

Retirement and Activity Restrictions Following Concussion



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KEYWORDS

• Concussion • Retirement • Activity restrictions • Sport-related concussion

KEY POINTS

- Return-to-play decisions in the setting of multiple concussions, prolonged recovery, or structural abnormalities should be individualized based on thorough history, imaging, medical workup, and specialist consultation.
- There are limited evidence-based guidelines to guide retirement decisions in the setting of athletes with multiple concussions or prolonged recoveries.
- There are consistent expert opinions regarding return to play in the setting of congenital and acquired structural abnormalities of the cervical spine and brain.
- Neuropsychological testing is a critical component in the workup of patients considering medical retirement.

INTRODUCTION

In recent years, concussion has been brought to the forefront of both public and scientific literature. This attention includes increased concern about removing athletes from the field of play following a concussion, along with establishment of return-to-play protocols for subsequent practices and competition.¹ In addition to these safeguards, which are thus far clinically rather than empirically driven, more players and physicians are being faced with the difficult question of how many concussions are too many to continue participation in a given sport. Now, in the wake of increased attention on the subject, players across several professional sports are electing to retire or terminate contracts because of concerns over the long-term consequences of concussion. As many athletes attempt to balance their passion for sport and financial security with their long-term health and safety, physicians are in the unique position to offer education and guidance around how many concussions are too many.

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EPIDEMIOLOGY

The Centers for Disease Control and Prevention estimates that there are between 1.6 and 3.8 million recreation and sport-related concussions per year.² Marar and colleagues³ studied high school athletes over a 2-year period and found concussions occurred at a rate of 2.5 per 10,000 athlete exposures. Football had both the highest number of concussions (47%) and the highest rate of concussion (6.4 per 10,000 exposures). The sport with the greatest proportion of concussions compared with other injuries was boys' ice hockey (22%). In sex-comparable sports, girls had a higher concussion rate (1.7) than boys (1.0). Overall, 11.5% of athletes sustaining a concussion had previously sustained a sports-related concussion in either that season or a previous season. Most athletes (55.3%) returned to play in 1 to 3 weeks, with 22.8% returning in less than 1 week and 2.0% returning in less than 1 day.³ In a 2014 survey of Division I National Collegiate Athletic Association athletes, 11.7% reported one concussion and 4.5% reported multiple concussions during their collegiate career. The highest rates were in women's and men's ice hockey, wrestling, and football. The highest reported rate of multiple concussions was in football.⁴

In professional sports, the stakes and financial incentives are higher. There were 228 reported concussions in the 2013 National Football League season, including preseason and regular season games and practices.⁵ The National Hockey League (NHL) saw 559 concussions from the 1997 through 2004 seasons totaling 1.8 concussions per 1000 player hours.⁶ There were 53 concussions in the 2014 NHL season, down from 78 in the previous season.⁷

PAST AND CURRENT RECOMMENDATIONS

The question of when to retire following sport-related concussion is not a new one. Historically, recommendations were based on a proposal by Quigley in 1945, which was later published by Thorndike⁸ in 1952. This article suggested that play should be suspended for at least the remainder of the season if an athlete sustained 3 concussions. At the time, concussion required a loss of consciousness. Although these recommendations were based on anecdotal evidence and using a concussion definition that we no longer consider valid, they have been used as the basis for current return-to-play guidelines, league protocols, medical decision making, as well as the hypothetical threshold for research into the cumulative effects of repeated injury. In 2002, McCrory⁹ published a review questioning the scientific validity of the 3-strike rule and suggesting that there is no set number of concussions after which a player should retire. A general set of guidelines was proposed based on common clinical scenarios, including the recommendations that players with persistent cognitive or neurologic symptoms should be withheld from collision sports until symptoms fully resolve and also highlighting the importance of differentiating postconcussive headaches from headaches with an alternative cause.

McCrory⁹ proposed that moderate to severe traumatic brain injury (TBI) resulting in subarachnoid hemorrhage (SAH), persistent neurologic deficit, or TBI requiring craniotomy should be a contraindication to further participation in collision sport. Recommendations for moderate TBI resulting in epidural hematoma include reevaluation for participation in collision sport after a minimum of 12 months. If symptoms have resolved and neurologic sequelae have normalized, return to play may be considered.⁹

Cantu and Register-Mihalik¹⁰ published a statement in 2011 addressing the issue of retirement from sport following concussion. Contraindications to returning to

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