Cognitive Rest: The Often Neglected Aspect of Concussion Management

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IT IS DIFFICULT these days to get through a week without seeing an article or hearing a news report on the topic of sport-related concussion. The National Football League has been under extensive scrutiny in both the media and in Congress. Interestingly, and justifiably, many of the reports admit that concussions are not only a problem for the NFL, but also for the thousands of high school and youth student-athletes who look up to professional athletes. Unlike their NFL counterparts, however, these young athletes face many unique challenges, including the cognitive demands of school, which should be accounted for in concussion management protocols.

Recent advances in concussion-related research have provided clinicians with numerous guidelines for recognition, assessment, and return to play. It is now widely recognized that neurometabolic impairment is the foundation of a concussive injury, which involves a cascade of neurochemical abnormalities that follow a force application to the brain.[1] In the wake of these impairments, both physical activity and cognitive activity become sources of additional neurometabolic demand on the brain. A basic treatment assumption in concussion is that symptom exacerbation, or reemergence of a symptom in the wake of physical or cognitive activity, is a signal that the brain's dysfunctional neurometabolism is being pushed beyond its tolerable limits. Therefore, the clinician must carefully manage the neurometabolic demands of the brain during recovery from a concussion to avoid exceeding a threshold that produces worsening of symptoms.

Knowledge of neurometabolic dysfunction has greatly improved management of concussive injuries; however, traditional concussion management often neglects the student-athlete's role as a student. It is now well-accepted that excessive neurometabolic activity can interfere with recovery from a concussion and that physical rest is needed. Athletes are typically withheld from physical activities until they become asymptomatic and then are progressed through a graded physical exertion return-to-play protocol. Although physical rest is an important facilitator of symptom resolution, physical rest alone fails to address another key aspect of brain function in youth—mental exertion associated with school activities.

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A substantial body of literature has documented the neurocognitive deficits that are associated with concussion.[2,3] Recent work has demonstrated that a significant degree of symptom exacerbation follows cognitive activity. This form of exacerbation is known as a cognitive exertion effect. In one study, 88.5% of girls and 55.4% of boys reported such adverse effects after concussive injury (Gioia et al., Unpublished data). Therefore, we believe that cognitive rest should be incorporated into a concussion management protocol. Although cognitive rest has been advocated in the last two international consensus statements[4,5]

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and has been identified as one of the cornerstones of concussion management,[5] the management of cognitive exertional efforts is not a standard component of treatment. Therefore, it is important for clinicians to understand the need for cognitive rest and how to incorporate related concepts and treatment strategies into a concussion management plan.

What Is Cognitive Rest?

The concept of cognitive exertion can be represented on a continuum that ranges from no activity (i.e., full rest) to full activity (i.e., no rest). It is not realistic to achieve a state of *no* cognitive activity (i.e., full cognitive rest) unless the person is asleep or comatose. A conscious patient must engage in some degree of cognitive activity. The therapeutic goal is to limit cognitive activity to a level that is tolerable and that does not exacerbate or cause the reemergence of symptoms.

Thus, cognitive rest is an aspect of postconcussion treatment that involves avoidance of the *excessive* neurometabolic processes associated with cognitive activities. Similar to the instructions we would provide to an athlete to avoid weight bearing on an injured ankle or knee, the concept of cognitive rest involves avoidance of mental challenges during the initial postconcussion stages. Cognitive rest requires the patient to refrain from all activities that involve mental exertion, such as working on a computer, watching television, using a cell phone, reading, playing video games, text messaging, and listening to loud music. Any of these activities may exacerbate symptoms and could delay recovery.[5-7] Furthermore, some student-athletes may derive benefit from full-time or part-time removal from school while symptomatic.[5, 7] Most student-athletes are anxious to return to play as quickly as possible, which lessens concern about injured status being used as a basis for malingering.[6] Most student-athletes find compliance with instructions to limit or completely avoid cognitive activities difficult, because such activities are routinely performed to stay busy, avoid boredom, and communicate with teammates and friends.

It is important to apply an individualized cognitive rest management plan, which requires both the clinician and the student-athlete to have an understanding of the individual's tolerance for non-exacerbating cognitive activity. Individuals have differing levels of tolerance for various cognitive activities. For example, on post-injury day 3, one student-athlete may be able to read for 30 minutes before experiencing fatigue, headache, and reduced concentration. Another student-athlete may be able to tolerate only 10 minutes of this same activity. Tolerance for a cognitive activity can be expected to increase as the student-athlete recovers, but the rate at which tolerance increases may vary from person to another. For example, the first student-athlete may be able to double his tolerance from 30 to 60 minutes by postinjury day 8, whereas the second student-athlete's tolerance for concentrated reading increases to 20 minutes at postinjury day 10. The key issue is the need for individualized assessment, management, and monitoring of cognitive exertion tolerance over time.

There are various ways for cognitive rest to be incorporated into a concussion management plan, which range from complete restriction during the initial stages of recovery to modifications of specific cognitive demands imposed by classroom activities and homework assignments. For example, the School Version of the ACE Care Plan[8] (www.cdc.gov/ncipc/tbi/Physicians Tool Kit.htm) adjusts both the amount of time and the intensity of a cognitive task to accommodate a student's tolerance. Student-athletes who fatigue easily may benefit from regular rest breaks during the day, which may be provided in the athletic training room or the school nurse's office. Student-athletes with neurocognitive deficits in attention or concentration may benefit from shorter assignments (e.g., large assignments divided into smaller tasks or reduced workload). Other strategies include alternating half days of school attendance (e.g., morning classes on Monday, afternoon classes on Tuesday, morning classes on Wednesday, etc.) so that the same courses are not missed on consecutive days, which may add to the student-athlete's level of anxiety.

Communication

The athletic trainer or therapist (AT) plays a crucial role in ensuring that the athlete is compliant with instructions for both physical and cognitive rest. Physical rest is ensured through communication with the student-athlete, parents, and coaches about playing status. Ensuring cognitive rest is more difficult. The AT will need to communicate with the parents, coaches, athletic director, school nurse, school counselor, principal, and teachers to guarantee that the specific recommendations for cognitive rest are properly implemented.

The school's written concussion plan should explicitly recognize the need for cognitive rest, as demonstrated in the School Version of the ACE Care Plan. Ideally, the AT and school academic personnel will discuss concussion management prior to the start of the academic year.

Considerations for Return to School and Sports

The student-athlete must be asymptomatic at "rest" before return-to-sports participation is considered. It is important that assessment of status ensures that no symptoms are elicited by either cognitive activity or physical activity. After the student-athlete becomes asymptomatic at rest, a graded physical activity progression is initiated to evaluate tolerance (i.e., absence of symptoms). A graduated cognitive activity progression (i.e., return to school activities) is also important. Once the student-athlete remains asymptomatic at a specific level of cognitive activity, the degree of cognitive exertion should be gradually increased (e.g., greater volume of workload and reduced restrictions). The increase in cognitive exertion should progress slowly, and the student-athlete should be monitored for return of symptoms until full participation in school and social activities is achieved. School performance should return to a normal level before implementing a physical exertion progression.[6] Therefore, AT assessment of cognitive exertion effects is an essential component of a concussion management plan.

Conclusions

When managing a sport-related concussion, an AT needs to consider the "student" aspect of the student-athlete. The importance of cognitive rest should be stressed to athletes, parents, teachers, coaches, and others who are involved with the care of the student-athlete. Assessment of the student-athlete's symptom response should include the range of cognitive activities that occur in school and at home. A concussion management plan should include communication with the academic team and the athletic department of the school. Ideally, the management plan should be established prior to the start of the school year, and it should be reviewed annually by all personnel. The management plan should include medical referral of any student-athlete who exhibits difficulty in managing cognitive demands, especially when cognitive rest does not appear to facilitate recovery. ▮

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