

# Muscular Injuries

BERT R. MANDELBAUM is an MD at the Santa Monica Orthopaedic Sports Medicine Research Foundation in Santa Monica (USA), a member of the USSF Sports Medicine Committee, a lead physician for the US National Teams and an instructor and lecturer on medical matters for FIFA.

HOLLY J. SILVERS is an MPT at the Santa Monica Orthopaedic Sports Medicine Research Foundation in Santa Monica (USA).

Muscular injuries in football players are a common phenomenon. Acute traumatic injuries to muscle and tendon can account for 50% of all injuries. Muscle strains (muscles are strained... and ligaments are sprained!) are commonly associated with an athlete strongly contracting the muscle while simultaneously stretching it (e.g. slide tackling with a straight knee). The strain occurs when the muscle's ability to handle the outside load is exhausted. The muscle's ability to absorb shock is overcome. The muscle injury can range from breaking a few fibres (myofibrils), a tear in the outer covering (fascia) or a complete muscle rupture. They most commonly occur where the muscle and the tendon meet (musculotendinous junction). Muscle strains often involve muscles that cross two joints, like the rectus femoris of the quadricep, biceps femoris of the hamstring and the gastrocnemius of the calf.

## Types of muscle strain

Contusion injuries occur upon impact when the muscle is forcefully pressed against another player, the ground or goalpost. Bleeding will quickly ensue due to increased blood flow from exercising. Bleeding can be subdivided into two groups: intra-muscular (within the muscle membrane) and inter-muscular (outside of the muscle membrane). Intra-muscular bleeding usually occurs more on the outer portion of the muscle and has an intact membrane (fascia), which limits the extent of the bleeding. These athletes will experience pain and immobility (stiffness). This is difficult to treat secondary to the decreased ability for the muscle fascia to rapidly expand with increasing blood volume. Inter-muscular bleeding occurs when the outer covering (fascia) of the muscle has been damaged. These athletes will experience less pain and stiffness due to the ability for the blood to disperse outside of the fascial membrane. Delayed onset muscle soreness (DOMS) occurs when there is a sudden change in activity level. Symptoms usually begin 12 to 24 hours after exercise and include pain, weakness, fatigue, deep stiffness, and decreased mobility of the involved body part. Symptoms usually last from 1 to 2 days and can be treated with rest, ice, and compression. DOMS usually occurs after

prolonged eccentric (lengthening) activity of the muscle that leads to changes in the myofibril.

### **Schematic representation of the structure of a muscle**

1. Muscle belly[NL]2. Muscle bundle(fasciculus)[NL]3. Muscle fiber[NL]4. Myofibril

### **Signs and symptoms of a muscle strain are as follows:**

- Pain with contraction
- \* Pain with stretching
- \* Bruising (ecchymosis)
- \* Swelling (edema)
- When muscles are injured, they go through a four-step process. This includes initial inflammation, cell proliferation (granulation), remodeling, and maturation of tissue. Non-steroidal anti-inflammatory medicines, physical modalities such as ice or ultrasound, and therapeutic exercise are used in the rehabilitation to decrease the inflammatory response.

### **Causes**

Muscle strains may be caused by one or a number of factors including:

- inadequate warm-up programme,
- \* insufficient flexibility,
- \* insufficient muscular strength, poor coordination,
- \* fatigue, or
- \* a premature return to play after rehabilitation of a prior injury.

Ideally, you should warm-up for 10 to 15 minutes prior to initiation of play. This brief warm-up allows for the intramuscular temperature to rise sufficiently and allows for adequate deformation of the collagen and the musculotendinous junction. It should be followed by a thorough stretching session that allows a 30 to 60 second stretch of all major muscle groups. These stretches should be static in nature - do not bounce during a stretch.

### **Treatment of muscle injuries**

Acute muscle injuries should be initially treated using the RICE mnemonic:

- rest,
- \* ice
- \* compression of the injured muscle, and
- \* elevation of the injured area above the level of the heart.

Non-steroidal anti-inflammatory medications are effective in decreasing the pain and swelling that accompanies a muscle strain without compromising the strength of the muscle. If the lower extremity has been injured, it may be appropriate to utilize crutches or another assistive device to unweight the affected body part. Immobilization of the injured extremity will limit the activity of the sarcomeres within the muscle and can accelerate the healing response. It is important to immobilize the affected muscle in a lengthened position. It should be noted that prolonged immobilization of an extremity can lead to disuse atrophy and subsequent weakness of the muscle. This course of treatment should not exceed 96 hours (4 days) after the initial injury in an extreme case. After this time, gentle mobilization of the injured area should begin. Rehabilitative exercises should begin when tolerated after a minor muscle strain. The programme should be initially focused on passive mobility and static exercises (contraction of the involved muscle with no movement). Gentle low-load cycling and pool rehabilitation may be introduced 3 to 7 days after injury. Gradually introduce dynamic (movement based) exercises with low resistance. As healing progresses, one can increase the amount of resistance lifted with a concentric (shortening) muscular contraction. If these activities can be completed without the initiation of pain, eccentric (lengthening) exercises may be included to the rehabilitation programme. If the athlete is unable to tense the muscle due to a complete tear, external electrical muscle stimulus may be utilized.

The more complex problems: In the more complex situation and if the muscle strain is intra-muscular (intact muscle fascia), the use of ultrasound or MRI examinations may help characterizing the injury details. Surgical intervention is rarely needed in the case of muscle strain.

Generally, comprehensive rehabilitation will allow the athlete to heal in a timely and efficient fashion. However, in rare situations, if the bleeding causes an increase in the pressure (compartment syndrome) of the muscle membrane, surgical drainage and fasciotomy may be necessary. If rehabilitation is unsuccessful (i.e. torn hamstring muscle), surgical intervention may be indicated. If the blood from a contusion begins to calcify, a condition known as myositis ossificans may develop. This usually occurs 4-6 weeks after injury when the blood begins to ossify and prevents optimal functioning of the involved muscle. Generally

rehabilitation will reduce symptoms and the athlete can return to play in 2 to 3 months. If rehabilitation is unsuccessful, surgery may be indicated to remove the ossification.

### **Prevention**

In general, prevention of muscle injury is always the goal and can be achieved through:

- a comprehensive pre-season conditioning programme
- \* thorough warm-up
- \* attention to stretching to enhance muscular flexibility
- \* progressive strengthening exercises, and
- \* proper nutrition and hydration.

If an injury does occur, conservative rehabilitation programmes with an athletic trainer or physical therapist should be sought out. Upon completion of the prescribed therapeutic intervention, the athlete will be able to return to his/her prior level of play without risking further injury.

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Darl D. Rose, Director

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