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Sprain and strain -Their management and rehabilitation

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Abstract

Sports injuries are injuries that occur in athletic activities or exercising. Every day, a lot of people all over the world participate in games and sports activities or competitions. Participation in sports improves physical fitness and overall health and wellness. Games and sports can also result in injuries, some minor, some serious and still other in lifelong medical problems. Sports injuries result from acute trauma or repetitive stress associated with athletic activities. Sports injuries can affect bones or soft tissue (ligaments, muscles, tendons). There are numerous sports injuries happened in the field of sports. It is very important for all coaches, trainers and players to know the causes symptoms, prevention and treatment for all these common injuries in order to avoid most of these types of injuries, also to update the poor training methods. This paper will review the general common sports injuries.

Keywords: Sports injuries, sprain, strain, exercise, sports

1. Introduction

Sports carry an element of risk in the form of injury. In fact, there is no sport -whether amateur or professional - where injury does not occur. In some sports, chance injury may be much due to the nature of the sport itself; in others, it may be less. The athletic injury may be as simple and insignificant as a bruise on the knee or elbow and as serious and fatal as a thigh fracture or skull smash. Athletic injuries occur from two different mechanisms: Macrotrauma and Microtrauma. Macrotrauma - A deeply distressing experience - is a sudden injury from a major force. This could, for example, be due to a bad fall from a horizontal (or parallel) bar or a ball hit during play in field hockey or cricket. Such situations abound in almost all sports, and can cause fractures, sprains of ligaments, muscle strains (tear) and bruises or contusions, which are commonly termed as acute injuries. Microtrauma is due to repetitive injury over a long period of time and these injuries are also termed overuse. Types of injuries include stress fracture, little league elbow and shoulder impingement syndrome. Most sports injuries involve musculoskeletal system.

Every day, millions of people (of all ages) in the world participate in games and sports activities, from soccer fields to softball diamonds and kabaddi courts. It's called playing, but sports activities are more than play. Participation in sports improves physical fitness, coordination, and self-discipline, and gives children/individuals valuable opportunities to learn teamwork. Games and Sports can also result in injuries some minor, some serious, and still others resulting in lifelong medical problems.

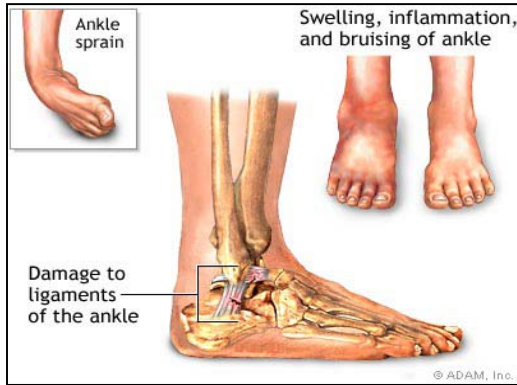
Young athletes/sportspersons taking part in games/sports/physical activities are in majority and they are not merely small adults. Their bones, muscles, tendons. and ligaments are still growing, which makes them more susceptible to injury. Growth plates - the areas of developing cartilage where bone growth occurs in youngsters - are weaker than the nearby ligaments and tendons. What is often a bruise or sprain in an adult can be a potentially serious growth plate injury in a young athlete/sportsperson.

Young sportspersons/athletes of the same age can differ greatly in size and physical maturity. Some youngsters may be physically less mature than their peers and try to perform at levels for which they are not ready. Thus Coaches, Physical Educators and Parents should try to group youngsters according to skill level and size, not chronological age, particularly during contact sports. If this is not practical, they should modify the sport/game to accommodate the needs of children with varying skill levels.

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2. Sprain

A sprain is an injury to a ligament resulting from overstress which causes some degree of damage to the ligament fiber or their attachments.



2.1 Causes

It occurs when a joint is forced beyond the normal range of motion, as in a sudden twist of and stretch on the ankle, elbow, knee, wrist or shoulder while landing, falling or follow through after a jump, pull-up, pushup, hit, kick, bowl etc. Fundamentally abnormal motion to a degree beyond the power of a ligament to withstand it will cause sprain. The ligament tear may affect any number of ligament fibers, from a few to the entire ligament. The extent of the damage depends upon the amount and duration of the force applied on the weakest link in the chain of the ligament - a spot within the ligament itself or at one of its attachments, possibly the site of previous damage. Sprains occur so frequently in sports like football, basketball, volleyball, gymnastics, certain athletic events etc, generally due to athletes low fitness level, over- doing and accident.

2.2 Symptoms or Features

The following symptoms suggest that a ligament injury has taken Place,

- Bleeding Causing bruising, Swelling and tenderness around the affected joint.
- Bleeding causing effusion of blood and synovial fluid in the joint cavity.
- Acute pain when the limb is moved or loaded.

There may be instability of the joint depending upon the event of injury.

2.3 Types

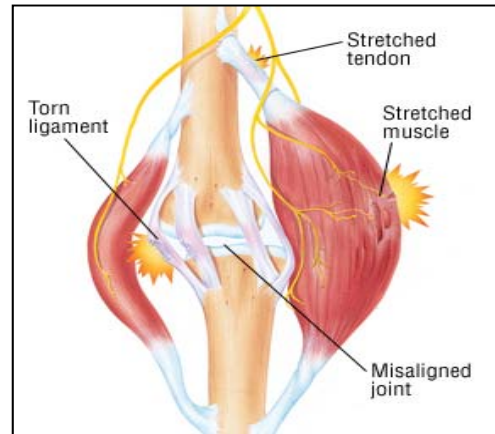
Depending on the degree of damage, sprains may be divided into four different categories as shown below,

- **Mild Sprain:** In mild sprain a few fibers of ligament are torn with some resultant hemorrhage in the ligament but with no actual functional loss and Strength diminution. The ligament does not get weakened.
- **Moderate Sprain:** In this type of sprain some portion of the ligament is torn and some degree of functional loss is present. The amount of degree may vary from tearing of a relatively small portion of the ligament to complete functional loss.
- **Severe Sprain:** In severe sprain the loss of function of the ligament is also severe due to a force that tears it almost completely.

- **Sprain fracture:** In this type of sprain, there is a wide separation of the ligament ends and the fragment of bone to which the ligament is attached is torn away from the rest of the bone, all function is lost.

3. Strain

Strain or pulled muscle is defined as damage to a tendon or muscle occasioned by overuse or overstress. Strains are the common injuries among sportspersons, yet very much misunderstood and inadequately treated for reasons best known to the sports medicine people. Muscle injuries account for 10-30 percent of all injuries occurring in sports, and 30 percent of all injuries occurring in football are muscle injuries.



3.1 Causes

Muscle pulls result when more tension is applied to a muscle than it can bear. The more Severe the pain, the more extensive the injury, is a general rule.

- **Insufficient warm-up:** Your muscles are stiff and tight and therefore susceptible to injury. Before playing a sport you should warm up for at least ten minutes.
- **Poor flexibility:** Every time you exercise hard, your muscles are slightly damaged. With healing, they shorten and, like a tight violin string, are more susceptible to tearing unless you have restored the flexibility by stretching.
- **Overtraining:** Every time you exercise intensely, your muscles are slightly damage. If you exercise intensely again before your muscles have time to heal, you are much more likely to injure them.
- **Muscle imbalance:** Every muscle that moves a limb in one direction has an opposing muscle that moves it in the other direction. If one muscle is much stronger than the other it can overpower and damage the weaker one.
- **Mineral deficiency:** Lack of sodium, potassium, magnesium and other minerals can predispose the muscle injury.
- **Structural abnormality:** Certain structural abnormalities, such as flatfeet, unequal arm or leg length, or deep curve in the back, have the effect of putting excess stress on a particular muscle and make that muscle more likely to be injured.
- **Poor training methods:** All training programs should include gradual increases in workload, speed, and resistance. Rapid increase in these factors often lead to more stress than a muscle can handle and result in an injury.

- **Trauma:** Stepping into a hole or being hit by someone can cause excess muscle stress and consequent injury.
- **Lack of an adequate endurance programme:** Rhythmic endurance exercises thicken the muscles, tendons, and ligaments and make them more resistant to injury.

3.2 Types

Strains are also categorized as simple and violent.

In a simple or ordinary strain there is no appreciable haemorrhage, but a low grade inflammatory reaction with swelling, oedema (accumulation of fluid in tissue spaces) and some disruption of the adjacent fibers. A strain of the hamstrings or quadriceps or calf of a football player, and strain of the throwing arm of the baseball player are completely disabling, and may prevent their participation in the game.

A violent strain is caused by a single violent force applied to the limbs or extremities. It may result from either violent contraction of the muscle against resistance as when the sprinter leaves the blocks, or from violent overstretching of the muscle while it is forcefully contracted as when the arm is forcefully extended from a flexed position, with the biceps taut.

3.3 Symptoms

The following signs and symptoms suggest occurrence of a strain:

- Swelling over the injured part especially when the injury is severe.
- Sudden, severe, localized and persistent pain while moving or stretching the injured area.
- Muscle spasm at the site.
- Loss of strength in the injured limb.
- Inflammation of the tendon sheath.

4. Minor soft tissue injuries

4.1 Abrasions: These are caused by falling on and rubbing against on a rough surface, and are referred to as "turf burns", "mat burns" or "floor or cinder burns" Depending upon the type of surface that causes them. By a reddish irregular surface appearance on account of the blood oozing from the under lying injured capillaries, abrasions get the nick name of "straw berry".

4.2 Incisions: These are cuts made by sharp objects such as knives, shaving blades or such other things. Depending upon the severity of the incision skin, tendon, muscle and blood vessels might get damaged.

4.3 Lacerations: A direct blow on the skin causes the skin to tear off especially from points where bone structures underneath are prominent.

4.4 Punctured wounds: This type of wounds are caused by a direct penetration or piercing of some sharp or pointed objects such as nails or needles that make a small opening, and sometimes causing no bleeding. Accidents like these may push through contamination into the body.

4.5 Blisters: Blisters are caused largely due to the friction between some object such as tight shoes or wielding of a cutter, an axe or a screw driver continuously for a long time. This separates the epidermis from the dermis and the affected area gets puffed up due to accumulation of fluid. If

the shearing force causes the blood vessels to rupture, there may be blood in place of fluid. Blisters may come up on any part of the body, but palms, fingers and feet are more prone to them.

4.6 Calluses: Thickening of the skin (epidermis) on the palms or feet marks calluses. Excessive accumulation of calluses tissue, especially where the bane structure underneath if quite prominent, leads to friction, pressure and/ or irritation on the affected part, Which gets hard and inelastic.

4.7 Avulsions: On account of direct blow, when part of a structure is torn off but still keeping attached to the body, is known as avulsion.

5. Management and Rehabilitation of sprain and strain

All of the traumatic injuries cause damage to the cells that make up the soft tissues. The dead and damaged cells release chemicals, which initiate an inflammatory response. Small blood vessels are damaged and opened up, producing bleeding within the tissue. In the body's normal reaction, a small blood clot is formed in order to stop this bleeding and from this clot special cells (called fibroblasts) begin the healing process by laying down scar tissue.

The inflammatory stage is therefore the first phase of healing. However, too much of an inflammatory response in the early stage can mean that the healing process takes longer and a return to activity is delayed. The sports injury treatments are intended to minimize the inflammatory phase of an injury, so that the overall healing process is accelerated. Inflammation is characterized by pain, localized swelling, heat, redness and a loss of function. The inflammatory stage typically lasts around 5 days and all treatment during this time is designed to address the cardinal signs of inflammation - pain, swelling, redness, heat and a loss of function.

The immediate care of common sports injuries (sprains, strains, contusions, etc.) consists of a four step program that should be followed as soon as an injury occurs, whether or not you go to a physician. The four part program is called RICE, and stands for REST, ICE, COMPRESSION, and ELEVATION.

- **Rest:** As soon as an injury occurs it is important to stop the activity immediately. Prolonged delay in stopping the activity could cause further damage to the injured part. When a body part has become injured, the body reacts with an inflammatory process, which causes swelling, redness, local increase of heat in the area, pain, and malfunction. The degree of each of these depends upon the severity of the injury.
- **Ice:** Put ice on the injured part as soon as possible after the injury. Ice or cold, specifically, controls swelling by constricting the blood and lymph vessels, decreases muscle spasm (which often accompanies injury), and decreases some of the discomfort and pain caused by the inflammation. By reducing the swelling that collects around the injured area, the rehabilitation time will be lessened and you will be able to return to your sport more quickly. The ice should be applied for 20-30 minutes. It could be in the form of an ice bag, chemical packs, frozen vegetables, can of soda, snow, etc. It should be applied every hour for the next several hours.
- **Compression:** Compression also helps to limit swelling in the injured area. The compression should be applied

concurrently with the cold treatment (a wet elastic bandage). After the ice treatment, a dry elastic wrap or tape should be applied comfortably firm not too tight to cut off circulation, or too loose to allow further swelling. If lack of sensation or numbness is felt, the wrap is probably too tight. The use of sponge pads around bony prominences (ankle bones) will insure even pressure around the injured part. The wrap should be loosened while going to bed, but worn continuously until the swelling has subsided (about 48-72 hours).

- **Elevation:** The fourth part of the treatment is to elevate the injured part while being compressed. In elevating, support should be placed under the entire limb. The height should be above the level of the heart to help drain the excess fluid from the injured area. While sleeping, the compression wrap should be loosened and the foot of the bed or mattress raised by some suitable object (for injuries to the lower extremity) or the head of the bed or mattress raised for the upper extremity injuries.

Rice should be continued for at least 48- 72 hours. Under no circumstances during this time should any form of heat be applied, including excessive time in hot showers or baths. That would just increase the swelling and inflammation. When you are sure that the swelling has stopped, give yourself an extra day of RICE. During the acute (first 72 hours) stage of the injury, no other activity should be performed. Your body has been injured and will need all the help to heal the injury. This means optimal healing conditions-proper nutrition, your normal amount of sleep, and a positive attitude. The same amount of effort you placed in your sport/athletic endeavors should be placed in your rehabilitation program.

6. Steps to reduce the risk of sports injuries

Sportspersons/athletes/players/Students/trainees/individuals can reduce their risk of injury by following the basic steps, which are given below:

- Overall conditioning is essential; it can help Sportspersons/athletes avoid injury, and it also enhances rehabilitation and shortens the “down time” of Sportspersons/athletes.
- Every student/Sportsperson/athlete should receive a pre-participation physical examination, including a general medical examination and an orthopedic examination.
- Athletes/Sportspersons should work with coaches and sports/athletic trainers/experts around the year to ensure they maintain their condition with appropriate exercises and nutrition.
- Sportspersons/Athletes should focus on developing muscular strength and endurance cardiovascular fitness and flexibility.
- Good nutrition is a must. Incorporate the basic food groups that is grains, fruits and vegetables, dairy and meat/poultry/flsh. Athletes/sportspersons diets should also be high in complex carbohydrates.
- Sportspersons/Athletes practising or playing in warmer climates should become acclimatized to high levels of activity in hot weather. Practice should be held early in the morning or late in the afternoon.
- Limit workouts and practices to maximum two hours.

- The night before an event, sportspersons/athletes should hydrate with electrolyte fluids to reduce the risk of dehydration.
- Fluid breaks should be offered at least every 45 minutes, and sportspersons/athletes should be entitled to unrestricted amounts of fluids to help prevent dehydration and other forms of heat related illness.
- All athletes/sportspersons should use appropriate equipment that fits properly in practices as well as competitions.
- Ice should be available on the sidelines of every game/match and practice to apply to appropriate injuries.
- Every institute with a sports/athletic programme should have a written emergency plan that is reviewed regularly and addresses every level of medical care.
- Every institute should be encouraged to develop an Injury Protection manual that documents how injuries will be handled.
- The physical education/sports department should be encouraged to have a medical card for every sportsperson/athlete in the institute/College/Department/University.
- Physical educators/Coaches should be certified in first aid.

7. Conclusion

All the sports injuries occur during any sports activities or exercising can result from accidents, poor training or warming up technique in practice, inadequate equipment, and overuse of a particular body part. It is very important for any one related to sports field to be aware about all kinds of sports injuries; causes symptoms, prevention and treatment, in order to manage an injury prevention program as a team, which includes education on rehydration, nutrition, monitoring team members, monitoring behavior, skills, and techniques.

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