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# Mechanisms of Hamstring Injury in Professional Soccer Players: Video Analysis and MRI Findings

Alexi Jokela, Jussi Kosola, Xavier Valle,  
Ricard Pruna, Lasse Lempainen





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# Disclosures:

We have no conflicts of interests to disclose.



# Background

- Hamstring injuries are common in sports requiring sprinting, stretching, jumping and sudden turns.<sup>1,2</sup>
- There is a paucity of information on the precise mechanisms of hamstring injuries in soccer players.<sup>3,4</sup>
- The objective was to describe the injury mechanisms and magnetic resonance imaging (MRI) findings in acute hamstring injuries of male soccer players using a systematic video analysis.



# Design and setting

- This is a descriptive case series study of consecutive acute hamstring injuries from September 2017 to January 2022.
- All subjects were patients of two specialized sports medicine hospitals.



# Participants

- Professional male soccer players aged between 18-40 years, referred for injury assessment within 7 days after an acute hamstring injury, with an available video footage of the injury and positive finding on MRI.



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# Methods

- Two authors completed the specific hamstring questionnaire based on standardized scoring forms.
- Hamstring injury mechanisms and their relation to hamstring muscle injury MRI findings were analyzed.
- Main outcome measures were hamstring injury mechanism (playing situation, player/opponent behavior, movement, and biomechanics) and MRI injury location.



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# Results

- 14 videos of acute hamstring injuries in 13 professional male soccer players were analyzed.
- Three different injury mechanisms were seen: mixed-type (both sprint-related and stretch-related, 43%), stretch-type (36%), and sprint-type (21%).
- Most common actions during injury moments were change of direction (29%), kicking (29%), and running (21%).



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# Sprint-type injuries:

- (A) Proximal BF injury;
- (B) Proximal BF injury;
- (C) Proximal BF injury.



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## Stretch-type injuries:

- (A) Distal semimembranosus (SM) injury;
- (B) Distal BF injury of the myotendinous junction (MTJ);
- (C) Proximal BF + semitendinosus (ST) avulsion;
- (D) Proximal SM injury;
- (E) Proximal BF + ST avulsion.

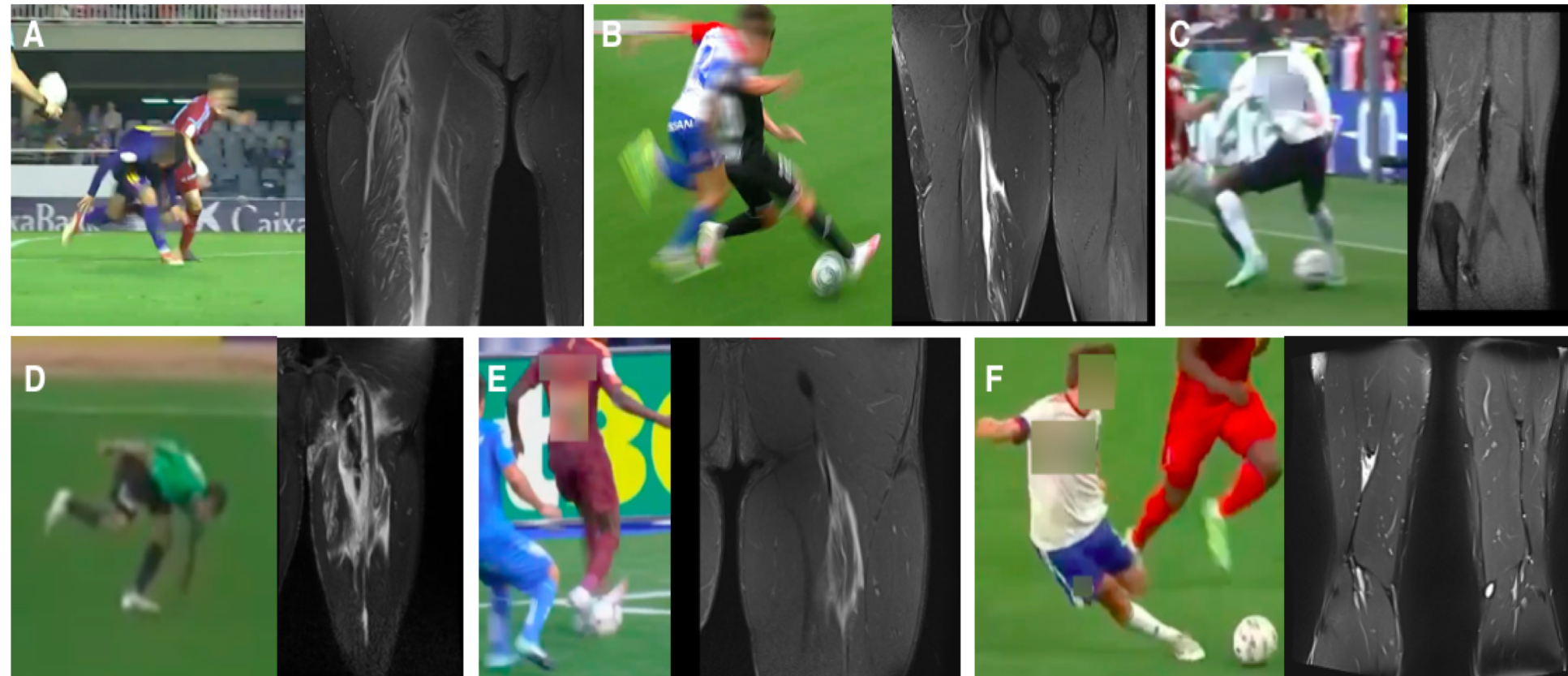


# Results

- Most injuries occurred at high or very high horizontal speed (71%) and affected isolated proximal biceps femoris (36%).
- Most frequent body positions at defined injury moments were neutral trunk (43%), hip flexion 45°-90° (57%), and knee flexion <45° (93%).
- MRI findings showed that 79% were isolated single-tendon injuries.



**Mixed-type injuries:** (A) Proximal BF injury; (B) Mid-thigh SM injury; (C) Distal BF avulsion; (D) Proximal BF + ST avulsion; (E) Proximal BF injury; (F) Distal ST injury of the MTJ.



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# Conclusions

- According to video analysis, most hamstring injuries in soccer occur during high-speed movements.
- Physicians should suspect proximal and isolated single-tendon – most often biceps femoris – hamstring injury, if represented injury mechanisms are seen during game play.
- In addition to sprinting and stretching, also mixed-type injury mechanisms occur.



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