



## Limitations of MRI muscle injury classification system



Magnetic resonance imaging (MRI) plays a key role in evaluating and classifying the extent of muscle injuries in athletic players. While the use of MRI is clear in diagnosis, and for follow-up of injuries, there is some limitation in its ability to predict return to play (RTP) based on current MRI classification systems, according to a review published online in the *European Journal of Radiology*.

"MRI evidence of significant muscle injury (grade 0 and 1) have a shorter period of RTP, while injuries classified as high grade (3 and 4) on MRI do not correlate well with time to RTP," notes the review published by researchers from the Department of Diagnostic and Interventional imaging, University of Texas Health Science Center at Houston.

Muscle injury accounts for about one-third of total sports-related injuries. The commonest groups of muscles injured among high-level football players include the hamstrings, followed by the quadriceps.

There are three distinct types of acute muscle injuries encountered:

- Contusions which are caused by blunt trauma when the deep layers of the muscle are compressed against underlying bone. Clinically, muscle contusions can be categorised as mild, moderate or severe.
- Strains are the tears caused by excessive forceful muscle contraction and commonly occur in muscles crossing two joints such as biceps femoris, rectus femoris, and gastrocnemius.
- Tendon injury can be a result of an acute tear or chronic overuse with tendon degeneration. The most commonly injured tendons are the Achilles and the quadriceps tendons.

Muscle injuries lead to significant time off the field and affect return to play. Early diagnosis of these injuries is very important as this can guide therapy, suggest prognosis and follow up. Ultrasound and MRI are the two most frequent modalities applied to image muscle injuries. MRI has high contrast resolution, high sensitivity and the ability to image in multiple planes. MRI is the method of choice to confirm and evaluate the extent and severity of injury.

The grade of injury correlates with metrics such as time to recovery and risk of reinjury in athletic players. Grade 1 injury has less than 5 percent loss of function and mild evidence of haematoma or oedema. Grade 2 injury is more severe but with some function being preserved. Grade 3 injury is complete muscle tear with no objective muscle function and occasionally a palpable gap in the muscle belly.

Initial clinical assessment, prompt conservative treatment with protection from further injury, rest, ice,

compression and elevation (PRICE), play an important role to improve prognosis and reduce recovery time. Anti-inflammatory medications, rehabilitation programmes, electrotherapeutic modalities, hyperbaric oxygen therapy, and prolotherapy injections are some of the modalities applied as treatment. Steroid injections intra or extra muscular at focal areas of muscle injury have also been investigated, though remain controversial.

According to the article, injuries involving larger muscle volume, larger surface area, and length, and central tendon involvement result in a longer return to play. However, muscle strains without central tendon involvement or myotendinous junction injury have a shorter period of RTP.

"One of the limitations of MRI evaluation is that the distinction between muscle oedema and muscle fibre disruption is not always possible. There is inadequate information available for a correlation between direct muscle injury and clinical features like recovery time and risk of reinjury among the athletes," the article points out.

Since reinjury rates do not correlate with severity of injury on MRI, the article says further randomised controlled trials are required to better establish a classification system which can help clinicians with the return to play based upon the imaging features. "Multiple therapy methods are available with variable effects on time to RTP," the article adds.

Source: [European Journal of Radiology](#)

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