Patellofemoral Syndrome Home Study Course

1 CE Hour Text, Examination, and Course Guide

Presented by the: Center for Massage Therapy Continuing Education

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Instructions for the Patellofemoral Syndrome home study course

Thank you for investing in the Patellofemoral Syndrome home study course, a 1 CE hour course designed to further your knowledge in the principles and practice of treating clients with signs and symptoms of knee pain and/or patellofemoral syndrome. This guide will contain all of the instructions you will need to complete this course. This is a 1 CE hour course, so that means it should take you approximately 1 hour to read the text and complete the multiple choice exam and course evaluation.

The following are steps to follow in completing this course:

- 1. Read and review the exam and text in this file. The exam is provided for review before testing online and is the same as the online exam.
- 2. When you are ready to test online, access the online examination by logging in to your account at https://www.massagetherapyceu.com/login.php.
- **3.** Complete your examination and print your certificate. The exam is open book and there is no time limit for completion.

You must pass the exam with a 70% or better to pass this home study course. You are allowed to access and take the exam up to 3 times if needed. There is no time limit when taking the exam. Feel free to review the text while taking the test. This course uses the text *Patellofemoral Syndrome, an excerpt from Condition-Specific Massage,* by Celia Bucci. All of the answers can be found in the text. It is advised to answer the exam questions in the study guide before testing online. That way, when you are testing you do not have go back and forth through the online exam.

If you have any questions please feel free to contact us at 866-784-5940, 712-490-8245, or <u>info@massagetherapyceu.com</u>. Most state boards require that you keep your "proof of completion" certificates for at least four years in case of audit. Thank you for taking our Patellofemoral Syndrome home study course.

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It is the responsibility of the practitioner to determine the appropriateness of the techniques presented in terms within the scope of practice. This information is in no way meant to diagnose or treat medical conditions. Written medical opinions are always the best way to resolve any questions regarding contra-indications to or advanced treatment of knee pain and/or patellofemoral syndrome.

Patellofemoral Syndrome Exam

- 1. Patellofemoral syndrome refers generally to _____ primarily due to improper tracking of the patella over the femur.
 - A. Anterior knee pain
 - B. Posterior knee pain
 - C. Lateral knee pain
 - D. Medial knee pain
- 2. All of the following may all play a role in improper biomechanics that contribute to patellofemoral syndrome EXCEPT:
 - A. Pes planus or pes cavus
 - B. Inversion or eversion of the ankle
 - C. Rotation of the femur or tibia
 - D. Forward head posture
- 3. When treating patellofemoral syndrome, if the client has a history of arthritis, cartilage degeneration, or previously unresolved injuries, or if you suspect the client has a fractured bone or a torn ligament, what is the best course of action?
 - A. Proceed with light treatment twice a week, then re-evaluate to see if any progress has been made
 - B. Work with the client's health care provider and consult a pathology text for massage therapists before proceeding
 - C. Diagnose the client's condition as such and begin aggressive treatment on the affected areas
 - D. Proceed with treatment, but use special positioning for comfort as well as to reduce postures that contribute to patellofemoral syndrome or coexisting conditions
- 4. Client assessment begins during your first contact with a client, when is this?
 - A. When the client shows up for their appointment
 - B. When you begin treatment on the table
 - C. On the telephone when an appointment is requested
 - D. Once the first treatment session is completed
- 5. Why should only active ROM assessment be used in the acute stage of injury to prevent undue pain or re-injury?
 - A. Since it allows the client to control the amount of movement and stay within a pain-free range
 - B. Since it allows the therapist to control the amount of movement and stay within a pain-free range
 - C. Since it allows the client to control the amount of movement and go beyond the painfree range
 - D. Since it allows the therapist to control the amount of movement and go beyond the pain-free range

- 6. Palpation assessment in clients for patellofemoral syndrome should include the assessment of:
 - A. Tissues of each individual client from the knee to the toes
 - B. Tissues of each individual client from the ilium to the knee
 - C. Tissues of each individual client from the thoracic region to the ilium
 - D. Tissues of each individual client from the ilium to the toes
- 7. During treatment, when assessing for and treating myofascial restrictions in the thigh, where might you find restrictions?
 - A. Along the length of the iliotibial band
 - B. In the lateral quadriceps
 - C. At the medial thigh and knee
 - D. All of the above
- 8. What is the correct instruction to give clients to stretch the hamstrings and plantar flexors while seated?
 - A. Instruct the client to stand comfortably with the back supported, and then flex one knee and dorsiflex the ankle and hold for 15–30 seconds or as long as is comfortable
 - B. Instruct the client to sit comfortably with the back supported, and then extend the knees and dorsiflex the ankles and hold for 3-5 minutes or as long as is comfortable
 - C. Instruct the client to sit comfortably with the back supported, and then flex the knees and plantar flex the ankles and hold for 30-60 seconds or as long as is comfortable
 - D. Instruct the client to sit comfortably with the back supported, and then extend the knees and dorsiflex the ankles and hold for 15–30 seconds or as long as is comfortable
- 9. All of the following are possibilities if there is no improvement with each session EXCEPT:
 - A. There is too much time between treatments
 - B. The client is adjusting activities of daily living and is keeping up with self-care
 - C. The condition is advanced or involves other musculoskeletal complications that are beyond your basic training
 - D. The client has an undiagnosed, underlying condition

This completes the Patellofemoral Syndrome exam. Proceed to the next page to view the text.

Condition Specific Massage Therapy

SECOND EDITION

Celia Bucci

Chapter 10:

Patellofemoral Syndrome

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Patellofemoral Syndrome

Understanding Patellofemoral Syndrome

Patellofemoral syndrome refers generally to anterior knee pain primarily due to improper tracking of the patella over the femur. Many factors can affect the tracking of the patella, and the degree of discomfort, pain, or restricted mobility varies widely. To recognize these potential contributing factors, it is important to understand the relationships among the femur, tibia, patella, and the soft tissues responsible for their movement and stability.

The knee joint includes two articulations. The concave plateaus of the tibia and the convex condyles of the femur articulate to form a modified hinge joint (tibiofemoral). The posterior aspect of the patella also has concave surfaces—called the medial and lateral facets—that articulate with the medial and lateral condyles of the femur (patellofemoral). The ridge that separates the medial and lateral facets of the patella glides in the groove between the medial and lateral condyles of the femur. Articular cartilage that covers the condyles of the femur and the tibial plateau, and the menisci that sit between them provide cushioned, friction-free movement of the joint.

Flexion and extension of the knee, which involve both of these articulations, are not simple transverse movements. Some rotation and translation of the bones occurs during flexion and extension of the healthy knee. The angle of the joint and the strength of its surrounding structures influence the amount of rotation and translation. Noncontractile soft tissues including the medial and lateral collateral ligaments and the anterior and posterior cruciate ligaments protect the knee from excessive rotation and translation during movement. Other noncontractile tissues that protect the knee include the joint capsule, menisci, bursae, and fat pads (Fig. 1). Contractile soft tissues that both move and stabilize the knee include the quadriceps, hamstrings, gracilis, sartorius, and gastrocnemius. A healthy knee depends on all of these structures working together to create smooth movement.



The lateral condyle of the femur is more prominent anteriorly than the medial condyle, which provides a buffer for excessive lateral movement of the patella. The medial condyle of the femur extends more distally than the lateral condyle, but both lie in the same plane as they articulate with the tibia. This puts the femur at an angle from the inferior medial location of the knee to the superior lateral location of the hip. The angle at the intersection of those differently oriented bones-called the Q angle-partly determines how the quadriceps pull on the tibia in knee extension and how they contract eccentrically in knee flexion. To measure this angle, draw one line diagonally from the middle of the patella to the anterior superior iliac spine (ASIS), and another from the middle of the patella through the middle of the tibial tubercle (Fig. 2). The average Q angle is approximately 15° ; it is often greater in females than in males, because women generally have a wider pelvis. Because the Q angle affects the line of pull of the quadriceps, significant deviations can have a great impact on how the bones of the knee joint articulate and how the soft tissues respond. In the case of patellofemoral syndrome, an increased Q angle-sometimes resulting from an injury, activities of daily living, or postural deviations anywhere from the hips to the feet-may contribute to excessive lateral tracking of the patella.



The quadriceps are also angled, following the line of the femur. The patella is rooted in the quadriceps tendon, is stabilized inferiorly by the patellar tendon, and is further stabilized by the

Figure 10-2 Q angle.

medial and lateral retinacula. In extension and flexion of the knee, the patella moves superiorly and inferiorly over the condyles of the femur. The main function of the patella is to help guide the movement of this joint with differently angled bones by realigning the quadriceps' pull on the tibia. Without the patella, the quadriceps would draw the tibia diagonally, along their line of pull. Instead, the quadriceps move the patella slightly laterally along the line of the femur, while the patellar tendon redirects the line of pull on the tibia, moving it more perpendicularly and minimizing rotation. If the patella is not tracking normally, stress to the joint and the muscles that move it increases.

Because the quadriceps' line of pull is lateral compared to the orientation of the patellar tendon, several other structures are vital for proper tracking of the patella. The distal fibers of the vastus medialis run obliquely, offering ideal resistance to a lateral pull on the patella. The medial patellar retinaculum resists lateral pull while the lateral patellar retinaculum resists medial pull. The medial and lateral collateral ligaments assist in normalizing a valgus or varus position of the knee, which may help to prevent improper tracking of the patella.

COMMON SIGNS AND SYMPTOMS

The most common symptom of patellofemoral syndrome is pain at the anterior knee, often just above or just below the patella. Pain usually has a gradual onset. Pain may also be felt at the medial or lateral side of the knee depending on which structures are primarily involved. Pain is usually most intense with a weight-bearing extension of the knee. Symptoms are felt when walking, running, squatting and rising from a squat, and when ascending and descending stairs. While sitting for long periods, the knee is flexed, elongating the quadriceps, and pain may be felt upon standing when the lengthened quadriceps need to contract concentrically. The knee may also give way during weight-bearing activities. While instability of the joint may be a complicating factor in patellofemoral syndrome, the knee giving way may also be the result of a neuromuscular reflex inhibition of the quadriceps in response to pain. This inhibition may lead to atrophy of the quadriceps.

Hyper- or hypomobility of the patella in a lateral or medial direction may be present. When structures are pulling the patella laterally, medial mobility may be reduced. When structures are pulling the patella medially, lateral mobility may be reduced. You may notice swelling at the knee when misalignment of the patella and factors contributing to patellofemoral syndrome increase friction and lead to increased inflammation and arthritis. Snapping or grinding may be felt or heard by the client when flexing and extending the knee, particularly during weight-bearing activity.

Patellofemoral syndrome was once called (and is still often confused with) chondromalacia of the patella, which involves degeneration of cartilage. The signs and symptoms listed above are often present without any changes to the cartilage of the patella. However, left untreated, patellofemoral syndrome may lead to degeneration of the patellar cartilage.

POSSIBLE CAUSES AND CONTRIBUTING FACTORS

There is no single, clearly understood cause of patellofemoral syndrome. Improper tracking of the patella and increased pressure within the patellofemoral joint may involve a variety of coexisting contributing factors. Lateral misalignment of the patella is reported more often than medial misalignment. This is thought to be due to lateral pull by the quadriceps. An increased Q angle may contribute to excessive lateral pull by the quadriceps and rotation of the femur or tibia and may affect proper tracking of the patella. A tight vastus lateralis or iliotibial band, which have distal tissues that blend into the lateral patellar retinaculum, also increase lateral pull on the patella. The distal fibers of the vastus medialis, referred to as vastus medialis obliquus, run at an oblique angle, making them favorable for opposing lateral pull on the patella by the quadriceps and iliotibial band. A weak vastus medialis obliquus may not be optimally effective for this function. In all of these cases, weight-bearing or repetitive activities increase the demand on the knee and the risk of injury to its stabilizing soft tissues.

Try this yourself. Stand on one leg, leaning against a wall or chair for balance. Extend and flex the knee of the opposite leg. If there is no tissue damage, the movement of your knee will be smooth, and you probably will not feel any discomfort. Now, adduct your hip, crossing your free leg over the leg you are standing on, and extend and flex your knee 10 times so that movement of the tibia is straight and directly in front of you. This may not be the exact mechanism of an increased Q angle, but it approximates the rotation of the femur and the increased angle of pull on the quadriceps. Moving the tibia straight and directly in front of you approximates walking. After 10 repetitions of this action, do you feel stress in the medial knee or hip? Now imagine the additional impact on the joint if you added the full weight of your body. Next, without causing discomfort beyond your tolerance, walk around with one ankle everted or inverted. Pay attention to what you feel in that knee and hip compared to the leg with a normally oriented ankle and foot.

Sitting or squatting for long periods lengthens the quadriceps, particularly the distal tendons, which may weaken knee extension causing pain when the individual needs to recruit these muscles to stand. Lengthening may be associated with neuromuscular dysfunction, affecting the tone and strength of the quadriceps, which can cause the knee to give way. It is unclear whether the neuromuscular dysfunction is a cause or result of changes to the quadriceps' muscle tone. Along the same lines, the knee is usually flexed when sitting, which shortens and possibly increases the resting tone of the hamstrings. This may increase the risk of strain during eccentric contractions of the hamstrings such as when extending the knee to stand. Furthermore, if the quadriceps have weakened, they may be less able to oppose the hamstrings that flex the knee.

Although less common, medial misalignment does occur and should be assessed. In fact, any anomaly in the structures of the knee can affect patellar tracking in the femoral groove. Patella alta—a patella that is abnormally high in relation to the femur—is positioned in the more shallow aspect of the femoral groove and may be associated with lateral displacement. Patella baja—a patella that is abnormally low in relation to the femur—increases contact with the tibia and is associated with chondromalacia. Patella alta and patella baja are often associated with an injury to the quadriceps and patellar tendons. A lateral femoral condyle that is smaller than average or that does not protrude sufficiently anteriorly cannot provide an adequate buffer for the patella and may also contribute to excessive lateral tracking.

Pes planus or pes cavus, inversion or eversion of the ankle, and rotation of the femur or tibia may all play a role in improper biomechanics that contribute to patellofemoral syndrome. Injuries, particularly to the ligaments that stabilize the knee, and more so if they are repeated or untreated, may affect the articulation of bones in the joints of the knee and encourage compensating patterns in the soft tissues surrounding the knee. Surgery, including arthroscopic procedures, may damage soft tissues, cartilage, and proprioceptors, resulting in scar tissue and compromised function. Overuse and weight-bearing impact, such as when running and ascending or descending stairs or hills, may contribute to inflammation and degeneration of structures. Weight gain may also be a predisposing factor.

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
Baker's cyst	May be asymptomatic Pain and swelling behind the knee If cyst ruptures, pain, swelling, and bruising at posterior knee and calf	Physical exam Transillumination X-ray MRI	Baker's cyst can be confused with deep vein thrombosis and should be assessed by a medical professional prior to treatment. Massage is locally contraindicated in the popliteal area. Massage elsewhere is indicated.
Bone spur	Pain in knee, particularly on flexion and extension and when kneeling Reduced ROM	X-ray MRI CT scan	Massage will not reduce symptoms of a bone spur. ROM testing or exercises are locally contraindicated. Be cautious with compressions.
Bursitis (pes anserine, infrapatellar, prepatellar)	Heat, redness, and swelling Pain at rest Aching or stiffness with use Significant pain when kneeling and ascending or descending stairs Fever, pain, and swelling if infection occurs	Physical exam ROM tests X-ray MRI	Massage is systemically contraindicated if bursitis is due to infection. Massage is locally contraindicated in the acute stage to avoid increased swelling. In the subacute stage, massage to structures surrounding the joint is indicated.
Chondromalacia	Dull pain and tenderness at the anterior knee Worsens with kneeling, squatting, prolonged sitting, standing from sitting, and ascending or descending stairs Crepitus	Physical exam X-ray MRI	Massage is indicated to reduce stress on the joint by altering soft tissues but will not affect cartilage. Avoid compression to the patella and repeated ROM exercises of the knee.
Gout	Redness, heat, and swelling Sudden, intense pain, often at night, that diminishes gradually over a couple of weeks	Physical exam Blood and urine uric acid concentration tests Synovial fluid test	Massage is contraindicated during acute attacks. Gout may indicate other systemic conditions. Work with health care team.

Table 10-1: Differentiating Conditions Commonly Confused with or Contributing to Patellofemoral Syndrome

Patellofemoral Syndrome (continued)			
CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
Iliotibial band syndrome	Sharp or burning pain in lateral knee, particularly following activity Pain resolves with rest in early stages As syndrome progresses, pain with simple activities like walking and ascending or descending stairs	Physical exam ROM tests	Massage is indicated.
Ligament injury/ sprain	Snapping sound or sensation at time of injury Acute pain that worsens with movement Rapid swelling, heat, and redness Unable to bear weight on the injured leg Knee gives way In the subacute stage, joint may regain function	Physical exam MRI	Massage is indicated and best used following acute stage.
Meniscus injury	Pain and stiffness Popping sensation Slowly progressive swelling Reduced ROM Pain with activity Knee may lock in place	Physical exam McMurray's test X-ray MRI Arthroscopy	Massage is indicated to reduce stress on the joint by altering soft tissues but will not affect meniscus. Avoid compression to the injured meniscus and the patella and minimize repeated ROM exercises of the knee.
Osgood-Schlatter disease (primarily affects teenagers)	Pain that worsens with activity Swelling Tenderness at tibial tuberosity Symptoms often resolve when bones stop growing	Physical exam ROM tests X-ray	Techniques that increase circulation are locally contraindicated in the acute stage to avoid increased inflammation. Massage is indicated in chronic stage.
Osteoarthritis	Pain on standing and walking Swelling Tenderness with pressure on joint Stiffness, particularly after rest or inactivity Inflexibility in the knee Grating sensation or sound	Physical exam X-rays Blood tests Synovial fluid tests Arthroscopy	Massage is contraindicated during an acute flare-up. Massage is indicated in the subacute stage.
Plica syndrome	Intermittent anteromedial knee pain Inflammation Edema Thickening of plica Decreased elasticity of plica Snapping sound when dense plica rolls over femoral condyle Knee may lock or give way	TARP sign (Taut Articular band Reproduces Pain) Arthroscopy	Massage is indicated to reduce inflammation or adhesions, restore mobility, and effect a change in the tone of muscles that cross the knee. There is no research to indicate the benefit of massage to the plica itself.

Table 10-1: Differentiating Conditions Commonly Confused with or Contributing to Patellofemoral Syndrome (continued)

Table 10-1: Differentiating Conditions Commonly Confused with or Contributing to Patellofemoral Syndrome (continued)

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
Rheumatoid arthritis	Chondromalacia Periods of flare-ups and remission Pain, swelling Aching and stiffness, particularly after rest or inactivity Reduced ROM Distortion of knee joint Rheumatic nodules Occasional low-grade fever and malaise	Physical exam Blood tests Synovial fluid tests X-ray	Massage is indicated in nonacute stages. Work with the health care team.
Septic arthritis	Pain, swelling, redness, and heat around the knee Fever, chills Symptoms may occur without prior injury	Synovial fluid test Blood test X-ray MRI	Massage is systemically contraindicated. Refer to a medical professional.
Tendon injuries	Pain in the knee Swelling Pain worsens with intense weight-bearing activity such as jumping, squatting, or climbing stairs Reduced ROM	Physical exam ROM tests	Massage is indicated.

CONTRAINDICATIONS AND SPECIAL CONSIDERATIONS

First, it is essential to understand the cause of the client's knee pain. If the client has a history of arthritis, cartilage degeneration, or previously unresolved injuries, or if you suspect the client has a fractured bone or a torn ligament, work with the client's health care provider and consult a pathology text for massage therapists before proceeding. These are a few general cautions:

- **Underlying pathologies.** Arthritis or conditions affecting the cartilage may be contributing factors. If you suspect an underlying condition (consult Table 1 and your pathology book for signs and symptoms), refer the client to their health care provider for medical assessment before initiating treatment. If the client is diagnosed with an underlying pathology that is not a contraindication for massage, work with the health care team to develop a treatment plan that is appropriate for that individual.
- **Endangerment sites.** Be cautious near endangerment sites in the popliteal area.
- **Producing symptoms.** Symptoms may occur during treatment. If treatment reproduces symptoms, first adjust the client to a more neutral posture. If this does not relieve the symptoms, reduce your pressure or move away from the area. You may be able to treat around the site that reproduced the symptoms, but proceed with caution.
- **Treatment duration and pressure.** If the client is elderly, has degenerative disease, or has been diagnosed with a condition that diminishes activities of daily living, you may need to adjust your

pressure as well as the treatment duration. Frequent half-hour sessions may suit the client better.

- Positioning. Use bolsters to position the client for comfort as well as to reduce postures that contribute to patellofemoral syndrome or coexisting conditions. Adjusting the alignment of the hips, knees, and ankles helps to keep muscles closer to their anatomic length and may facilitate access.
- **Friction.** Do not use deep frictions if the client has a systemic inflammatory condition such as rheumatoid arthritis or osteoarthritis, if the health of the underlying tissues is compromised, or if the client is taking anti-inflammatory medication. Friction creates an inflammatory process, which may interfere with the intended action of anti-inflammatory medication. Recommend that your client refrain from taking such medication for several hours prior to treatment if the health care provider agrees.
- **Injections.** If the client has had a steroid or analgesic injection within 2 weeks of treatment, avoid the area. These injections reduce sensation, which may prevent the client from assessing your pressure adequately. These injections may also alter the physiology of the soft tissues, increasing the risk of injury from manual pressure.
- **Tissue length.** It is important when treating myofascial tissues that you do not lengthen those that are already stretched. Assess for myofascial restrictions first and treat only those that are clearly present. Likewise, overstretched muscles should not be stretched from origin to insertion. If you treat trigger points in overstretched tissue, use heat or a localized pin and stretch technique instead of full ROM stretches.
- Hypermobile joints and unstable ligaments. Be cautious with mobilizations if the client has hypermobile joints or if ligaments are unstable due to injury, pregnancy, or a systemic condition.

MASSAGE THERAPY RESEARCH

In 2006, Paul van den Dolder and David Roberts published a study titled "Six Sessions of Manual Therapy Increase Knee Flexion and Improve Activity in People with Anterior Knee Pain: A Randomised Controlled Trial." The participants were 38 individuals between the ages of 18 and 80 with anterior knee pain, who were assigned to either an experimental group that received manual therapy or to a control group whose subjects were placed on a waiting list. Participants were excluded if knee pain was caused by recent trauma, infection, tumor, or acute inflammation or if the participant had knee surgery within 6 weeks of the study. Participants were also excluded if pain was reproduced with extension, flexion, or lateral flexion of the lumbar spine or overpressure to the hip or if there was no tenderness on palpation of the lateral knee. Manual therapy consisted of six 15- to 20-minute treatments over the course of approximately 2 weeks. Therapy focused on transverse frictions to the lateral retinaculum of the knee in the fully extended and fully flexed positions, tilt patellofemoral stretches, and sustained medial glide during extension and flexion. Participants were given no self-care instructions or other healing advice. Pain was measured using Laprade and Culham's patellofemoral pain severity questionnaire. ROM and activity were also assessed. The experimental group reported less average daily pain, less pain, increased speed while ascending or descending stairs, and increased knee flexion compared to the control group. There was no change in knee extension for either group.

In 2009, Pedrelli et al. published a study titled "Treating Patellar Tendinopathy with Fascial Manipulation." All 18 subjects, who were between the ages of 17 and 42 with unilateral, subacute, or chronic patellar tendon pain, received a single treatment using the fascial manipulation technique. Subjects with acute inflammation, meniscus damage, or advanced osteoarthritis were excluded. Prior to treatment, subjects completed the VAS pain questionnaire, describing pain experienced while descending steps and while jumping on flat feet. Subjects were asked to refrain from sports for 4 days following treatment. The same evaluation was repeated after one treatment and again one month after treatment. All treatments were performed by the same therapist and included fascial techniques over the muscular fascia between the vastus lateralis and the rectus femoris with pressure applied toward the vastus intermedius. Client feedback was used to accurately locate the point that produced local pain and referral. All patients reported decreased pain or weakness or increased mobility. All subjects reported a significant decrease in pain immediately following treatment, and progress was maintained or even improved at follow-up by all but three participants. These three subjects had a recurrence of pain, albeit less severe than at pre-treatment levels. It is also noted that these three subjects had more complicated clinical cases compared to other participants.

In 2008, Jennifer Zalta published "Massage Therapy Protocol for Post-Anterior Cruciate Ligament Reconstruction Patellofemoral Pain Syndrome: A Case Report." The study involved a 29-year-old female athlete with a history of injury to her anterior cruciate ligament, medial collateral ligament, and medial meniscus and had surgical repair of all but the medial ligament. After several months following surgery, the subject began experiencing grinding and clicking in the knee. She was later diagnosed as having patellofemoral pain syndrome. She scheduled arthroscopic surgery to remove the damaged cartilage and to reduce crepitus and agreed to participate in the case study beginning 4 days after her arthroscopy. Treatments were performed once a week over the course of 10 weeks, lasting between 60 and 90 minutes to accommodate a wide variety of contributing factors. Subjective pain and function levels were recorded before and after each treatment and daily during the treatment period. Goals included reducing postsurgical inflammation (lymphatic drainage); reducing hypertonicity and lengthening the tensor fasciae latae, iliotibial band, and hamstrings (muscle energy technique); deactivating trigger points in the tensor fasciae latae, vastus lateralis, and biceps femoris (neuromuscular therapy); increasing ROM (PIR and contract relax techniques); and reducing fibrotic tissue around the patella (myofascial release and cross-fiber friction). Strengthening of the vastus medialis oblique and the hip adductors were assigned as self-care. Following the treatment program, the client reported full, pain-free ROM in the affected knee. Pain was reported as 0 on a 0-10 scale by the sixth session. Lateral pull on the patella was reduced, and results of orthopedic tests showed improvement in the Q angle, tensor fasciae latae and iliotibial band contracture, patellar grind, and contracture in the knee flexors. Two weeks before the 1-year follow-up, the subject injured her medial meniscus, but reported that, prior to this most recent injury, she had experienced no pain and had returned to presurgery activity.

Working with the Client

CLIENT ASSESSMENT

The signs and symptoms of patellofemoral syndrome can present in many different ways. Dysfunction that causes the patella to track laterally is most often reported, but any abnormal tracking that results in pain or dysfunction of the patellofemoral joint may be present. In addition, various repetitive actions, postures, or injuries may be contributing factors; each client will present differently. For example, an increased Q angle may affect the length and strength of the hip adductors and abductors as well as inversion or eversion of the ankles. A tight semitendinosus may contribute to injury of the pes anserine tendon, which in turn may affect the health of the sartorius or gracilis. Tight hamstrings or quadriceps may also affect pelvic tilt and lumbar lordosis. In general, lateral tracking of the patella suggests shortening of the soft tissues of the medial structures that stabilize the knee while medial tracking of the patella suggests shortening of the soft tissues of the medial thigh and weakening of the lateral structures that stabilize the knee. What follows are common presentations for patellofemoral syndrome. However, it is essential to assess every joint involved to put together an accurate picture for each individual client.

Assessment begins during your first contact with a client. In some cases, this may be on the telephone when an appointment is requested. Ask in advance if the client is seeking treatment for a specific area of pain so that you can prepare yourself.

Table 2 lists questions that may aid your assessment.

QUESTIONS FOR THE CLIENT	IMPORTANCE FOR THE TREATMENT PLAN	
Was there a precipitating event, or can you remember a specific moment when the pain began?	The details of the activity or posture that initiated the pain may help you to determine contributing factors. A new regimen of running, new activity that requires weight-bearing movement or squatting, or newly developed sedentary postures may contribute to symptoms of patellofemoral syndrome.	
Where do you feel symptoms?	The location of symptoms gives clues to the location of trigger points, injury, or other contributing factors. Patellofemoral syndrome generally causes pain in the anterior knee. Although pain elsewhere does not exclude the possibility of patellofemoral syndrome, it may suggest a coexisting condition.	
Describe what your symptoms feel like.	Differentiate between possible origins of symptoms, and determine the involvement of bones and soft tissues.	
Do any movements make it worse or better?	Locate tension, weakness, or compression in structures producing such movements. Extension of the knee, ascending and descending stairs, and weight-bearing activity often exacerbate symptoms.	
Have you seen a health care provider for this condition? What was the diagnosis? What tests were performed?	Medical tests may reveal contributing factors as well as contraindications. If no tests were performed in making a diagnosis, use the tests described in this chapter for your assessment. If your assessment is inconsistent with the diagnosis, ask the client to discuss your findings with their health care provider or for permission to contact the provider directly.	
Have you been diagnosed with a condition such as arthritis?	Arthritis may contribute to signs and symptoms, may require adjustments to treatment and may impact treatment outcomes.	
Have you had a previous injury or surgery?	Injury or surgery and resulting scar tissue may cause adhesions, hyper- or hypotonicity, and atypical ROM.	
What type of work, hobbies, or other regular activities do you do?	Repetitive motions that stress the knee and static postures that increase flexion of the knee may contribute to the client's condition.	
Are you taking any prescribed medications or herbal or other supplements?	Medication of all types may contribute to symptoms or have contraindications or cautions.	
Have you had a corticosteroid or analgesic injection in the past 2 weeks? Where?	Local massage is contraindicated.	
Have you taken a pain reliever or muscle relaxant within the past 4 hours?	The client may not be able to judge your pressure.	
Have you taken anti-inflammatory medication within the past 4 hours?	Deep friction may initiate an inflammatory process and should not be performed if the client has recently taken anti-inflammatory medication.	

Table 10-2: Health History

Postural Assessment

Allow the client to walk and enter the room ahead of you while you assess their posture and movements. Look for imbalances or patterns of compensation for deviations common with patellofemoral syndrome. Watch as the client climbs steps, and look for reduced mobility in the knee or whether the client is favoring one side. Assess for joint instability, limping, rotation of the femur or tibia, or hyper- or hypolordosis. Have the client sit to fill out the assessment form and watch to see if they lower into the chair cautiously or shifts around to find a comfortable position for the knee. Watch also as the client stands up to see if they can stand without assistance or whether they lift out of the chair using the arms or by leaning on a stable surface. When assessing the standing posture, be sure that the client stands comfortably. If they try to stand in the anatomic position, you will not get an accurate assessment of their posture in daily life. If the patella is tracking laterally, you may notice adduction of the hips, valgus of the knee, increased Q angle, or eversion of the ankle. If the patella is tracking medially, you may notice rotation of the femur and tibia, which appears as lateral rotation of the feet. Other anomalies may include patella alta or patella baja, hyper- or hypoextension of the knees, swelling around the patella, and pes planus or pes cavus.

Figure 3 compares a healthy posture to a posture affected by patellofemoral syndrome due to lateral tracking of the patella.



Figure 10-3 Postural assessment comparison. Compare the postures in these images. In the figure on the right, note the angle and rotation of the femur and tibia and the orientation of the ankle and the foot.

ROM Assessment

Test the ROMs of the knee involving muscles as both agonists and antagonists. Since it allows the client to control the amount of movement and stay within a pain-free range, only active ROM should be used in the acute stage of injury to prevent undue pain or re-injury. Box 1 presents the average active ROM results for the joints involved in patellofemoral syndrome.

Box 10-1: Average Active ROM for Joints Involved in Patellofemoral Syndrome

Hip

Flexion 110-120° Rectus femoris Gluteus medius (anterior fibers) Tensor fasciae latae Sartorius Psoas major Iliacus Gluteus minimus Adductor magnus Adductor longus Adductor brevis

Extension 10-15°

Biceps femoris Semitendinosus Semimembranosus Gluteus maximus Gluteus medius (posterior fibers) Adductor magnus (posterior fibers)

Lateral Rotation 40-60°

Biceps femoris Gluteus maximus Gluteus medius (posterior fibers) Sartorius Piriformis Ouadratus femoris Obturator internus Obturator internus Obturator externus Gemellus superior Gemellus inferior Psoas major Iliacus

Medial Rotation 30-40°

Semitendinosus Semimembranosus Gluteus medius (anterior fibers) Adductor magnus Adductor longus Adductor brevis Gracilis Pectineus Tensor fasciae latae

Hip (continued)

Abduction 30–50° Gluteus maximus Gluteus medius Gluteus minimus Tensor fasciae latae Sartorius Piriformis (with flexed hip)

Adduction 30°

Adductor magnus Adductor longus Adductor brevis Pectineus Gracilis Psoas major Iliacus Gluteus maximus (low fibers)

Knee

- Flexion 120–150°
 - Biceps femoris Semitendinosus Semimembranosus Gracilis Sartorius Gastrocnemius Popliteus Plantaris

Extension 0-15°

Rectus femoris Vastus lateralis Vastus medialis Vastus intermedius

Medial Rotation (when flexed) 20-30°

Semitendinosus Semimembranosus Gracilis Sartorius Popliteus

Lateral Rotation (when flexed) 30–40° Biceps femoris

Ankle

Dorsiflexion 20° Tibialis anterior Extensor digitorum longus Extensor hallucis longus

Plantar Flexion 50°

Gastrocnemius Soleus Tibialis posterior Peroneus longus Peroneus brevis Flexor digitorum longus Flexor hallucis longus Plantaris

Inversion 45-60°

Tibialis anterior Tibialis posterior Flexor digitorum longus Flexor hallucis longus Extensor hallucis longus

Eversion 15-30°

Peroneus longus Peroneus brevis Extensor digitorum longus

Active ROM

Compare your assessment of the client's active ROM to the values in Box 1. Pain and other symptoms may not be reproduced during active ROM assessment because the client may limit movement to a symptom-free range.

• Active extension of the knee may be restricted and cause pain when weak quadriceps and shortened hamstrings limit movement and when improper patellar tracking increases bone to bone contact. Grinding or clicking may be heard or felt by the client. Active extension of the knee may also

reveal lateral tracking of the patella when the rectus femoris and vastus lateralis contract with greater force than the vastus medialis.

- Active abduction of the hip may be restricted if medial rotation of the femur and knee valgus are present.
- Active dorsiflexion of the ankle may be restricted if the plantar flexors of the ankle are short and tight.

Passive ROM

Compare the client's P ROM on one side to the other when applicable. Note and compare the end feel for each range.

- Passive flexion and extension of the knee may reveal crepitus.
- **Passive extension of the knee** may reveal lateral tracking of the patella when the lateral retinaculum is tight or medial tracking if the medial retinaculum is tight.

Resisted ROM

Use resisted tests to assess the strength of the muscles that cross the knee. Compare the strength of the affected side to the unaffected side.

- **Resisted extension of the knee** may reveal weakness in the quadriceps and cause pain in the anterior knee.
- **Resisted flexion of the knee** may cause pain in the anterior knee.
- **Resisted abduction of the hip** may reveal weakness in the gluteal muscles.

Special Tests

The following special tests can help you to determine which structures are contributing to pain and when a client should be evaluated by a medical professional using X-ray or other tools, which may reveal conditions that are contraindications or require special considerations when planning treatment with massage.

The patellar glide test is used to assess the medial and lateral mobility of the patella (Fig. 4). This test may also reveal crepitus.



Figure 10-4 Patellar Glide Test.





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- 1. The client should be supine with a bolster under the knees and the quadriceps relaxed.
- 2. Place your thumb on one side of the patella and one or two fingers on the other side.
- **3**. Slowly and gently glide the patella laterally and medially to assess its mobility. Ideally, the patella should move a distance equal to approximately half of its width in either direction.
- **4**. Limited medial glide suggests that lateral structures are restricting movement. Limited lateral glide suggests that medial structures are restricting movement.

The vastus medialis coordination test is intended to isolate and assess the function of vastus medialis during extension of the knee (Fig. 5).

- 1. The client is supine with the knees extended and the quadriceps relaxed.
- 2. Place your fist under the distal thigh, superior to the affected knee.
- **3.** Ask the client to slowly extend the knee without moving other joints while you assess the coordination of that action.
- 4. If you feel the client pushing the thigh into your fist or pulling away from your fist or if they flex the hip to raise the leg, ask them to perform the action again by extending only the knee. You may also be able to see the orientation of the teardrop-shaped vastus medialis.
- **5.** The test is considered positive for vastus medialis oblique dysfunction if the client has difficulty extending the knee or if they recruit muscles other than the quadriceps to perform this action.



Figure 10-5 Vastus medialis coordination test. Test the functioning of the vastus medialis with resisted extension.

Palpation Assessment

Dysfunction in any joint from the sacroiliac to the metatarsals may cause or result from patellofemoral dysfunction. Because contributing factors may vary widely, it is essential to assess the tissues of each individual client from the ilium to the toes. It should not be surprising to find minor or even major differences in the way the tissues respond to this dysfunction.

Assess the knee for atypical temperature, color, and texture. You may find inflammation, adhesions, and tenderness around the patella. If the patella is tracking laterally, you may find the lateral retinaculum, iliotibial band, vastus lateralis, rectus femoris, and tensor fasciae latae tight and adhered; they may contain trigger points. The vastus medialis oblique may be hypotonic, and the semitendinosus, gracilis, and sartorius—muscles that blend into the pes anserinus tendon—may be dense and adhered with trigger points. Crepitus, fibrotic tissue, or a plica cord may be palpated at the medial knee. The hamstrings may feel tight and dense due to flexion contracture. Depending on the biomechanical factors involved, the adductors may be dense and adhered and the abductors taut or weak.

The gastrocnemius may also be tight due to flexion contracture at the knee. If eversion of the ankles is a factor, the peroneus longus and brevis and the extensor digitorum longus may be short and tight. These two factors may also play a role in developing plantar fasciitis, in which case the plantar flexors may be short and tight, and the tissues of the plantar surface of the foot may be thick, dense, and tender. If the client has a long history of knee pain or injury or has had surgery, you may find scar tissue and adhesions in the affected areas. Trigger points that refer pain into the anterior knee may be found in the sartorius, rectus femoris, vastus medialis, vastus lateralis, adductor brevis, and adductor longus. See Figure 6 for common trigger points with referrals into the anterior knee.



Figure 10-6 Common trigger points and referral. Common trigger points associated with patellofemoral syndrome and their referral patterns.

CONDITION SPECIFIC MASSAGE

Because the causes of knee pain vary widely, the exact cause can be difficult to pinpoint, and more than one of these conditions may coexist. Systemic conditions that involve cautions or contraindications for massage may be the underlying cause of knee pain. If you feel uncertain that symptoms are caused by improper tracking of the patella or any of the soft tissue dysfunctions listed above, refer the client for medical assessment by a health care provider prior to treatment with massage.

It is essential for the treatment to be relaxing. You are not likely to eliminate the symptoms associated with patellofemoral syndrome or any of the coexisting conditions in a single treatment. Do not attempt to do so by treating aggressively. Be sure to ask your client to let you know if the amount of pressure you are applying keeps them from fully relaxing. If the client responds by tensing muscles or has a facial expression that looks distressed, reduce your pressure. Remember that you are working on tissue that is compromised. Ask the client to let you know if any part of your treatment reproduces symptoms, and always work within their tolerance. Deep palpation of a trigger point may cause pain at the upper end of the client's tolerance. Explain this to your client, describe a pain scale with a level of pain that should not be exceeded, and ask them to breathe deeply during the application of the technique. As the trigger point is deactivated, the referral pain will also diminish. Common trigger points and their referral patterns are shown in Figure 6.

The following suggestions are for treating the more common presentation of patellofemoral syndrome, caused primarily by improper lateral tracking of the patella. If the client has an acute injury, the protocol is PRICE (protection, rest, ice, compression, and elevation). You may work conservatively proximal or distal to the site, but avoid the area of injury until the subacute or chronic stage.

Treatment Goals:



- Begin in the supine position with the knees bolstered.
- If you notice swelling, apply superficial draining strokes toward the nearest lymph nodes.
- If swelling is minor or absent, apply moist heat to the anterolateral thigh above the knee on the affected side. Do not use heat if swelling is significant.



- Use your initial warming strokes to increase superficial circulation, soften tissues, and to assess the tissues from the ASIS down to the feet. You should be able to minimally assess tissues of the thigh, leg, and foot, which may help you to determine where to focus the time remaining after treating the knee.
- Before applying emollient, assess for and treat myofascial restrictions in the thigh. You may find restrictions along the length of the iliotibial band, in the lateral quadriceps, and at the medial thigh and knee.
 - Treat the tissues of the thigh generally to reduce tension and to continue reducing adhesions.
- Once the superficial tissues are pliable enough to allow for deeper work, lengthen tissues that are short and tight, and reduce tension in tissues that are taut. These may include the rectus femoris, vastus lateralis, tensor fasciae latae, iliotibial band, gracilis, sartorius, semitendinosus, and the adductors.

Treat any trigger points that are found.



Assess the tissue surrounding the patella and knee joint for crepitus, adhesions, and fibrous tissues. Tissues affected may include the medial and lateral retinacula of the knee, the pes anserine tendon, the quadriceps tendon, the patellar tendon, and the iliotibial band. Use small, focused strokes to release these tissues. If the structures are short and tight, follow this by long strokes in the direction of each muscle's fibers to restore length and tone. Take your time with this step, and treat the area thoroughly within the client's tolerance.



If you found the adductors and medial hamstrings to be short and tight, stretch them by passively abducting the hip. Perform PIR, if necessary, to relax and lengthen these muscles if a passive stretch is insufficient.

If eversion is a contributing factor, assess and treat the peroneal muscles and extensor digitorum longus for adhesions, increased tone, and trigger points.



Use clearing strokes to the entire lower extremity to increase venous return.



Turn the client prone with a bolster under the ankles. Stretch the lateral quadriceps by bringing the heel toward the buttocks and gently pulling the leg toward you. Use PIR to encourage lengthening if you note resistance.



If time permits, assess and treat the gluteal muscles, hamstrings, and plantar flexors for adhesions, hypertonicity, and trigger points if found.



Use clearing strokes to the entire lower extremity to increase venous return.



CLIENT SELF-CARE

A client with patellofemoral pain may benefit from wearing a knee brace during activity, in particular if their activities include sports, repetitive actions, or weight-bearing motions of the knee such as squatting and lifting heavy objects. If the client wears a brace, recommend that they remove the brace during periods of inactivity to avoid reduced circulation to the area if the health care provider agrees. Clients with pes planus or eversion of the ankle may benefit from corrective arch support. Refer the client to a podiatrist for an assessment and fitting for corrective arch support.

The following are intended as general recommendations for stretching and strengthening muscles involved in the client's condition. The objective is to create distance between the attachment sites of muscles that have shortened and to perform repetitions of movements that decrease the distance between the attachments of muscles that have weakened. If you have had no training in remedial exercises and do not feel that you have a functional understanding of stretching and strengthening, refer the client to a professional with training in this area.

Clients often neglect self-care because their daily lives are busy. Encourage them to follow these guidelines:

- Instruct the client to perform self-care throughout the day, such as while taking a phone call, reading e-mail, washing the dishes, or watching television instead of setting aside extra time. When performing self-care while standing, ask the client to notice if they are shifting weight to one leg, if the knees are close together, and if the femur is medially rotated. If so, instruct the client to focus on distributing weight evenly to both legs and to keep the toes pointed forward within their comfort level.
- Encourage your client to take regular breaks from stationary postures or repetitive actions. If the client's daily activities include hours of sitting, suggest moving for at least a few minutes every hour. If the client's daily activities require repetitive actions affecting the knee, suggest resting for at least a few minutes every hour.
- Demonstrate gentle self-massage of the tissues surrounding the knee to keep adhesions and hypertonicity at bay between treatments.
- Demonstrate all strengthening exercises and stretches to your client and have them perform these in your presence before leaving to ensure that they are performing them properly and will not cause harm when practicing alone. Stretches should be held for 15–30 seconds and performed frequently throughout the day within the client's limits. The client should not force the stretch or bounce. Stretching should be slow, gentle, and steady, trying to keep every other joint as relaxed as possible.
- Stretching and strengthening exercises should be recommended according to your findings in ROM testing and palpation. Because patellofemoral syndrome may present differently with each client, self-care should be tailored to specific needs.



Figure 10-7 Stretch the lateral structures of the leg.



Figure 10-8 Stretch the hamstrings and plantar flexors while strengthening the quadriceps.

Stretching

To stretch the lateral structures that may contribute to drawing the patella laterally, instruct the client to stand at an arm's length from a wall with the affected side toward the wall. Rest one hand on the wall for support, and with the feet together, laterally flex the trunk away from the wall and hold for 15–30 seconds (Fig. 7). Do not perform this stretch if it increases pressure on the medial knee. If you found the gluteus medius weak or stretched, instruct the client to adjust their posture in this stretch until it is felt primarily in the lateral leg instead of in the gluteal muscles.

To stretch the hamstrings and plantar flexors while seated, instruct the client to sit comfortably with the back supported, and then extend the knees and dorsiflex the ankles and hold for 15–30 seconds or as long as is comfortable (Fig. 8). This action also helps to strengthen the quadriceps. Repeat this action a few times, and then get up and walk around to mobilize the knee.

If eversion contributes, instruct the client to simultaneously stretch the evertors and strengthen the invertors by actively inverting the ankle fully and holding for as long as is comfortable. Repeat this action a few times, and then get up and walk around to mobilize the ankle.

Strengthening

While it is difficult to isolate the vastus medialis oblique from the other quadriceps, it is important to restore its strength and tone so that it can antagonize lateral tracking of the patella. The seated hamstring stretch described above also strengthens the quadriceps. Repeating the steps of the vastus medialis coordination test (Fig 5) with a rolled towel or other bolster under the thigh just above the knee will also strengthen the vastus medialis.

SUGGESTIONS FOR FURTHER TREATMENT

Ideally, a client with patellofemoral syndrome will have treatments twice a week until the client can perform activities of daily living with minimal or no pain for at least 4 days. Once this is achieved, reduce frequency to once per week until symptoms are absent for at least 7 days. When the client reports that they have been pain-free for more than 7 days, treatment can be reduced to twice per month. If the client is painfree for 3 or more consecutive weeks, they can then schedule once per month or as necessary. If the client's symptoms are localized and other postural deviations are minimal, half-hour treatments may be sufficient to effect a change in patellofemoral function. In the treatment of patellofemoral syndrome that is muscular in nature, there should be some improvement with each session. If this is not happening, consider the following possibilities:

- There is too much time between treatments. It is always best to give the newly treated tissues 24–48 hours to adapt, but if too much time passes between treatments in the beginning, the client's activities of daily living may reverse any progress.
- The client is not adjusting activities of daily living or is not keeping up with self-care. As much as we want to fix the problem, we cannot force a client to make the adjustments we suggest. Explain the importance of the client's participation in the healing process, and encourage the client to follow your recommendations, but be careful not to judge or reprimand a client who does not.
- The condition is advanced or involves other musculoskeletal complications that are beyond your basic training. Refer this client to a massage therapist with advanced clinical massage training. Continuing to treat a client whose case is beyond your training could turn the client away from massage therapy altogether and hinder healing.
- The client has an undiagnosed, underlying condition. Discontinue treatment until the client sees a health care provider for a medical assessment.

If you are not treating the client in a clinical setting or private practice, you may not be able to take this client through the full program of healing. Still, if you can bring some relief in just one treatment, it may encourage the client to discuss this change with their health care provider and seek manual therapy rather than more aggressive treatment options. If the client agrees to return for regular treatments, their symptoms are likely to change each time, so it is important to perform an assessment before each session. Once you have released superficial tissues in general areas, you may be able to focus more of your treatment on deeper tissues in a specific area. Likewise, once you have treated the structures specific to patellofemoral syndrome, you may be able to pay closer attention to compensating structures and coexisting conditions.

Professional Growth

Case Study

Ronja is a 64-year-old, married female. She is a retired accountant. Ronja and her husband moved from suburban Chicago to San Francisco following their retirement last year. Over the past 2 months she has had knee pain, which is becoming worse. Currently, the pain makes it difficult for her to walk the hills of San Francisco to run her errands.

SUBJECTIVE

Ronja complained of knee pain that began approximately 2 months ago and has been increasing gradually. She feels aches, sometimes throughout the day, in both knees and feels pain around her right kneecap and on the inside of her knee when she walks. The pain keeps her from performing some activities on some days. She moved from a suburban setting where she worked sitting at a desk all day and had to drive everywhere, because everything was far from her home. She and her husband made a complete lifestyle change that included moving to a more natural environment where locally grown foods are readily available, and they could walk or ride a bike instead of driving. It was difficult at first for her to adjust to the increased activity, but she did not have any pain until recently. Her physician diagnosed chondromalacia and said that she would eventually need knee replacement surgery. He said that while nothing showed up on an MRI, it is probably in the early stages and will show up later. He gave her a prescription for physical therapy. She was referred by a friend who was treated at this clinic and experienced a full recovery from similar symptoms.

OBJECTIVE

Ronja appears very healthy and vibrant and looks many years younger than her age. She climbed the stairs very slowly, mainly relying on the left leg to lift her weight. She also stood up from a seated position very cautiously but without leaning on the table or chair for support.

Postural assessment revealed increased lordotic curve with anterior pelvic tilt, slight lateral rotation of the hips bilaterally, flexion of the knees bilaterally, and ankle eversion bilaterally. The four lateral toes of the right foot are hyperextended. The Q angle appears within normal range. Medial patellar glide is reduced. ROM testing resulted in reduced active extension of the knees bilaterally, which is possibly a protective measure. The client felt pain in the medial knee with resisted extension of the knee and resisted adduction of the hip. During passive extension of the right knee, Ronja tensed up at the end range. Crepitus was noted during extension and flexion of the right knee. There was weak abduction of the right hip and minimal active inversion of the ankles. There was only slightly greater range with passive inversion.

Palpation revealed tension in rectus femoris which is adhered to a hypertonic vastus lateralis and a dense, fibrous iliotibial band on the right. Fascial restrictions along the lateral right thigh from ASIS to tibiofibular joint. The medial aspect of the patellofemoral joint was tender to the touch with considerable crepitus and possible plica cord. The vastus medialis feels fibrous and hypotonic. The semitendinosus, sartorius, and gracilis, along with the pes anserine tendons, are taut and tender with adhesions at the distal fibers. The hamstrings feel dense and adhered only at the distal, medial fibers. The peroneals and extensor digitorum longus are short, tight, and adhered. The ankle invertors are taut and weak.

Signs and symptoms suggest patellofemoral syndrome with mild hyperlordosis.

ACTION

Treatment today focused on reducing knee pain. If the client agrees, future treatment will include restoring proper knee function, pelvic tilt, orientation of the femur and the tibia, and ankle function.

On the right thigh, I performed myofascial release from the ASIS to the tibiofibular joint. I used cross-fiber friction on the iliotibial band. I then used petrissage followed by muscle stripping to the rectus femoris, vastus intermedius and vastus lateralis, and IT band. A trigger point was found at the superior fibers of the rectus femoris that referred into the anterior knee. Two rounds of compressions reduced referral pain from level 7 to 2. I applied cross-fiber strokes to the medial knee to release metabolites and reduce crepitus followed by clearing strokes toward the inguinal lymph nodes. I applied general kneading to the medial thigh. I used cross-fiber strokes from the pes anserine along the path of the sartorius and again along the path of the gracilis and the medial hamstrings to separate the fibers of the muscles of the medial thigh, followed by long gliding strokes. I used muscle stripping to lengthen the sartorius and medial hamstrings and performed a stretch to the medial hamstrings. I applied myofascial release, superficial cross-fiber strokes, and muscle stripping to reduce adhesions and lengthen ankle evertors.

I used similar, although less aggressive, treatment to the left thigh and leg. *I* also applied general deep tissue techniques to the low back, gluteals, calves, and feet.

Following treatment, the client stated feeling looser and less protective with steps. Ronja descended the stairs with less caution, although she did use the handrail.

PLAN

I demonstrated a hamstring stretch with knee extension and hip flexor stretches with lunges. I recommended speaking with a podiatrist about shoes with good arch support or being fitted for orthotics to reduce eversion. I demonstrated strengthening for ankle invertors and vastus medialis and emphasized the importance of limiting exercises to a pain-free range. I suggested slowly reintroducing activities that had previously resulted in pain.

I explained that reducing symptoms at the knee alone is manageable with half-hour sessions but that biomechanical factors at the hip and ankle likely contribute to her pain and a more complete recovery would best be managed with 1-hour sessions. Ronja has agreed to 1-hour treatments twice a week until symptoms are absent for at least 4 consecutive days with reassessment at that time.

CRITICAL THINKING EXERCISES

- 1. In general, the most common presentation of patellofemoral syndrome emerges when the lateral structures that move and stabilize the knee in extension are stronger than the medial structures. Create a SOAP chart with a history, assessment, and treatment plan that describes a case of patellofemoral syndrome due to excessive medial tracking of the patella. This client likely presents with pain and tenderness at the lateral knee, weakening of structures that affect lateral tracking, and tension in structures that affect medial tracking. Treatment goals should include lengthening shortened tissues, strengthening weak muscles, and restoring proper neuromuscular function.
- **2.** 2. Develop a 10-minute stretching and strengthening routine for a client, covering all of the muscles involved in patellofemoral syndrome. Use Box 10-1 and Figure 10-4 as a guide. Remember that a stretch increases the distance between the origin and insertion of a muscle and is important for those muscles that are shortened while strengthening is performed by actively bringing the origin and insertion closer together and is important for the antagonists of shortened muscles. Describe each step of

Condition Specific Massage Therapy

the routine in enough detail that the client can refer to these descriptions in your absence and perform them without harm.

- **3.** 3. A client calls to schedule a massage for knee pain. He states that he hears crunching and clicking in his knee when he stands up and sometimes when he walks. He explains that he has sprained the ankle of the affected leg twice and the ankle of the opposite leg once. He has also had an episode of myositis ossificans to the tibialis anterior after being kicked during a soccer game. Discuss the possible relationship between the injuries and patellofemoral syndrome. What questions would you ask this client? Are there questions that you need to ask his health care provider? What special considerations would you need to include in your treatment plan both for contributing factors and for contraindications?
- **4**. Conduct a short literature review to explain the relationship between symptoms suggesting patellofemoral syndrome and the following:
 - Pes cavus
 - Arthritis
 - Insufficient anterior prominence of the lateral femoral condyle
 - Depth of the patellar groove
 - Patellar taping

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