Hamstring injuries and predicting return to play: 'bye-bye MRI?'

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"QUICK—GET AN MRI SO WE KNOW WHEN HE WILL BE BACK READY TO PLAY"

In the elite athlete setting, MRI has gradually gained a magical reputation: it is the crystal ball that answers all the questions of the injured athlete, coaching and medical staff. Without imaging the injury, there is no peace of mind within the team. There is no doubt that the evolution of imaging techniques can support the management of the injured athlete, but we argue that the current available data suggests that it is almost useless for predicting return to play (RTP) following hamstring injury.

IF YOU THINK A GRADE II INJURY WILL TAKE 4 WEEKS, IT WILL TAKE 4 WEEKS IRRESPECTIVE OF WHEN THE PLAYER WAS READY

In a recently published systematic review of the literature, we concluded that there is no strong evidence for any MRI finding that can guide sports physicians and radiologists in predicting prognosis for the time to RTP after an acute hamstring injury.[1] This conclusion is mainly based on two limitations in the current literature:

1. Multiple studies on hamstring injuries found correlations between different MRI measures and the time to RTP. Unfortunately, these are limited to univariate analyses on correlations between MRI parameters and RTP. None of the studies analysed the additional value of MRI to clinical evaluation in multivariate models. No study has established if the *addition* of MRI helps predict RTP.
2. There is a considerable risk of bias in most of the studies on this topic, as the clinicians are not blinded to the MRI as they treat their players.

WHY IS BLINDING CRUCIAL TO PREVENT BIAS?

"All my MRI Grade I hamstring injuries take 3 weeks because I let all my MRI grade I hamstring injuries go back after 3 weeks"

When studying prognostic factors, the outcome measure should be independent of the prognostic factor of interest to prevent biased results.[2] For daily practice, this implies that the RTP decision-maker is unaware and blinded to the potential prognostic factors such as baseline MRI results.

SELF-FULFILLING PROPHECY: BREAKING BAD AND THE OBSERVER EFFECT

The lead character in the TV series Breaking Bad went by the pseudonym of 'Heisenberg'—an oblique reference to the Quantum Mechanics' Uncertainty Principle and the strange phenomenon that observing some particles changes the properties of these particles. We feel that observing hamstring injury on MRI changes the way the observer behaves (but not the hamstring injury). Take the example of an 'MRI negative injury'. The knowledge that there is no sign of injury seen on MRI will likely affect judgements of the injured athlete and the medical staff involved, and result in a faster progression through rehabilitation and RTP than in MRI positive injuries. It is a self-fulfilling prophecy that, without blinding for the MRI findings, the factor 'MRI negative injury' will most likely be associated with a shorter time to RTP. To the best of our knowledge, of the 12 studies documenting RTP after hamstring injury where MRI was available, only 2 had the clinicians blinded to the MRI.[3 4]

CLINICAL RELEVANCE: 'BYE, BYE MRI'?

In clinical practice, the diagnostic work up generally consists of history, physical examination and, possibly, additional imaging. We argue that the prognostic value of an investigation is only of clinical relevance when it provides additional prognostic value after clinical evaluation. As none of the studies included in the systematic review analysed both clinical and MRI findings, it is unknown whether the MRI findings provide such additional prognostic information. Recent data clearly show that MRI did not provide additional prognostic information.[5]

"I AGREE THAT MRI MIGHT NOT BE USEFUL IN A RESEARCH SETTING, BUT FOR MY ELITE-ATHLETES IT IS INDISPENSABLE"

In clinical practice, we are interested in providing an RTP prognosis for an individual injured athlete. Although our knowledge has significantly improved at a group level, the current available research cannot satisfactorily predict the time to RTP for the individual athlete. We will illustrate this with an example using the MRI grading system, which is the most commonly used prognostic MRI factor.

In the largest series and landmark paper on the prognostic value of MRI, Hallen and Ekstrand found that, in professional football players, MRI grading was significantly correlated with injury time.[6] This study reported, for each injury grade (in days ±SD): grade I, 18±19; grade II, 24 ±13; grade III, 60±57. By applying these results to an individual professional football player with a grade II hamstring injury, we can estimate that there is a 95% chance that he returns to play somewhere between 0 and 50 days (mean: 24 days±2 times the SD of 13 days). The athlete, coaching staff and press will justly argue that these estimations of the injury time are a long way from being satisfactory.

STATISTICS ON THE TABLE

There are many different factors determining RTP in hamstring injuries, and anatomical severity, as measured by the MRI, is only one of the factors. But the current available data show that MRI does not substantially contribute to the answer of the athletes' most important and simple question after they are injured: 'When can I return to play?'. Is it therefore the right moment to say 'bye–bye MRI' to the device as a prognostic tool for predicting RTP after hamstring injuries in the individual athlete? We tend to answer yes, but we encourage you to surprise us with unbiased and blinded data.

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