

Predictors of time to return to play and reinjury following hamstring strain injuries with and without tendon involvement in professional football



Scott McAuley¹, Nick Dobbin² and Peter Goodwin²

Email: scott.mcauley@liverpoolfc.com

¹Liverpool Football Club, Liverpool, UK; ²Department of Health Professions, Manchester Metropolitan University, Manchester, UK

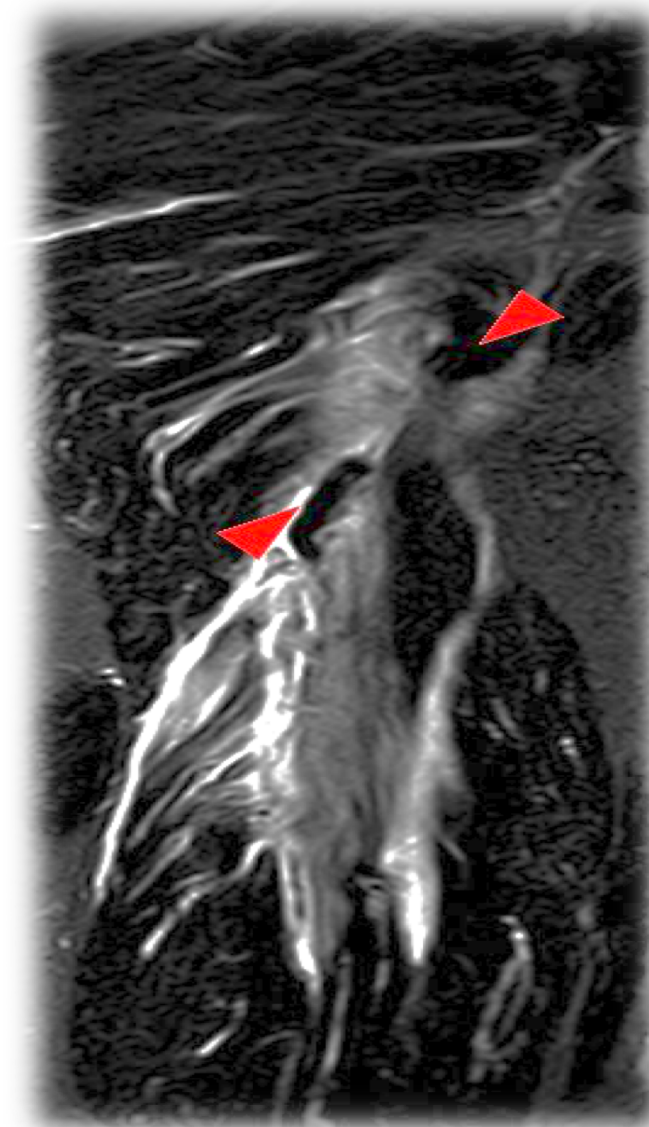
Introduction

Hamstring strain injury (HSI) is the single most commonly sustained injury in professional football, accounting for approximately 12% of all injuries sustained.¹ HSI presents a significant burden to professional football clubs, with implications for the number of lost playing days, demand on the medical department and financial impact.² Further, HSI recurrence rates are high with approximately 50% of these occurring within 4 weeks of returning to play.³

Currently, HSI are typically graded between 1 and 3,⁴ but recent efforts have sought to use the British Athletics Muscle Injury Classification (BAMIC).⁵ Using this, it is suggested that HSIs extending into the intramuscular tendon are more prone to reinjury, resulting in greater time-loss and delayed time to return to play (TtRtP).^{5,6} Currently, there is limited evidence regarding the effects of HSI with and without intramuscular involvement as well as the impact of factors such as removal of a player and grade.

This study aims to:

- 1) Describe the number of HSIs using the British Athletics Muscle Injury Classification (BAMIC).
- 2) Determine if intramuscular tendon HSI results in extended TtRtP and higher reinjury risk.
- 3) Determine the predictors of TtRtP and reinjury.



Methods

Design: Retrospective study in one English Premier League (EPL) football club over four seasons.

Participants: Twenty-four senior, male (26.1 ± 3.8 y) professional footballers from a single EPL football club.

Inclusion criteria: Players included underwent an MRI within 7 days of injury and graded by a Radiologist using the BAMIC (0a-4).⁵

Outcome measures: TtRtP and injury recurrence rates were recorded along with information on whether the players was removed from play.

Data analysis: Data was analysed using a Kruskal-Wallis test and linear regression, with alpha set at 0.05 in all instances.

Results

A total of 29 HSI were reported across 24 players over four seasons, with these ranging in grade from 0b to 3b (Figure 1a) and demonstrated an increase in TtRtP as the grading of HSI increased (Figure 1b).

Six reinjuries were reported with these associated with an original grading of 1a ($n = 1$), 1b ($n = 3$), 2c ($n = 1$) and 3b ($n = 1$).

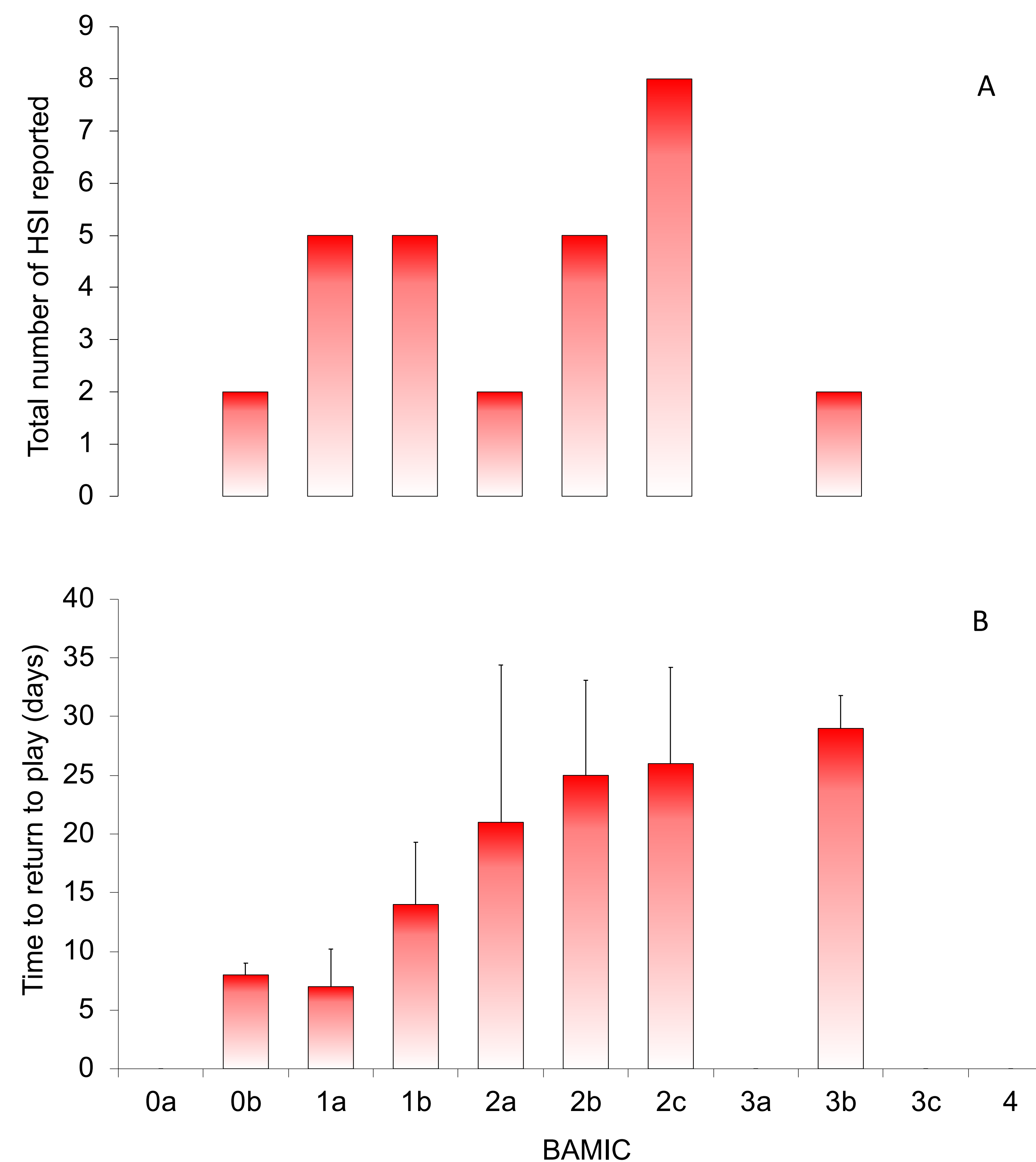


Figure 1. Total number of HSIs (A) and TtRtP (B) with reference to BAMIC.

There was a significant difference between days missed on TtRtP according to the BAMIC 0b-3b ($H = 18.1$, $P = 0.006$), with a significant difference observed between 1a and 2c ($P = 0.027$).

No significant difference was observed in TtRtP between injury without intramuscular tendon involvement [2b] and with intramuscular tendon involvement [2c], and no greater risk of reinjury.

Results from the linear regression revealed that the removal of a player from the pitch and the grade were significant predictors for TtRtP, explaining 78.6% of the variance.

The Unstandardized B value indicated each step up in grade of HSI increased a player's TtRtP by an extra 3 days. Removal from play following HSI increased TtRtP by 10 days as opposed to if the player was not removed from play.



Conclusion

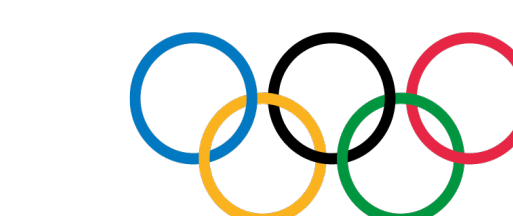
The results of this study support previous work that suggests HSI are highly prevalent in professional football. Further, we show that HSI can vary considerably across the BAMIC with most being 1a/b or 2b/c, with a significant difference in TtRtP between 1a and 2c observed.

HSIs extending into the intramuscular tendon (2b *cf.* 2c) do not influence TtRtP or reinjury risk but that factors such as overall grade and whether the player is removed or not does affect TtRtP.

The results of this study provided practitioners with some insight into the suitability of BAMIC in professional football as well as highlighting the importance of accurately determining grade and removal of a player for estimating the time-loss of a player following HSI.

References

- 1 Woods, C., Hawkins, R. D., Maltby, S., Hulst, M., Thomas, A. and Hodson, A. (2002) 'The Football Association Medicine Research Programme: an audit of injuries in professional football- analysis of hamstring injuries.' *British Journal of Sport Medicine*, 38(1) pp. 36-41.
- 2 Backthorpe, M., Wright, S., Bruce-Low, S., Nanni, G., Sturdy, T., Gross, A. S., Bowen, L., Styles, B., Villa, S. D., Davison, M. and Gimpel, M. (2018) 'Recommendations for hamstring injury prevention in elite football: translating research into practice.' *British Journal of Sports Medicine*, 53(7) pp. 449-456.
- 3 Wangsteen, A., Tol, J. T., Wivrouw, E., Linschoten, R. V., Almusa, E., Hamilton, B. and Bahr, R. (2016) 'Hamstring reinjuries occur at the same location and early after return to sport: a descriptive study of MRI-confirmed reinjuries.' *The American Journal of Sports Medicine*, 44(8) pp. 2112-2121.
- 4 Fuller, C. W., Ekstrand, J., Junge, A., Anderson, T. E., Bahr, R., Dvorak, J., Hagglund, M., McCrory, P. and Meeuwisse, W. H. (2006) 'Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries.' *Clinical Journal of Sport Medicine*, 16(2) pp. 83-92.
- 5 Pollock, N., Patel, A., Chakraverty, J., Suokas, A., James, S. L. and Chakraverty, R. (2016) 'Time to return to full training is delayed and recurrence rate is higher in intratendinous ('c') acute hamstring injury in elite track and field athletes: clinical application of the British Athletics Muscle Injury Classification.' *British Journal of Sports Medicine*, 50(5) pp. 305-315.
- 6 Van der Made, A. D., Almusa, E., Reurink, G., Whiteley, R., Weir, A., Hamilton, B., Maas, M., Ngai, A. S., Moen, M. H., Goudswaard, G. J. and Tol, J. L. (2018) 'Intramuscular tendon injury is not associated with an increased hamstring reinjury rate within 12 months after return to play.' *British Journal of Sports Medicine*, 52(119) pp.1261-1266.



IOC WORLD CONFERENCE
ON PREVENTION OF INJURY & ILLNESS IN SPORT

Acknowledgement

The authors would like to acknowledge the support of the Medical Team at Liverpool Football Club, the Radiologist and participants.