

## Dr. Peter Sorman

I am a neuropsychologist practicing for over 25 years. I specialize in brain trauma and conduct independent forensic medical examinations for attorneys (plaintiff and defense), the courts, workers compensation and private carriers. I am a family man, enjoy politics, ride fast cars/motorcycles, and have a 2nd degree Black Belt. I am working on my first book, which shares my experiences as a neuropsychologist through the anonymous stories of my patients.

### Post-Concussion Syndrome: Facts, Myth, and Enigma

Multiple blows to the head are not good. Circa 1997, I received a call from a colleague in Buffalo, New York asking if I would evaluate the Buffalo Sabres Hockey Team. One of their key players sustained two "concussions" within 12 hours. Their trainers wanted to know if he should play the next game. The battery of tests on all players were to be used as baseline data. Should an injury arise, I was to return within 24 hours and re-test the player to help determine their "fitness for duty". I was not a big hockey fan in those days, but my son really wanted an autographed hockey stick from the guys. Besides, the era of having professional evaluations of sports concussions was on the rise. A colleague who trained with me at Mt. Sinai Hospital in New York City's Department of Neurosurgery, was about to evaluate the New York Jets with a similar set of neuropsychological tests. The data accumulated from many professional contact sports teams evolved into screening instruments used widely today for professional sports and school football/hockey and even soccer teams.

My staff and I shuffled off to Buffalo in the dreary cold of February to arrive at the relatively new HSBC arena. After two days of testing the team members who were very cooperative we forwarded our findings to the team physician and key researcher in Pittsburgh.

The team was very careful to avoid concussional injuries from that point onward. They probably couldn't tolerate another Dr. Sorman evaluation. Unfortunately, the player who sustained the two concussions in 12 hours never returned to regular play, and became a footnote in the annals of hockey.

I learned from this experience, and through many sports related injuries sustained by my private patients over the years, that concussions are not additive; they are logarithmic. One plus one concussion does not equal two. The compounding effects of multiple concussions, over a short period of time, is problematic and potentially permanent. This is where the story of concussions, and the Post-Concussive Syndrome, becomes muddled.

A "concussion" is derived from the Latin "concusses" meaning shake or shock. As noted in my earlier paper ("What's So Mild About Mild Traumatic Brain Injury"), operational definitions differ in MTBI. Similar differences are found in the literature on concussions and the so-called, Post-Concussion Syndrome.

According to the American Academy of Neurology, a concussion is a "trauma-induced alteration in mental status that may or may not involve a loss of consciousness. Confusion and amnesia are the hallmarks of concussion". Confusion and amnesia typically occur immediately after a blow to the head or several minutes later. Guidelines for the Management of Sports Concussions include the following symptoms:

1. A vacant stare
2. Slower to answer questions
3. Easily distracted
4. Slurred speech
5. Stumbling, inability to walk a straight line
6. Extreme emotions
7. Memory problems
8. Any period of loss of consciousness

A grading scale, developed by AAN, is often assigned to patients seen in the emergency room:

Grade 1: Confusion and/or mental status changes with no loss of consciousness that resolves in less than 15 minutes.

Grade 2: Same as Grade 1, but symptoms last more than 15 minutes

Grade 3: Any loss of consciousness.

Typical concussion symptoms include: headache, confusion, nausea or vomiting, diminished attention/concentration, short-term memory problems, fatigue, irritability, hypersensitivity to noise or bright lights, ringing in the ears, sleep difficulties, anxiety and/or depressed mood.

Symptoms that resolve within 7-10 days are considered a "simple concussion" and those symptoms that persist, a "complex concussion" that may involve multiple concussions within a short period of time (Prague Statement, 2004).

A Post-Concussion Syndrome (PCS), commonly cited by medical and legal practitioners, involves the challenge of evaluating criteria different from Mild Traumatic Brain Injury. In MTBI, the condition can occur with or without a loss of consciousness. In PCS, the ICD-10 and DSM-IV Research Criteria both require a loss of consciousness. Therefore, 90% of individuals sustaining a MTBI, would be precluded from a PCS diagnosis. In addition, the DSM-IV criteria requires that neuropsychological data substantiates difficulties with attention and memory. This would also require that a patient is evaluated for symptom validity, to determine the presence or absence of potential malingering. Remember that patients with MTBI symptoms will typically resolve within weeks or a few months post-trauma. Long standing symptoms are often a psychological reaction to the trauma, or the unleashing of old, unresolved traumas from prior experiences.

The Post-Concussion Syndrome is more elusive. This label has been assigned to patients who complain of physical, cognitive and emotional symptoms years after a trauma, that often times never involved a loss of consciousness. In fact, when reviewing many patient

files, one notes multiple Workers' Compensation Claims, history of previously unreported psychiatric issues and claims of cognitive alterations (i.e., memory problems) years after the trauma in question.

Is PCS a real phenomenon? I believe it may be, depending on the individual's case history. The Buffalo Sabre Hockey player who sustained 2 serious (grade 2 and 3) concussions within 12 hours, had a Post-Concussion Syndrome lasting quite some time. Boxers, who accrue numerous concussions over the course of their careers, can sustain serious and life altering brain damage (e.g. Muhammed Ali) with "dementia pugilistica". Snowboarders who receive multiple (unhelmeted) head injuries within 6-9 months can have permanent brain damage affecting short-term memory. High school football and hockey players can sustain permanent brain damage from repeated concussions within a season.

How do we begin to determine true PCS from fabrication or psychological (psychogenic) origins? My work in Independent Medical Examinations has taught me that history, corroborated by hard medical facts, is a starting point. Neuropsychological screening devices for professional and school-age athletes are another objective measure to evaluate pre and post injury mental status. The consensus from recent research data on PCS is that unresolved subjective complaints of physical or cognitive impairments must be evaluated carefully and objectively. The PCS diagnosis is often times used as a convenient label for a simple concussion. Medical and legal practitioners should be aware of these differences when rendering a diagnosis or making a legal claim.

I would like to add that my review of MTBI and PCS does not necessarily apply to concussional traumas sustained by individuals in combat by explosions or rapid ballistic injuries. I believe this domain deserves and requires a separate set of research criteria and evaluation. The physical force of such trauma, would, at the very least, likely produce potential dysfunction to inner ear systems regulating balance and proprioception. The psychological impact of such trauma I defer to my colleagues who specialize in this domain. There is also the question of acceleration trauma bearing on potential intracranial injury, where frontal and temporal regions of the brain are most vulnerable due to the bony protuberances in the skull.

The bottom line is we are only beginning to understand the complexity of concussional traumas and their potential for long term dysfunction. A thorough analysis of a patient's history, medical records, assessment of symptom validity and rigorous neuropsychological testing is a starting point to untangle this elusive diagnostic puzzle.

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