Organic Motion Cycling

Strains and Sprains

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The aim of this vignette is to highlight the differences between a Strain and a Sprain and describe how the injuries occur.

Sprain:

A Sprain is an injury to a ligament. "…A sprain occurs when one or more ligaments have been stretched, twisted or torn", (NHS, 2012, Online)

Ligaments are composed of mainly collagen fibres and are "…non contractile, but have a degree of longitudinal pliability, which allows a modicum of stretch to safely occur. However when ligaments are stretched beyond their pliable length, they will not recoil, and will remain slightly stretched, possibly leading to a laxity and reduced stability in the affected joint. This effect has been described as a plastic deformation of the fibres", (Ward, 2004, P 146)

A Ligament will tear when it is stretched beyond its range of plastic deformity. A ligament tear can occur anywhere along its length, near or at the ligament attachment into the bone, (Ward, 2004)

The NHS Choices website list the common causes of sprains as, "Sprains and strains are most likely to occur if you:

- Over reach
- Change direction suddenly
- Slow down or accelerate suddenly
- Fall and land awkwardly
- Collide with an object

Ligaments are strong bands of fibrous connective tissue that hold joints together. As a result sprains occur in the region of joints.

The NHS Choices website lists the common locations for sprains as:

- "The knee – which can become trained when a person turns quickly during physical activities
- The ankle – which can become strained when walking or running on an uneven surface
- The wrist – which can become strained when a person falls onto their hand
- The thumb – which can become strained during repetitive physical activity (such as playing a racquet sport) or a fall", (NHC Choices, 2012, Online)

Other risk locations for sprains are the ligaments around the shoulder and hip regions.

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Depending on the intensity, sprains fall into three categories; mild or 1st degree, moderate or 2nd degree and severe or 3rd degree.

The American Academy of Orthopaedic Surgeons (2007) lists the individual signs of a sprain within each category thus:

- Mild or 1st Degree sprains are described as a stretch to a ligament. The individual will usually experience minimal pain and swelling. There is minimal or no loss of function and no joint loosening.
    - Recovery times for mild or 1st degree sprains is usually two to three weeks if appropriate physical therapy if applied and followed, (Ward, 2004)
- During a moderate or 2nd Degree sprain the ligament/s are partially torn. This produces some swelling, moderate pain and joint instability. The individual has some difficulty putting weight on the affected joint and may experience some loss of function.
    - Recovery times for moderate or 2nd degree sprains is usually three to six weeks if appropriate physical therapy is applied and followed, (Ward, 2004)
- Severe or 3rd Degree sprain produces excruciating pain at the moment of injury. The individual will usually feel a tear or a pop in the joint. During this type of sprain the ligaments may tear completely or separate from the bone. The injured ligament/s is no longer able to hold the bones securely and as a result the joint becomes non-functional. The individual would not be able to put any weight on the joint. Pain, swelling and bruising are usually severe and may be accompanied by associated muscle spasm. "…This grade of sprain demands surgical repair or at least immobilization, prior to a comprehensive rehabilitation programme", (Ward, 2004, P 146)

Recovery times for severe or 3rd degree sprains is usually three to four months or longer if appropriate physical therapy is applied and followed, (Ward, 2004)

Strain:

A strain is an injury to a muscle or tendon.

"…A strain occurs when the muscle fibres stretch or tear. They usually occur when the muscle has been stretched beyond its limit or it has been forced to contract (shorten) too quickly", (NHS, 2012, Online)

Ward describes a strain as resulting from excess stress being placed through the tissues of the muscle or tendon, usually by an indirect injury which is caused by an overloading or overstretching of the musculo-tendinous unit, (2004).

Ward (2004) lists the common causes as:

- Overload on a muscle or tendon during concentric or eccentric phases of isotonic contraction
- "…it is generally recognized that strong eccentric contractions are more commonly the cause of muscle injury (overloading as the muscle is lengthening); however, the majority of strains tend to occur during normal RoM", (Ward, 2004, P 145)

The NHS Choices website (2012) list further causes of strains as:

- Over reach

- Change direction suddenly
- Slow down or accelerate suddenly
- Fall and land awkwardly
- Collide with an object

The junctions where the muscle and tendons meet is considered to be a weak point and as a result a common site for acute muscle injuries, (Ward, 2004)

The NHS Choices website (2012) lists the common locations for strains as:

- Hamstring strains. In the presence of a muscle imbalance between the quadriceps and the hamstrings and excessive force applied when kicking a ball, running, sprinting or leaping.
- Gastrocnemius and soleus strains
- Quadriceps strains
- Lumbar strains as a result of excessive jumping in sports such as basketball or volleyball

Depending on the intensity, strains fall into three categories; mild or 1st degree, moderate or 2nd degree and severe or 3rd degree.

Ward (2004) list the individual signs of a strain within each category thus:

- Mild or 1st degree strains are a partial tear. The individual will experience mild to moderate pain on contraction or stretch of the muscle. The muscle may feel weaker than normal and be accompanied by a minor muscle spasm or tightening. Mild swelling and/or discolouration may be evident and tenderness upon palpitation.
    - Recovery times for a mild or 1st degree strain is usually quick if appropriate physical therapy is applied and followed
- Moderate or 2nd degree strain is a more sever partial tear as a result of the muscle or tendon being subject to a more forceful contraction or stretch. The individual will experience moderate to strong pain during stretch, contraction and palpitation. The muscle/tendon will feel weak and may possibly be accompanied by a spasm in both the injured and surrounding muscles. Moderate to major swelling and a greater degree of muscle impairment will be evident. A therapist may also be able to detect a palpable indent in the muscle tissue.
    - Recovery times for a moderate or 2nd degree strain will depend on the degree of muscle damage. Three to six weeks is a good indication of recovery times if appropriate physical therapy is applied and followed.
- Severe or 3rd degree strains are a complete rupture of the muscle or tendon. A 3rd degree will completely separate the muscle fibres and result in a complete or virtual lack of continuity in the affected muscle. 3rd degree strains occur when the muscle is very forcefully contracted or overstretched. The individual will experience severe pain at the moment of injury. Pain will gradually diminish, however significant muscle weakness and loss of function will be experienced. There will be severe swelling; muscle spasm in surrounding muscles and complete loss of strength on specific resistance testing. A Therapist will feel obvious bunching of the muscle fibres upon palpitation with both bump and hollow deformities being obvious. The individual will continue to experience local and diffuse pain for some time following the injury. 3rd degree trains usually require surgery to repair or at the minimum several weeks immobilization of the affected limb.
    - Recovery times for a severe or 3rd degree strains is several weeks of post-surgery recovery or immobilization followed by two to three months of

appropriate physical therapy. Full rehabilitation and return to fitness may take longer dependant on the nature of the injury.

According to the American Academy of Orthopaedic Surgeons (2007) an 3rd degree hamstring strain can "…side line a person for up to six months", (Online)

References:

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