Understanding Tendinopathies Home Study Course

1 CE Hour

Text, Examination, and Course Guide

Presented by the:

Center for Massage Therapy Continuing Education

PO Box 117 • Elk Point, SD 57025

866-784-5940 • www.massagetherapyceu.com

Instructions for the Understanding Tendinopathies home study course

Thank you for investing in the Understanding Tendinopathies 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 tendinopathies. 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 *Tendinopathies, 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 info@massagetherapyceu.com. 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 Understanding Tendinopathies home study course.

© 2024, Center for Massage Therapy Continuing Education, LLC and Celia Bucci

The author grants permission to photocopy this outline for personal use only. Beyond this consent, no portion of this outline may be copied or reproduced in any form without written permission from the Center for Massage Therapy Continuing Education, LLC and Celia Bucci.

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 tendinopathies.

© 2024 Center for Massage Therapy Continuing Education, LLC and Celia Bucci. All rights reserved.

Understanding Tendinopathies Exam

1. The term “tendinopathy” refers generally to:
    A. Pathology that affects a tendon
    B. Pathology that affects a muscle
    C. Pathology that affects a ligament
    D. Pathology that affects the muscular system

2. Which of the following is the treatment goal for tendinitis?
    A. To reduce inflammation, reduce adhesions and scar tissue, and realign fibers
    B. To reduce the adhesions between the tendon and synovial sheath, smooth the roughened surface of the tendon within the sheath, and encourage the restoration of synovial fluid
    C. To reduce adhesions, encourage collagen regeneration, and realign the collagen fibers
    D. To increase inflammation, increase adhesions and scar tissue, and realign fibers

3. All of the following are possible causes and contributing factors to tendinopathies EXCEPT:
    A. Repetitive activity
    B. Improper warming up prior to activity
    C. Postural or muscle imbalances
    D. Healthy eating

4. For which of the following is massage contraindicated?
    A. An acute flare-up of osteoarthritis
    B. Carpal tunnel syndrome
    C. Plantar Fasciitis
    D. Myofascial pain syndrome

5. Why is it important to ask the client "When did the symptoms begin"?
    A. It may help you to determine contributing factors
    B. It may help you to determine the stage of the injury and the health of the tissue
    C. It may help you to differentiate tendinopathy from other soft tissue injuries
    D. It may help you to determine if the client can tolerate deeper pressure

6. The location of pain during a full passive stretch of the affected joint may help to determine:
    A. If the condition is chronic or acute
    B. If massage is contraindicated
    C. If the injury is in the muscle belly or the tendon
    D. The strength of the affected joint

7. In your initial warming techniques when treating a client with a tendinopathy, you should be able to assess tissues for:
    A. Adhesions, hypertonicity, fractures, and fever
    B. Adhesions, subluxations, protective muscle spasm, and fractures
    C. Adhesions, hypertonicity, protective muscle spasm, and tensile stress
    D. Edema, hypertonicity, subluxations, and tensile stress

© 2024 Center for Massage Therapy Continuing Education, LLC and Celia Bucci. All rights reserved.

8. When using lengthening strokes in treating tendinopathies, it is advised to not stretch the muscles until you have treated the injured tendon to:
    A. Promote reflexive contractions
    B. Avoid reflexive contractions
    C. Avoid reflexive flexions
    D. Avoid further injury

9. Ideally, a client with a tendinopathy will have treatments _____ until the client can perform activities of daily living with minimal or no pain for at least 4 days.
    A. Two or three times a day
    B. Once a week
    C. Two to three times a month
    D. Two or three times a week

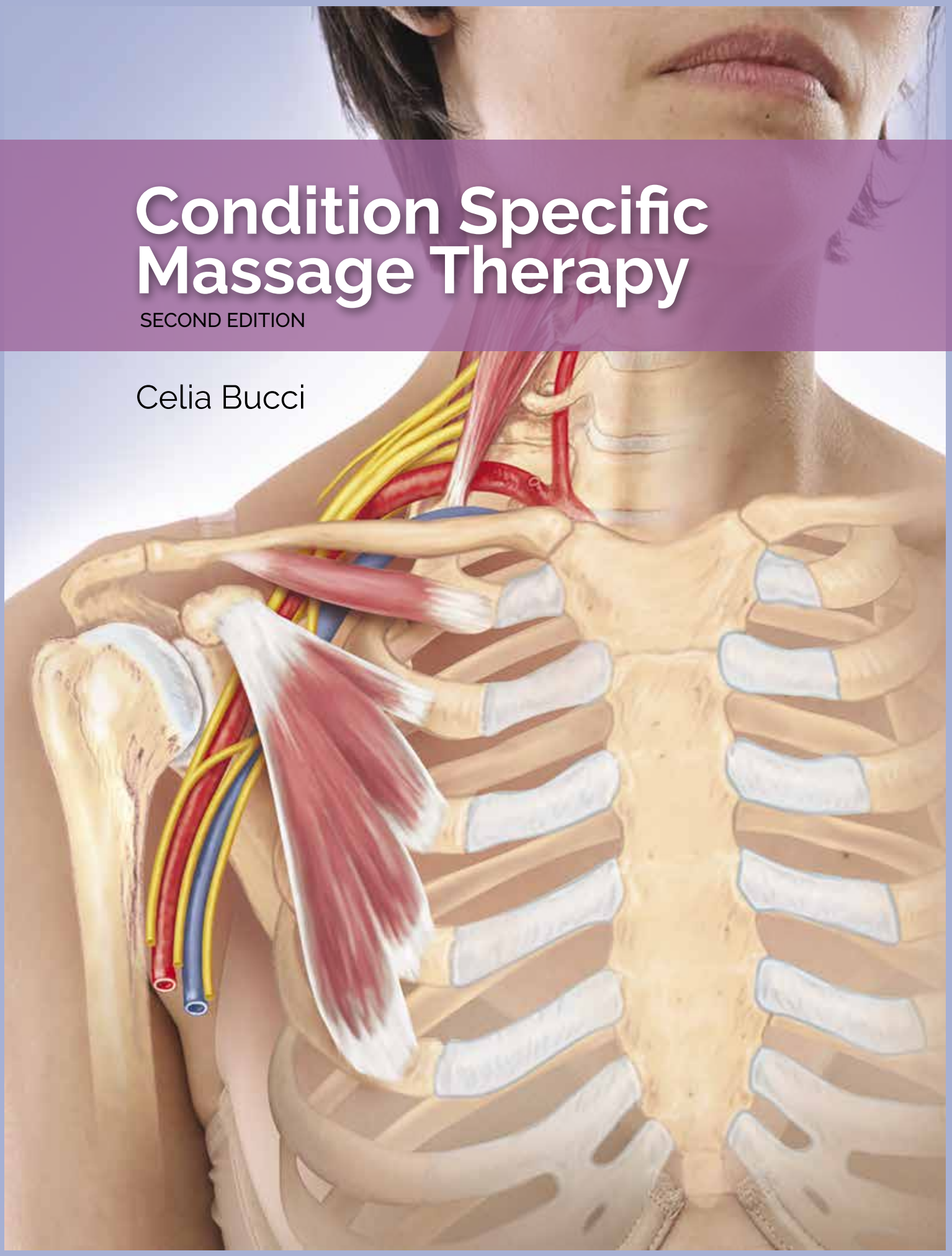
This completes the Understanding Tendinopathies exam. Proceed to the next page to view the text.

© 2024 Center for Massage Therapy Continuing Education, LLC and Celia Bucci. All rights reserved.

Condition Specific Massage Therapy

SECOND EDITION

Celia Bucci



Chapter 14:

Tendinopathies

Tendinopathies

Understanding Tendinopathies

In the past, research into musculoskeletal pain and injury often considered the muscle and tendon as one mechanism. In recent years, the tendon itself has been studied in more clinical detail, revealing remarkable details about its composition, function, and role in injury. Because of this, many previously held beliefs about tendon injuries have been revised, and new research continues to reevaluate our understanding of tendons. Knowledge of the mechanisms of tendon failure and the pain originating from injured tendons continues to become more specific and refined. The term "tendinopathy" refers generally to pathology that affects a tendon. This chapter covers three common tendinopathies: tendinosis, tendinitis, and tenosynovitis. These tendinopathies have several similar qualities. The treatments for each are also similar. They vary in underlying causes, however, so while the treatment for each may be similar, the treatment goal for each differs. In all three cases, an untreated tendinopathy increases the risk for rupture of the tendon. Understanding the form and function of tendons helps one differentiate these conditions and their treatment.

Muscle fibers contract to produce the force that moves a joint. That force is transmitted to the bones by tendons. Tendons are tough structures made largely of collagen and protein that are less flexible and less elastic than muscles but have tensile strength comparable to that of bones. The structure and composition of the body's many tendons differ slightly according to their particular function. These differences also play a role in

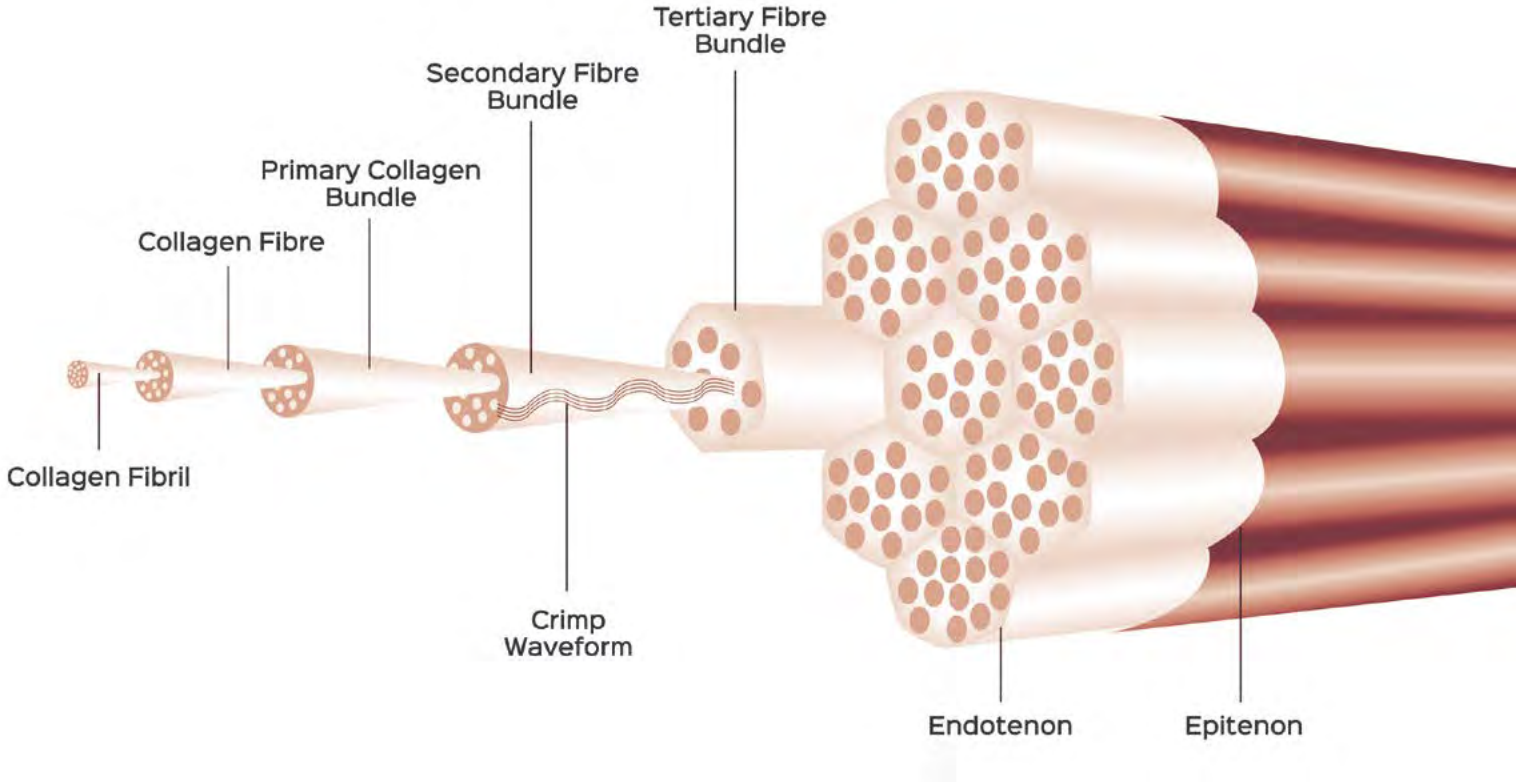


Figure 14-1 Tendon structure.
Image Credit: Gritsalak Karalak/Shutterstock

the risk of injury and the process of repair. Tendons under high functional demand, such as the superior tendon of the long head of the biceps brachii, have a higher level of collagen remodeling than those that are under lower demand, such as the inferior tendon of the biceps brachii.

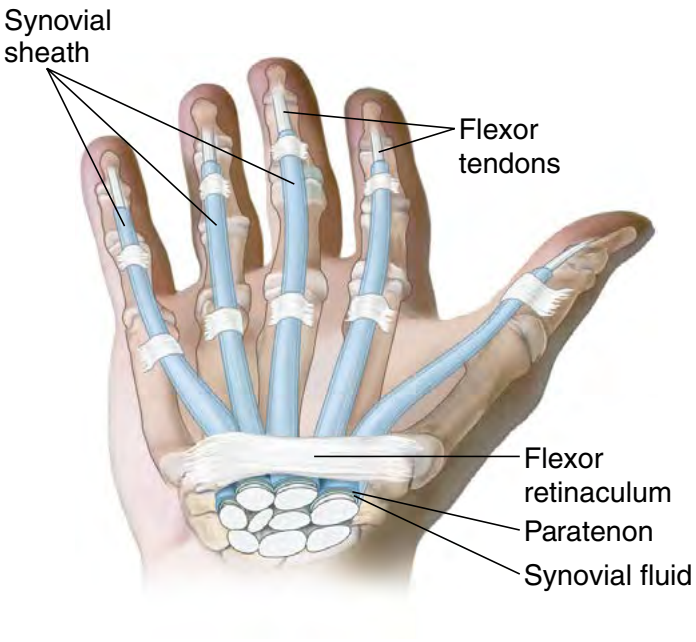


Figure 14-2 Tenosynovium.

In general, collagen fibers in tendons are densely packed and arranged longitudinally, parallel to each other and parallel to the forces commonly applied to them. This arrangement reinforces their resistance to tensile stress. These collagen fibers are bundled into fascicles. (Fig 1.) Each fascicle is wrapped in connective tissue called the endotenon, which also wraps around groups of fascicles forming the tendon. Vessels and nerves that supply the tendon are found mainly in the endotenon. Endotenons are wrapped in a layer of continuous, loose connective tissue called the peritenon. Tendons that work together, such as the wrist flexors, may be wrapped in an additional layer called the epitenon. Tendons that bend around joints or pass beneath a retinaculum are subject to greater amounts of friction. These tendons are each encased in a sleeve-like synovial sheath called the tenosynovium (Fig. 2). These sheaths contain synovial fluid that lubricates the tendons, allowing them to glide freely and protecting the tendon itself from friction. Between the tendon and its synovial sheath is a fatty connective tissue matrix called the paratenon.

In a relaxed tendon, the parallel collagen fibers are slightly crimped. This structure, like a spring, provides shock absorption during activity. When a muscle contracts, its tendon lengthens before shortening. As tensile stress is applied, these crimps flatten, allowing the tendon to lengthen slightly while making it stiffer and resistant to further lengthening. This protects both the tendon and its muscle from overstretching and strain. The breaking point (when fibers tear under tensile stress) is reached when tension increases the length of a tendon by approximately 8%. Golgi tendon organs—proprioceptors found at the musculotendinous junction—detect muscle tension during a contraction. When healthy muscles contract in a controlled manner, a reflex response initiated by the Golgi tendon organs relaxes the muscle when the amount of tension approaches the point of failure. When the muscle, tendon, or proprioceptors that detect tension are not healthy, or when a contraction occurs too quickly or forcefully for the reflex response to protect the musculotendinous unit, overloading can occur. Because the tendon is so much stronger than muscle, when tearing does occur, it usually occurs in the muscle belly or the musculotendinous junction or the tendon detaches from the bone. Although rare, tearing of the tendon fibers does occur. These tears, the underlying cause of tendinitis, are also called strains.

Like a spring, as the tendon lengthens and stiffens, it also stores energy. At the end of a ROM, the tendon recoils, releasing energy and generating a greater force for movement, which reduces the energy expenditure required by the muscle. Similar to a rubber band, the size and shape of a tendon influences the amount of stretch and the amount of energy released in recoil. A long, thin tendon stretches further, requires less force from its muscle to stiffen, and accumulates more energy for release on recoil to produce broad movement. This is ideal for muscles that primarily propel the body and that fatigue quickly as well as those that control fine motor skills. A short, flat tendon stretches less, requires more force by the muscle to stiffen, and accumulates less energy to be released on recoil, producing strong but more subtle movement. This is ideal for muscles that maintain posture and that fatigue slowly and for tendons that assist in stabilizing joints.

Painful conditions involving a tendon are often referred to as tendinitis. Tendinitis is the inflammation of a tendon, usually resulting from acute injury or chronic overuse that results in small tears in tendon fibers

and interrupts the already limited blood supply (Fig. 3 A). The treatment goal for tendinitis is to reduce inflammation, reduce adhesions and scar tissue, and realign fibers. Rest is often recommended in the early stage to allow the fibers to begin healing naturally. Treatment involves transverse strokes to reduce adhesions and scar tissue and to increase circulation that supplies nutrients as well as longitudinal strokes and stretching to realign the torn fibers and encourage collagen repair. However, current studies assessing cellular changes to injured tendons have shown that inflammation—the response to tearing and repair—is not as frequently involved in tendon injuries as previously believed and that tendinitis is actually quite rare. The suffix "–itis," which denotes inflammation, has been incorrectly applied for common tendon injuries. Instead, new research has demonstrated that tendon injuries are more often the result of chronic collagen degeneration, disorganized fiber arrangement, and increased vascularization. Inflammation seems mainly to be an issue when fibers have torn.

The suffix "–osis" denotes degeneration, and the term "tendinosis" has since become more widely used in describing chronic tendon injuries (Fig. 3 B). The treatment goals for tendinosis are to reduce adhesions, encourage collagen regeneration, and realign the collagen fibers. Mechanical loading, characteristic of friction, firm pressure, and stretching or eccentric exercise encourages collagen remodeling. Tendinitis and tendinosis can affect any tendon, but most commonly affected are the tendons of the rotator cuff, the long head of the biceps brachii, the common flexor and extensor tendons at the elbow, the patellar tendon, the tendons of popliteus and tibialis posterior, and the Achilles tendon.

Tenosynovitis, an inflammation of the tenosynovium, can occur in any tendon wrapped in a synovial sheath (Fig. 3 C). Inflammation of the synovium is often the result of injury or overuse that causes a roughening of the otherwise smooth tendon, hindering efficient movement through the sheath, creating friction and inflammation and impeding the restoration of synovial fluid. Tenosynovitis can also result from infection in the synovium, usually as a result of an injection, bite, or other injury that pierces the tendon or from complications of gonorrhea. These cases are often accompanied by rash and fever, and the client should be referred to their health care provider for medical treatment. Gout may also contribute to tenosynovitis, particularly in the lower extremities. If the client is at risk for gout, refer them to a health care provider for uric acid testing. In this case, massage is contraindicated in the acute stage. Refer to a pathology book for detailed suggestions for treating a client

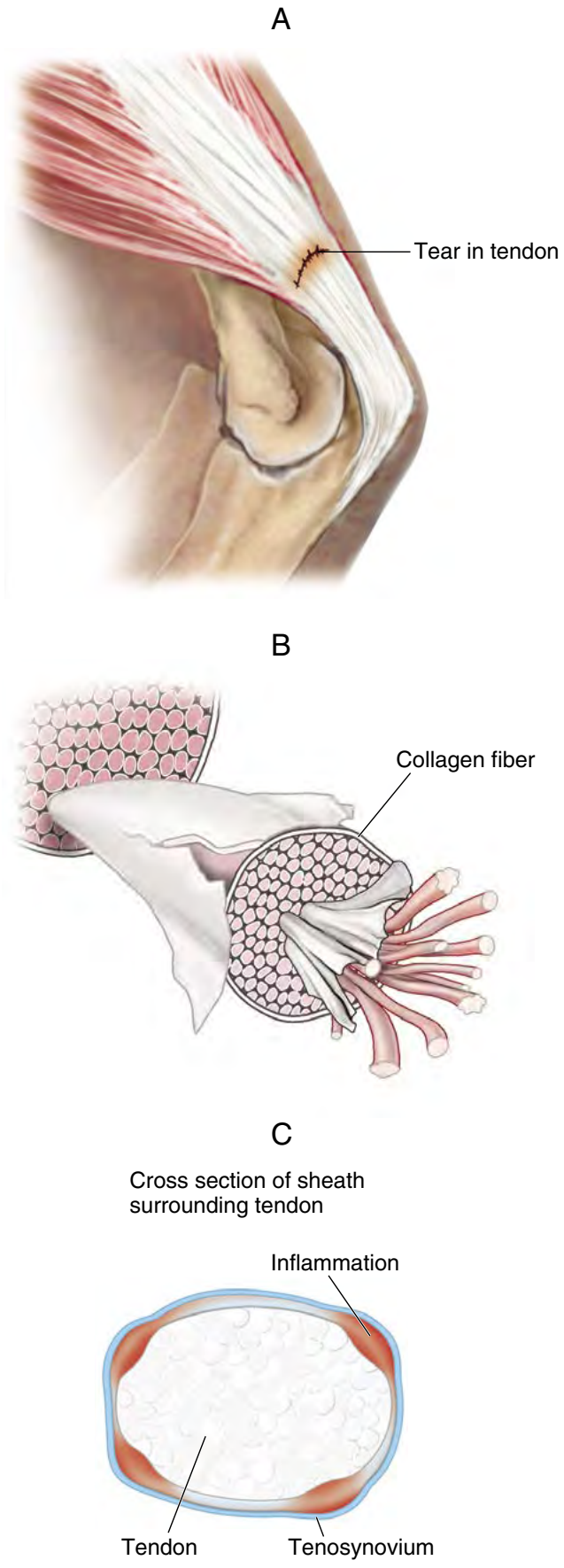


Figure 14-3 A) Tendinitis is inflammation of the tendon. (B) Tendinosis is degeneration of collagen fibers. (C) Tenosynovitis is inflammation of the tenosynovium.

with gout. The treatment goal for tenosynovitis that is not infectious in origin is to reduce the adhesions between the tendon and synovial sheath, smooth the roughened surface of the tendon within the sheath, and encourage the restoration of synovial fluid. Again, transverse friction and lengthening the tendon are preferred techniques for these goals. Common areas of tenosynovitis include the abductor and extensor pollicis tendons (called DeQuervain's tenosynovitis), finger flexors (called trigger finger), and the tendons of the ankle dorsiflexors.

COMMON SIGNS AND SYMPTOMS

The signs and symptoms of tendinopathies often develop gradually as a result of overuse, improper biomechanics, or the degenerative process that results from illness or aging. Acute injuries including grade 2 or 3 strains to a musculotendinous unit do occur and are sometimes the first sign that a tendinopathy was developing. Tendinopathy, the general condition of tendon injury, is marked by pain or tenderness local to the tendon, decreased strength of the musculotendinous unit, and crepitus, stiffness, and reduced ROM in the joint it crosses. These symptoms often increase with use, particularly during repetitive and resisted activities, and especially when the tendon is stretched or recoils. Symptoms may wake one from sleep, and pain and stiffness are often worse in the morning or after immobility. Gentle movement often improves symptoms that result from immobility, although intense activity may aggravate the condition. A full passive stretch of the affected tendon may elicit pain at the tendon. Local pain at the site of a tendon helps to differentiate tendinopathy from injury to a muscle belly. The muscle of the affected tendon may be hypertonic, hypotonic, or adhered and may contain trigger points. The synergists and antagonists of the affected muscles may develop compensating patterns including hypertonicity, adhesions, and trigger points. When the client compensates by avoiding lengthening the tendon, the joint may begin to lock into the shortened position.

It may be difficult to differentiate tendinitis, tendinosis, and tenosynovitis without medical testing. However, a few distinguishing characteristics may give you some clues. Tendinitis is an inflammatory condition and is often accompanied by swelling, redness, and heat at the site of the tendon. Because tendinitis involves torn fibers, eliminating the aggravating activity and allowing the tendon to rest and form scar tissue supports the healing process. Additionally, inflammation characteristic of tendinitis is interrupted by anti-inflammatories and corticosteroids, minimizing pain and other symptoms while supporting the healing process. If your client has rested, iced the injury, and used anti-inflammatory medication for a few weeks with only short-term relief that returns when the medication is not used, this may indicate that inflammation is not a primary contributing factor and that the condition is not tendinitis. With rest, improvement often begins shortly after the acute stage. With treatment, tendinitis usually resolves completely in a few weeks. Without proper treatment, the tendon may continue to degenerate, putting the client at greater risk for rupture or tendinosis.

Tendinosis is not an inflammatory condition. Therefore, while anti-inflammatories may temporarily reduce pain, they are not likely to improve symptoms over the long term. In fact, studies have shown that anti-inflammatories may inhibit collagen regeneration, and thus, healing. Corticosteroids have also been shown to reduce collagen regeneration, and while they may offer temporary relief of pain, they can ultimately hinder healing and increase the risk of further injury. Ice, which is often used to reduce inflammation, also initiates vasoconstriction. Since increased vascularity is a sign of tendinosis, ice may reduce symptoms and encourage healing. Because tendinosis is the result a degenerative process, and regeneration of collagen occurs more slowly than repair of torn tissues, improvement may take several weeks to months. The presence of heat and swelling, the duration of symptoms, and the effect of medication may help you differentiate between tendinitis and tendinosis.

Signs and symptoms of tenosynovitis include pain, swelling, and heat at the joint crossed by the tendon, reduced mobility of the affected joint, and pain with movement of the joint. Crepitus may also be present. When infection is the underlying cause of tenosynovitis, fever and redness may also be present. If you suspect infection, refer the client to a health care provider for medical assessment. Palpable nodules may also be found in the affected tendon. Nodules may be recognized before the client experiences other symptoms. ROM is

limited, particularly when attempting to lengthen the tendon, sometimes requiring passive force to release the tendon from adhesion to its sheath. While movement may be painful, immobility reduces the production of synovial fluid and may lead to adhesions and locking of the joint in the shortened position. Movement is essential to prevent adhesions and immobility.

POSSIBLE CAUSES AND CONTRIBUTING FACTORS

Repetitive activity is a common contributing factor in tendinopathies. Tailors and seamstresses, computer and cash register operators, and musicians are at risk for tendinopathies, particularly in the upper extremities. Poor biomechanics and postural or muscle imbalances may cause overloading of a tendon during sport or recreational activities, work, or general activities of daily living and may contribute to a tendinopathy. Improper warming prior to activity, improper technique during activity, and unsuitable accessories such as shoes can also contribute to overloading a tendon. Athletes and assembly line employees are particularly affected by tendinopathies due to overloading. Golfers and tennis players are at risk for tendinopathies in the elbows, while runners are more likely to develop tendinopathies in the knees or ankles. Assembly line work that involves lifting puts the employee at greater risk of tendinopathies in the shoulder.

Once a tendinopathy arises, failing to allow sufficient time for healing in the early stages can slow or halt the natural healing process. With tendinitis, if small tears in the tendon do not form scars that are strong enough to resist further tearing, the inflammatory process will continue, compromising the structure's integrity, and the risk of further injury increases. Similarly, continuing activity that encourages the inflammatory process characteristic of tenosynovitis may weaken the structure and cause compensating patterns to become habitual. With tendinosis, continuing aggravating activities once degeneration has begun may inhibit the regeneration of collagen and continue to weaken the tendon.

However, recent studies have begun to reveal that inactivity or underuse may also play a role in chronic tendinopathy. Movement encourages collagen regeneration and the production of synovial fluid. Immobility discourages collagen regeneration, encourages adhesions, and can lead to atrophy. While some rest or at least limiting the aggravating activity is necessary to allow healing to begin, movement is an important element of the natural healing process.

Being overweight increases demand on the musculoskeletal system during all activities and may contribute to tendinopathies. Diabetes—often associated with obesity—as well as drugs used to control diabetes may cause metabolic changes that increase fibrosis and may alter the structure of tendons. Statins—the drugs used to reduce cholesterol—and some antibiotics include risk factors for both muscle and tendon pathologies. Rheumatoid arthritis—a systemic inflammatory pathology—increases the risk of tendinitis and tenosynovitis and may exacerbate symptoms. Gout—an accumulation of uric acid in the joints—may also contribute to inflammatory tendinopathies. Most commonly, the process of aging, which reduces elasticity and increases intolerance to tensile stress in both muscles and tendons, is a contributing factor. Infectious tenosynovitis can be caused by injuries that expose the tendon to bacteria, improper injection technique, IV drug use, and injuries that require medical attention. Individuals with a compromised immune system may be at greater risk for infectious tenosynovitis.

Because tendinopathies can occur anywhere in the body, they can be confused with many other conditions throughout the body. For example, pain in the toe may be a tendinopathy, but it can also be the result of gout. Wrist pain may be the result of tendinopathy, carpal tunnel syndrome, or both. Table 1 lists some general conditions commonly confused with or contributing to tendinopathies. Because tendinopathies may be difficult to distinguish, it is particularly important to understand the client's health history, precipitating events, and other possible causes of pain in the area before treatment. Consult your pathology book for more detailed information. If you are unsure and the client's symptoms resemble those of a more serious condition, particularly if the client has other risk factors, refer them to a health care provider for medical assessment.

Table 14-1: Differentiating Conditions Commonly Confused with or Contributing to Tendinopathies

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
Calcific tendinitis (inflammation of tendon due to calcium deposits)	Can affect any tendon, most common in the shoulder Pain, inflammation, stiffness, weakness, crepitus Aggravated by activity Symptoms worsen during periods of calcium shedding and reabsorption	X-ray	Massage is indicated within the client's pain tolerance. Client should be made aware that shedding of calcium deposits may temporarily intensify symptoms. ROM techniques may prevent frozen shoulder.
Osteoarthritis	Tenderness with pressure on joint Stiffness, particularly after rest or inactivity Inflexibility Swelling Grating sensation or sound	Physical exam X-rays Blood tests Synovial fluid tests Arthroscopy	Massage is contraindicated during an acute flare-up, indicated otherwise.
Rheumatoid arthritis	Periods of flare-ups and remission Pain, swelling Aching and stiffness, particularly after rest or inactivity Reduced ROM Distortion of joint Rheumatic nodules Occasional low-grade fever and malaise	Physical exam Blood tests Synovial fluid tests Radiography	Massage is indicated in nonacute stages. Work with the health care team.
Reiter's syndrome (reactive arthritis)	Often preceded by infection, low-grade fever, or conjunctivitis Tendon pain Joint pain Skin lesions in palms or soles Redness, burning, or discharge from eyes Urinary urgency or burning	Physical exam Joint x-ray Urinalysis HLA-B27 antigen	Massage is contraindicated until infection is resolved, and during active flare-ups of arthritis. Work with the health care provider to tailor the treatment plan to meet the individual's needs. Avoid skin lesions
Carpal tunnel syndrome	Pain, numbness, and tingling in thumb, index, and middle fingers, and lateral half of ring finger Gradual atrophy and reduced fine motor skills	Phalen's test Tinel's sign EMG Nerve conduction test	Massage is indicated.
Plantar fasciitis	Often develops gradually but can be acute Sharp, burning, or aching pain in arch of foot Swelling in arch Symptoms worse at push-off phase of gait, particularly after periods of inactivity Possible tearing of fibers and bone spur in calcaneus	X-ray, MRI to rule out other causes of pain Dorsiflexion-eversion test Windlass test	Massage is indicated.

Table 14-1: **Differentiating Conditions Commonly Confused with or Contributing to Tendinopathies (continued)**

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
Sprain	Usually acute Inflammation, heat, redness, and pain in acute stage Remaining inflammation, weakness, reduced ROM in chronic stage	Often self-assessed Physical exam MRI	Massage is indicated.
Spasm/cramp (contracture)	Sudden, often sharp pain in the affected voluntary muscle Palpable and often visible mass of hypertonic muscle tissue	Often self-assessed X-ray or MRI may be used to assess extent of damage	Massage is indicated. Discuss with health care provider if repeated spasm is related to an underlying condition or side effects from medication.
Myofascial pain syndrome	Persistent muscle aches or pain Muscle or joint stiffness Muscle tension Trigger points Pain interrupts sleep	Physical exam Palpate for trigger points Referred pain or twitch response Other tests may be performed to rule out other sources of pain	Massage is indicated. Myofascial pain syndrome is associated with trigger points.
Bursitis	Pain, particularly with activity or palpation Heat, redness, swelling, or tenderness	Physical exam ROM tests X-ray or MRI if conservative treatment is not successful	Massage is systemically contraindicated if bursitis is due to infection, and locally contraindicated in the acute stage to avoid increased swelling. In the subacute stage, massage to the structures surrounding the joint is indicated.
Diabetes	Frequent urination, frequent thirst, increased appetite, fatigue, nausea	Physical exam Fasting blood sugar test	Indicated when tissues and circulation are not compromised.
Gout	Redness, heat, and swelling Sudden, intense pain, often at night, which 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.

CONTRAINDICATIONS AND SPECIAL CONSIDERATIONS

First, it is essential to understand the cause of pain. If the client cannot move the joint, heard a popping sound, or has significant weakness or if you suspect the client has a fractured bone or significant tearing to the tissues, work with the client's health care provider and consult a pathology text for massage therapists before proceeding. These are a few general cautions:

- **Infection.** When tenosynovitis is infectious, massage is contraindicated until the infection has resolved and the client receives clearance from their health care provider.
- **Reproducing symptoms.** Symptoms may occur during treatment. If treatment reproduces symptoms beyond the client's pain tolerance, adjust the client to a more neutral posture. Shortening or adding slack to the tendon may help. 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 and return to it after treating superficial and peripheral tissues, 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.
- **Friction.** Do not use deep frictions if the health of the underlying tissues is at risk for rupture. Allow time for scarring and tissue regeneration to avoid re-injury. Do not use friction if the client is taking anti-inflammatory medication or anticoagulants. Friction initiates an inflammatory process, which may interfere with the intended action of anti-inflammatory medication. Recommend that the client refrain from taking such medication for several hours prior to treatment if the health care provider agrees. Because anticoagulants reduce clotting, avoid techniques that may cause tearing and bleeding.

MASSAGE THERAPY RESEARCH

Tendinopathy is being studied intensely. New research continues to revise our understanding of the structure and function of tendons, the causes of pathology, and treatment options. Because of this, there are as many new questions as there are answers.

In 1999, Gehlsen et al. conducted a study titled "Fibroblast Responses to Variation in Soft Tissue Mobilization Pressure" that assessed morphologic changes in the Achilles tendon of rats after applications of augmented soft tissue mobilization therapy (ASTM). The study supports the premise that microtrauma, such as pressure or friction, facilitates the healing process in tendons and asks what magnitude of microtrauma is necessary to induce change. Thirty rats were randomly assigned to one of five groups: tendinitis, tendinitis plus light ASTM, tendinitis plus medium ASTM, tendinitis plus extreme ASTM, and a control group (healthy tendon). Tendinitis was induced using an injection of collagenase. The three ASTM groups received a massage every 4 days, totaling six treatments. Fibroblasts were assessed by microscope 1 week after the final ASTM treatment. The control group showed parallel collagen fibers, as in healthy tendons. The tendinitis group showed fiber misalignment. The ASTM groups also exhibited fiber misalignment with an increased number of tendon fibroblasts indicating the healing process, with the extreme ASTM group exhibiting the greatest number of fibroblasts. The authors concluded that ASTM stimulates fibroblast proliferation and that the amount of pressure used affects the level of cellular response. ASTM involves the use of instruments other than the hands to apply pressure to the soft tissues. This is generally performed to spare the practitioner from developing overuse injuries. It is unclear whether applying the same amount of pressure with the hands instead of instruments would significantly alter the outcomes.

In a 2008 study titled "The Effect of Mechanical Load on Degenerated Soft Tissue," Warren Hammer presents three case studies in which he assesses the Graston Technique of soft tissue mobilization for the treatment of supraspinatus tendinosis, Achilles tendinosis, and plantar fasciosis (degeneration of the plantar fascia). Like ASTM, the Graston Technique is a form of mechanical loading of soft tissues that uses stainless steel instruments with curved edges contoured to fit shapes of the body. The client with supraspinatus tendinosis was treated twice a week for 5 weeks. The client with Achilles tendinosis was treated twice a week for 6 weeks and performed eccentric exercises at home. Both of these clients were asymptomatic following this regimen. The client with plantar fasciosis was treated 12 times over the course of 6 weeks and advised to use orthotics. She reported 95% improvement but had to discontinue treatment due to insurance conflicts. Hammer's conclusions support previous studies suggesting that mechanical loading of soft tissues facilitates fibroblast production and collagen remodeling and is thus effective in treating conditions in which collagen degeneration is a primary contributing factor. He also suggests the need for further study to examine how Graston Technique compares to other manual techniques, how mechanical loading differs in the case of acute versus chronic injuries, and how the magnitude of load relates to anti-inflammatory versus pro-inflammatory processes of healing. It is important to note that the conclusions of this study are based solely on the clients' reports of symptom relief, ROM and strength testing, and comparative palpation following treatment. No histological studies were performed to measure fibroblast proliferation.

Pedrelli et al. (2009) concentrated their inquiry on the role of fascial restrictions in tendinopathies. In their study titled "Treating Patellar Tendinopathy with Fascial Manipulation," 18 patients with a history of unilateral patellar tendon pain were treated with the fascial manipulation technique described by physiotherapist Luigi Stecco, with the goal of restoring gliding between intrafascial fibers. Pain with movement was evaluated before treatment, immediately after treatment, and one month after treatment. A single therapist performed all treatments, which included applying pressure mid thigh between the vastus lateralis and rectus femoris with force toward the vastus intermedius. Deep friction or mobilization of the fascia was subsequently applied. Participants were asked not to perform sports for 4 days following treatment to avoid stressing the structures. All participants reported reduced pain immediately following treatment. Two participants reported complete relief that was maintained 1 month after treatment. Nine participants reported a relief following treatment that continued to improve between treatment and the 1-month follow-up. Three participants reported feeling pain relief immediately following treatment, with a recurrence of some pain between treatment and the 1-month follow-up, but the level of pain was still less than before treatment.

While these studies are encouraging, it is important to note that while pain is reduced and strength is regained, it is still somewhat unclear how or why this occurs. Without fully understanding the mechanism of tendon pathologies, treatments are more frequently geared toward symptom relief. While valuable, symptom relief does not necessarily result in long-term recovery or reducing the risk of re-injury. Further studies are needed to determine the exact effect that massage techniques have on repairing or regenerating the collagen fibers in tendons or in reducing inflammation.

Working with the Client

CLIENT ASSESSMENT

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 specific area of pain so that you can prepare yourself.

Table 14-2: **Health History**

QUESTIONS FOR THE CLIENT	IMPORTANCE FOR THE TREATMENT PLAN
Where do you feel symptoms?	The location of symptoms helps to locate the injured tendon or to differentiate tendinopathy from other soft tissue injuries.
Describe what your symptoms feel like.	A description of symptoms including weakness, heat, or fullness in the area may help you to differentiate tendinosis, tendinitis, and tenosynovitis.
What activity were you performing when you first felt the pain?	The details of the activity or posture that initiated the pain may help you to determine its cause. A new regimen of exercise, weight-bearing activity, or repetitive action, particularly following a period of inactivity may contribute to tendinopathies.
When did the symptoms begin?	Onset of symptoms may help you to determine the stage of the injury and the health of the tissue.
Do you have a history of injury or surgery to this area?	An explanation of prior injury to the area may help you to determine contributing factors. Surgery and resulting scar tissue may increase the risk of tendinopathy.
Do any movements make your symptoms worse or better?	Locate weakness in structures producing such movements. Resisted activity or activities that stretch the tendon are likely to increase symptoms. Adding slack or reducing tension in the tendon may decrease symptoms.

Table 14-2: **Health History (continued)**

QUESTIONS FOR THE CLIENT	IMPORTANCE FOR THE TREATMENT PLAN
Have you seen a health care provider for this condition? What was the diagnosis? What tests were performed?	Medical tests may reveal the location and stage of tendinopathy or coinciding injuries. If no tests were performed to make a diagnosis, use the tests described in this chapter for your assessment. If your assessment is inconsistent with a diagnosis, ask the client to discuss your findings with a health care provider or ask for permission to contact the provider directly.
Are you taking any prescribed or over-the-counter 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. A history of repeated corticosteroid injections may affect the integrity of muscle and tendons, increasing the risk of injury. Use caution when applying pressure or cross-fiber strokes. Analgesics reduce sensation and may cause the client to allow you to work too aggressively.
Have you taken a pain reliever or muscle relaxant within the past 4 hours?	The client may not be able to judge your pressure and may allow you to work too aggressively.
Have you taken anti-inflammatory medication within the past 4 hours?	Deep friction initiates an inflammatory process and should not be performed if the client has recently taken anti-inflammatory medication. Regular use of anti-inflammatories may also contribute to collage degeneration.

Postural Assessment

Allow the client to enter the room ahead of you while you assess their posture and movement. Look for imbalances in the movement of the joint crossed by the affected tendon or patterns of compensation that may develop to protect the injured structures. Watch as the client walks and climbs steps if the lower body is affected. Watch as the client opens the door, takes off their coat, or picks up a pen if the upper body is affected. Watch as the client sits, stands from sitting, lifts or sets down objects, turns to talk to you, and so on to see if they can perform these activities without assistance or if they avoid resistance against the affected tendon. Look for reduced mobility or the favoring of one side.

When assessing the standing posture, be sure that the client stands comfortably. If they deliberately attempts to stand in the anatomic position, you may not get an accurate assessment of their posture in daily life. If the client has the joint braced with a removable device, ask them to remove it if it is possible to bear weight without it so that you can get an accurate picture of the strength of the injured structures. When tendinopathy affects the lower body, the client may stand in a position that keeps the weight off the affected joint. This, in turn, may initiate imbalances in posture from the feet up to the spine. Check for irregularities in the ankles, knees, hips, and low back. When the upper body is affected, the client may hold the joint in a position that keeps the injured tendon from stretching. This may initiate compensating patterns that protect the affected tendon. Look for imbalance in the shoulders, rotations in the arm, forearm, and cervical or thoracic spine. You may not be able to attend to all of the compensating patterns in the early treatments but may be able to return to them once the aggravating injury begins to heal.

ROM Assessment

Test the ROM of both the agonists and antagonists that cross the joint also crossed by the injured tendon. Since it allows the client to control the amount of movement and stay within a pain-free range, only active ROM testing should be performed in the acute stage to avoid further injury. In the chronic stage, the client may have developed compensating patterns causing pain in other joints that should also be tested.

Active ROM

Compare your assessment of the client's active ROM in the affected joints to the normal values.

- **Active ROM of the affected joint** may be limited but will not likely produce localized pain when tendinosis or tendinitis is present. The client may limit movement to the pain-free range. More likely, an active contraction without resistance may not stress the tendon to the point of discomfort, but may cause discomfort in the affected muscle or compensating structures. With tenosynovitis, pain will likely result with any activity that involves the tendon gliding within its sheath. If the joint is already stuck in a flexed position, the value of active ROM testing is limited.

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. P ROM should not be used in the acute stage of injury.

- **P ROM of the affected joint** may produce no symptoms or demonstrate restriction when shortening the muscle, but often produces pain on a full passive stretch. The location of pain during a full passive stretch of the affected joint may help to determine if the injury is in the muscle belly or the tendon. Pain local to the tendon suggests tendinopathy. With tenosynovitis, passive movement that requires the tendon to move through its sheath may be painful. A full passive stretch may require more force than usual, and clicking, grating, or crepitus may be present as the tendon detaches from its sheath. Apply the passive stretch slowly, and limit it to a range within the client's pain tolerance.

Resisted ROM

Use resisted tests to assess the strength of the affected musculotendinous unit. Compare the strength of the affected side to the unaffected side when possible. R ROM should not be used in the acute stage of injury.

- **R ROM of the affected joint** may produce pain at the tendon that may refer into the muscle. It may be necessary to perform the test in a variety of positions to elicit symptoms and to assess synergists to the affected musculotendinous unit. Weakness is not likely in the early stages of tendinitis or tendinosis but may develop if the condition is not treated. With tenosynovitis, if the joint is stuck in the shortened position there is no benefit to performing R ROM of the affected joints.

Special Tests

There are numerous orthopedic tests for tendinopathies that are specific to the affected tendon. These specific, named tests are largely comprised of combinations of passive lengthening and resisted contractions of the affected muscles. It will be important to learn these orthopedic tests if you choose to focus your advanced training on clinically oriented treatments or research. At a beginner's level, length and strength assessment, a full passive stretch of the affected tendon, and palpation are sufficient assessment tools for distinguishing tendinopathies from other potential causes of pain. Use ROM testing as described above, and refer to previous chapters for special tests of the muscles affected by those conditions.

Palpation Assessment

If the affected tendon passes directly over a bone, the bursa beneath it may be inflamed. Treating bursitis requires advanced training. If you suspect bursitis as a coexisting condition, avoid deep pressure and friction locally in all stages. In the subacute stage of bursitis, massage to the surrounding structures is indicated, but direct pressure is avoided. Additionally, if you suspect bursitis that may be infectious in nature, refer the client to their health care provider for assessment before providing massage therapy.

The area around the affected tendon may be warm or swollen due to inflammation, particularly if the affected tendon is superficial and if tendinitis or tenosynovitis is the condition to be treated. The site of injury may be tender on palpation. Tenderness diminishes as the injury heals. Tenderness on palpation may radiate to surrounding tissue, and the area of radiating pain will also diminish as the injury heals. The tendon itself may feel thick and dense. Adhesions may be present around the affected tendon and among the synergists and antagonists of the affected musculotendinous unit. Crepitus may be notable around the affected tendon and with movement of the affected joint. With tenosynovitis, grating may be evident when making the tendon glide within its sheath by lengthening the affected musculotendinous unit. If the tendon is pulled taut over the bones of the joint it crosses, it may strum over the bone with movement of the joint or with manual manipulation. Hypertonicity and trigger points may be found in the affected musculotendinous unit, its synergists, and its antagonists. If the joint has been immobilized for an extended period, if the client has developed protective patterns, or if the injury involves serious strain or compression or lesions to the nerves, the affected muscles may begin to atrophy. In addition, if the injury coincides with a strain, which is often the case with tendinitis, scar tissue may form to heal tears. If not properly treated, scarring and adhesions may reduce local circulation, resulting in ischemia. The ischemic area may feel cool to the touch.

To effectively treat a tendinopathy, it is essential to locate the precise tendon and to know the direction of fibers of the affected tendon and muscle. Refer to the illustrations of specific muscles throughout this text to determine fiber direction. Take your time palpating the location, and be very precise. Once you have identified the affected tendon, palpate slowly, covering approximately 1 inch of tissue in 5–10 seconds. Stay focused, and allow the receptors in your fingers to transmit important information. Feel for adhesions, scars, or other anomalies in texture, tone, temperature, and tenderness.

CONDITION SPECIFIC MASSAGE

Tendinopathy may be one element of a musculoskeletal injury or chronic pain condition. For example, carpal tunnel syndrome may involve a tendinopathy of a flexor tendon; strains that occur at the musculotendinous junction may be the cause or result of a tendinopathy; and the pain associated with patellofemoral syndrome may involve or be confused with patellar tendinopathy. These are just a few examples. Always consider the health of the tendon when assessing musculoskeletal conditions. When tendinopathy contributes to the symptoms of another condition, the following recommendations are incorporated into the treatment and meant to aid healing and reduce the risk of re-injury of the tendon. Reducing adhesions, reducing scar tissue if present, encouraging collagen regeneration and reorienting collagen fibers, reducing hypertonicity and tensile stress, and strengthening weak muscles are the basic goals of treating tendinopathies. When tendinopathy is the primary condition, the following suggestions can be used alone.

Because tendinopathy can occur in any tendon, the following descriptions do not specify particular muscles as in earlier chapters. Use the resources in previous chapters when needed to determine fiber direction, joints crossed, superficial versus deep tissues, and so on. Although the treatment goals for tendinitis, tendinosis, and tenosynovitis differ, transverse friction, pressure, and controlled tensile stress applied to the tendon, along with treating the affected muscle and its synergists and antagonists, are common to all treatments. In some cases, tendinopathies are complicated by other conditions such as infection, entrapment, or a compartment syndrome. A complicated case of tendinopathy is best supervised by a professional with advanced training.

It is essential for the treatment to be as relaxing as possible. Deep friction of a tendon can be somewhat painful and requires the client to allow you to reach the upper limit of their tolerance. Explain this to your client, and ask them to let you know when the amount of pressure you are applying causes them to tense up. In addition, because treatment to the affected tendon can be uncomfortable, it is best to alternate 30-60 seconds of treatment directly to the tendon with more general treatment to the muscles, stretches, and joint mobilizations. You are not likely to eliminate the symptoms associated with tendinopathies or any coexisting conditions in a single treatment. Do not attempt to do so by treating overly aggressively. 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 and what level of pain 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.

The following suggestions are for treating pain, weakness, and limited ROM caused by a tendinopathy. This is generalized for any affected tendon.

Treatment Goals:


Increase circulation


Reduce adhesions


Reduce tone/ tension


Lengthen tissue


Treat trigger points


Passive stretch


Clear area

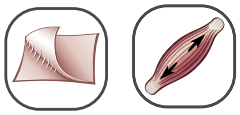
- Positioning and bolstering depend on which tendon is to be treated.
- If you find swelling, apply superficial draining strokes toward the nearest lymph nodes, and when possible, bolster the area to allow gravity to draw fluid toward the thorax.

- If swelling is minor or absent, apply brief moist heat to the affected area to soften adhesions and to increase circulation. Just a few minutes of moist heat is sufficient. If inflammation is present, do not use heat.

- Use your initial warming strokes to increase superficial circulation, soften tissues, and to assess the tissues broadly surrounding the site of injury and those that may be compensating for the injured musculotendinous unit. You should be able to initially assess tissues for adhesions, hypertonicity, protective muscle spasm, and tensile stress, which will help you determine how to focus your time.

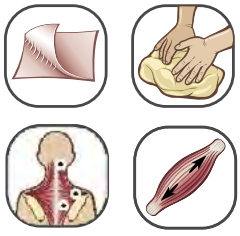
- Before applying emollient, assess for and treat fascial restrictions around the injured area and compensating structures. Tissues that have shortened to prevent re-injury, particularly those closest to the joint, are most likely to develop fascial restrictions.

- Soften the tissues peripheral to the site of injury, beginning proximal. Pay special attention to the muscle of the affected tendon and its synergists. If the antagonists are accessible, treat these now, or return to this step when the client changes position.



- Once the superficial tissues are pliable enough to allow for deeper work, apply transverse strokes to reduce the remaining adhesions and apply lengthening strokes to the peripheral tissues that are short and tight, beginning proximal. Muscles with fiber direction and actions in common with the muscle of the injured tendon are likely to have shortened, possibly in spasm, to protect the injured tendon and muscle from further injury.

- Treat any trigger points found in the synergists of the affected muscle or in muscles compensating for the injury. Treat trigger points in antagonists if they are accessible, or return to this step when the client changes position. Follow trigger point treatment with lengthening strokes, but do not stretch the muscles until you have treated the injured tendon to avoid reflexive contractions.



- Assess and treat the muscle belly of the affected tendon for adhesions, tension, and trigger points. Follow trigger point treatment with lengthening strokes, but do not stretch the muscles until you have treated the injured tendon to avoid reflexive contractions.

- Locate the injured tendon. With tendinosis and tendinitis, passively position the affected joint so that the tendon is lengthened but not overstretched. Reproducing symptoms may indicate overstretching. With tenosynovitis, the tendon should be fully lengthened and taut, within the client's tolerance.


- Working slowly within the client's pain tolerance, apply short, deep transverse strokes to the full length of the injured tendon. Begin with strokes in one transverse direction, and continue with strokes in the opposite transverse direction. Transverse strokes both reduce adhesions and scar tissue, and encourage collagen repair. Follow this with longitudinal strokes to redirect tendon fibers, and mobilizations that lengthen the tendon. Alternate rounds of transverse strokes, longitudinal strokes, and mobilizations until you feel a change in texture. If the area gets hot or begins to swell, discontinue this step, and apply ice to the area for a few minutes to slow down the inflammatory process and cool the area.

- Apply longitudinal strokes to the full length of the injured tendon and muscle.

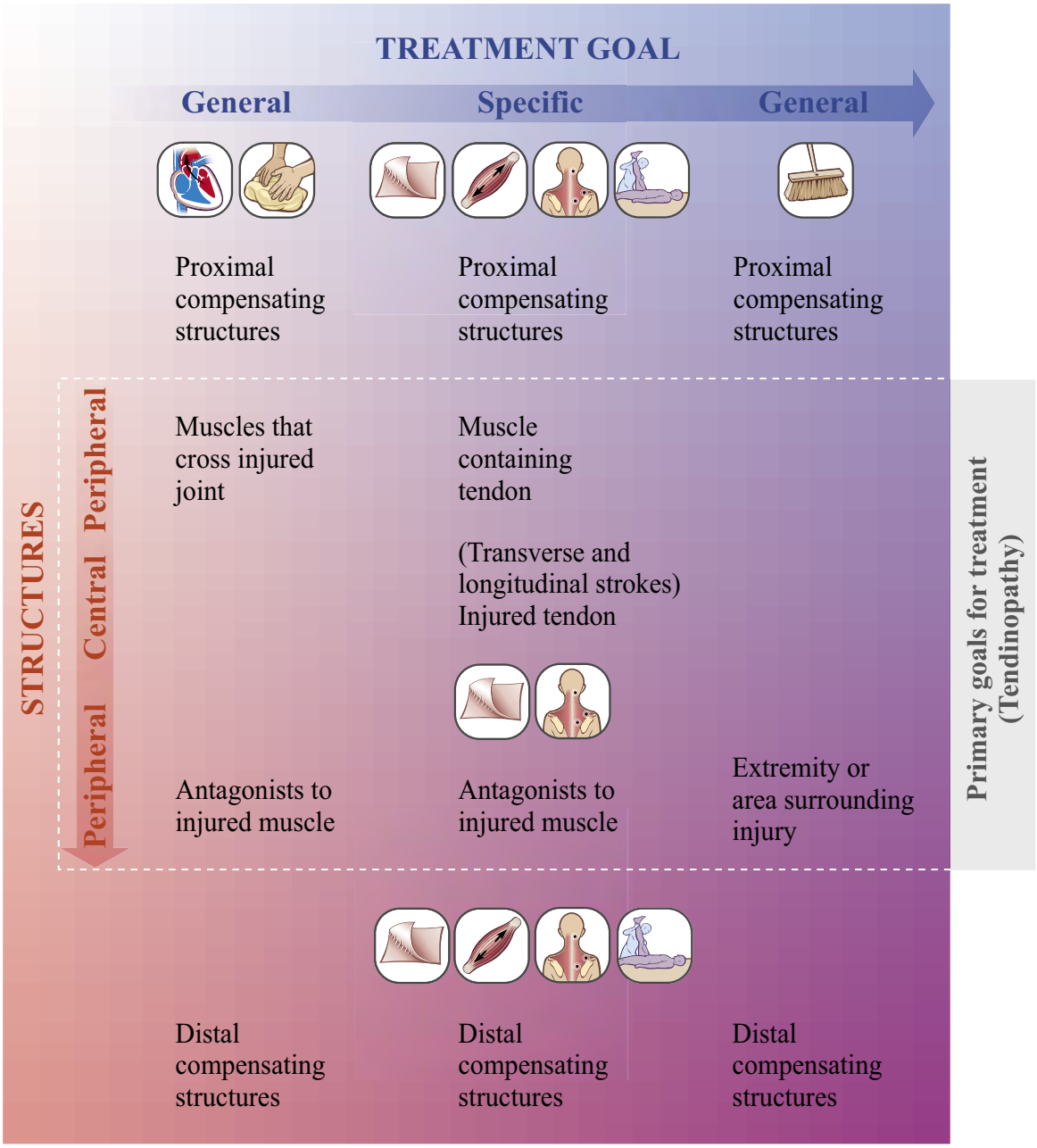
- Passively stretch the affected musculotendinous unit as fully as possible within the client's tolerance. This may require repositioning the client. Hold the stretch for 10-15 seconds. This step is essential for realigning the fibers and increasing the load on the tendon, which facilitates collagen remodeling.



- If you were unable to address the antagonists of the muscle with an injured tendon, reposition the client and address them now.



- If time permits, assess and treat any compensating patterns found.



CLIENT SELF-CARE

Avoiding further injury is a primary concern when recommending self-care. While reducing aggravating activities and decreasing loads will help reduce friction, inflammation, and strain, activity is essential for collagen regeneration and to reduce adhesions. During the healing process, the client may choose to wear a brace or other protective device while performing activities that aggravate symptoms. It is best to wear these only when participating in aggravating activities and to allow the joint to be mobile otherwise. Arch supports may be helpful with tendinopathies of the lower extremity and if prescribed, should always be worn. Proper biomechanics are crucial to avoid re-injury. Ask your client to show you the repetitive activity that they perform or the action that initiated pain, and suggest ways of moving that will minimize aggravating factors.

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 musculotendinous

units that have shortened and to perform repetitions of movements that decrease the distance between the attachments of units 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 due to time constraints. Encourage them to follow these guidelines:

- Instruct the client to perform self-care throughout the day, such as while talking on the phone, reading e-mail, washing dishes, or watching television instead of setting aside extra time.
- Encourage the client to take regular breaks from stationary postures or repetitive actions. If the client's daily activities include hours of inactivity, suggest moving for at least a few minutes every hour to prevent adhesions and reduced circulation. If the client's daily activities require repetitive actions that contribute to a tendinopathy, suggest resting for at least a few minutes every hour or reducing the aggravating activity as much as possible.
- Demonstrate gentle self-massage of the tissues surrounding the injury 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. The stretch 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.

Stretching

Maintaining proper length and tone of the musculotendinous unit, its synergists, and its antagonists is essential to reduce the risk of re-injury. Stretches should be performed throughout the day, particularly before and after activity. The results of ROM testing and palpation will determine which muscles have shortened and need to be stretched. In general, stretching occurs when the distance between the attachment sites of the muscle is increased. Refer to previous chapters for stretches to specific muscles or groups of muscles. Take care to instruct the client to stretch slowly and to limit stretches to the comfortable range, beginning slowly, and gradually increasing the stretch as symptoms diminish and the risk of re-injury is reduced. Stretching an injured muscle too quickly or too deeply may initiate a reflex response, which may result in spasm. In addition, when the affected muscle is lengthened, its antagonists are shortened. If the antagonists are involved in protective splinting, contracting them too quickly or too deeply may also result in spasm.

Strengthening

Eccentric exercise has been shown to improve recovery from tendinopathies since increasing the load on the tendon encourages collagen proliferation. Eccentric exercises are those that lengthen the injured muscle. For example, if the long head of the biceps brachii is affected by tendinosis, extension of the shoulder increases eccentric loading to the biceps tendon and encourages healing. Eccentric exercise also strengthens the antagonists of the injured muscle, which helps to balance strength on either side of the joint. These exercises should be introduced slowly and increased in intensity only within the client's tolerance.

Strengthening weakened or atrophied muscles is equally important for restoring proper function of the affected joint. The results of ROM testing and palpation will determine which muscles have weakened and need to be strengthened. In general, active or resisted concentric contractions strengthen muscles. As with stretching, a strengthening program should progress gradually. Pain-free, active ROM is effective for gradually

restoring strength to weakened muscles. As healing progresses and the risk of re-injury diminishes, add resistance to active ROM. Refer to previous chapters for exercises to strengthen specific muscles or muscle groups.

SUGGESTIONS FOR FURTHER TREATMENT

Ideally, a client with a tendinopathy will have treatments two or three times a week until the client can perform activities of daily living with minimal or no pain for at least 4 days. Once this has been 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 pain-free for 3 or more consecutive weeks, they can then schedule appointments once per month or as necessary.

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 their 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 has other musculoskeletal complications that are beyond your basic training. Refer this client to a massage therapist with advanced training. Continuing to treat a client whose case is beyond your training could hinder healing and turn the client away from massage therapy altogether.
- The client has an undiagnosed, underlying condition. Discontinue treatment until the client sees a health care provider for 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 a health care provider and seek manual therapy rather than more aggressive treatment options. If the client agrees to return for regular treatments, the symptoms are likely to change each time, so it is important to perform an assessment before each session. Once you have addressed symptoms specific to the tendinopathy, you may be able to pay closer attention to compensating structures and coexisting conditions.

Professional Growth

Case Study

Elisa is a 25-year-old student studying fashion design. She has pain in her thumb and palm that began while sewing a piece for her final project. She uses her computer daily, draws sketches of fashion designs with fine detail, and frequently sends text messages and plays games on her cell phone.

SUBJECTIVE

Elisa stated that she has had episodes of pain in her right hand for the past year, particularly when sewing and sending text messages. She also feels some pain when carrying groceries or other heavy items in bags with handles instead of in a backpack. The worst of the pain is between her thumb and index finger.

She does not feel pain in the left hand regularly but has noted that lately it seems weaker than usual. She explained that in the past year, the aching in her right hand has become more frequent and more intense and that, at least a couple of times per week, her thumb and index finger lock and she feels pain in her forearm. She also started feeling general aching in her shoulders. She bought a brace to support her hand but has a hard time performing tasks while wearing it, so she has not used it much. She has tried ibuprofen and felt some relief, but only when she was not using her hands. When she used ibuprofen and continued to work, the pain persisted. When she first felt the symptoms, she had a manicure that included a forearm and hand massage. She said that for that day and the next she had some relief. She hopes that focused massage will have even better, long-term results. She has no known underlying conditions. Her mother, who was a seamstress before retiring, had received a diagnosis of DeQuervain's tenosynovitis. Elisa wants to avoid developing the same condition. When asked, she stated that she has felt no unusual fatigue or malaise and has had no fever, sharp pain, or other unusual symptoms other than the pain in her hand. When asked, she stated that the pain does not wake her from her sleep but that she occasionally feels weakness in the morning when picking up her coffee cup.

OBJECTIVE

Elisa appears healthy and vibrant. Her handshake was firm with no signs of pain. She had no difficulty turning the doorknob and seemed comfortable using a pen to fill out her intake forms. The right hand is slightly swollen compared to the left. Swelling is general, not specific to any finger. The skin is slightly dry and chapped bilaterally. There is no difference in temperature between the hands. When asked to fully extend the thumb and fingers of both hands, extension on the right side was visibly reduced compared to the left, and Elisa felt aching in her thumb and along the anterior forearm. Passive extension of each individual finger revealed reduced ROM in the thumb and forefingers of both hands with pain on full passive extension of the right thumb. Palpation of the flexor tendons resulted in a level 5 pain on the right flexor pollicis longus, level 2 pain on the right first digit tendon of the flexor digitorum, level 2 pain on the left flexor pollicis. No remarkable results were seen from the passive stretch or palpation of other fingers. Palpation revealed tenderness and hypertonicity in the adductor pollicis and opponens pollicis. Palpation of the forearms revealed adhesions and hypertonicity in the flexors, particularly on the right, and taut bands in the extensors, which were also more pronounced on the right. Palpation of the common flexor tendon produced no pain, and Elisa stated that it felt good. No trigger points were found. Signs and symptoms suggest right flexor pollicis longus tendinosis with short, tight wrist flexors and taut wrist extensors. Shoulder aches may be the result of compensation.

ACTION

I began in the supine position, bolstering the right arm and applying drainage strokes to reduce minor fluid accumulation in the right hand. I applied general Swedish massage to the pectorals, shoulders, neck, and arms. I proceeded with treatment to the bilateral forearms and hands, beginning on the right with myofascial release using wringing to the forearms and deep fascial techniques to reduce adhesions among flexors and extensors. Adhesions were most significant in the right distal flexors. I applied kneading and stripping to the adductor and opponens pollicis and transverse friction to the forearm muscles, followed by lengthening the flexors and applying broad pressure and circular strokes to the extensors. No trigger points were found. With the forearm supinated, the wrist slightly extended with a bolster, and the fingers held in extension with one hand, I applied transverse friction to the tendons of the flexor pollicis longus and the flexor digitorum. I applied stripping to the same tendons followed by deep effleurage to the same muscles. I performed four rounds of treatment, alternating between friction and the lengthening of tendons with the lengthening of muscles. I applied a full deep stretch to the thumb and fingers, followed by clearing strokes toward the axilla, and 3 minutes of icing to frictioned tendons.

PLAN

Following treatment, Elisa stated that she felt much less discomfort in her hands. She continued to feel discomfort on passive extension of the R. thumb and first finger, though less than before treatment. Elisa rescheduled for another treatment in 3 days. I recommended full stretches to the fingers and wrist several times throughout the day. I suggested that she ask her roommate to apply wringing to her forearms occasionally to keep adhesions at bay and demonstrated self-massage to continue reducing adhesions and hypertonicity in the forearms and between the thumb and first digit. I also suggested reducing activities that are least necessary (e.g., texting less during times when she is sewing a lot). I explained that her simple tendinosis could develop into a more serious case. I explained DeQuervain's tenosynovitis, so she can monitor for symptoms. Currently, there is no tenderness in the extensor pollicis, no pain or crepitus with passive flexion of the thumb, and no heat or swelling in the radial aspect of the wrist.

CRITICAL THINKING EXERCISES

1. Your client mentions feeling pain in the left shoulder and points to the anterior aspect, near the head of the humerus. Active extension of the left shoulder is limited compared to extension of the right shoulder, but causes little pain. Full passive extension of the left shoulder causes pain at the very spot the client originally pointed to. Write a SOAP note for this client. Is tendinopathy a possibility? Which tendon might be affected? How will you determine if it is tendinosis, tendinitis, or tenosynovitis? Which muscles may be compensating? Create a scenario that describes how this pattern developed, the signs and symptoms, possible coexisting conditions, a postural assessment, testing, precautions or contraindications, and specific treatment. Use a reference that describes the actions of the muscles to help you correlate the signs and symptoms. There is no single, correct SOAP note for this exercise. Be creative, as the possibilities are virtually endless.
2. This chapter contains references to the coinciding of tendinopathy with one of the conditions described in Chapters 4–11. Choose one of the conditions described in those chapters and discern which tendon could be injured or at risk for tendinopathy based on the client's posture or activities. How will you incorporate tendinopathy into the treatment description for that condition?
3. Conduct a short literature review to learn about the relationship between tendinopathies and the following:
    - Statin medication
    - Fluoroquinolone antibiotics
    - Mesenchymal syndrome
    - Genetic collagen variations

BIBLIOGRAPHY AND SELECTED READINGS

Anderson O. RunnersWeb.com. Science of Sport: Do You Really Have Tendonitis–Or is it Tendinosis? Available at http://www.runnersweb.com/running/news/rw_news_20050513_RRN_Tendons.html. Accessed Spring 2009.

Biel A. *Trail Guide to the Body: How to Locate Muscles, Bones and More*, 3rd ed. Boulder, CO: Books of Discovery, 2005.

Franchi M, Fini M, Quaranta M, et al. Crimp morphology in relaxed and stretched rat Achilles tendon. Journal of Anatomy. 2007;210(1):1–7.

Gehlsen GM, Ganion LR, Helfst R. Fibroblast responses to variation in soft tissue mobilization pressure. Medicine & Science in Sports & Exercise. 1999;31(4):531–535.

Hammer W. The effect of mechanical load on degenerated soft tissue. Journal of Bodywork and Movement Therapies. 2008;12(3):246–256.

Hertling D, Kessler R. *Management of Common Musculoskeletal Disorders: Physical Therapy Principles and Methods*, 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins, 2006.

James R, Kesturu G, Balian G, et al. Tendon: Biology, biomechanics, repair, growth factors, and evolving treatment options. Journal of Hand Surgery. 2008;33(1):102–112.

Khan KM, Cook JL. Overuse tendon injuries: Where does the pain come from? Sports Medicine and Arthroscopic Review. 2000;8(1):17–31.

Khan KM, Cook JL, Taunton JE, et al. Overuse tendinosis, not tendinitis. The Physician and Sports Medicine. 2000; 28(5):5.

Lowe W. *Orthopedic Massage: Theory and Technique*. St Louis, MO: Mosby-Elsevier, 2003.

Mayo Foundation for Medical Education and Research. Bursitis. Available at http://www.mayoclinic.com/health/bursitis/DS00032. Accessed Spring 2009.

Mayo Foundation for Medical Education and Research. Myofascial Pain Syndrome. Available at http://www.mayoclinic.com/health/myofascial-pain-syndrome/DS01042. Accessed Spring 2009.

Mayo Foundation for Medical Education and Research. Sprains and Strains. Available at http://mayoclinic.com/health/sprains-and-strains/DS00343. Accessed Spring 2009.

Oatis C. *Kinesiology: The Mechanics and Pathomechanics of Human Movement*, 2nd ed. Baltimore, MD: Lippincott Williams & Wilkins, 2009.

Pedrelli A, Stecco C, Day JA. Treating patellar tendinopathy with fascial manipulation. Journal of Bodywork and Movement Therapies. 2009;13(1):73–80.

Rattray F, Ludwig L. *Clinical Massage Therapy: Understanding, Assessing and Treating over 70 Conditions*. Toronto, ON: Talus Incorporated, 2000.

Riley G. Tendinopathy—From basic science to treatment. Nature Clinical Practice Rheumatology. 2008;4 (2):82–89. Available at http://www.nature.com/nrrheum/journal/v4/n2/full/ncprheum0700.html. Accessed Spring 2009.

Shoulder-Pain-Management. Calcific tendonitis. Available at http://www.shoulder-pain-management.com/CalcificTendonitis.html. Accessed Spring 2009.

Vogel KG. Tendon structure and response to changing mechanical load. Journal of Musculoskeletal Neuron Interaction. 2003;3(4):323–325.

Werner R. *A Massage Therapist's Guide to Pathology*, 4th ed. Baltimore, MD: Lippincott Williams and Wilkins, 2009.

Zatsiorsky VM. *Biomechanics in Sport: Performance Enhancement and Injury Prevention*. Malden, MA: Blackwell Science, 2000.