Non contact Hamstring injuries in sports

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Summary

Hamstring muscle injuries are frequent in different sports and are a clinical challenge for Sports Medicine Teams. Injury Mechanics are import to know while assessing the injured athlete. There are at least two distinctly different types of acute hamstring injuries, which are best distinguished by the different injury situations. Classifying the severity of the injury is equally important. Active Range of motion measurements, proper imaging selection and the anatomical location of the injury must be considered. Once the diagnosis is established rehabilitation issues must be considered. Recurrence rate of the injury and prevention are issues that must always be included in our Hamstring Injuries approach as Clinicians.

Key words: non contact, Hamstring injuries, sports.

Introduction

Muscle injuries are among the most common, most misunderstood, and inadequately treated conditions in sports. According to some studies, muscle injuries account for 10-30% of all injuries in sport [1].
Hamstring muscle strains are frequent in different sports and are the single most common injury in professional football[1]. Several studies have indicated that hamstring strains are frequent in track and field as well, especially among sprinters and jumpers [1, 3]. The re-injury rate is high [1, 3], which in most cases probably indicates inadequate rehabilitation program and/or a premature return to sport[4].
Hamstrings function is complex. Depending on leg positioning and relationship to the ground it can serve as a hip extensor, knee flexor, and external rotator of the hip and knee. Long head receives innervations via a tibia portion of the sciatic nerve, the short head receives innervations from the common personal nerve.
There are at least two distinctly different types of acute hamstring strains, which are best distinguished by the different injury situations[5]. The most common injury type occurs during high-speed running[5] and the other occurs during movements leading to extensive lengthening of the hamstrings, such as; high kicking, sliding tackle and sagittal split[5]. The high-speed running type is mainly located to the long head of biceps femoris and typically involves the proximal muscle-tendon junction[4]. In contrast the stretching-type is located close to the ischial tuberosity and typically involves tendon tissue of the semimembranosus[2,5]. The strains occurring during high-speed running generally cause a more marked acute functional impairment, but typically require a shorter rehabilitation period than the stretching-type of hamstring strains[5]. The injury situation and the injury location can give important information about the injury prognosis. The injury location can be determined both by maximal pain upon palpation and by MRI during the first two weeks after injury occurrence. The two types of hamstring strains require different approaches when rehabilitation is planned. In the case of high-speed running type of injuries, it is common for the athlete to experience a considerable improvement 4-6 days after the injury has happened, especially with respect to pain, strength and flexibility. This is, however, a potentially dangerous feeling because the healing process is still only in its initial stage and the risk for re-injury is evident since the injured tissue is less able to absorb energy. Slow jogging, without pain or limping can be allowed early in the rehabilitation process, whereas high speed-velocity eccentric conditioning is an essential component of the later part of the rehabilitation.
For the stretching-type of injuries it is important to inform the athlete that the rehabilitation period is likely to be prolonged, even though the initial symptoms are relatively mild in terms of pain and functional impairment. To optimistic and unrealistic information will only reinforce the disappointment and frustration of the injured athlete. The athlete can undergo demanding rehabilitation training early on, as long as pain-provoking exercises are avoided. Passive stretching and heavy load exercises appear to provoke the stretching-type of injuries by increasing pain. Little information is available in the international literature about non contact acute (NCA) muscle injury classification systems[6].
Various systems have been used to classify the severity of the non contact acute(NCA) muscle injury. Acute muscle injuries are commonly classified as strains (Grade I), partial tears (Grade II) and complete tears (Grade III) [7,8].
Particularly in elite athletes, where decisions regarding return to play and player availability have significant finan-

cial or strategic consequences for the player and the team, there is an enormous interest in optimising the diagnostic, therapeutic and rehabilitation process after muscle injuries, to minimise the absence from training and to reduce recurrence rates[6,9].

Location - Anatomical

Recently it was described an imaging (magnetic resonance or ultrasound) nomenclature, which considers the anatomical site, pattern and severity of the lesion in the acute stage. By site of injury, they define muscular injuries as proximal, middle and distal. Anatomically, based on the various muscular structures involved, muscle injuries distinguish intramuscular, myofascial, myofascial/perifascial and musculotendinous injuries[10].
A general rule of thumb is "the closer to the ischial tuberosity, the longer rehabilitation period". Intramuscular or intermuscular haematoma should be also differentiated.

Imaging

Ultrasound and MRI are most commonly used to image the muscle lesion. Takebayashi et al. published in 1995 an ultrasound-based three-grade system ranging the lesion, from a grade 1 injury with less than 5% of the muscle involved, grade 2 presenting a partial tear with more than 5% of the muscle involved and up to grade 3 with a complete tear[11]. Peetrons has recommended a similar grading[12].
In general, MRI findings, particularly the length and cross-sectional area of injury, may be used as an estimate of time for rehabilitation and can sometimes be predictive of the time high-performance athletes will be away from play. The currently most widely used system ranging the lesion by MRI are defining four grades: grade 0 with no pathological findings, grade 1 with a muscle oedema only but without tissue damage, grade 2 as partial muscle tear and grade 3 with a complete muscle tear[13].
In patients with an equivocal or remote history of trauma, imaging is advised, as it may help to better define a soft tissue mass if a neoplastic mass is clinically suspected[10].
Also MRI study described findings with poor prognosis of muscle injury when the muscle rupture and retraction, haemorrhage, ganglion-like fluid collections, are greater than 50% cross-sectional involvement were associated with convalescent periods of more than 6 weeks.

Clinical

In terms of Clinical Classification time to walk pain-free has been used to define the severity of the injury and predict the time to recovery, 4 weeks to RTP for the time to walk[14].
Also in muscle-tendon complex of the long head of biceps femoris, a clinical assessment of the point of highest pain on palpation, within 3 weeks from the injury, is predictive of recovery time[15].

Our Clinical classification for non contact Hamstring injuries, which is based on estimating the knee active range of motion deficit between the injured and the healthy side[1].
We also correlate our findings with the time needed to full return to play. Following the clinical classification we are able to define the severity of the injury decide for the treatment, to design the rehabilitation protocol and follow them during that period, to predict the time to full rehabilitation and to assess the reinjure rate[9].
We must always keep in mind to differentiate Common Signs and Symptoms of a Hamstring Strain Injury Compared to Those Referred to the Posterior Thigh from another Source[16] .

Rehabilitation

Rehabilitation is one of the key points dealing with Hamstring injuries[17] . We as clinicians have to prescribe the right clinical application correlated to each healing process phase perative intervention is reserved only for severe injuries, such as complete rupture of the hamstring muscles, either at the insertion or at the origin(avulsion).
Strengthening the hamstring muscles for many sports is a fundamental focus of prevention and rehabilitation programs. Although selective strengthening of the hamstring muscles has been recommended as a key component in the management of hamstring injury, only limited literature exists to guide clinicians in designing effective strengthening programs.
Current approaches to hamstring strengthening have been guided by knowledge of the anatomy and function of the muscles constituting the hamstrings[18] : the long head of the biceps femoris muscle (BFl), the short head of the biceps femoris (BFs), the semimembranosus (SM), and semitendinosus (ST).
The reinjure rate for hamstring injuries has been found to be 12-31%. Early return to sport & poor rehabilitation program met with a high risk of reinjure According to our clinical classification Objective clinical findings can provide an effective clinical tool to assess the risk of re-injury following acute hamstring muscle strains in elite track and field athletes[9,1]. In terms of Prognosis the following factors have been shown to require a greater convalescent period: injury involving a proximal free tendon, proximity of the injury to the ischial tuberosity, increased length and cross-sectional area of injury.
Past history of hamstring injury is the main risk factor for the next injury. Being unable to walk at a normal pace-pain-free within 24 h of injury was independent predictor of being unable to return to play in less than 4 weeks from the time of injury. Defining the severity of the injury enable us to assess the expected return to play timescale which is important in guiding rehabilitation and in team planning[1] .

Discussion

Careful combination of a Clinical Classification including medical history, mechanism of the injury, injury location, inspection, clinical examination, active range of motion deficits and choosing the appropriate imaging will most likely lead to an accurate diagnosis on NCA Hamstring Injuries.

Hamstring injuries prevention approach would assume an interconnected, multidirectional, synergic interaction between injury risk factors. Eccentric strengthening of the hamstring muscles should only be a part and has been recommended as a key component of prevention programs. Recent evidence suggests that the protocols of eccentric training have the ability to reduce hamstring injuries. In order to guide clinicians in designing effective and complete strengthening programs eccentric training effects and selection principles are exposed with track and field as an example[19].

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