

CONTRASTING BIOMECHANICS OF ACUTE HAMSTRING STRAINS

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INTRODUCTION: Hamstring strains are common in sports. Recently, two different types of hamstring strain have been described, one related to sprinting, the other to stretching exercises (Askling et al., 2006). MRI showed that the sprint-related injury was situated in the long head of the biceps femoris muscle (Askling et al. 2007). Biomechanical modelling has been used to explore mechanisms of the sprint-related injury (Thelen et al. 2006). The purpose here was to contrast the stretch-related injury with the sprint-related one, with respect to injury location and biomechanics.

METHOD: Eighteen national calibre sprinters and 15 professional dancers have been investigated. Clinical examination encompassed history and palpation, MRI-analysis comprised detailed location and size of the injury, and biomechanical modelling included the geometry and length changes of individual hamstring muscles, modifying current models to cover an extreme range of hip movement.

RESULTS: Injury occurrence: sprinters during high speed running – dancers during slow stretching exercises to the limit of joint excursion (splits). Location: sprinters in the long head of the biceps femoris (18/18) – dancers mainly in the semimembranosus (13/15). Modelled length changes: during a sprint step about half of the lengthening present during a sagittal split, but, at the present stage of model development, no difference in length change among the individual hamstring muscles could be demonstrated within each exercise.

DISCUSSION: The data on injury history and location clearly indicate the presence of two different types of hamstring strain. Even if the instant of injury in the sprint step is not known, it has been made plausible that it occurs at the end of the swing phase (Thelen et al. 2006) when the active muscles are lengthening. It is evident that this elongation is far from that possible in the allegedly passive stretching, where the injury occurs at an extreme position in the range of motion. Currently, modelling does not provide enough insight into putative mechanisms behind the muscle-specificity in sprint- and stretch-types of hamstring strain.

CONCLUSION: Awaiting further mechanistic studies and improved biomechanical models, it can still be concluded that from a practical point of view, a careful diagnosis of the two types of hamstring injury is important, since the time back to pre-injury level is considerably longer for the stretch- than the sprint-related injury (Askling et al. 2006).

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