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Special Issue on Brain Injury Litigation

The Use of Diffusion Tensor Imaging to Assist in the Diagnosis of Traumatic Brain Injury Life Care Planning and Acquired Brain Injury: Determining Needs and Costs at the Dawn of the Patient Protection Affordable Care Act The Economics of Mild Traumatic Brain Injury Disability Pitfalls of Oversimplified Headache Diagnosis in TBI Litigation What You Can Expect When You Become an Expert No Really, It Takes a Team

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PITFALLS OF OVERSIMPLIFIED HEADACHE

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Imagine this scenario: an individual in a low-speed, rear-end collision is diagnosed with a concussion and whiplash, prescribed painkillers for her soft tissue injuries, and released later that day from the emergency department. Two months later, she complains to her family doctor of severe daily headaches. She has pre-existing hypothyroidism, untreated sleep apnea, and a toothache. Further, she stopped taking her prescribed daily painkillers a few days ago. The physician's impressions are "posttraumatic headaches" attributable to the concussion the patient suffered a two months ago.

Headaches are common: an estimated 47% of adults experience at least one per year.¹ They are also a common symptom following concussions.² In traumatic brain injury litigation, "post-traumatic" headaches are often cited among a plaintiff's chief symptoms.³ In some cases, this diagnosis is based on little more than the plaintiff's report of headaches and an assumption by a treating doctor or medical expert that because headaches followed the accident, it caused them.

However, not all headaches are created equal. The International Headache Society's International Classification of Headache Disorders⁴ lists hundreds of different types and subtypes of headaches, with only a few that are properly described as "posttraumatic" in origin. Accurate diagnosis of a headache attributed to trauma or to whiplash requires understanding the individual's medical and headache history and undertaking a differential diagnosis that involves consideration of the diagnostic criteria for post-traumatic headache. It also requires consideration of "other

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diagnoses that might better explain the headache."⁵ For example, the above scenario presents at least four different potential causes of the patient's headaches recognized by the ICHD that are completely unrelated to the motor vehicle accident: hypothyroidism, toothache, sleep apnea, and medication withdrawal.⁶

In litigation involving a concussion claim, a diagnosis of "post-traumatic" headaches that does not result from the process of differential diagnosis, but rests instead on assumption, is vulnerable to exclusion. A more nuanced analysis of headaches that follow concussion can avoid potential evidentiary pitfalls in the legal context and may also promote better outcomes by helping patients and their medical providers understand the true origins of headaches.

International Classification of Headache Disorders

The International Headache Society (IHS) is an international organization dedicated to research, education, and management of headaches. IHS publishes the International Classification of Headache Disorders, a comprehensive classification of headache disorders and their diagnostic criteria. The World Health Organization recognizes this system as the official classification of headaches and has incorporated it into the International Classification of Diseases since 1992.⁷ In 2013, IHS published the beta version of the International Classification of Headache Disorders—Third Edition (ICHD-3).⁸ It identifies some 300 different headache disorders, each with unique defining characteristics and diagnostic criteria.

The ICHD-3 classifies and provides diagnostic criteria for post-traumatic headaches.

The ICHD-3 describes several subtypes of headaches that can properly be described as "post-traumatic": "headache attributed to traumatic injury to the head," "headache attributable to whiplash," and "headache attributed to craniotomy."⁹ These headaches are classified further according to whether they are "acute" or "persistent" and whether the patient received a "mild traumatic injury to the head" or "moderate or severe traumatic injury to the head."¹⁰

An acute headache's clinical features must arise within seven days of the trauma, the regaining of consciousness, or the ability to sense and report pain, and must subside within three months.¹¹ If any features are present beyond this threemonth interval, the headache is deemed "persistent."¹² Whether associated with a concussion or a more severe traumatic brain injury, these headaches typically subside within a few weeks or months, but may persist and be disabling in a minority of cases.¹³

"Delayed-onset" headaches arising more than seven days after head trauma are insufficiently validated to be diagnosed as "post-traumatic."

The appendix of the ICHD-3 contains "novel entities that have not been sufficiently validated by research conducted so far[,]" or formally accepted by the ICHD.¹⁴ These include theoretical diagnoses for "delayed-onset" post-traumatic headache subtypes describing headaches that arise between seven and thirty days after traumatic injury to the head.¹⁵ The ICHD-3 cautions that there is not enough evidence to justify enlarging the seven-day criterion for classifying headaches as "post-traumatic," because the seven-day requirement provides stronger evidence of a causal link with the trauma when compared to longer intervals.¹⁶

Are post-traumatic headaches the best fit?

For the hundreds of headache classifications identified in the ICHD-3, one criterion is consistent: the headache must be "not better accounted for by another ICHD-3 diagnosis."¹⁷ Clinicians seeking to characterize a patient's headache as "post-traumatic" must rule out other diagnoses that may better describe causes and symptoms.

For example, tension-type headaches, as defined by the ICHD-3,18 have lifetime prevalence in the general population between 30% and 78%, according to various studies.¹⁹ And there are headache types attributable to overuse of over-the-counter painkillers, such as ibuprofen, acetaminophen, or aspirin.20 Thus, a patient who has recently sustained a concussion, has a mild or moderate headache that is bilateral and nonpulsating, and who takes aspirin regularly (say, as a blood thinner) may meet the criteria for three different headache diagnoses in the ICHD-3. To properly identify the patient's headaches as "post-traumatic headaches" and thereby attribute them to the concussion, it would be necessary first to consider and rule out the possibility that the patient's headache is a tension-type headache that may be unrelated to the concussion and the possibility that it is a medication-overuse headache that could respond well to changes in the patient's medication.

The diagnostic criterion that the headache is not better

accounted for by another diagnosis elucidates several critical points about headache diagnosis. First, headache disorders are easily identified as a symptom, but not easily categorized.²¹ Diagnosing a patient with a headache does not explain the multitude of biological mechanisms that could be causing the headache. Second, a one-size-fits-all approach to headache diagnosis that characterizes every headache that occurs after a concussion as "post-traumatic" can be inaccurate and misleading. Third, in the litigation context, those who attribute a plaintiff's headaches to a traumatic incident should be prepared to explain that attribution and why alternative diagnoses or causative factors do not apply.

Admissibility Requirements Applicable to a Post-Traumatic Headache Diagnosis

The ICHD-3 requires consideration of medical history, diagnostic criteria, and analysis of other potentially applicable diagnoses to ensure that the diagnosis rendered is the best fit. Cases discussing the requirements for a diagnosis to be admissible in court describe much the same process. An overly simplistic diagnosis of "post-traumatic" headaches without due consideration of medical history, diagnostic criteria, or alternative explanations may well be excluded if challenged. Attorneys and experts who understand the complexities of headaches following a concussion will be in a better position to avoid potential evidentiary pitfalls.

The Daubert standard requires experts to use a reliable methodology.

In all federal and most state courts, the admissibility of expert testimony is determined under the standard announced by the U.S. Supreme Court in Daubert v. Merrell Dow Pharmaceuticals, Inc.²² The trial judge has "a gatekeeping role"²³ and subjects all expert opinion testimony²⁴ to an "assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue."²⁵ An expert may render an opinion in court only if it is "based on sufficient facts or data," only if the opinion is "the product of reliable principles and methods," and only if the expert "reliably applied the principles and methods to the facts of the case."²⁶

A diagnosis is admissible if the product of a qualified expert's reliable differential diagnosis.

Testimony by a medical expert that a person has a particular condition is admissible when it is the product of a properly conducted differential diagnosis.²⁷ Differential diagnosis is defined as "the determination of which of two or more diseases with similar symptoms is the one from which the patient is suffering, by a systematic comparison and contrasting of the clinical findings."²⁸ For a differential diagnosis to be deemed reliable, courts require that the expert has "taken care to consider other hypotheses that might otherwise explain a plaintiff's condition" and that the expert be able to explain why plausible alternative diagnoses were ruled out.²⁹

Accordingly, a doctor who has diagnosed post-traumatic headache should be prepared to explain how he or she arrived at that diagnosis. Unfamiliarity with relevant diagnostic criteria, failure to consider alternative diagnoses unrelated to trauma, or inability to explain why plausible alternative explanations were ruled out could result in exclusion of the diagnosis at trial.

Reliably attributing a condition to an external cause requires considering and ruling out alternative causes.

A number of courts have recognized that the process of identifying which condition is causing a set of symptomsdifferential diagnosis-is different from the process of isolating the cause of the diagnosed condition. The "science and study of the causes of diseases" is "etiology."30 Reliably identifying an external cause of a medical condition requires undertaking a "differential etiology,"31 "a medical process of elimination whereby the possible causes of a condition are considered and ruled out one-by-one, leaving only one cause remaining."32

In a 2011 decision, Hendrix v. Evenflo Co., the Eleventh Circuit excluded expert opinions that a TBI sustained in an auto accident caused a child's diagnosed Autism Spectrum Disorder because of the experts' insufficiently reliable differential etiology analyses.³³ The court explained that in identifying the cause of a diagnosis, the "expert must provide reasons for rejecting alternative hypotheses using scientific methods and procedures, and the elimination of these hypotheses must be founded on more than subjective beliefs or unsupported speculation."³⁴

Many ICHD-3 classifications combine a diagnosis and a determination of etiology. Following ICHD-3 diagnostic criteria to arrive at a posttraumatic headache diagnosis, including considering diagnoses unrelated to trauma to ensure that the diagnosis given is the best fit, should satisfy the reliability requirements for both diagnosis and external causation opinions.

By contrast, an expert who concludes that headaches are caused by trauma or by trauma from a specific accident without adequately considering alternative explanations may violate Daubert's reliable methodology requirement, subjecting that opinion to exclusion. One expert's inadequate causal analysis before attributing a TBI plaintiff's headaches to a fall prompted criticism from—and exclusion of the opinion under Daubert by—a federal district court judge, who wrote, "[I]t is common knowledge that headaches can come from an almost infinite variety of sources and to select one from the hay stack without explanation is fanciful."³⁵

Failure to consider relevant medical history, or over-reliance on a temporal relationship to show causation, can render medical testimony inadmissible.

To be reliable, both a diagnosis and an opinion linking a diagnosis to a particular cause require obtaining a thorough medical history.³⁶ Courts have excluded such opinions when the expert offering them has failed to learn or adequately consider relevant medical history. An expert's failure to consider pre-existing headaches and migraine headaches before attributing a premises liability plaintiff's post-accident headaches to the fall was one reason for exclusion of the opinion.³⁷

Another frequent basis for excluding medical causation testimony is an expert's assumption that because a condition followed a specific incident, the incident must be its cause. Opinions with little basis other than "this time-dishonored fallacy should not go to a jury," a federal district court explained in Bowers v. Norfolk Southern Corp.38 The plaintiff in Bowers, a railroad employee, sued the railroad for back and neck injuries that his expert, an orthopedic surgeon, attributed to a five-hour ride on a vibrating and inadequately padded seat. The causation opinion was excluded as unreliable because the expert "based his causation testimony on a temporal relationship, not on a scientific method" and because he failed to account for several "obvious" alternative explanations for the plaintiff's pain evident from the plaintiff's medical history.

Before concluding that a patient's headaches are secondary to a traumatic brain injury, doctors should "consider all relevant potential causes of the symptoms and then eliminate alternative causes based on a physical examination, clinical tests, and a thorough case history."³⁹

Achieving Better Treatment Outcomes with More Rigorous Headache Analysis

Rather than assume that headaches following trauma are caused by it, making

the effort to understand a patient's headache history and to identify the bestfitting diagnosis will not only reduce the risk of an evidentiary challenge, but has the potential to improve patient outcome. In many cases, the treatment indicated for headaches depends upon the underlying biological mechanisms. For example, a headache with its origins in soft tissue irritation in the neck may respond to treatment of the underlying soft tissue injury. As another example, headache properly diagnosed as "medication overuse headache" under the ICHD-3 could be relieved by assessing and adjusting the patient's medication regimen. This is especially true given that headache is a common side effect of many medications prescribed for relief of common post-concussive symptoms, such as SSRI antidepressants, benzodiazepines, and opioids.

Conclusion

By using a more thoughtful, thorough analysis of a plaintiff's headache complaints, clinicians and attorneys may arrive at conclusions that are more scientifically reliable, avoid evidentiary pitfalls, and promote better outcomes.

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