

Abandoning a sport you love after concussion

Calling it quits

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Currently, there are no evidence-based guidelines for retiring an athlete from his or her sport after concussion.¹ Although there are a variety of guidelines regarding concussion management, there is no consensus on the number of concussions that would warrant an athlete to permanently retire.^{1,2} The decision should be individualized for each athlete, with careful consideration taken if there are structural abnormalities on neuroimaging, multiple lifetime concussions, persistent diminished academic or workplace performance, persistent postconcussive symptoms, prolonged recovery course, and perceived reduced threshold for sustaining recurrent concussions.³ The athlete's age, level of play, severity and number of previous concussions, and comorbid conditions are additional variables that must be weighed in this decision.¹

In this issue of *Neurology*[®] *Clinical Practice*, Davis-Hayes et al.⁴ present a series of 10 clinical vignettes, highlighting the variability that is commonly seen in patients in the context of sports-related concussion (SRC). Given the complexity involved in clinical decision-making, the authors also present a 2-part algorithm to assist with management.

While the authors should be commended for the attempt to operationalize a complex medical decision-making process, the algorithm is not without limitations, including a limited number of variable clinical cases on which it is based. Encouragingly, the authors review several of the extant articles commenting on retirement.^{2,5-7}

As a valuable starting point, the algorithm requires further validation to be truly empirical. Replication will need to involve use of the algorithm by general clinicians (e.g., pediatricians, internists, family physicians, and sports medicine physicians), who may not have access to specialist care, advanced neuroimaging (e.g., diffusion tensor imaging), or neuropsychological testing.

The clinical vignettes presented are also based primarily on adult examples, including collegiate, semiprofessional, and professional athletes. While the authors note that SRC recovery, at a group level, falls between 10 and 14 days, this does not consider contemporary data showing protracted recovery times in children.⁸ Thus, knowledge of the specific recovery dynamics in youth vs adults is necessary to better understand what is considered slow vs normal recovery. Further complicating decision-making in adolescents and children is the frequency of which presumed concussion symptoms exist in the general, noninjured population. Iverson et al.⁹ present data on several thousand adolescent athletes tracked as part of a statewide concussion outcome project. These data revealed that a high prevalence of athletes would be diagnosed with postconcussion syndrome based on symptom checklists given in an uninjured state. Several factors emerged that inflated symptom scores, including history of previous concussion, learning disability, attention-deficit/hyperactivity disorder (ADHD), psychiatric conditions, migraines, substance use, and insomnia. These highlight the complexities in guiding decision-making about retirement from sport in athletes with preexisting conditions, and, while this is noted in the second part of the decision-making algorithm, there is little direction provided about weighting these factors when making retirement decisions.

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Regarding the use of diffusion tensor imaging (DTI) as an absolute contraindication in continued involvement in sport, caution is warranted given that several studies have suggested positive DTI findings in individuals without head trauma, including ADHD, dyslexia, depression, hypertension, migraine, and substance use.¹⁰

Finally, previous studies have suggested that strict rest and removal from normal levels of activity can interfere with concussion symptom recovery.¹¹ The authors do not provide any discussion of whether a temporary retirement, combined with active rehabilitation, may alter decisions regarding permanent retirement.

Author contributions

B.C. Baughman: Drafting/revising the manuscript. J.W. Tsao: Drafting/revising the manuscript.

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References

1. Concannon CL, Orphanos J, Bailes JE. When to consider retiring an athlete after sports-related concussion. *Clin Sports Med* 2011;30:189–200.
2. Cantu RC. When to disqualify an athlete after a concussion. *Curr Sports Med Rep* 2009;8:6–7.
3. Harmon KG, Drezner JA, Gammons M, et al. American Medical Society for Sports Medicine position statement: concussion in sport. *Br J Sports Med* 2013;47:15–26.
4. Davis-Hayes C, Baker DR, Bottiglieri TS, et al. Medical retirement from sport after concussions: A practical guide for a difficult discussion. *Neurol Clin Pract* 2018;8:40–47.
5. Cantu RC, Register-Mihalik JK. Considerations for return-to-play and retirement decisions after concussion. *PM R* 2011;3:440–444.
6. Cantu RC. The role of the neurologist in concussions: when to tell your patient to stop. *JAMA Neurol* 2013;70:1481–1482.
7. McCrory P. When to retire after concussion? *Br J Sports Med* 2001;35:380–382.
8. Field M. Does age play a role in recovery from sports-related concussion? A comparison of high school and collegiate athletes. *J Pediatr* 2003;142:546–553.
9. Iverson GL, Silverberg ND, Mannix R, et al. Factors associated with concussion-like symptom reporting in high school athletes. *JAMA Pediatr* 2015;169:1132–1140.
10. Van Ewijk H, Heslenfeld DJ, Zwiers MP, Buitelaar JK, Oosterlaan J. Diffusion tensor imaging in attention deficit/hyperactivity disorder: A systematic review and meta-analysis. *Neurosci Biobehav Rev* 2012;36:1093–1106.
11. Thomas DG, Apps JN, Hoffman RG, McCrea M, Hammeke T. Benefits of strict rest after acute concussion: A randomized controlled trial. *Pediatrics* 2015;135:213–223.

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