

Sport injuries

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Fractures

- A fracture is a break, usually in a bone.
- Fractures commonly happen because of car accidents, falls or sports injuries. Other causes are low bone density and osteoporosis, which cause weakening of the bones. Overuse can cause stress fractures, which are very small cracks in the bone.

Fractures

- Bones are rigid, but they do bend or "give" somewhat when an outside force is applied. However, if the force is too great, the bones will break, just as a plastic ruler breaks when it is bent too far.

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Types of fractures

- **Stable fracture.** The broken ends of the bone line up and are barely out of place.
- **Open, compound fracture.** The skin may be pierced by the bone or by a blow that breaks the skin at the time of the fracture. The bone may or may not be visible in the wound.
- **Transverse fracture.** This type of fracture has a horizontal fracture line.

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Types of fractures

Oblique fracture. This type of fracture has an angled pattern.

Comminuted fracture. In this type of fracture, the bone shatters into three or more pieces.



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Cause

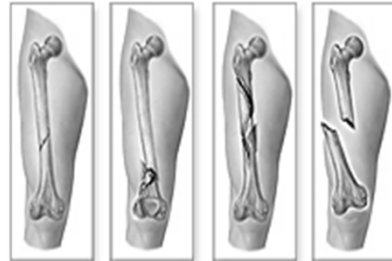
- **Trauma**
- **Osteoporosis**
- **Overuse**

Repetitive motion can tire muscles and place more force on bone. This can result in stress fractures. Stress fractures are more common in athletes.

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Symptoms

- Out-of-place or misshapen limb or joint
- Swelling, bruising or bleeding
- Intense pain
- Numbness and tingling
- Limited mobility or inability to move a limb



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Treatments

- **Cast Immobilization:** A plaster or fiberglass cast is the most common type of fracture treatment.
- **Functional Cast or Brace:** The cast or brace allows limited or "controlled" movement of nearby joints. This treatment is desirable for some, but not all, fractures.

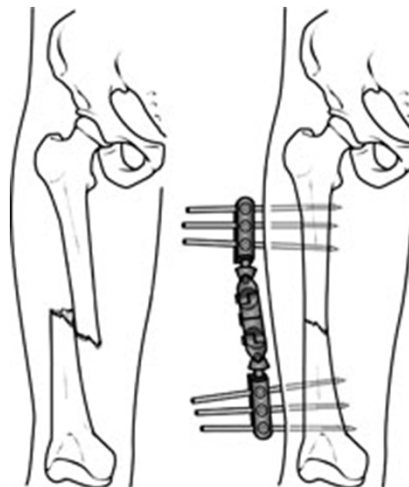
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Treatments

- **Traction:** Traction is usually used to align a bone or bones by a gentle, steady pulling action.
- **External Fixation:** In this type of operation, metal pins or screws are placed into the broken bone above and below the fracture site. The pins or screws are connected to a metal bar outside the skin.

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External Fixation



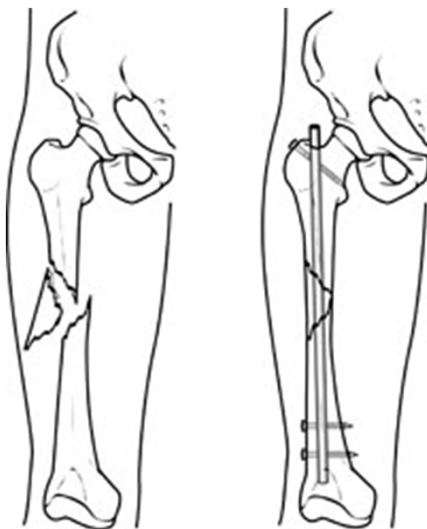
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Treatments

- **Open Reduction and Internal Fixation**
- During this operation, the bone fragments are first repositioned (reduced) in their normal alignment, and then held together with special screws or by attaching metal plates to the outer surface of the bone. The fragments may also be held together by inserting rods down through the marrow space in the center of the bone.

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Open Reduction and Internal Fixation



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Recovery

- Fractures take several weeks to several months to heal, depending on the extent of the injury and how well you follow your doctor's advice. Pain usually stops long before the fracture is solid enough to handle the stresses of normal activity.
- Specific exercises will help you restore normal muscle strength, joint motion, and flexibility.

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Stress Fractures

- A stress fracture is a small crack in a bone. Stress fractures often develop from overuse, such as from high-impact sports like distance running or basketball.
- Most stress fractures occur in the weight-bearing bones of the foot and lower leg. Studies show that athletes participating in tennis, track and field, gymnastics, dance, and basketball are at high risk for stress fractures.

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Stress Fractures

- When muscles are overtired, they are no longer able to lessen the shock of repeated impacts. When this happens, the muscles transfer the stress to the bones. This can create small cracks or fractures.

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Chapter 2

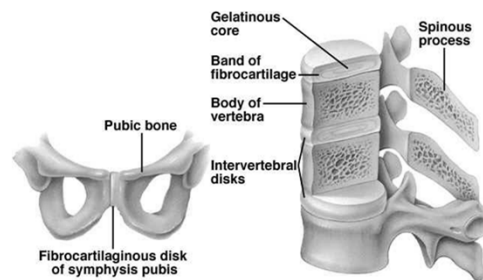
Joint injuries

Introduction

- Hyaline
- Fibrocartilage

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Cartilaginous Joint — Symphysis



Knee Joint - Side View

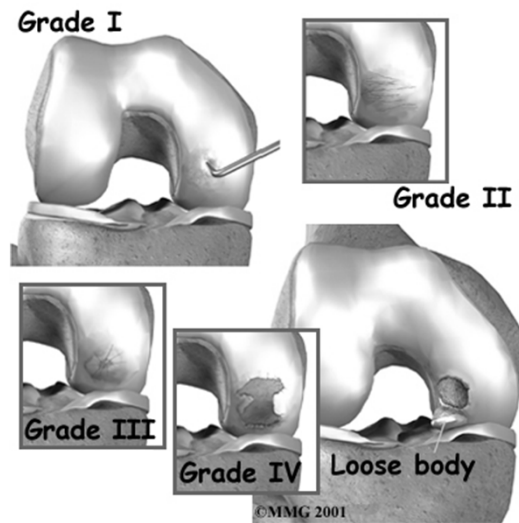
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Osteochondritis dissecans

- Osteochondritis dissecans (OCD) is a condition that develops in joints, most often in children and adolescents.
- As a result, the small piece of bone and the cartilage covering it begin to crack and loosen.
- The most common joints affected by osteochondritis dissecans are the knee, ankle and elbow, although it can also occur in other joints.

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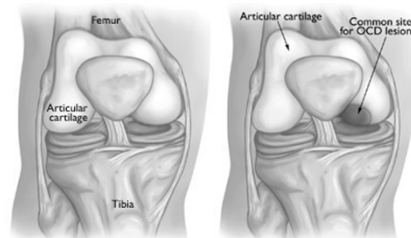
Osteochondritis dissecans



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Cause

- It is not known exactly what causes the disruption to the blood supply and the resulting OCD. Doctors think it probably involves repetitive trauma or stresses to the bone over time.



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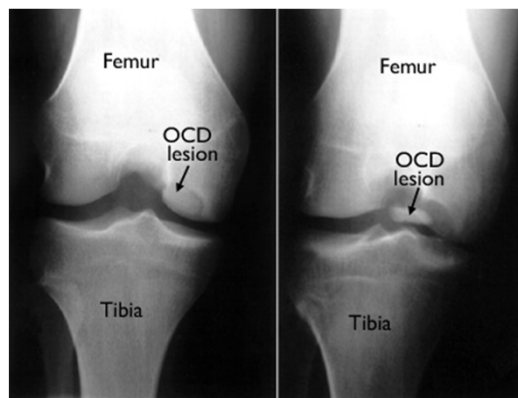
Symptoms

- Pain and swelling of a joint — often brought on by sports or physical activity — are the most common initial symptoms of OCD. Advanced cases of OCD may cause joint catching or locking.

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Examination

- X-rays
- Magnetic resonance imaging (MRI) and ultrasound



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Treatment

- **Observation and Activity Changes**
- In most cases, OCD lesions in children and young teens will heal on their own, especially when the body still has a great deal of growing to do. Resting and avoiding vigorous sports until symptoms resolve will often relieve pain and swelling.
- **Nonsurgical Treatment**
- use of crutches, or splinting or casting the affected arm, leg or other joint for a short period of time.

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Osteoarthritis

- Osteoarthritis, also known as "wear and tear" arthritis, is a progressive disease of the joints.
- With osteoarthritis, the articular cartilage that covers the ends of bones in the joints gradually wears away.
- when the joint bent and straightened, there is now a frayed, rough surface. Joint motion along this exposed surface is painful.

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Osteoarthritis

- Osteoarthritis usually develops after many years of use. It affects people who are middle-aged or older. Other risk factors for osteoarthritis include obesity, previous injury to the affected joint, and family history of osteoarthritis.

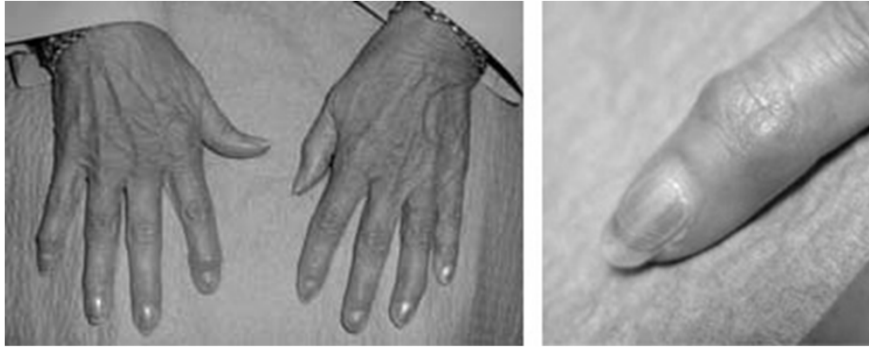
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Symptoms

- A joint affected by osteoarthritis may be painful and inflamed. Without cartilage, bones rub directly against each other when the joint moves. This is what causes the pain and inflammation.
- Pain may be worse in the morning and feel better with activity. Vigorous activity may cause pain to flare up.
- The joint may stiffen and look swollen, enlarged or "out of joint." A bump may develop over the joint.
- If bending the joint becomes difficult, motion may be limited.

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Symptoms



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Diagnosis

- A complete medical history, physical examination, X-rays, and possibly laboratory tests will be done.



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Treatment

- **Nonsurgical Treatment**

- **Lifestyle Modifications**

- The doctor may recommend rest or a change in activities to avoid provoking osteoarthritis pain. This may include modifications in work or sports activities. It may mean switching from high-impact activities (such as aerobics, running, jumping, or competitive sports) to low-impact exercises (such as stretching, walking, swimming, or cycling). A weight loss program may be recommended, if needed, particularly if osteoarthritis affects weight-bearing joints (such as the knee, hip, spine, or ankle)

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Treatment

- **Medications**

- Non-steroidal anti-inflammatory drugs can help reduce inflammation.

- **Corticosteroids**

- **Dietary supplements** called glucosamine and chondroitin sulfate may help relieve pain from osteoarthritis.

- **Physical Therapy**

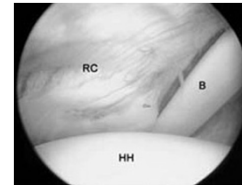
- A balanced fitness program, physical therapy, and/or occupational therapy may improve joint flexibility, increase range of motion, reduce pain, and strengthen muscle, bone, and cartilage tissues.

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Treatment

■ Surgical Treatment

- Arthroscopy
- Osteotomy
- Joint fusion
- Joint replacement
- Arthroscopy is a surgical procedure orthopaedic surgeons use to visualize, diagnose, and treat problems inside a joint.
- The word arthroscopy comes from two Greek words, "arthro" (joint) and "skopein" (to look). The term literally means "to look within the joint."



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Rheumatoid Arthritis

- In rheumatoid arthritis, swells, invades surrounding tissues, and the joint lining produces chemical substances that attack and destroy the joint surface.
- People of all ages may be affected. The disease usually begins in middle age.
- Rheumatoid arthritis usually affects joints on both sides of the body in the hands and feet, as well as the hips, knees, and elbows. Without proper treatment, rheumatoid arthritis can become a chronic, disabling condition.

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Cause

- Ligaments and joint capsules become less effective supporting structures. Erosion of the articular cartilage, together with ligamentous changes, result in deformity and contractures. As the disease progresses, pain and deformity increase.



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Symptoms

- Swelling, pain, and stiffness in the joint, even when it is not being used
- A feeling of warmth around the joint
- Deformities and contractures of the joint
- Symptoms throughout the body, such as fever, loss of appetite and decreased energy
- Weakness due to a low red blood cell count (anemia)
- Nodules, or lumps, particularly around the elbow
- Foot pain, bunions, and hammer toes with long-standing disease

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Treatment

- **Medication**
- Medications used to control rheumatoid arthritis fall into two categories: those that relieve symptoms and those that have the potential to modify the course of the disease. Often, they are used together. Aspirin and ibuprofen can help reduce the pain and inflammation of rheumatoid arthritis. Disease-modifying drugs include methotrexate and sulfasalazine and gold injections.

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- X-ray of hip with rheumatoid arthritis and total hip replacement



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Gout

- Gout develops when too much uric acid accumulates in your bloodstream. This dissolved uric acid then comes out of the bloodstream and forms microscopic spike-like crystals in joints or soft tissues.
- Your body reacts to uric acid crystals as if they were a foreign body or bacteria. White blood cells and other infection fighting cells are sent into the area, which results in inflammation.

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What Gout Affects

- **Joints.** Gout frequently involves the joint of the big toe. However, it can affect small joints like those in the finger, as well as large joints, such as the knee and hip.
- **Bursae**
- **Tendon sheaths.** These tunnels protect and provide nutrition to tendons in the hands and feet.
- **Kidneys.** High uric acid levels may cause kidney stones and, sometimes, damage the kidneys. About 15 people out of 100 with gout develop kidney stones.

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Cause

- Gout can develop when your body produces too much uric acid or when it does not eliminate enough of it. When the levels of uric acid in your blood are too high, it is called hyperuricemia.
- **The Role of Uric Acid**
- Uric acid is produced when your body breaks down purines, which are substances naturally found in your body, as well as in protein-rich foods.

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Symptoms

- A gout attack can be sudden and severe. It may wake you up at night with intense pain in your big toe.
- The joint that is affected is typically red and swollen. It may also feel hot.



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Examination

- **Blood Test**
- **Synovial Fluid Analysis**

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Treatment

- **Ice.** Apply ice to the affected area to reduce swelling. Do not apply ice directly to the skin. Use an ice pack or wrap a towel around the ice. Apply ice for about 20 minutes at a time.
- **Elevate.** Frequently raise and keep the affected area above the level of the heart.
- **Rest.** Move the affected area as little as possible while symptoms are present.
- **Over-the-counter non-steroidal anti-inflammatory medicines.**

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Surgical Treatment

- Removal of tophi
- Joint fusion
- Joint replacement



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Chapter 5

Ligaments Injuries

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Sprains, Strains, and Other Soft-Tissue Injuries

- Some of the soft-tissue injuries you are most likely to experience include:
 - sprains
 - strains
 - contusions
 - tendonitis
 - bursitis
 - stress injuries

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Sprains

- The joints of your body are supported by ligaments.
- Ligaments are strong bands of connective tissue that connect one bone to another. A sprain is a simple stretch or tear of the ligaments.
- The areas of your body that are most vulnerable to sprains are your ankles, knees, and wrists.

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Sprains

- Most mild sprains heal with "R.I.C.E." (rest, ice, compression, and elevation) and exercise. Moderate sprains may also require a period of bracing. The most severe sprains may require surgery to repair torn ligaments.

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What causes sprains and strains?

- A sprain is caused by direct or indirect trauma (a fall, a blow to the body, etc.) that knocks a joint out of position, and overstretches, and, in severe cases, ruptures the supporting ligaments. Typically, this injury occurs when an individual lands on an outstretched arm; slides into a base; jumps up and lands on the side of the foot; or runs on an uneven surface.

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Strains

- Chronic strains are the result of overuse (prolonged, repetitive movement) of muscles and tendons. Inadequate rest breaks during intensive training precipitates a strain. Acute strains are caused by a direct blow to the body, overstretching, or excessive muscle contraction.
- People at risk for the injury have a history of sprains and strains, are overweight, and are in poor physical condition.

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What are the signs of a sprain?

- While the intensity varies, pain, bruising, swelling, and inflammation are common to all three categories of sprains:
 - mild,
 - moderate,
 - severe.

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Grading sprains and strains

- **Grade one sprain** – mild stretching of your ligament has taken place.
- **Grade two sprain** – there has been a partial rupture (splitting) of your ligament but the joint it is associated with is still stable.
- **Grade three sprain** – there has been a complete rupture of the ligament and the joint is unstable.

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Treating a sprain

- Most sprains and strains can usually be treated with self-care techniques, such as PRICE therapy – protection, rest, ice, compression and elevation.

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Preventing sprains

- using the correct footwear for activities
- warming up properly before exercise
- stretching or 'warming down' after exercise
- doing regular strengthening and conditioning exercises

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Treating sprains and strains

- PRICE therapy
- avoiding HARM

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Protection

- **Protection** – protect the injured area from further injury, by using a support or, in the case of an ankle injury, wearing shoes that enclose and support your feet, such as lace-ups.

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Ice

- **Ice** – for the first 48 to 72 hours after the injury, apply ice wrapped in a damp towel to the injured area for 15 to 20 minutes every two to three hours during the day. Do not leave the ice on while you are asleep, and do not allow the ice to touch your skin directly because it could cause a cold burn.

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Compression

- **Compression** – compress or bandage the injured area to limit any swelling and movement that could damage it further. You can use a crepe bandage or a simple elastic bandage available from a pharmacy. It should be wrapped snugly around the affected area but not so tightly that it restricts blood flow. Remove the bandage before you go to sleep.

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Elevation

- **Elevation** – keep the injured area raised and supported on a pillow to help reduce swelling. If your leg is injured, avoid having long periods of time where your leg is not raised.

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HARM

- For the first 72 hours after a sprain or muscle strain you should avoid:
- **Heat** – such as hot baths, saunas or heat packs (applying a controlled amount of heat to affected joints)
- **Alcohol** – drinking alcohol will increase bleeding and swelling and decrease healing
- **Running** – or any other form of exercise that could cause more damage
- **Massage** – which may increase bleeding and swelling

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Treating pain

- codeine, only available on prescription, may be required.
- Oral non-steroidal anti-inflammatory drugs (NSAIDs), such as Ibuprofen can also help reduce swelling and inflammation. However, NSAIDs should only be considered 48 hours after the injury has occurred because they affect the healing process.

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Muscle Cramp

- Have you ever experienced a "charley horse"? If yes, you probably still remember the sudden, tight and intense pain caused by a muscle locked in spasm.
- A charley horse is the common name for a muscle spasm. Muscle spasms can occur in any muscle in the body, but often happen in the leg.

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Muscle Cramp

- A cramp is an involuntary and forcibly contracted muscle that does not relax. Cramps can affect any muscle under your voluntary control (skeletal muscle). Muscles that span two joints are most prone to cramping. Cramps can involve part or all of a muscle, or several muscles in a group

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Muscle Cramp

- The most commonly affected muscle groups are:
 - Back of lower leg/calf (gastrocnemius)
 - Back of thigh (hamstrings)
 - Front of thigh (quadriceps)
- Just about everyone will experience a muscle cramp sometime in life. It can happen while you play tennis or golf, bowl, swim, or do any exercise. It can also happen while you sit, walk, or even just sleep.

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Muscle Cramp

- Muscle cramps are very common among endurance athletes (i.e., marathon runners and triathletes) and older people who perform strenuous physical activities.
- Athletes are more likely to get cramps in the preseason when the body is not conditioned and therefore more subject to fatigue. Cramps often develop near the end of intense or prolonged exercise, or 4-6 hours later.

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Cause

- Although the exact cause of muscle cramps is unknown (idiopathic), some researchers believe inadequate stretching and muscle fatigue leads to abnormalities in mechanisms that control muscle contraction.
- **Stretching and Muscle Fatigue**
- **Heat, Dehydration, and Electrolyte Depletion**

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Cause

- A regular program of stretching lengthens muscle fibers so they can contract and tighten more vigorously when you exercise. When your body is poorly conditioned, you are more likely to experience muscle fatigue,
- Muscle cramps are more likely when you exercise in hot weather because sweat drains your body's fluids, salt and minerals (i.e., potassium, magnesium and calcium). Loss of these nutrients may also cause a muscle to spasm.

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Symptoms

- Muscle cramps range in intensity from a slight tic to agonizing pain. A cramping muscle may feel hard to the touch and/or appear visibly distorted or twitch beneath the skin. A cramp can last a few seconds to 15 minutes or longer. It might recur multiple times before it goes away.

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Treatment

- Cramps usually go away on their own without seeing a doctor.
- Stop doing whatever activity triggered the cramp.
- Gently stretch and massage the cramping muscle, holding it in stretched position until the cramp stops.
- Apply heat to tense/tight muscles, or cold to sore/tender muscles.

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Prevention

- To avoid future cramps, work toward better overall fitness. Do regular flexibility exercises before and after you work out to stretch muscle groups most prone to cramping.
- **Warm Up**
- **Calf Muscle Stretch**
- **Hamstring Muscle Stretch**
- **Quadriceps Muscle Stretch**

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Tendinitis

- **Tendinitis** (also **tendonitis**), meaning inflammation of a tendon, is a type of tendinopathy often confused with the more common tendinosis, which has similar symptoms but requires different treatment.
- Generally tendinitis is referred to by the body part involved, such as Achilles tendinitis (affecting the Achilles tendon), or patellar tendinitis

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Types

- Tendinitis injuries are common in the upper shoulder and lower section of the elbow (including the rotator cuff attachments), and are less common in the hips and torso.
- rock climbers tend to develop tendinitis in their fingers or elbows, swimmers in their shoulders. Achilles tendinitis is a common injury, particularly in sports that involve lunging and jumping, while Patellar tendinitis is a common among basketball and volleyball players owing to the amount of jumping and landing

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Diagnosis

- Symptoms can vary from aches or pains and local joint stiffness, to a burning that surrounds the whole joint around the inflamed tendon.
- In some cases, swelling occurs along with heat and redness, and there may be visible knots surrounding the joint.

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Diagnosis

- With this condition, the pain is usually worse during and after activity, and the tendon and joint area can become stiff the following day as muscles tighten from the movement of the tendon.
- If the symptoms of tendinitis last for several months or longer it is probably tendinosis.

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Treatment

- Treatment of tendon injuries is largely conservative. Use of non-steroidal anti-inflammatory drugs (NSAIDs), rest, and gradual return to exercise is a common therapy.
- Ice, compression and elevation are also frequently recommended. Physical therapy, Occupational therapy, orthotics or braces may also be useful.
- Initial recovery is typically within 2 to 3 days and full recovery is within 3 to 6 months

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Treatment

- Tendinosis occurs as the acute phase of healing has ended (6–8 weeks) but has left the area insufficiently healed;
- Steroid injections have not been shown to have long term benefits but have been shown to be more effective than NSAIDs in the short term.
- In chronic tendinitis or tendonosis laser therapy has been found to be better than conservative treatment at reducing pain;

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Tenosynovitis

- **Tenosynovitis** is the inflammation of the fluid-filled sheath (called the synovium) that surrounds a tendon.
- Symptoms of tenosynovitis include pain, swelling and difficulty moving the particular joint where the inflammation occurs.



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Tenosynovitis

- When the condition causes the finger to "stick" in a flexed position, this is called "stenosing" tenosynovitis, commonly known as "trigger finger".

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Causes

- Causes of tenosynovitis are unknown. Repeated use of hand tools can precede the condition, as well as arthritis or injury. Tenosynovitis sometimes runs in families and is generally seen more often in males than in females.

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Diagnosis

- A physical examination shows swelling over the involved tendon.
- you move the muscle to which it is attached to see whether you experience pain

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Treatment

- Treatments for tenosynovitis depend on the severity of the inflammation and location. Mild tenosynovitis causing small scale swelling can be treated with non-steroidal anti-inflammatory drugs (NSAIDs) such as Naproxen, ibuprofen or diclofenac.
- Resting the affected tendons is essential for recovery; a brace is often recommended.^[2] Physical or occupational therapy may also be beneficial in reducing symptoms

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Treatment

- More acute cases are treated with cortisone (steroid) injections, then a course of paracetamol and ibuprofen for pain. Outpatient surgery can be used to enlarge the synovium.

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Bursitis

- **Bursitis** is the inflammation of one or more bursae (small sacs) of synovial fluid in the body.
- They are lined with a synovial membrane that secretes a lubricating synovial fluid.^[1] There are more than 150 bursae in the human body

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Bursitis

- When bursitis occurs, however, movement relying upon the inflamed bursa becomes difficult and painful. Moreover, movement of tendons and muscles over the inflamed bursa aggravates its inflammation, perpetuating the problem. Muscle can also be stiffened.

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Signs and symptoms

- Bursitis commonly affects superficial bursae. These include the subacromial, prepatellar, retrocalcaneal, and pes anserinus bursae.
- Symptoms vary from localized warmth and erythema ^[4] to joint pain and stiffness

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Cause

- Trauma, auto-immune disorders, infection and iatrogenic etiologies can all cause bursitis.^[5] Bursitis is commonly caused by repetitive movement and excessive pressure. Shoulders, elbows and knees are the most commonly affected.
- rheumatoid arthritis
- scoliosis can cause bursitis of the shoulders

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Treatment

- It is important to differentiate between infected and non-infected bursitis.
- People may have surrounding cellulitis and systemic symptoms include a fever. The bursa should be aspirated to rule out an infectious process
- Bursae that are not infected can be treated symptomatically with rest, ice, elevation, physiotherapy, anti-inflammatory drugs and pain medication.

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Treatment

- Since bursitis is caused by increased friction from the adjacent structures, a compression bandage is not suggested because compression would create more friction around the joint. Chronic bursitis can be amenable to bursectomy and aspiration
- Bursae that are infected require further investigation and antibiotic therapy. Steroid therapy may also be considered.

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Calcific bursitis

- **Calcific bursitis** refers to calcium deposits within the bursae. This most occurs in the shoulder area.
- Signs and symptoms
- Pain during rest
- Tenderness on palpation
- Stiffness (reducing joint range of motion)
- Swelling

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Diagnosis

- X-ray
- MRI scan
- Treatment
- Ice (in the acute stage)
- Rest (immobilization of the affected limb in the acute phase)
- Non steroidal anti-inflammatory drugs
- Injections of steroid
- Physical therapy
- Surgical treatment

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موج کوتاه

- استفاده درمانی دیاترمی موج کوتاه
 - ۱- اثر بر فرایندهای التهابی
 - ۲- اثر بر عفونتهای باکتری
 - ۳- اثر بر آسیبهای تروماتیک
 - ۴- کاهش زمان بهبودی
 - ۵- تسکین درد
 - ۶- اثر بر روی بافت ماهیچه ای

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دیاترمی

محدودیت‌های کاربردی جریان دیاترمی

- ۱- خونریزی
- ۲- لخته بستگی سیاهرگی (ترمبوز وریدی)
- ۳- بیماری سرخرگی
- ۴- بارداری
- ۵- فلز در بافتها
- ۶- فقدان حس پوستی
- ۷- تومورها
- ۸- رادیوتراپی
- ۹- بیماران ویژه

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موارد کاربرد آب درمانی

- | | |
|--|---|
| ۷- ایجاد روحیه نشاط و شادابی | ۱- کاهش درد و گرفتگی عضلات |
| ۸- افزایش حجم تنفسی و کارکرد بهتر ریه ها | ۲- ریلکسیشن |
| ۹- کاهش اسپاسم | ۳- بازآموزی فعالیت عضلات فلج |
| ۱۰- افزایش حرکت روده ها و جلوگیری از یبوست | ۴- تقویت عضلات |
| ۱۱- کارکرد بهتر کلیه ها | ۵- افزایش گردش خون و بهبود تغذیه بافتها |
| | ۶- جلوگیری از تحلیل رفتن عضلات |

Ankle anterior drawer

- Integrity of the anterior talofibular ligament and calcaneo-fibular ligament.
- The patient sits on the examination table with their legs hanging freely over the end of the table.
- The examiner places the left hand over the distal tibia to secure the leg



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Ankle anterior drawer

- The examiner's right hand grasps the hind foot (red lines, second figure). The index and long fingers should cup the patient's heel.
- To administer the test, the examiner applies an anterior force to the heel while stabilizing the leg.



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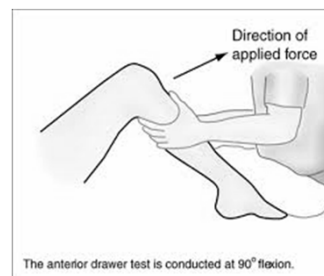
Ankle anterior drawer

- The test should be repeated in plantarflexion (last figure) to isolate the anterior talo-fibular ligament.
- Normally, anterior translation of the talus should not exceed a few mm, and there should be a firm endpoint to the anterior movement of the talus.

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Anterior drawer test of the knee

- Anterior cruciate ligament (ACL) of the knee
- The patient should be supine, with the hips flexed to 45 degrees, the knees flexed to 90 degrees, and the feet flat on table. The examiner sits on the patient's feet and grasps the patient's tibia and pulls it forward.



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Anterior drawer test of the knee

- Excessive displacement of the tibia anteriorly indicates that the ACL is likely torn

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