# The invisible injury

*Session Summary: Management of Neuropsychiatric Sequelae of Traumatic Brain Injury, Kimberly Arlinghaus, MD*

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**KEYWORDS**

Traumatic brain injury, personality changes, emerging treatment

Dr. Arlinghaus gave an inspiring session on the neuropsychiatric sequelae of traumatic brain injury. TBIs are on the rise and there is concern that this will become an epidemic of our veteran population. Here, highlights are presented, including some evidence regarding pharmacologic treatments, all of which are considered off-label use.

Kimberly Arlinghaus, MD, presented Management of Neuropsychiatric Sequelae of Traumatic Brain Injury at the 2012 CPNP Annual Meeting. Dr. Arlinghaus commenced her presentation with recognition and tribute for those that have served in the US Armed Forces. In her time as a board-certified psychiatrist with specialization in neurology, Dr. Arlinghaus has worked with the veteran population extensively and now serves as the Medical Director of Behavioral Health at the Lone Star Circle of Care in Round Lake, TX.[1]

It is estimated that approximately 1.5 million Americans survive Traumatic Brain Injury (TBI) each year, with falls, motor vehicle accidents, struck-by events, and assaults recognized as the most common causes of TBI. With the increase in active duty military personnel and veterans returning from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) deployments, the incidence of TBI in this population has been on the rise in recent years. Dr. Arlinghaus described the most common battlefield injury, blast injuries, as an "epidemic in the veteran population", with which symptoms can masquerade as a variety of primary psychiatric conditions, making it difficult to recognize for years. TBI results from structural injury or physiological disruption of brain function in addition to any of the following: alteration of consciousness, memory, altered mental status, neurologic deficits, or intracranial lesion. Not all individuals with external force applied to the head will have a TBI, but an individual does meet criteria if any of the above symptoms are present immediately following the event. Note that loss of consciousness is not required, but any alteration in consciousness after the event meets criteria for TBI.

Dr. Arlinghaus presented two vivid portrayals of situations that may directly cause TBI in combat zones, a blast-wave video demonstration and a vehicle-borne Improvised Explosive Device (IED) video demonstration. Each representation depicted the transformation of explosive material to gas, which results in high pressure affecting those even hundreds of feet away from an initial explosion. A blast wave produces a blast wind so powerful that it is able to rip, shear, and tear neurons.

As a result of high pressure, or the external force applied to the brain, a diffuse axonal injury (DAI) may result. Dr. Arlinghaus emphasized that practitioners must actively screen for TBI following closed head injury, as it is usually identified only by taking an accurate patient history related to symptoms following injury. Frontal temporal lobes are the most commonly damaged in this type of injury. There are usually no significant findings on brain imaging with DAI, unless the injury is severe enough to warrant secondary damages.

During the presentation, Dr. Arlinghaus described that 80% of TBIs are mild, but in individuals who sustain repeated TBIs, the recovery from a brain injury is more difficult than the injury itself. Fortunately, the recovery in most individuals "is a continuum". In mild injury, the most recovery occurs within 3-6 months, but longer (12-18 months) in more severe TBI, she explained.

Neuropsychiatric problems are common in people with post-concussive syndromes. Therefore, according to Arlinghaus, it is essential to provide knowledge to practitioners in emergency settings that patients should be educated about the possible symptoms that may be experienced following TBI. Because TBI is so easy to miss, says Arlinghaus, the outcomes can become something much bigger as the injury remains unidentified. People need to be told that they may experience emotional outbursts, an inability to concentrate, and/or tinnitus, among other symptoms. Some individuals affected by TBI may initially suffer from impulsivity, photophobia, or phonophobia. In mild injury, these symptoms usually subside, but may be permanent in more severe cases. Patients may often seek mental health care rather than assessment for TBI, due to a lack of education about the symptoms related to the injury.

## MISCLASSIFICATION OF SYMPTOMS

TBI can be easy to miss, according to Arlinghaus. This is why mental health providers may be the first point of contact for patients with vague symptom descriptions. Additionally, Dr. Arlinghaus describes the necessity of putting TBI in appropriate context, especially when treating patients with concurrent Post-Traumatic Stress Disorder following multiple military deployments or concurrent substance abuse. The added complexity of patients with these problems makes their treatment extremely challenging, she points out.

## PERSONALITY CHANGES

Personality changes may occur in patients with TBI as a result of axonal damage, says Arlinghaus. "The shell of a person is there, but it's not them, because the seat of the soul is in the mind", she says.

These patients may become very apathetic, lack initiative, and look very depressed, although they may not actually suffer from true depression. The problem is, Dr. Arlinghaus contends, that if you are throwing antidepressants at these people, you do not reach expected efficacy. "You need to know what you are treating and if TBI is part of the problem", otherwise, she points out, "[you may be barking] up the wrong tree with the wrong medication".

One of the most common complaints of family members involved with TBI, according to Arlinghaus, is the short fuse of affected patients, referred to as aggressive type. "You're pouring gasoline, on top of gasoline, and what's the match?" she asks. The match for these individuals, she explains, might be a personal loss or the use of drugs and alcohol.

Arlinghaus discussed labile type personality changes seen with TBI, where emotion is expressed in tears. She also discussed paranoid type, where antipsychotics, though frequently prescribed, do not work very well if brain injury is the cause. Anticonvulsants tend to work better, often in combination with antipsychotics, she explained. Depression, anxiety, and sleep disorders are all also frequently seen in patients affected by TBI.

## FRUSTRATIONS OF PHARMACOLOGIC TREATMENT

Psychopharmacologic treatment of TBI is frustrating, because there are no drug treatments with FDA approved labeling for this indication. Ultimately when a patient presents with a series of symptoms, the best practice is to use medications with evidence for treatment within those primary disorders.

Dr. Arlinghaus compared the pharmacologic responses of individuals affected by TBI to elderly patients. They are very sensitive to anticholinergic side effects, sedation, seizures, and possible Extrapyramidal Symptoms (EPS). It was emphasized that neuroleptics may decrease neuronal recovery after TBI. Class 1, 2, and 3 evidence for the pharmacologic management of TBI was presented. In the literature discussed, it is unfortunate that only a total of 7 studies have been considered Class I, or gold standard evidence. Additionally, all of these studies looked only at improvement in cognitive function, not other areas affected by the injury.

In terms of psychopharmacologic intervention, we know the most about treatment of cognitive problems, says Arlinghaus. The literature lacks support for the treatment of aggression, mood, anxiety, or psychosis. Some highlights of the pharmacologic therapy discussed by Arlinghaus are as follows:

- Methylphenidate-successful in improving attention, as the processing speed tends to be lower in those with TBI than unaffected individuals.[3]
- Donepezil-may be helpful in improving cognitive function, processing speed, behavioral problems.[3]
- Bromocriptine-may be most beneficial in enhancing executive function.[3]
- Phenytoin-has been used prophylactically for people following TBI, but very poor cognitive function outcomes may result. Not helpful for prophylaxis of seizures after about 1 week.[4]
- Lithium-avoid due to the high incidence of neurotoxic adverse effects.[3]
- Anticholinergics-avoid due to increased sensitivity to adverse effects.[3]
- Bupropion-avoid due to lowering of seizure threshold.[3]

Arlinghaus provided several useful clinical pearls from her extensive experience working with patients affected by TBI and from the existing body of evidence. Because these individuals are so sensitive to drug-induced effects and may be experiencing a variety of concurrent neuropsychiatry sequelae, it is critical to "use medicines that are going to do the least damage in lower doses", she says.

## REFERENCES


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