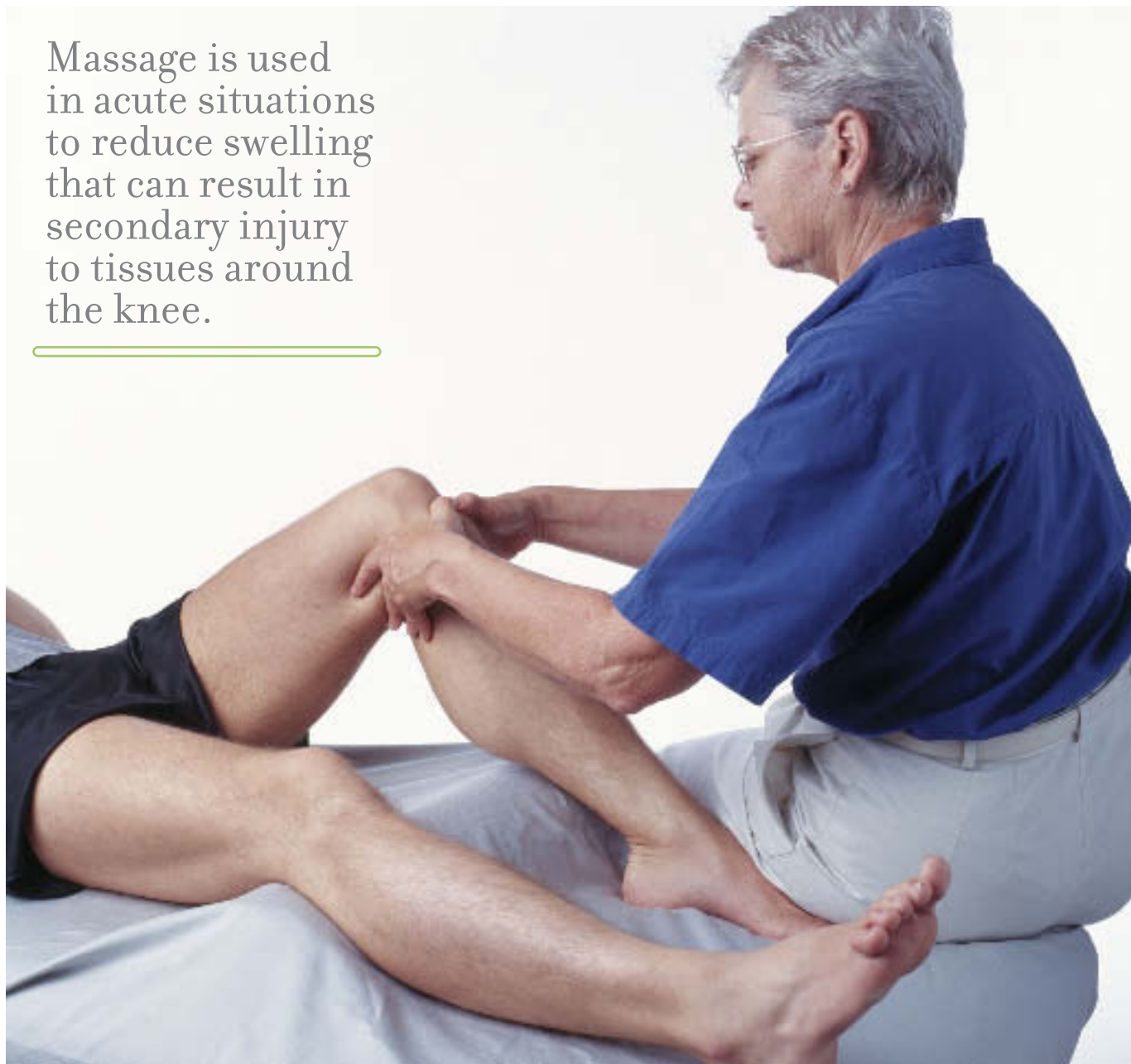


Photo 3. Transverse friction to the infra-patellar tendon.

Relaxing and lengthening the muscles that cross the knee takes pressure off the joint and facilitates good patellar tracking.

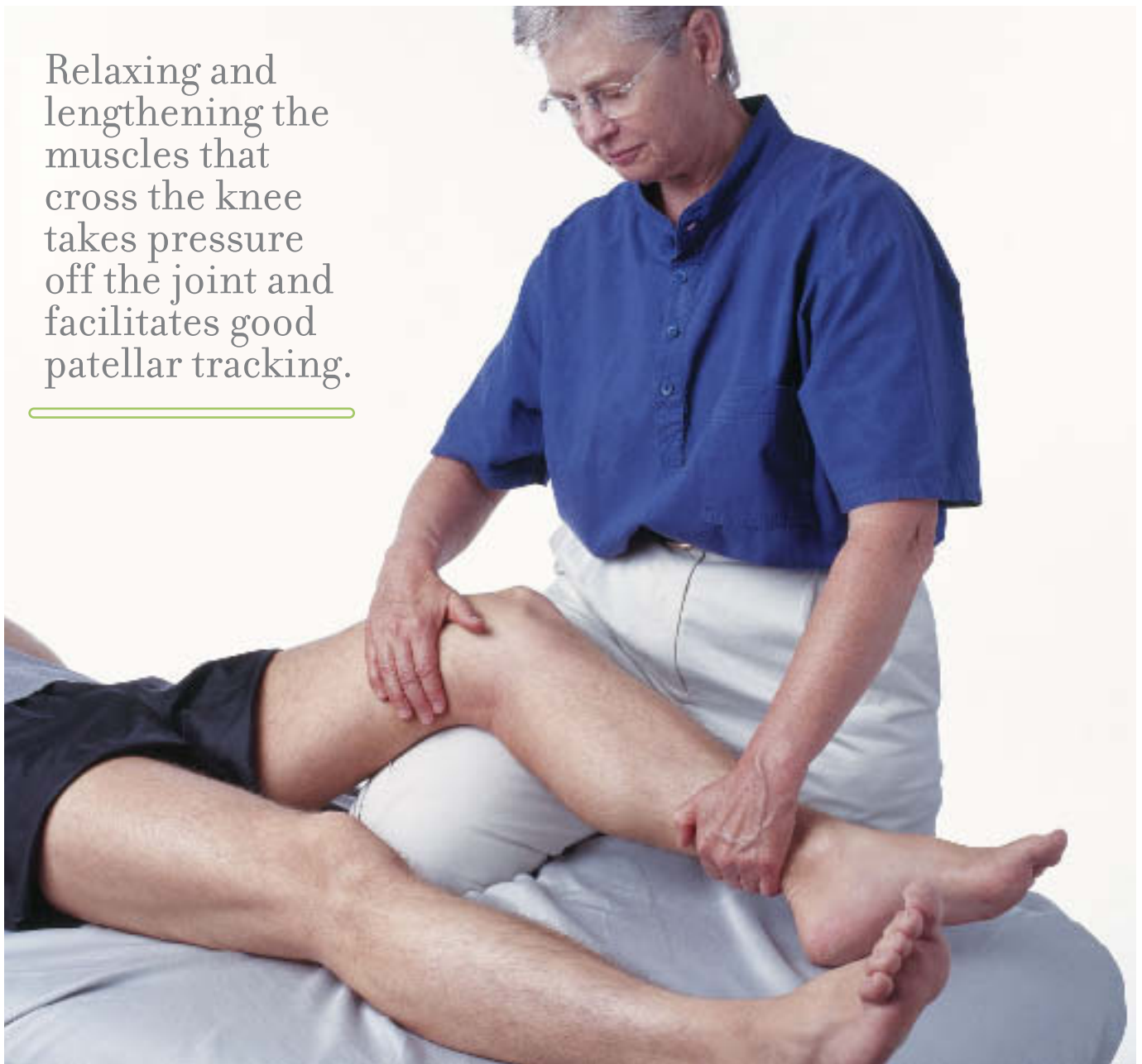
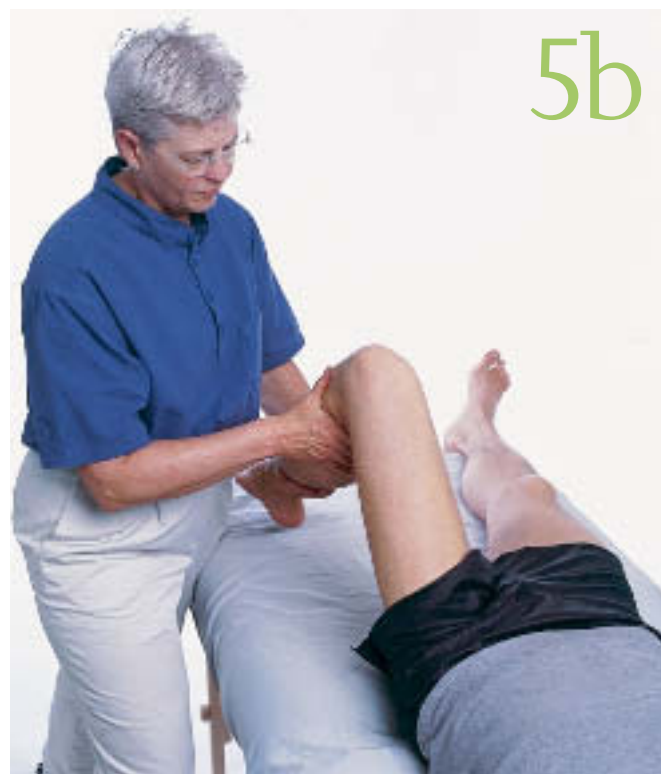


Photo 4. Lifting adductors muscles toward the anterior while bringing the knee into extension; technique to realign muscles of the inner thigh.

Chronic Knee Problems: Massage Applications

The chief therapeutic goals of massage for chronic knee problems are relief from symptoms, and the restoration of tissues to a healthier state. Massage also can be used to complement a corrective exercise regimen that the client is performing outside of the massage, such as exercises that strengthen weakened muscles or restore balance to muscle antagonists.

After assessing the overall situation, and ruling out contraindications, plan the massage session to focus on major contributing factors. Comprehensive massage therapy for knee problems include reducing swelling, relaxing hypertonic muscles, deactivating trigger points, freeing adhesions in surrounding musculoskeletal structures and improving flexibility. The elements of therapy for common knee pain and corresponding massage applications are summarized in Table 1 (page 103).



Photos 5a, 5b and 5c: Figure-eight mobilizing technique for the knee; contraindicated for unstable knees.



In the supine position, use a bolster under the knees so that they are flexed. Avoid hyperextension. When the client is prone, place a bolster under the ankles, but check with the client to make sure this does not put too much pressure on the kneecap. Avoid pressure that pushes the kneecap into the table.

Reduce Swelling

To reduce swelling, place the client supine and elevate the leg. Apply an ice pack. Effleurage is an effective massage technique to increase circulation and move fluids toward the torso. After a general warm-up of the leg, apply petrissage techniques (e.g., kneading and compressions) to the thigh muscles and then the lower leg. Follow this with long effleurage strokes moving fluids in a distal to proximal (i.e., foot to torso) direction. The flat of the hand is used to apply gentle effleurage over specific puffy sites, such as the pes anserinus bursa (Photo 3, page 105).

Lymphatic drainage massage techniques can also be applied to the knee area. These are gentle superficial techniques that move lymph fluid into the lymphatic capillaries and toward the secondary nodes behind the knee and the inguinal nodes in the groin region.¹⁰

Relax Muscles

Relaxing and lengthening the muscles that cross the knee takes pressure off the joint and facilitates good patellar tracking.



Photo 6. Passive stretch for quadriceps and gluteal muscles; forearm in the knee crease decreases pressure in the joint cavity.

Photo 7 (right). Passive stretch for posterior leg muscles.

Take special care in applying mobilizing and stretching techniques to the knee. Too much lateral mobility in the knee can cause instability.

Techniques like kneading, deep effleurage and jostling increase circulation and send signals for neuromuscular relaxation. Broadening of the quadriceps muscles helps normalize biomechanical balance around the knee (Photo 4, page 106).¹¹

Deactivate TrPs

Trigger points (TrP) in the quadriceps, hamstrings and popliteus muscles can refer pain into the knee.¹² Ischemic compression to trigger points followed by stretching can deactivate TrPs associated with knee stiffness, weakness and pain.



Free Adhesions

Deep transverse friction techniques are effective to stimulate collagen production for connective tissue repair, and to free adhesions in ligaments and tendons around the knee. They are also used for tendonitis and after surgery for healthy scar formation.

Knowledge of knee structures and good palpatory skills are important for applications to specific ligaments and tendons. Fingertip friction around the knee is useful for initial warming and creating movement in ligaments and tendons in the area. Using the thumbs to apply transverse friction to the infra-patellar tendon (the patellar ligament) is demonstrated in (Photo 3, page 105).

Fascial adhesions also can cause misalignment of the muscles around the knee. According to Hendrickson, the adductor muscles of the thigh tend to misalign posteriorly, particularly after injuries that prevent the leg from fully extending. The muscles can be realigned with a scooping motion that lifts the muscles from posterior to anterior. Photo 6 (left) demonstrates this technique with joint movement. The fingertips of one hand lift soft tissues upward (anteriorly), while the other holds the leg just above the ankle and simultaneously lifts the leg into extension.¹³

Improve Mobility And Flexibility

Finally, many of the factors that contribute to knee pain—as well as many of its causes—are associated with lack of mobility and flexibility in the lower body. Mobilizing techniques and stretches can be performed to help return knee function to normal, but only to the extent that pain, swelling and the condition of joint permit.

Take special care in applying mobilizing and stretching techniques to the knee. Too much lateral mobility in the knee can cause instability, but lack of mobility causes stiffness and wear and tear on structures. Two useful mobilizing techniques for the knee are movement of the patella, and figure-eight movement of the joint. The figure-eight technique is demonstrated in Photos 5a, 5b and 5c (page 107).

Stretches are best done after a thorough warming of the leg, and friction around the kneecap and collateral ligaments. With the client supine, slowly press the thigh toward the chest. Place your forearm in the knee crease to decrease pressure in the joint cavity, and hold the client's leg with the other hand just above the ankle (Photo 6, left). When you release the stretch, be sure to keep control of the client's leg with a hand under the knee, so that it does not snap back into hyperextension. This stretch produces flexion at the knee and hip, lengthening the quadriceps and gluteal muscles.

Stretch the muscles crossing the posterior knee with the client supine. Keeping the leg extended and foot in dorsi flexion, move the leg into flexion at the hip to elongate the hamstrings and gastrocnemius muscles (Photo 7, left). Achieving a normal range of flexion and extension at the knee mitigates common patterns of dysfunction.

Conclusion

Well functioning, pain-free knees are a blessing that allow the freedom of movement to pursue many of life's simple pleasures. Massage therapy can minimize pain factors, improve mobility and contribute to a lifetime of healthy knees. 📖



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