

First Aid For Acute Sprains, Strains, And Bruises

Most people at some time or another, have sprained a joint, pulled a muscle, or have been badly bruised. These so called soft tissue injuries occur to those engaged in sporting activities, work activities, and normal daily living activities. There are many conflicting remedies for the treatment of such injuries. People are often unsure whether to move or rest the injured area. They are often unsure whether to heat, cool, rub something on the injured area, or just leave it alone.

The treatment of soft tissue injuries, whether recent or long standing, is based on a few simple principles. An understanding of your injury and the bodies healing process is usually all that is needed to effectively treat these injuries. The information in the following paragraphs will entail the basic knowledge and principles required to optimally heal your uncomplicated soft tissue injuries.

Soft Tissues of the Body

Sprains, Strains, and bruises affect the soft tissues of the body. Most commonly involved are the joint capsules, ligaments, muscles and tendons. In order to effectively treat soft tissue injuries, a basic understanding of the structure and function of the musculoskeletal system is required.

Bones and periosteum:

Bones form the rigid framework of the body. Periosteum is the sensitive covering layer of the bone to which the tendons, capsules, and ligaments are attached.

Joints,Capsules, and Ligaments:

Joints are the meeting places of two or more bones where movement takes place. A tough capsule encases all joints. Straplike bands called ligaments reinforce capsules. Capsules and ligaments have little give and are common sites of injury.

Muscles and Tendons:

Muscles are fleshy tissues, richly supplied with blood vessels. They contract and relax both voluntarily and involuntarily. Tendons are strong cable like structures, which connect the muscle to there bony attachments. The muscle-Tendon unit is responsible for producing movement at the joints. Compared to muscles tendons have much less blood supply, therefore often take longer to heal.

Bursa:

Bursa are fluid filled sacs, strategically placed to reduce friction between layers of tissues: for example, between tendons and bone.

Nerves:

Nerves are the electrical lines between the brain and the tissues of the body. They send messages to muscles directing them to move parts of the body. They also provide the skin and all other tissues sensation such as the sense of pain, sense of temperature, and sense of touch.

Blood Vessels:

Blood vessels supply nutrition to the tissues of the body, as well as remove waste products from the tissues of the body.

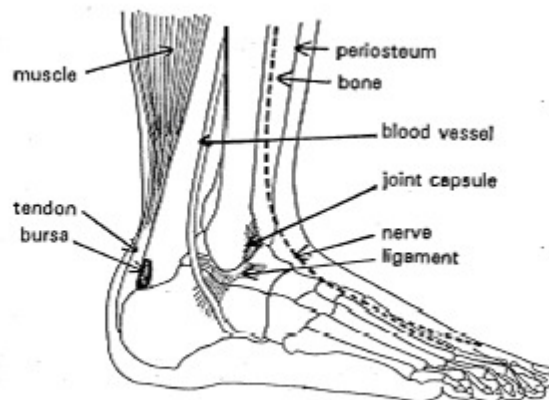


Fig. 2a Side view of right foot.

Types of Injuries

Soft tissue injuries can be divided into 2 categories:

1. Traumatic injuries
2. Overuse injuries

Traumatic injuries:

A traumatic injury occurs instantly as a result of a specific incident. This can be caused by an external force, which comes into contact with the body with sufficient force to cause tissue damage (i.e. a fall, a blow from an opponent's foot or hand). Trauma can also be induced from a sudden forceful uncoordinated movement, which causes overstretching of soft tissues (i.e. straining a calf muscle from pushing vigorously off of the toe during sport)

Overuse injuries:

Overuse injuries develop over a period of time as a result of unaccustomed or excessive, repetitive activities (i.e. working on production lines, typing, prolonged running).

These type of injuries are usually caused by:

- Sudden increase or change in activity
- Lack of general fitness and flexibility
- Incorrect technique while performing the activities at fault
- Unsuitable equipment for the task at hand
- Poor design of work/sport area.

The most common causes of overuse injuries are:

- Too much
- Too soon
- Too often

The Phases Of Soft Tissue Healing

Your body's response to injury can be divided into 3 phases:

- Soft tissue damage
- Inflammation
- Repair

Soft tissue damage

Excessive force applied to soft tissues will cause damage. This results in pain and may lead to a certain amount of internal bleeding and swelling. Depending on the depth and severity of the injury, a bruise may appear. Bruising is visible evidence that blood vessels have been damaged and blood has seeped out.

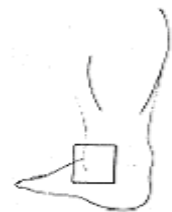


Fig. 4a Near view of left ankle.

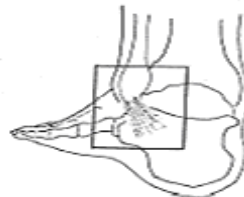


Fig. 4b Intact ankle ligament.

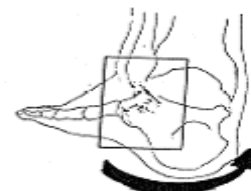


Fig. 4c Tearing of ankle ligament.

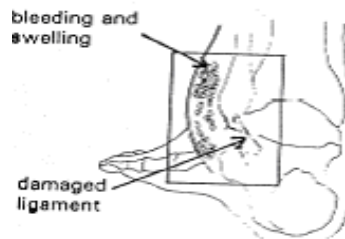
Inflammation

Inflammation is your body's first aid response to injury. It is a localized protective reaction triggered by damage to your soft tissues. Often the inflammatory process is excessive when compared to the actual amount of soft tissue damage. The signs of soft tissue inflammation are:

- Pain
- Heat

- Redness
- Swelling
- Loss of movement

The inflammatory process may be present for as little as 3 and as much as 21 days depending on the severity of tissue damage, and the individual's response to injury. If the initial injury is not treated effectively the inflammatory response could persist for an extended period of time. This often may delay repair, lead to excessive scar tissue formation, cause loss of flexibility, strength, function, and cause the tissues to become overly sensitive to normal stimuli (severe pain with the lightest of touch or pressure to the injured tissues). Early and appropriate self-treatment can limit the inflammatory response and enhance recovery.

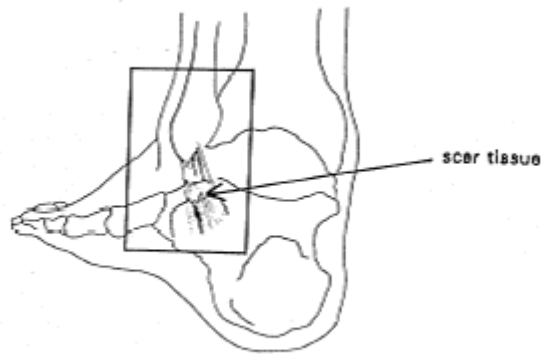


Repair:

2-3 days following injury, while the inflammatory process is still present, the repair process begins with the formation of new blood vessels around the edge of the injury site. After a further three to five days a new tissue is formed. The repair process may continue for several weeks.

The new tissue that is formed is known as scar tissue. Scar tissue does not have the same properties as the original tissue. If not exercised regularly, scar tissue will shrink and shorten, leading to inflexibility, and pain/stiffness when the scar is stretched, compressed, or contracted. Unless appropriate steps are taken to remodel this dysfunctional tissue, pain and functional deficits may persist indefinitely.

Appropriate exercise and advice started early in the healing process will lessen the time required to return to normal activity, and greatly reduce mechanical pain associated with these soft tissue injuries.



To avoid the problems mentioned above you must start exercising to stretch and strengthen the healing tissues as soon as possible. Continue the exercises until the injured area has regained its normal flexibility, strength, and function. This may take a few weeks to several months depending on the severity of the injury. Lack of appropriate exercising is the main reason why soft tissue injuries do not fully recover.

Rest, Ice, Compression, Elevation (RICE) Treatment Principle

Rest and Relative Rest:

When you feel pain following a recent injury, stop whatever you are doing. Take a few minutes to assess the damage and let the pain settle. Then gently try to move the injured area. If the pain becomes worse, you may be increasing internal bleeding and swelling. To prevent further damage it is necessary to rest the injured part for 24 hours. To achieve this you may need to use a crutch to reduce weight to the injured area if it is a leg, or a sling if it is an arm.

When applying the principle of rest following an injury, it is not necessary to completely stop all activity. The injured part should only be rested to the extent that all painful activities are avoided. This is called relative rest. For example if following a lateral ankle sprain walking does not cause any pain, continue to walk short distances as pain allows. Maintenance of your general fitness by activities, which do not aggravate your injury, will assist the early recovery of full function.

Ice and Cold Therapy:

Both ice and cold therapy are very effective in reducing inflammation. Ideally ice or cold therapy should be applied immediately following injury, as this assists to decrease inflammation, pain, and muscle spasm.

Ice therapy involves the use of ice to obtain cooling of the injured area. The following methods of applying ice is recommended:

- Place crushed ice with a little water in a plastic bag. Then place the bag containing the ice inside another bag and mould this over the injured area.

- Mould a packet of frozen vegetables over the injured area
- Place a commercial therapeutic ice pack on the injured area following the manufactures instructions

Cold therapy provides less cooling of the injured area than ice therapy. It is therefore more suitable to apply cold therapy to children, elderly, and persons with thin, fragile, or sensitive skin.

The following methods of applying cold therapy are recommended:

- Place a cold, damp flannel over the injured area. The flannel can be cooled by dipping it in ice water. When the flannel warms up replace it with a cold one.
- Place the injured area in a bucket containing water and a few ice cubes. This is useful if the injury is to the hand or foot.
- Place the injured area under cold running water. This is useful for minor injuries or when other options are not available.

Guidelines For The Application Of Ice And Cold Therapy:

- Ice can burn. To avoid this, protect your skin with a layer of insulation before applying ice. Use a covering of oil, a paper towel or damp cloth. Check your skin after a few minutes. If your skin has become white stop the ice and try cold instead.
- Both ice and cold may give some initial discomfort. This should wear off in a few minutes. If, with the use of ice therapy, your skin is becoming numb or increasingly painful, stop the cold therapy and seek advice from a therapist.
- Apply ice or cold for no longer than about 15 minutes. Prolonged application will be of no further benefit.
- To obtain the maximum benefit, apply ice or cold therapy every 3 hours. The ideal time to apply ice or cold therapy is after each exercise session.

Compression:

Compression is the application of pressure over the injured area by bandaging. This is an invaluable and often overlooked first aid measure. It is the most effective way of reducing internal bleeding and swelling, particularly if applied within the first few minutes following injury.

Guidelines For The Application Of Compression:

- Use a bandage that will mould around the injured area, providing a firm and even pressure. Elastic bandages are preferable to other types of bandages.
- Bandage a good distance below and above the injured area.
- Apply the bandage firmly and comfortably. If too tight it may cause numbness, if too loose it will be ineffective.
- Wear the bandage day and night.
- Remove the bandage before ice or cold therapy, and re apply immediately afterwards. Re wrap in the mornings or whenever the bandage has loosened.

Elevation:

Immediately following the injury, elevate the injured limb above the level of your heart to limit the development of swelling. Elevate your injured limb at every opportunity for as long as swelling continues. Raising the injured limb above your heart level may be impractical at work and in other situations, but remember that some elevation is better than none at all. For example, resting your injured ankle on a chair will still provide effective elevation.

Guidelines For When To apply RICE

- At the time of injury immediately stop your activity. To prevent further damage, restrict any activity that is painful.
- Apply ice or cold therapy as soon as possible after the injury has occurred. Apply for about 15 minutes at a time, 3 times daily until inflammation has resolved.
- Do not apply heat, massage the injury, or drink alcohol as these activities increase bleeding and swelling the first few days to few weeks following a recent sprain, strain, or bruise.
- Apply compression, using bandage, immediately following ice or cold therapy
- Elevate your injured area above the level of your heart at regular interval throughout the day. This provides excellent opportunity to apply ice or cold therapy and compression while resting.
- As your pain and swelling decrease, reduce the application of ice or cold therapy to twice daily. When your daily activities are no longer painful discontinue the ice or cold therapy.
- Continue with compression and regular elevation until the swelling has disappeared. Compare your injured side with the other side to determine whether swelling is present or not.

Types Of Pain

Pain plays a vital role in the protection of your body and therefore should not be ignored. Identifying whether you are experiencing constant or intermittent pain will assist you to determine the nature of your problem, the stage of healing you have reached, and the treatment necessary to obtain full recovery.

Constant Pain:

Constant pain is pain that is felt at all times, whether you are active and moving or at rest. At the time of injury a sharp, localized pain is felt as soft tissues are damaged. After 5-10 minutes a constant dull or throbbing pain follows replacing this sharp, localized pain. This constant dull throbbing pain is caused by chemical irritation of the injured tissues due to the inflammatory process. Constant pain due to inflammation is treated with RICE followed by controlled movement.

Intermittent Pain:

Intermittent pain is pain that is not felt at all times. There will be times in the day when you will be completely pain free. Following recent injuries, once the repair process is underway and the chemical irritants present during the inflammatory process are not as concentrated at the injury site as they were initially, the constant ache will subside, and pain will only be felt with overstretching, or contracting the injured tissues. This type of pain is primarily mechanical in nature caused by placing normal loads (stretch, compression, or contraction) on healing soft tissue when attempting to use the affected body part. This type of pain responds well to the controlled movement (exercises) outlined here.

Referred Pain

Referred pain is pain that is felt some distance from the actual injury site. If your pain spreads down your arm or leg, it may be referred to that area from your neck or low back. In addition to pain you may feel symptoms such as numbness, tingling, or pins and needles. If you experience this type of pain, refer to the link [first aid for your neck](#), or [first aid for your low back](#) on this site.

Treatment By Controlled Movement (Exercise)

Controlled movement is the careful exercising of your soft tissues using pain as your guide. The amount and type of exercise performed depends on the stage of healing your injury has reached.

Controlled movement following a recent injury:

A recent injury needs to be exercised carefully over 3-6 weeks to ensure a full recovery.

Two days following the injury careful exercising may be commenced. At this stage your injury should be stabilizing due to the application of appropriate RICE treatment. Gentle controlled movement that does not increase pain, or cause lasting worsening of pain/swelling afterwards, stimulates the healing process without causing further damage.

Depending on your progress, four days following injury your exercises may be advanced with more frequency, repetitions, or more load, some discomfort during the performance of the exercises is allowed at this point, as long as a lasting increase in pain/swelling does not occur upon completion of the exercises.

Again, depending on your progress at day nine, exercises are further advanced with more frequency, repetitions, or load. By day nine the healing process is usually well established. Controlled movements (exercises) that produce a firm stretch and/or mild pain, which quickly subside upon rest, will lead to a strong and flexible repair.

At twenty-one days following injury, your progress is reviewed and if fully recovered preventive exercises are implemented to lessen the risk of re-injury to the injured area and other body parts (see link titled preventive/warm up routine).

Some injuries may need treatment with controlled movement for several more weeks to fully restore function. If this is the case treatment must continue daily to stretch or strengthen the healing tissue until full painless function is restored.

Controlled Movement For A Long-Standing Injury:

In the case of a long-standing injury, the actual soft tissue damage has healed. Lack of appropriate exercise at the time of healing has resulted in a loss of normal flexibility, strength, and function. To ensure your long standing injury has the basis of a stable repair, commence the exercise program as outlined on day four. This means that the exercises may increase, or produce some discomfort during the performance of the exercise, but should quickly resolve upon rest. Generally long-standing injuries take longer to fully recover than recent injuries, but they respond well to the progression of controlled movements as described here. Occasionally long standing injuries may be slightly and temporarily aggravated when first attempting controlled movements, as the injured tissues may have become overly sensitive to the normal stimuli of stretch, contraction, or compression. This temporary aggravation usually is mild and last only a few days if the program is continued, and generally is followed by marked progress in pain free movement and use of the injured area.

Reference:

Lindsay et al., Treat Your Own Sprains, Strains, and Bruises, Spinal Publications