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Basic Considerations In Assessments Of Head Injuries

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With the advent of rail travel in 1825 and its subsequent rapid expansion, the inevitable accidents and resultant injuries began to attract the attention of both legal and medical fields. Increasing numbers of accident victims who complained of diverse physical and psychological disturbances, despite no persisting discernible injuries, almost immediately led to a polarization of thought regarding their diagnosis.

Defense attorneys and industrial medical practitioners argued that the complaints were motivated by greed and were an attempt to profit from an "invisible" malady. They introduced the term "compensation neurosis" to describe what they believed were bogus complaints of malingerers. Others, however, pointed out that absence of evidence is not evidence of absence. They cited the similarity, consistency and frequency of the initial and later disturbances as evidence confirming the validity of what is now called the "post-traumatic syndrome."

The century-old controversy has continued despite increasing advances in neurodiagnostic imaging techniques such as the CT scan, PET scan and MRI. Of the estimated seven million head injuries per year in the United States, a half million are serious enough to warrant hospitalization. The majority of cases, therefore, fall into the category of "mild" head injury. Such patients who complain of emotional disturbances, physical pain and other diverse problems typically have negative CT scans and normal neurological examinations. These findings have been alternately cited either as evidence of the limitations of these diagnostic procedures or as evidence of malingering.

The long-standing problems of assessing pathological effects of head injury have been complicated by the absence of a reliable index which accurately reflects both initial and later outcomes. The accumulated initial and long-term studies of tens of thousands of head injured patients have documented that duration of post-traumatic amnesia (PTA) is the single best indicator of severity of diffuse damage to the brain resulting from traumatic brain injury, and the best predictor of outcome. Duration of PTA is the length of time after a blow to the head during which the patient is unable to continuously recount current events. Presence of PTA indicates that brain mechanisms underlying memory storage and retrieval have been injured either temporarily or, in more severe cases, permanently.

For example, a boxer who sustains a blow to the head can instantaneously lose the ability to recount current events, but may nevertheless continue fighting and perhaps even win the fight. Afterward, while showering, he may suddenly ask, "Where am I?" When told he won the fight, he may reply, "What fight?" Or he may deny he was in a fight. The general rule is that the longer the duration of PTA, the more severe the head injury. PTA lasting one week or more is considered to be indicative of a severe injury. Although Jennett also developed the Glasgow Coma Scale, he described PTA as the "best guide to the severity of diffuse damage" in head injury.

Mechanisms Of Head Injury

The human brain is the consistency of Jell-O. It is bathed in cerebrospinal fluid and is protected by thick connective tissue, as well as the skull. However, brain tissue is exquisitely sensitive to the rapid acceleration and deceleration forces of head injury which cause diffuse shearing, tearing and stretching of microscopic and macroscopic neural elements. The brain can sustain focal damage as it scrapes against rough surfaces inside the skull. It can also be bruised when it bounces against the skull at the point of impact (coup) and then rebounds against the opposite side (contra-coup).

The head injured patient may also suffer further brain damage as the result of restricted airway flow, cardiac or respiratory arrest, or extensive blood loss. Head injury can disrupt mechanisms regulating intracellular transport and serum electrolyte balances, which can lead to brain edema, increased intracranial pressure, progressive brain damage and eventually death. Acute emergence of seizures is not uncommon after head injury, and can contribute to brain damage by in-

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creasing the brain's metabolic demands beyond the available supply of glucose and oxygen. Pathological effects of seizures may be magnified at the time of the head injury if oxygen and glucose supply are already marginal due to respiratory or circulatory problems described above. Regardless of the severity of head injury, there is always the risk of brain damage due to intracranial bleeding. Patients may be lucid and talking immediately after the accident, but then lapse into a life threatening coma .

The remarkable sensitivity and enormous complexity of the brain permits us to experience the wide range of emotions, sensory impressions, thoughts and creative impulses that make us uniquely human. Even an apparently minor blow to this highly sensitive organ (with little or no PTA) can result in very real and significant symptoms which may seriously impair a person's ability to perform at work and/or relate normally to others. Moreover, accumulating studies have documented emergence of cognitive deficits and symptoms comprising the post-traumatic syndrome after whiplash injury in which there is no direct blow to the head or loss of consciousness.

A colleague of mine once firmly believed that unless a head injury was accompanied by loss of consciousness, the brain could not have been injured. After suffering a minor blow to the head in a "fender bender," the emergence of headaches, concentration problems and slowed problem-solving abilities forced him to change his opinion.

Despite continuing advances in our understanding of the neuropathology of head injury, many health practitioners share the opinion that loss of consciousness is the sine qua non of brain damage. As a result of this widely-held misconception, patients are often sent home from emergency rooms after an apparently minor accident and "mild" head injury with the instructions that they will get better. Yet, left to their own devices, many do not.

Neuropsychological Assessment

CT scans and neurological examinations are typically considered central to medical assessments of the status of the brain after head injury. CT scans and MRI may localize focal brain lesions with far more accuracy than can ever hope to be achieved with neuropsychological testing. However, CT and MRI cannot tell anything about what the patient can or cannot do or how his or her life has been altered after a blow to the head.

For example, I examined a patient whose CT scan revealed extreme hydrocephalus with 95 percent of the cranial cavity filled with cerebrospinal fluid and only an orange peel thickness of brain adjacent to the inner wall of the skull. Nevertheless, he obtained an IQ of 140, which is in the very superior range. Despite this drastic reduction in cerebral economy documented by CT scan, he graduated from college with honors and currently works as an accountant. On the other hand, a recent review reported normal CT findings in one-quarter to one-third of patients with severe head injuries (including those who subsequently died).

In contrast to the limitations of CT scans and other neurodiagnostic procedures, a carefully selected battery of standardized objective tests administered by an experienced neuropsychologist can provide a multi-dimensional view of how the head injured patient's brain is functioning, including the nature and degree of current deficits as well as potential for recovery and/or rehabilitation. Although we as yet do not have an adequate model which explains the complex processes and secrets of the brain, there are well-established neuropsychological principles underlying organization, disorganization and reorganization of brain function. Accumulating studies have also identified discrete factors that determine the initial and later effects of brain damage. These factors include patient age, education, premorbid capacities, time elapsed since the accident, type of test administered, nature of the underlying pathological process and premorbid condition of the brain. For example, the importance of patient age is reflected by the greater capacity of the younger than older brain to survive and recover from head injury.

Neuropsychologists who have been adequately trained to apply these principles and factors in interpretations of objective neuropsychological test findings are uniquely qualified to assess the head injured patient's deficits and estimate potential for recovery as well as the risk for emergence of delayed complications. Such complications include seizures, neuroses, psychoses (including schizophrenia and bipolar disorder), increased suicide rates, earlier onset of stroke, accelerated senescence, progressive irreversible intellectual declines and decreased life expectancy.

It is clear why an attorney who is attempting to determine damages in a head injury case must consider the nature and extent of current deficits, as well as their client's potential for developing delayed complications. It is also important for an attorney to realize that a

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critical part of the neuropsychological assessment lies in the evaluation of the presence or absence of the various symptoms comprising the post-traumatic syndrome. These symptoms include headaches, sleep difficulties, hyper- or hypo-sexuality, involuntary movements, sensory changes, dizziness, irritability, fatigability, distractibility, decreased socialization and personality change. Patient reactions to these sequelae can vary widely. Some will stoutly deny problems even when they are obvious to friends and family members. Others are aware of emerging problems, but lack insight regarding their causal relationship to the head injury. Many patients experience depression because they feel they will never be the same again. The sometimes strange physical sensations and emotional fluctuations can lead patients to believe they are losing their minds. Still others will be totally unaware of changes that are immediately apparent, even to untrained observers.

Symptoms comprising the post-traumatic syndrome can persist long after performances on cognitive tests have returned to the "normal" range. More importantly, these symptoms are often much more disturbing to the patient and can be more debilitating than persisting cognitive limitations. In some cases, objective neuroradiological, neurological and neuropsychological test findings are equivocal or within normal limits. The inadequately trained, unscrupulous or biased clinician may ignore the possibility that average test scores can reflect declines from higher premorbid levels. They may also fail to consider the limitations and potential lack of sensitivity of various assessment procedures and psychological tests to effects of the injury. They may wrongly conclude that there is no evidence of brain injury and attribute the patient's subjective complaints to "compensation neurosis" or pre-existing personality disorder.

Despite the fact these and other diagnostic issues warrant careful evaluation of all available clinical and objective data, many neuropsychologists use a technician to administer the tests. As a result, they do not have access to the critically important behaviors involved in actual test performances, including: relating to the examiner; responding to success and failure; fatigability; capacity to focus and sustain attention; fluctuations in performance levels; variations in mood and affect; and other dimensions of human behavior which are not tapped by formal objective testing. Instead, they may rely on MMPI scores to assess emotional state, personality style and tendency to malinger. However, patients with head injury typically show abnormal elevations on various MMPI scales. For this and other reasons, applications of the MMPI in assessments of head injured patients have been increasingly criticized in the literature.

Furthermore, if there is clinical evidence that a patient is attempting to dissemble or feign a defective performance, it does not automatically rule out presence of brain damage. An experienced neuropsychologist who has spent four to six hours with a patient obviously has more accurate and valid data upon which to draw conclusions regarding possible malingering, as well as a host of other clinical issues, than does a practitioner who has only spent 10 to 15 minutes in casual conversation before turning the patient over to the technician. The experienced clinician also includes, whenever possible, reports from family members, friends, co-workers and teachers in developing an appreciation of the premorbid capacities of the patient and the impact the injury has had on those capacities.

Needless to say, no single examination can be considered definitive and final. The only accurate method for determining varying rates of recovery of the various functions and readiness for return to employment or school is by continuing neuropsychological follow-up studies.

Conclusion

When a head injury becomes the subject of litigation, both prosecution and defense must rely on the expertise of a neuropsychologist for an accurate determination of its diverse initial and later effects. The points raised here should help the practicing attorney to develop an appreciation of the critical issues relating to accurate assessment of damages after head injury, as well as mitigating factors that can influence interpretations of the objective neuropsychological findings.

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