Hughston Health Alert

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Inside...

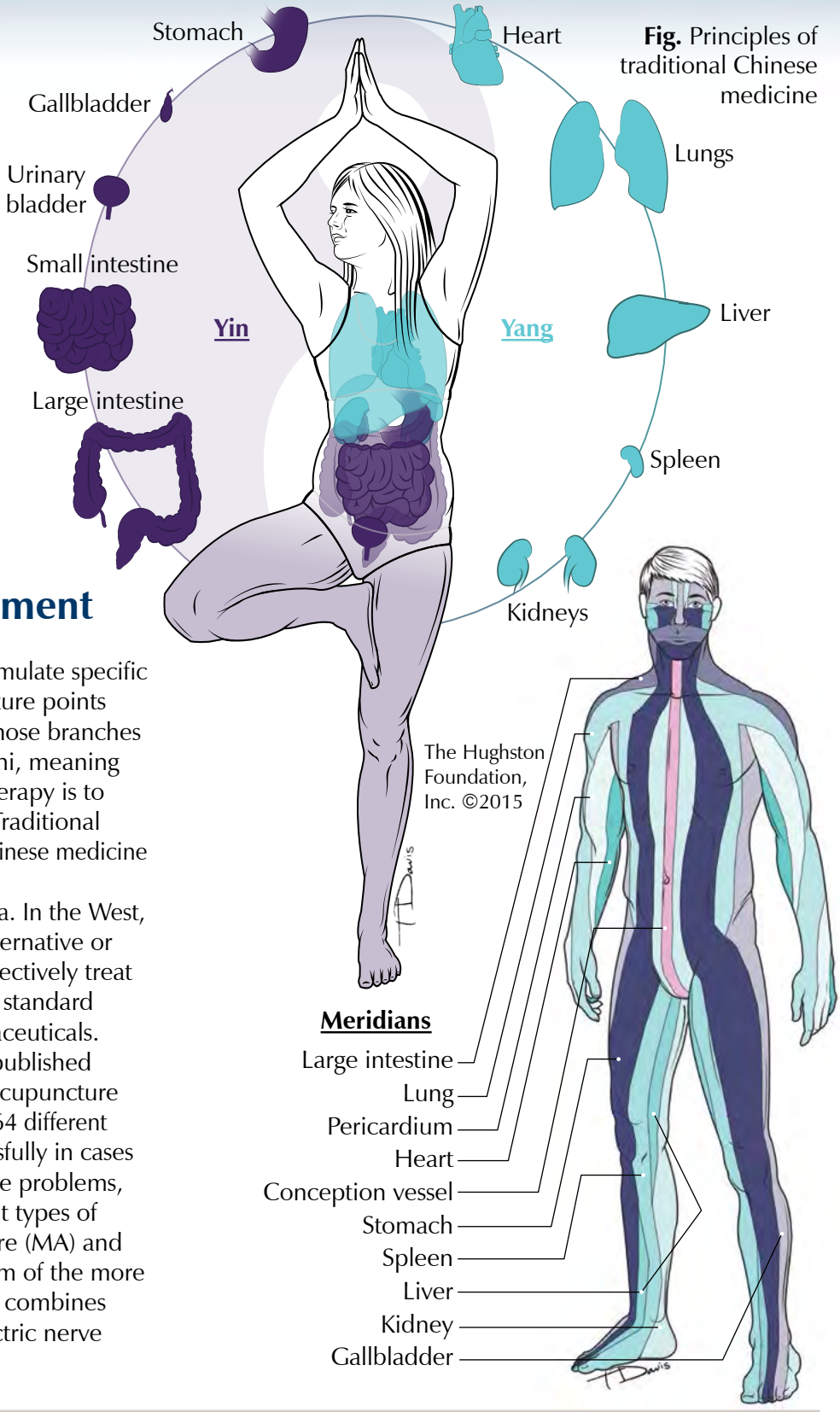

Fig. Principles of traditional Chinese medicine

Acupuncture and Orthopaedic Pain Management

Acupuncture is the use of thin needles to stimulate specific points along the body's skin. These acupuncture points correspond to channels or meridians (**Fig.**) whose branches connect to organs and through which qi or chi, meaning life energy, flows. The aim of acupuncture therapy is to correct imbalances in the body's flow of qi. Traditional Chinese acupuncture is an important part of Chinese medicine and boasts a 2,500-year history.

Acupuncture is still widely practiced in China. In the West, acupuncture is now considered a type of "alternative or complementary medicine" because it can effectively treat many conditions with fewer side effects than standard medical protocols, such as surgery or pharmaceuticals. The World Health Organization (WHO) has published guidelines on the therapeutic application of acupuncture and its effectiveness in relieving or eliminating 64 different symptoms. Acupuncture has been used successfully in cases of chronic pain, arthritis, nausea, and digestive problems, among other conditions. There are 2 different types of therapeutic acupuncture, manual acupuncture (MA) and electroacupuncture (EA). EA is a modified form of the more traditional MA. The advantage of EA is that it combines the therapeutic effects of transcutaneous electric nerve stimulation (TENS) with MA.

Fundamental Theories

Theory of Yin-Yang

The ancient theory of Yin-Yang holds that the world is material and is constantly evolving as a result of the interaction of 2 opposing forces known as Yin-Yang. Originally, these terms were used to designate the 2 slopes of a mountain: the shady side was Yin and the sunny side was Yang. Later, the meaning expanded to include all pairs of opposites. All natural phenomena and states of being are rooted in Yin and Yang, and can therefore be seen as dual—for example, day and night, brightness and darkness, movement and stillness, hot and cold.

Within the field of medicine, different parts of the body are also classified as either Yin or Yang. The lower and interior parts of the body belong to Yin and the upper and exterior parts to Yang. Likewise, the feet belong to Yin while the hands to Yang. Moreover, the heart, liver, spleen, lung, and kidney represent what are called the 5 Zang organs that pertain to Yin while the small intestine, large intestine, gallbladder, urinary bladder, stomach, and sanjiao (the triple-burner, an organ-energy system not recognized in western medicine) are what are known as the 6 Fu organs that pertain to Yang (**Fig.**).

Yin and Yang are both antagonistic and interdependent; they not only oppose and complement each other at the same time, but one can transform into the other. Traditional Chinese medicine applies the Yin-Yang principles of interrelationship and continuous transformation to the human body in order to explain its physiology and pathology, and this in turn can guide clinical diagnosis and treatment.

The theory of the 5 elements

The 5 elements refer to the 5 categories of basic substances thought to constitute the material world: wood, fire, earth, metal, and water. The Chinese people recognized that wood, fire, earth, metal, and water were not only substances essential to their daily lives, but also had distinctive qualities. Using the theory of 5 elements, traditional Chinese medicine has made a comprehensive study and comparison of all kinds of substances and phenomena in nature, including the human body. Depending on their particular properties, functions, and forms it has classified each of the Zang-Fu organs as well as the tissues, physiology, and pathology of the body as belonging to 1 of the 5 elements. In this way, physiology and pathology as well as man and his natural surroundings are correlated.

Pain relief using acupuncture

Although acupuncture has been used for thousands of years, the precise mechanism that makes it effective remains unclear to researchers. Through a large number of studies on humans and animals, the science community has demonstrated that acupuncture has various biological effects on the peripheral and central nervous systems as well as the endocrine, immune, cardiovascular, and digestive systems.

Acupuncture in orthopaedics

Osteoarthritis

Osteoarthritis (OA) is a degenerative joint disease observed mainly in the elderly population; in the lower limbs, the knee is the most commonly affected joint. Symptoms of knee OA can include pain, swelling, stiffness, muscle weakness, limited range of motion, and deformity. Any of these symptoms can affect the function of the joint, leading to abnormal gait patterns. Pain relief is usually the primary concern at clinics where practitioners aim to diminish the functional disabilities that cause pain. In an article recently published in *BMC Complementary & Alternative Medicine*, researchers concluded that the use of acupuncture produced significant reduction in pain intensity and improvement in functional mobility in patients. The study also concluded that evidence supports the use of acupuncture as an alternative to traditional pain management in patients who have osteoarthritis.[1]

Pain relief after total knee or total hip replacement

Acupuncture has been used to treat postoperative pain in patients who have had total joint replacement of the hip or knee. A study published in *Pain Medicine* has reported that acupuncture can provide short-term pain relief after total joint surgery. In the study, patients reported their pain before and after acupuncture using a scale of 0 to 10, with 10 indicating the most severe pain. The study's researchers found that patients who received acupuncture treatment on the first day after surgery noted a 45% reduction in pain, and those patients from the group who elected to have a second acupuncture treatment on day 2 after surgery marked an even greater reduction in pain.[2]

Side effects

The practice of acupuncture is not without risk; however, most adverse events are minor and are often caused by improper technique. The most frequently noted side effects occur at the needle insertion site and include minor bleeding, pain, and dizziness. More serious adverse events are rare and usually the result of practitioner error. The most common are infection from unsterile needles and injury (such as the puncture of a major organ or nerve damage) from improper needle placement.

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Reference
1. Manyanga T, Froese M, Zarychanski, et al. Pain management with acupuncture in osteoarthritis: a systematic review and meta-analysis. *BMC Complementary & Alternative Medicine*. 2014;14:312-19.
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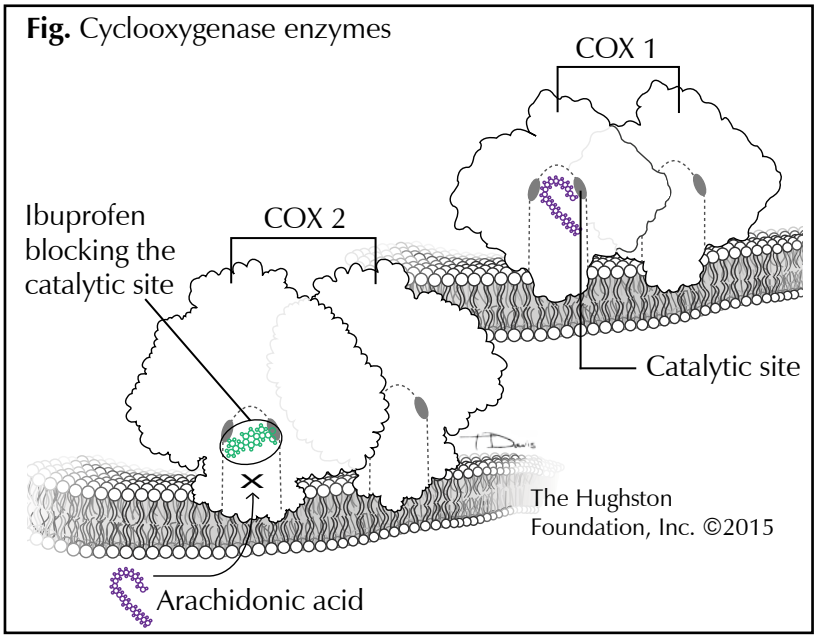
Getting Relief from Nonsteroidal Anti-inflammatory Drugs

Nonsteroidal anti-inflammatory drugs, better known as NSAIDs, are the most frequently used medications—whether physician- or self-prescribed—for the treatment of common ailments and injuries to the musculoskeletal system. Today physicians and patients have many choices when it comes to oral medications for the treatment of pain and inflammation. For example, physicians currently have more than 15 different types of NSAIDs to offer patients. At stores, patients must choose among brand-name and generic over-the-counter products belonging to 3 main categories—aspirin, ibuprofen, and naproxen.

How NSAIDs work

Despite their different forms and strengths, NSAIDs work to inhibit cyclooxygenase 1 (COX 1) and cyclooxygenase 2 (COX 2) enzymes (**Fig.**). Cyclooxygenase is an enzyme (protein molecule) that converts arachidonic acid into prostaglandins—active lipid compounds with hormone-like effects responsible for a wide-range of bodily functions, including constriction of the blood vessels and inflammation during an injury. Most NSAIDs are nonselective—meaning they block both COX 1 and COX 2— although some newer drugs only inhibit COX 2. COX 1 can be found in all tissues of the body and has been discovered to play a significant role in protection of the gastric lining of the stomach. NSAIDs reduce pain, fever, and inflammation, but not without some side effects. For example, the inhibition of COX 1 in the GI tract is thought to cause one common side effect, an upset stomach.

Fig. Cyclooxygenase enzymes



Side effects

Blocking COX 1 and COX 2 can also cause peptic ulceration, kidney dysfunction, and decreased hemostasis (blood clotting). Patients who receive long-term NSAID treatment have reported problems with ulcers in the stomach or intestinal tract at a rate as high as 20%. For this reason, physicians may consider the use of selective COX 2 inhibitors when treating patients with a history of peptic ulcer disease.

Prostaglandins influence kidney function. Besides helping to modulate the renin-angiotensin system (a system that regulates sodium balance, fluid volume, and blood pressure), prostaglandins have a direct effect on vascular tone (a blood vessel's degree of constriction). In patients with normal kidney function, the inhibition of COX enzymes does not usually cause problems. For those who have kidney disease, the decrease in the volume of renal blood flow that results from decreased prostaglandins can lead to further kidney injury, sodium retention, peripheral edema (swelling of the legs and feet), and hypertension (high blood pressure). Consequently, patients who have chronic hypertension, congestive heart failure, diabetes, or renal disease are often not prescribed NSAIDs.

NSAIDs affect the function of blood platelets which in turn affects hemostasis, the ability of the blood to clot. Non-aspirin NSAIDs decrease hemostasis for 2 to 3 days; by contrast, aspirin's effect on platelet function lasts 10 days. Some studies have demonstrated increased bleeding in those treated with NSAIDs, and US physicians ask patients to withhold taking oral NSAIDs for 7 days before surgery.

NSAIDs are used after surgery for pain relief as well as for the treatment of other conditions such as heterotopic ossification, which is bone formation in areas of the body that do not normally have bone. The condition is especially problematic in patients after trauma, spinal cord injury, or particular types of surgery around the hip and elbow. The extra bone formation can limit the recovery as well as motion of the joint affected. While one NSAID known as indomethacin has been used to treat this condition, studies have shown that another NSAID, naproxen, is just as effective. Treatment typically lasts for 6 weeks after surgery.

Since NSAIDs can prevent bone formation, most physicians recommend that patients not take oral anti-inflammatories while bones are healing. In the past NSAIDs were used for pain control for acute fracture, but an intravenous form, Toradol®, in particular, was suspected in the delayed healing of fractures during the acute phase. For this reason, most physicians will not administer IV forms of anti-inflammatories in patients with acute fractures, except those who are at risk for heterotopic ossification.

NSAIDs are not without risk when taken for long periods of time or when taken for short periods of time by patients who have comorbidities (the presence of 2 or more chronic diseases or conditions). Consequently, patients who require lengthy NSAID treatment or have comorbidities such as hypertension, kidney disease, or heart failure, should see their physician before starting or changing medications.

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Ultrasound for Diagnosis and Treatment in Orthopaedics

Ultrasound imaging is a safe, painless, and noninvasive tool for diagnosing and treating medical conditions that uses sound waves to produce dynamic pictures of internal body structures. Ultrasound technology has been applied in all areas of medicine. In orthopaedics, it is used to scan and produce an image of the soft tissues (muscles, ligaments, and tendons), joints, and bony structures of the musculoskeletal system as well as fluids. Ultrasound can also be helpful in identifying foreign bodies such as a wooden splinter lodged in the hand (**Fig. 1**).

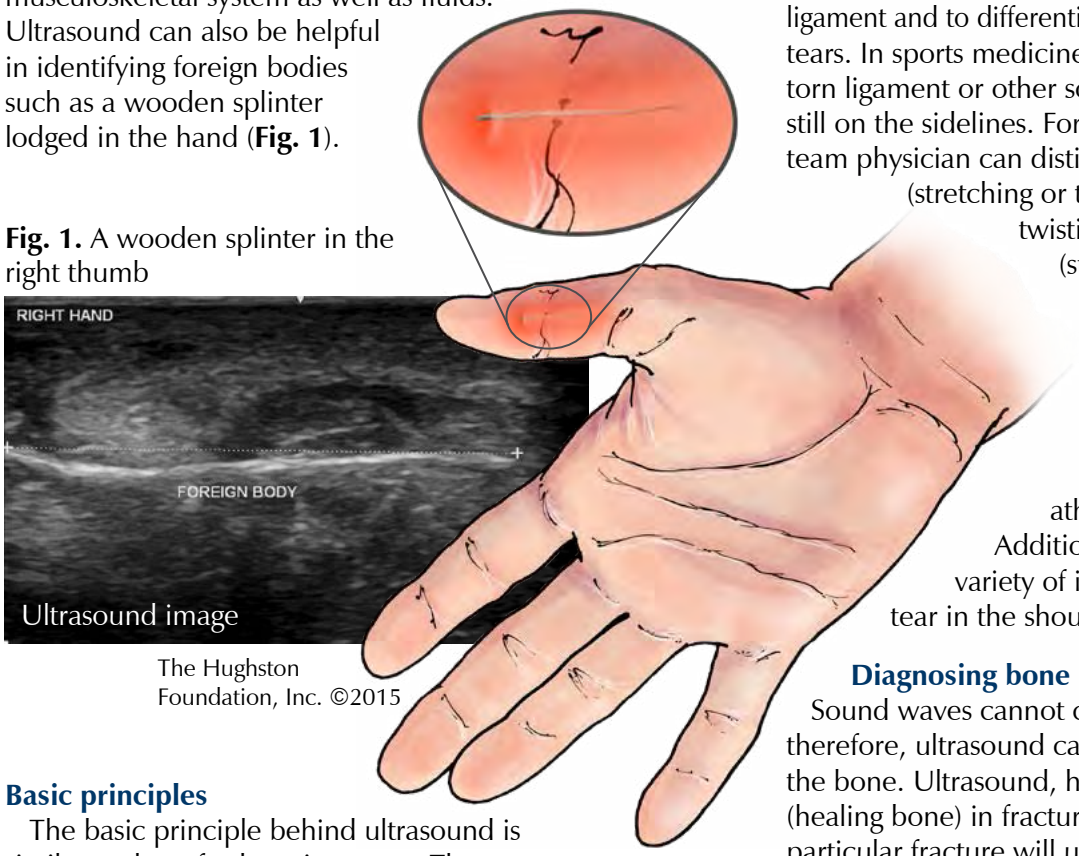

Fig. 1. A wooden splinter in the right thumb

Basic principles

The basic principle behind ultrasound is similar to that of submarine sonar. The term ultrasound refers to sound waves measured above the normal (audible) level of sound frequency which is 20Hz (Hertz) to 20,000Hz. By contrast, ultrasound machines use a frequency level between 2MHz and 10MHz for diagnostic purposes and a frequency level of around 0.5MHz for therapeutic purposes. An ultrasound probe that emits waves at these frequency levels is applied to the area under examination. The waves propagate throughout the tissues, then are reflected back by the tissues, received by the transducer, converted to electric current, and displayed on a monitor as an image. The pattern of the waves reflected back varies depending on the particular tissue or fluid involved, which means each of these can be identified by its characteristic image.

Who performs an ultrasound examination?

Obtaining a good image through ultrasound and understanding what that image shows requires highly-specialized skills. Ultrasound professionals, who include ultrasound technicians, sonographers, and radiologists (physicians who interpret images) are specially trained and certified to perform and evaluate ultrasound tests.

Diagnosing soft tissue injuries

Ultrasound images can help a physician determine the quality of various tissues around a joint—for example, the rotator cuff muscles at the shoulder, the biceps muscle at the elbow, the quadriceps tendon at the knee, and the Achilles tendon at the ankle. Ultrasound can also allow a doctor to diagnose or confirm a torn muscle, tendon, or ligament and to differentiate between complete or incomplete tears. In sports medicine, ultrasound can help to identify a torn ligament or other soft tissue injury while the athlete is still on the sidelines. For example, by using ultrasound, a team physician can distinguish a "regular" ankle sprain (stretching or tearing an ankle ligament by inward twisting) from a "high" ankle sprain (stretching or tearing the syndesmotic ligaments that connect the tibia and fibula by outward twisting). Ultrasound imaging can help the team physician determine the severity of the injury and the length of time needed before the athlete can safely return to play. Additionally, ultrasound imaging enables a variety of injuries in the joint, such as a labrum tear in the shoulder, to be diagnosed or confirmed.

Diagnosing bone injuries

Sound waves cannot completely penetrate hard bone; therefore, ultrasound can image only the outer surfaces of the bone. Ultrasound, however, can help to identify callus (healing bone) in fractures and thus predict whether a particular fracture will ultimately progress to union or not. Scans can also be useful in identifying mechanical impingement by soft tissue or bony structures found at the ankle, hip, elbow, or shoulder.

Diagnosing congenital abnormalities

In newborns, ultrasound can help to identify congenital joint abnormalities, particularly those of the hip. Because the bones of infants are non-ossified and soft with a large portion of cartilage, they are difficult to see on x-rays. Ultrasound scans can identify non-ossified bone cartilage and thus help to delineate the anatomical structure of the hip joint in newborns.

Diagnosing soft tissue masses, swelling, or fluid

Ultrasound images can show various masses or cysts and allow a physician to differentiate cellulitis (a bacterial infection that affects the skin and subcutaneous fat) from underlying fluid collection (**Fig. 2**). Such images can also help when it comes to determining an appropriate treatment plan. Moreover,

by revealing a pathway, ultrasound is extremely useful in aspirating bursae (fluid-filled sacs that cushion points of friction between bone and soft tissues) or soft-tissue abscesses, particularly when overlying tissues are inflamed and swollen with fluid. In children, the use of ultrasound is particularly helpful in identifying fluid collection inside or outside a hip joint without causing discomfort. Once the type of fluid has been identified, a plan can be made to aspirate it using ultrasound as a guide. The aspirated fluid can then be analyzed for the presence of infection; this can help to prevent unnecessary surgeries for inflammatory or non-infectious conditions.

Treatments

Ultrasound can be used for guidance in injecting corticosteroids into various body parts and joints to relieve pain and inflammation. During an injection procedure, ultrasound can help accurately locate the specific tissue targeted for treatment, reducing treatment time and patient discomfort. For example, in patients with carpal tunnel, ultrasound can help guide needle placement so that the median nerve is avoided (**Fig. 3**). Recently, the use of ultrasound has been successful in the treatment of calcific tendonitis (a condition where calcium deposits form in the tendon). With the help of ultrasound images, a particular substance is injected into the tendon to dissolve the calcium and then removed with a suction device, thus eliminating the need for surgery.

Fig. 2. Ganglion cyst on the right wrist

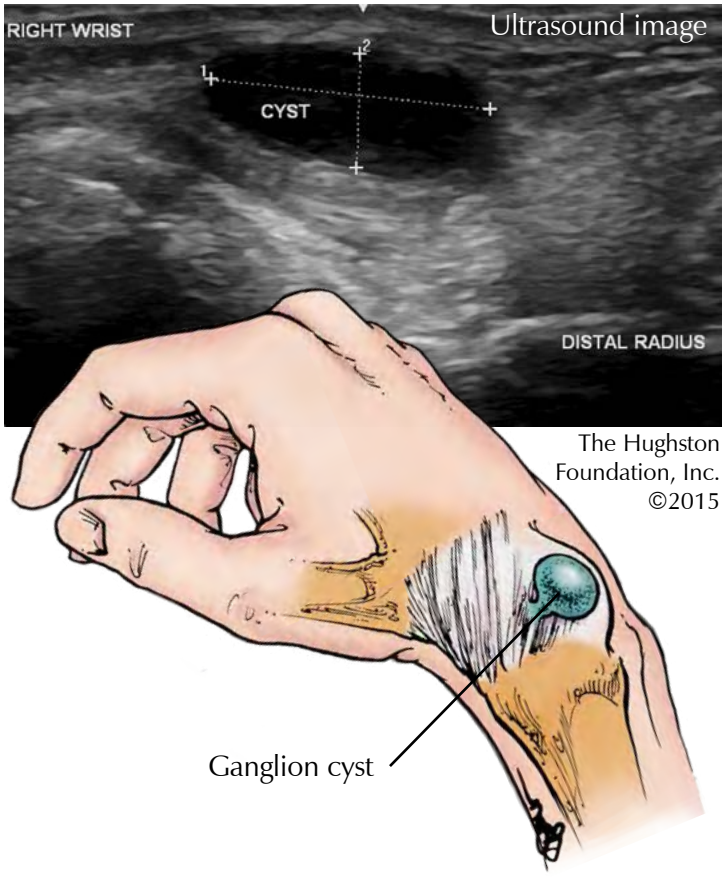

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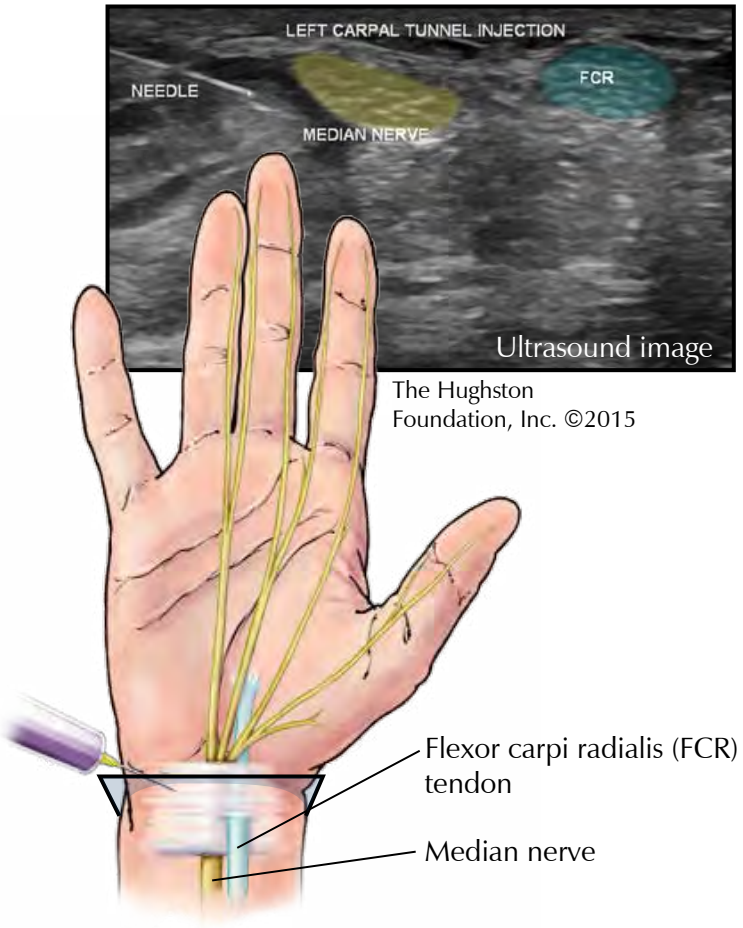
Fig. 3. Carpal tunnel injection



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Ultrasound versus other imaging technology

Ultrasound has several distinct advantages over other kinds of imaging. Ultrasound is safer than x-rays or computerized axial tomography (CT) scans as there is no radiation involved. When it comes to a variety of musculoskeletal conditions such as soft-tissue and intra-articular cartilage and ligamentous pathology, magnetic resonance imaging (MRI) is the most commonly ordered diagnostic test. CT scans, by contrast, are used for diagnosing various bone conditions as such images provide detailed evaluations of bony structures. Ultrasound is especially useful in cases where an MRI or CT scan may not produce a good image or when there is metallic hardware near the body part to be examined. Additionally, both MRI and CT machines are expensive as well as bulky and require a lot of space for installation. Ultrasound equipment, by contrast, is compact and many times more portable and cost-effective. Unlike with MRI or CT, however, the results of any ultrasound are operator-dependent. While the use of ultrasound may not completely replace the use of MRI or CT, it has its own range of uses and can be a helpful addition to diagnostic testing and treatment in orthopaedics.

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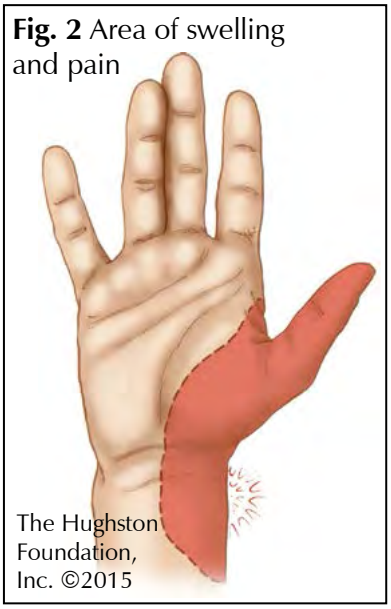
De Quervain's Tenosynovitis

THE DIGITAL COMEBACK

The rise of cellphone and smartphone use, and more specifically, the associated increase in text messaging, has caused a recent spike in de Quervain's tenosynovitis among the general population. The phrase "text messaging thumb" has been coined to identify the recent correlation between the new technology and this particular form of tenosynovitis (the inflammation of the tendon sheath and the thin, fluid-producing membrane, called the synovium, that lines it). There is no concrete evidence to prove that using a cellphone or smartphone, particularly for text messaging purposes, will cause a person to develop de Quervain's tenosynovitis; however, a study published by *Applied Ergonomics* has reported that using a smaller keyboard puts an unfavorable amount of strain on both the extensor pollicis brevis and the abductor pollicis longus tendons. The movements used to type on a smaller keyboard require placing and holding the thumb in many different positions for a brief period of time, straining the thumb musculature. While the use of cellphones and smartphones represents a new cause of de Quervain's tenosynovitis, diagnosis and treatment for the syndrome remains the same.

Fig. 2 Area of swelling and pain



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Overuse injury

De Quervain's tenosynovitis is an inflammation of the tendons and the surrounding sheaths of both the extensor pollicis brevis and abductor pollicis longus muscles (**Fig. 1**). These 2 muscles are used to abduct (pull away from the center of the hand) and extend the thumb respectively. Each of the muscle tendons is wrapped in a fibrous sheath that holds it in place. A lubricating connective tissue called the synovial membrane allows the tendon to glide smoothly through the sheath. If the inflammation is left untreated, the tendon can become thicker over time and cause a narrowing of the area in the sheath, which can limit thumb movement.

This inflammatory condition is more common in females than males and typically occurs between the ages of 30 to 50 years old. Generally, de Quervain's tenosynovitis is caused by overuse of the thumb and wrist; the most harmful movements include the repetitive extension of the thumb or a motion of pinching and twisting with the thumb while turning the wrist.

Symptoms

De Quervain's tenosynovitis often causes pain, swelling, and tenderness along the base of the thumb and down the wrist (**Fig. 2**). During thumb movement, clicking or catching can occur as the extensor pollicis brevis tendon moves through the sheath. Radiating pain in the forearm can also be experienced.

Treatment

For the patient who has de Quervain's tenosynovitis, first time treatment often involves rest, ice, nonsteroidal anti-inflammatory drugs (NSAIDs), and a thumb splint to prevent movement. If needed, a doctor can prescribe activity modifications and long-term splinting can eliminate excessive strain on the involved tendons. Some physicians recommend that the splint be worn for 4 to 6 weeks while others prescribe that it should be worn only as needed for pain. Once the swelling and pain have subsided, your physician may prescribe range of motion exercises that can be taught by a hand therapist and then self-performed to help maintain and restore normal thumb movement. If these noninvasive forms of treatment do not work, then corticosteroid injections can be given to help decrease the inflammation. As a last resort, surgery can be preformed to create more room for the tendons by opening the sheath (**Fig. 3**).

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Fig. 1 Tendons in fibrous sheath

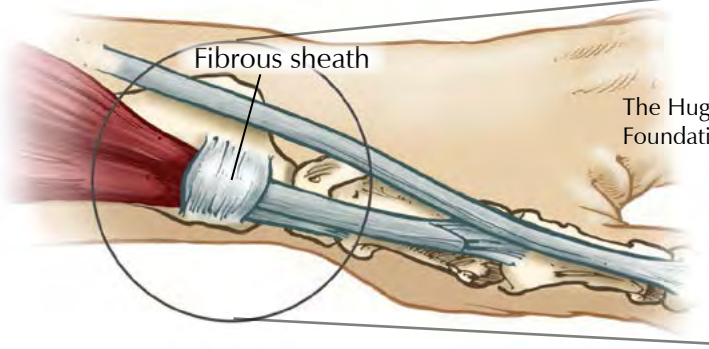

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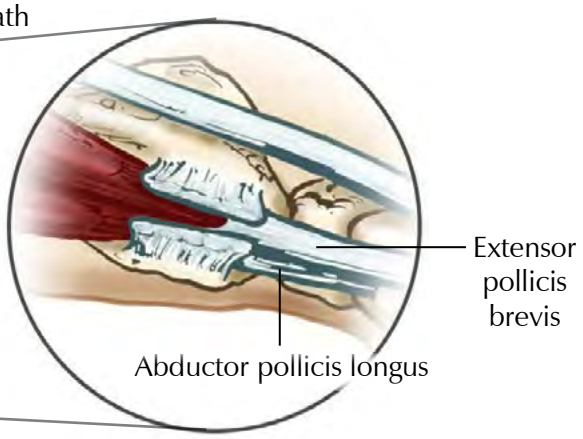
Fig. 3 Sugically opened fibrous sheath



Knee Effusion: What's causing the swelling in your knee?

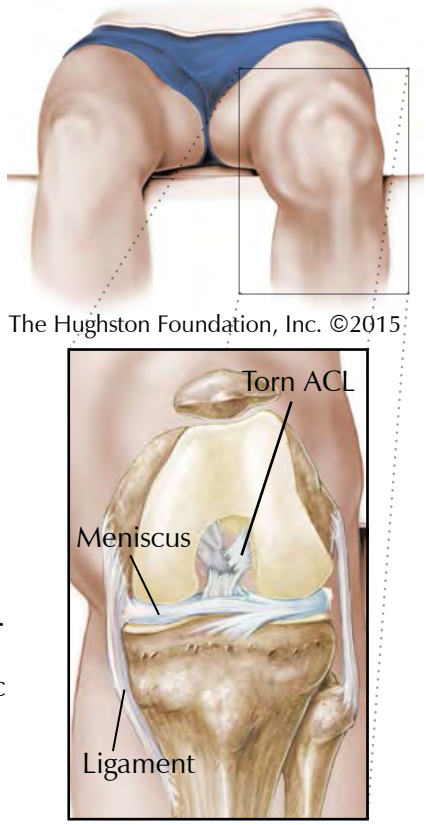
Knee effusion or swollen knee, sometimes referred to as "water on the knee," occurs when excess fluid or blood accumulates within the knee joint or the soft tissue surrounding the knee. Excess fluid in the knee joint often causes stiffness and pain. Depending on the amount of fluid accumulation, your knee can become red and warm to the touch and weightbearing may be painful. The swelling can make it difficult to walk or bend and straighten your leg completely. Depending on how much fluid build-up you experience, weightbearing may be painful. Swelling may happen after an injury or be caused by other medical conditions, such as arthritis. A swollen knee can occur either suddenly or gradually, making it challenging to determine the exact cause.

Causes

Anterior cruciate ligament (ACL) tears and fractures of bone or cartilage are common injuries that can cause blood to accumulate in the knee (**Fig.**). Within minutes this bleeding can result in swelling of the knee and intense pain. Injuries that can cause nonbloody fluid to accumulate include tears to the meniscus—a fibrocartilaginous disc that acts as a cushion between the ends of the femur (thighbone) and the tibia and fibula (lower leg bones)—or to the ligaments (tissues that connect bone to bone) of the knee joint. The swelling occurs within hours to days after injury and the pain is less intense than the pain experienced from a bloody swollen knee.

A swollen knee that has not been injured can be related either to a chronic condition, such as osteoarthritis, or can be caused by infection, gout, or pseudogout. Osteoarthritis in the knee joint results from the wear and tear of the cartilage and typically occurs with age. Infection can happen after a traumatic injury to the knee or following surgery; an infection can also spread from other parts of the body to the knee joint. Gout, a complex form of arthritis that produces sudden joint pain, is caused by high levels of uric acid (a substance produced during digestion to help get rid of waste material) circulating in the blood. When uric acid crystals build up in the knee, swelling and inflammation result. Pseudogout produces similar symptoms, but is caused by the build-up of calcium pyrophosphate deposits within the knee and is treated differently than gout.

Fig. Swollen knee joint caused by an ACL tear



Diagnosis

Your physician will examine your knee and ask you questions concerning your health history or a recent injury. He or she may then order a number of tests to help determine why fluid has accumulated in your knee. An x-ray can help to reveal whether you have a fracture, any dislocated bones, or arthritis in the knee joint. An ultrasound exam can also be used to diagnose arthritis or a tendon (tissue connecting muscle to bone) or ligament problem in the knee joint. If x-rays and ultrasound do not identify the cause, your doctor can order a magnetic resonance imaging scan (MRI) that shows the bones, muscles, tendons, and ligaments. Additionally, he or she can perform a procedure called arthrocentesis or joint aspiration by drawing fluid from the inside of the joint. A lab checks the fluid to see whether blood is present—indicating an injury—or perhaps bacteria, which would indicate infection. The lab can also check for calcium crystal deposits that are present in cases of gout or pseudogout.

If a medical history, knee examination, imaging tests, and fluid analysis do not reveal the cause of the knee swelling, your doctor can draw a blood sample from your arm and test for infection, rheumatoid arthritis (an autoimmune disease that causes joint inflammation), lyme disease (an acute inflammatory disease caused by deer ticks), bleeding disorders, or gout.

Treatment

If you have a swollen knee, contact your physician immediately. In the meantime, you can treat the swelling and pain using the RICE method (**R**est, **I**ce, **C**ompression, and **E**levation) and nonsteroidal anti-inflammatory medication. You should rest your knee as much as possible, avoiding weightbearing activity, apply ice packs (15 to 20 minutes every 2 hours), use compression (such as an ACE bandage), and elevate the leg on a pillow.

Once your physician knows the cause of the fluid buildup, and if over-the-counter pain relievers do not help, he or she may recommend stronger medication. If you have an infection, antibiotics may be prescribed. A steroidal anti-inflammatory medication, such as a cortisone injection, may also be given to help reduce the inflammation. Swelling is always a sign of an underlying problem with the knee joint and should be evaluated by your physician. Left untreated, a swollen knee can limit your mobility, and if an infection is causing the swelling, it can destroy your joint.

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