Recognition and Management of Post-Concussion Syndrome

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For many reasons, we are treating more concussions now than ever before. Public knowledge about concussion is increasing, and we are seeing more concern from the athletic community about the identification and proper management of this injury. Recent efforts to promote concussion education and research have clearly increased awareness of the injury and the importance of its identification and proper management. As more concussions are correctly identified, the likelihood that complications will be recognized also increases. Post-concussion syndrome (PCS) has been estimated to occur in 10% of concussion cases.¹ This estimate may be low, depending on the population and the definition of PCS. The Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) states PCS is present when three or more symptoms of concussion have persisted for at least three months after head trauma. Physicians who treat large numbers of concussed athletes seem to be diagnosing PCS earlier, sometimes as early as 3-4 weeks after the initial injury. Unfortunately, PCS may frequently be unrecognized by patients and clinicians. Mackenzie and McMillan² reported that only 20% of lay-people, 40% of people who had sustained a concussion, and 60% of general practitioners were able to recognize a case of PCS on the basis of symptoms.

When symptoms of concussion are present for longer than expected, the diagnosis of PCS should be considered. There is great debate on what “longer than expected” means. Certainly, the age of the athlete and the existence of any comorbidities (e.g., Attention Deficit/Hyperactivity Disorder [ADHD], depression, learning disability) affect timing of the diagnosis. For example, diagnosis of PCS at one month may not be appropriate for a 13-year-old girl with ADHD, because ADHD is known to prolong concussion recovery. PCS should be considered in any case, because lack of treatment can result in great frustration for the athlete and the athlete’s family. Ongoing cognitive, somatic, psychological, and psychosocial problems impact every aspect of the athlete’s life, from sport, to school, to social integration. Even short-term PCS (less than one year) can negatively affect an athlete’s academic and athletic development. Long-term PCS (greater than one year) can negatively affect an athlete’s overall academic standing, thereby influencing life goals (e.g., not going to college or changing career path) and earning potential. Long-term physical and psychological health is negatively affected.

Key Points

- Post-concussion syndrome (PCS) is often missed.
- PCS symptoms overlap with those of other illnesses.
- Neuropsychological testing is important for identification of PCS symptoms.
- Managing cognitive dysfunction requires significant school and work accommodations.

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Diagnosing PCS

Assessing the entire symptom spectrum is necessary for correct diagnosis of PCS. The symptoms of PCS are basically a continuation of acute concussion symptoms, but the symptoms can interact with others, causing worsening of the entire illness picture (e.g., sleep difficulties can worsen sadness and ability to concentrate). Symptoms can be somatic or physical (headache, nausea, dizziness, balance problems, fatigue, light and noise sensitivity), cognitive (poor concentration and memory, mental “fogginess,” slowed or difficult speed), emotional (irritability, sadness, anxiety, labile emotions), or related to sleep (sleeping more or less than usual, difficulty falling or staying asleep, drowsiness). PCS diagnosis is complicated by the presence of symptoms that are also associated with a number of other disorders (e.g., depression, post-traumatic stress disorder). Iverson suggested that 90% of depressed patients would meet liberal self-report criteria for PCS and ~50% would meet conservative criteria for symptoms-based diagnosis. It is important to pay attention to any preexisting condition and to assess any worsening of the condition after head trauma. A thorough history of the injury and subsequent symptoms, along with presence of academic or work struggles, family or social stress, and any previous treatment must be acquired. Information provided by family members, school personnel, and teammates can be helpful. Remember that part of the athlete’s condition includes cognitive impairment, so memory of events or symptoms may be poor, and the athlete may have difficulty with verbal communication of the nature of symptoms.

The diagnosis of PCS includes symptoms as well as neuropsychological test performance deficits. Often, the diagnosis is made without testing, which can be problematic, given the overlap of symptoms with other diagnoses. Neuropsychological testing is often used as a tool to assist with decisions on return to play and to clarify the importance of vague symptoms associated with a concussion. Computerized tests (i.e., ImPACT, Headminder, CogSport, and ANAM) are designed to identify athletes for whom full cognitive recovery has not occurred, not to manage PCS patients who are not recovering as expected. To better assess the spectrum of problems that can occur with PCS, formal neuropsychological testing is done to assess multiple aspects of cognition, attention, and psychological status, which usually takes 2-4 hours to complete. Given the DSM-IV criteria of three months symptom duration, some physicians wait to order formal neuropsychological testing until this amount of time has passed. If an athlete exhibits symptoms that are not resolving, however, earlier performance of neuropsychological testing is appropriate (e.g., one month after injury with no improvement). It is essential to have a neuropsychologist with concussion experience involved in the athlete’s care at this point, both for testing and further treatment recommendations. Neuropsychologists excel in development of academic and work accommodations and often advise schools about specific aids for the student-athlete with PCS. Neuropsychological testing can also clarify the presence and/or worsening of comorbidities, such as depression and ADHD.

There are no guidelines for diagnostic imaging for patients with PCS, but most physicians will obtain cranial images. Computed tomography (CT) is not often useful. Magnetic resonance imaging (MRI), signal-weighted MRI, and diffusion tensor imaging (DTI) may identify the presence and extent of cranial abnormalities, which can help to explain symptoms and prolonged recovery. More research is being done in this area.

The Importance of Cognitive and Physical Rest in PCS Treatment

One of the most important aspects of PCS to manage is cognitive dysfunction. The term cognitive rest refers to the minimization of any mental stress in a concussed patient that allows the brain to recover. Any mental work that precipitates symptoms (e.g., headache, fatigue, difficulty concentrating) interferes with healing and may prolong recovery. In the acute injury phase, students or workers may need to miss school or work days to decrease cognitive demands. This may be true in cases of PCS as well, but managing missed time becomes much more difficult as the duration of impairment is prolonged. The basic premise of cognitive rest is that tasks should be limited to those that the patient can perform symptom-free. If this is not possible for a PCS patient, tasks that do not exacerbate symptoms can be attempted. Because the school environment is most often the factor that exacerbates PCS symptoms...