

Repetitive Strain Injuries: Muscle and Tendon Disorders

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In this article we will discuss the Repetitive Strain Injuries (RSI) that affect muscles and tendons. Most people experiencing RSI have muscular conditions rather than nerve disorders.¹ These people report more overall pain than those with nerve problems. They also report more emotional consequences of RSI since so many aspects of life become painful.¹ Muscles and tendons heal more quickly than nerves, so in a way, you are fortunate if you suffer this type of problem because the main challenge is to recondition the muscles and tendons after they have healed.¹

We would like to remind you that self-diagnosis is risky. It's often difficult for trained professionals to diagnose RSI, so if you are having problems, please seek the help of a health care provider familiar with the diagnosis and treatment of RSI. Attempting to diagnose and treat yourself may lead to further injury if you do not correctly identify the problem.

Tendinitis, myositis, myofasciitis, and muscle damage

Tendons are spaghetti-like extensions of the muscles that attach directly into the inner layers of the bone.¹ The tendons don't have much flexibility, so microscopic tears can occur with overuse, which lead to the inflammation and pain common with tendinitis.^{1,2} Typing can have many strained positions, such as holding the pinkie in the air or reaching for the shift key, which places excessive, repeated strain on the tendons.¹ Inflamed tendons are painful to the touch; the pain can feel dull, achy, and sometimes nauseating.²

Tendinitis can occur anywhere there are tendons: attaching into the spine, the front of the shoulder joint (rotator cuff), the back of the shoulder (triceps tendon, latissimus dorsi tendon), the elbow (wrist flexor and extensor tendons), and the tendons attaching into the hand and fingers.² If you have aching in these areas that is clearly not felt in a specific muscle, your problem may be tendinitis. Tendinitis will not cause numbness or tingling, but it may cause weakness.

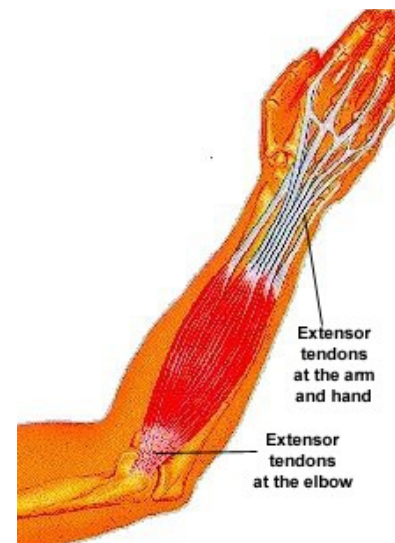


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Closely associated with, and often misdiagnosed as tendinitis, is inflammation of the muscle, called myositis.² When a tendon has been overworked or damaged, often the associated muscle is also overworked and damaged. When muscles are inflamed, it is not uncommon to also have inflammation of

the fascia surrounding the muscle. The fascia is a tough connective tissue that encases muscles and other structures of the body. Myofascitis indicates inflammation of both the muscle and the surrounding fascia.² Muscle problems usually result in aching or searing pain, loss of grip strength or stamina, or pain when you move. With muscle trauma, your nerves are usually in fine condition; they are simply reporting the pain.¹ Myositis and/or myofascitis are indicated if you have muscle aches and muscles that are painful to the touch. With myofascitis, small pebble-like swellings can be felt along the length of the muscle and the muscles will have a hardened feel to them.²

Short forearm muscles strain tendons of the fingers because they have to work harder. The shortened muscles and tight, inflexible tendons cause increased friction and cause further inflammation and tendinitis. Inflammation can cause swelling which may press on a nerve, leading to neurological problems.³

When muscles are overused, the body can't keep up with the destruction of tissues and may replace them with scar tissue, which is inelastic.³ Overuse of muscles causes cells to break down, releasing waste products that produce pain and inflammation. The body normally carries away these waste products, however use of anti-inflammatory drugs (such as aspirin) causes a disruption of this process. Instead of being cleansed away in the bloodstream, the waste products settle into scar tissue that then bind muscles and tendons and make them work harder.³

Shoulder Tendinitis

Bicipital tendinitis occurs where the biceps muscle inserts into the shoulder joint. When you raise your arms to the front, you will feel discomfort. Bicipital tendinitis can occur as a result of poor posture, rounded shoulders, or repeatedly moving the arm over a surface that is too high or too far away, such as moving a mouse on a high table.³

The rotator cuff is a group of muscles and tendons near the shoulder joint that turn the arm in and out and move it away from the body. Discomfort experienced while reaching behind, as when reaching into a hip pocket, can indicate rotator cuff tendinitis. This is associated with overusing the arm with the elbows in a "winged" position away from the body, as they are when the keyboard is too high or when you lean on armrests.³

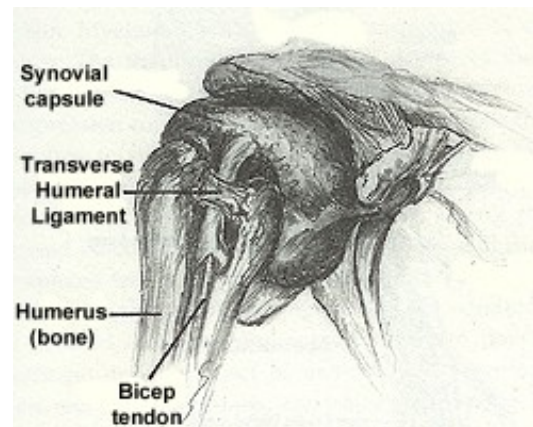


Illustration from Reference 2.

Forearm Tendinitis

The flexor carpi radialis pulls the wrist down, so this type of tendinitis may come from hitting the space bar too hard.³ Tenderness at the base of the thumb muscle is a result.

Extensor tendinitis affects the muscles used to straighten the fingers. Pain appears on the top of the hand near the wrist. Holding the hands for a prolonged time with the wrists bent is most likely the cause.

Flexor tendinitis affects the muscles used to bend the fingers. Pain usually occurs in the fingers. This can develop from excessive finger motion (e.g., while playing the guitar) or gripping a mouse or golf club.

Treatment

Heat should not be applied during the "acute" phase of injury, that is, during a flare-up or when inflammation is present.² If the area feels warm, it is probably inflamed. Use ice therapy during this phase of injury. Ice only offers temporary relief for serious problems, so seek competent health care. Don't use ice packs while performing a repetitive task because reduced blood flow and decreased tissue

flexibility while cold may cause further damage. Allow the area to warm up for at least 15 minutes after icing to prevent injury.² Do not use ice on your hands or fingers if you are aware that you have Raynaud's disease or Reflex Sympathetic Dysfunction (RSD).

Use ice no longer than 20 minutes. Allow 30 minutes between 20-minute icing sessions. This cycle can be repeated several times without harm to tissues. Be sure to use a thin towel between the ice pack and the skin to prevent skin damage.²

During the chronic stage of injury, only after inflammation has subsided, alternating heat and ice can be used to help the pumping action of the blood. Apply moist heat for 20 minutes, rest 20 minutes, then ice for 20 minutes. It is a good practice to stretch the hands, arms, and neck during the rest period after heat therapy. End with ice if your body is prone to swelling.²

Myofascial release, a deep tissue massage technique, is used in the case of tendinitis, myositis, and/or myofasciitis. By stroking along the line of muscle fibers, the therapist reduces adhesions and "stickiness" of the inflamed tendons and muscles, increases fluidity of muscle movement and increases circulation. This procedure may be painful and is followed by ice therapy to reduce swelling and inflammation. In addition, myofascial release can be effective in some nerve compression syndromes.²

In addition to therapy, it is important to recognize the importance of taking care of yourself. Since hormones called prostaglandins control inflammation, and prostaglandins are produced from fatty acids, you can, over a period of weeks, affect the inflammatory response by modifying the type of fats you eat. Increase the quantity of Omega-3 fatty acids in your diet by eating lots of wild salmon, sardines, walnuts, freshly ground flax seed or oil, and soy foods, or consider taking one of the new pharmaceutical grade fish oils.^{4,5} Incorporate lots of fresh, organic fruits and vegetables in your meals.^{4,5} Reduce your intake of polyunsaturated fats and oils, and oils high in Omega-6 fatty acids (sunflower, corn, soy, and safflower) and replace them with extra-virgin olive oil, grape seed, or expeller pressed canola oil.^{4,5}

Lateral and Medial Epicondylitis (tennis elbow and golfer's elbow)

The epicondyles are the point of attachment of the hand and wrist muscle tendons at the elbow joint. The outer, or lateral, edge of the epicondyles is the tendon insertion point of the wrist and hand extensor muscles (top of forearm). The inner, or medial, edge of the epicondyles is the tendon insertion point of the wrist and hand flexor muscles (under side of forearm). Inflammation of either of these regions is called either Lateral or Medial Epicondylitis. The common names of tennis elbow and golfer's elbow arose because these are common injuries for these sports, though many other things can cause these injuries to occur.²

Rotating the hand back and forth repeatedly, like a carpenter who turns a screwdriver throughout the day, a grocery worker who turns items to scan them all day, or an assembly worker who must turn items over causes these problems. It is also seen in young children who want to learn to throw a curve ball at an early age, which exerts extreme pressure on the epicondyles.² In the office, it is usually a result of having the work surface too high or dropping wrists while typing and/or using the mouse.³

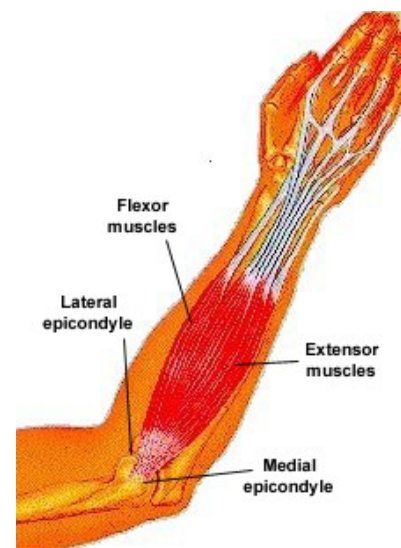


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Any activity resulting in overuse of the hand and wrist flexor or extensor muscles will irritate the epicondylar attachments. Patients with epicondylitis may experience extreme pain while attempting to straighten the arms or contract against resistance. The area over the elbow is tender to the touch.

Structurally, the tendons begin to pull on the bone's outer surface, called the periosteum, which leads to inflammation and soreness. With continued strain, the tendons start to tear and degenerate. Blood flow becomes restricted to the worn-out tissues and weak scar tissue replaces the injured tissues. If left untreated, this can lead to chronic pain in the elbow.²

Treatment

Strenuous activities and sports that aggravate this condition must be stopped to allow healing. Seek help from a qualified chiropractor or physiatrist to ensure proper diagnosis and treatment. Treatment may entail ultrasound and microcurrent electrical stimulation, chiropractic manipulation, and ice therapy. Under supervision of a care provider, an elbow brace may be used during some activities to compress the irritated tendons against the bone to relieve the tugging on the periosteum and allow the tendon-bone surface to heal. Massage to relax muscles and conditioning exercises to strengthen muscles after the swelling subsides may be prescribed.²

Ganglion Cysts

Ganglion cysts are raised bumps, about a half inch in diameter, usually occurring on the wrist, finger joints, or nailbed.^{1,3} They are due to herniation of the synovial fluid, occurring on the tendon, tendon sheath, or synovial lining. The only time they are dangerous is when they compress a nerve,^{1,3} though they can appear alarming. Cysts are a sign of wear and tear, so attention should be paid to the stresses placed on the associated tendons. Since they generally pose no problem, they may be left untreated.^{1,3} In the case of nerve compression, they can be treated surgically.

Tenosynovitis

When tendons wrap around bones and change directions, they are encased in a slippery tubing called the synovial sheath.^{1,2,3} This sheath protects the tendon from abrasion points by secreting a fluid called synovium. The synovium lubricates the tendon in the sheath much like motor oil in your car. In repetitive strain injuries, the synovium can thicken and become more viscous² or it can be overproduced¹ causing more friction for the tendons. Tendons don't glide through the sheath as smoothly and become swollen and thickened, leading to pain and inflammation.² If the tendon sheath swells and won't fit into areas that are already snug, such as the carpal tunnel, nerve compression can result.

Stenosing Tenosynovitis

This disorder affects the tendons of the hands where tendons pass through the synovial sheath. Stenosing refers to a narrowing of the sheath, teno refers to inflammation of the tendon, and synovitis refers to an increased production of synovial fluid due to irritation.² So stenosing tenosynovitis is a narrowing of the tendon sheath due to tendon inflammation and thickening and increased production of synovial fluid due to a trauma or repeated strain or friction of the tissues.

DeQuervains Disease. The sufferer of DeQuervains disease usually feels intense pain in the wrist that radiates to the thumb and upward to the forearm. Moving the thumb inward toward the other fingers causes severe pain and in worst cases, any movement of the thumb causes immediate pain.²

Two tendons of the thumb, the extensor pollicis brevis and the abductor pollicis longus, share one sheath as they pass under the extensor retinaculum. These two tendons are responsible for extending the thumb and deviating the thumb away from the other fingers.² DeQuervains may be misdiagnosed as carpal tunnel syndrome because it occurs at the wrist.¹

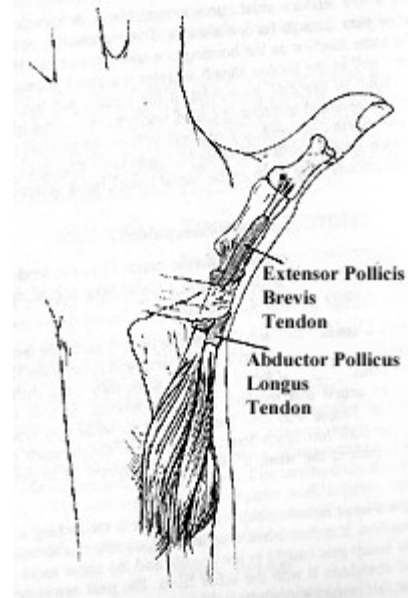
People who hold their thumbs up while they type or who hit the space bar with too much force may develop DeQuervain's.³ Excessive gripping of the mouse, pen and other tools will also cause this disease.

Treatment. The medical treatment of DeQuervain's disease is cortisone injection into the sheath and surgery to cut the sheath to relieve pressure. In many cases, however, non-surgical approaches are quite successful. Alternative treatments may involve ultrasound under water, chiropractic manipulation, deep tissue massage, myofascial work on associated muscles, and/or ice therapy.²

Trigger Finger. Trigger finger is the locking of a finger in a bent position. As with the thumb tendons, the finger tendons are encased in synovial sheaths as they pass under the retinaculum. The retinaculum helps guide the tendons to their insertion points and act to keep the tendons close to the bones of the hand. With overuse of a tendon from repetitive use such as mouse use, playing musical instruments, and hobbies such as crocheting and firing pistols or rifles, the sheath will become inflamed and the synovial fluid will thicken.² This compresses the tendon and results in swelling of the tendon, so they have difficulty passing through the sheath and under the retinaculum. When attempting to straighten the fingers, the person will find that one or more fingers will get caught up or stuck and they will have to be physically straightened with the other hand. This condition causes severe pain. In worst cases, the finger cannot be straightened at all.

This condition affects middle-aged men more than any other group and tends to affect the two smaller fingers, but can affect any of the fingers.

Treatment. If treated as soon as pain in the fingers is felt, it may be possible to bring down inflammation and normalize tendon movements. To accomplish this, use of pulsed ultrasound and microcurrent, acupuncture, chiropractic manipulation and myofascial release may be effective.² If no progress is made within two weeks, corticosteroid injections and surgery may be needed.²



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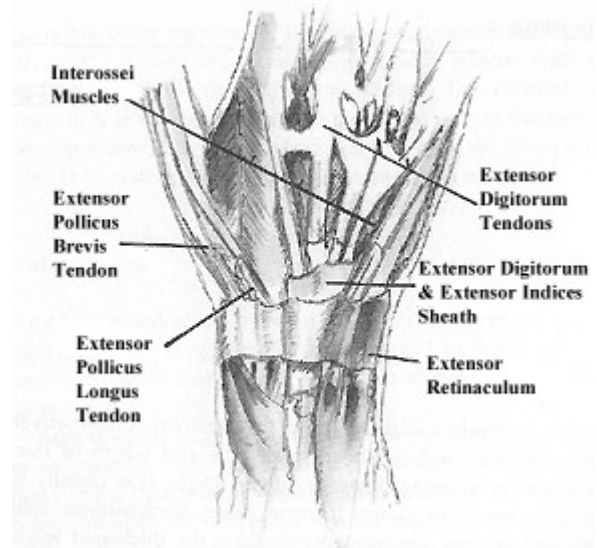


Illustration from Reference 2.

Some studies have reported more cases of trigger finger in diabetics than in the general population.² Generally more than one finger is involved with diabetics. Use of corticosteroids has only a 50% success rate for diabetics. Since diabetics are already under medical care, it is most likely that surgery will be suggested right away. However, it is best if the non-surgical methods are tried first.

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