Traumatic Brain Injury

Every year in the U.S., 1.7 million cases of traumatic brain injury (TBI) occur. Happening either as isolated incidents or alongside another injury, TBI can result in permanent disability and even death.

A TBI is caused by a bump, blow, or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. A TBI can have symptoms that are mild, meaning the person experiences a brief change in mental status or consciousness, including concussion (kuhn-kuh-shen), or TBI can have symptoms that are moderate or severe, meaning the person experiences a loss of consciousness or has amnesia (am-nee-zha) (loss of memory) after the event.

What causes TBI?

Overall, falls are the leading cause of TBI in the U.S., and blasts are the leading cause of TBI in active military personnel. Other causes of TBI include motor vehicle accidents, being struck by or against an object, sports injuries, and violence.

What are the symptoms of TBI?

Symptoms of mild TBI include:

- Loss of consciousness
- Headache
- Confusion
- Dizziness
- Blurred vision or tired eyes
- Ringing in the ears
- Bad taste in the mouth
- Lethargy or fatigue
- Change in sleep patterns
- Change in mood or behavior
- Trouble with memory, concentration, attention, or thinking

In addition to the above symptoms of mild TBI, symptoms of moderate or severe TBI include:

- Prolonged or worsening headache
- Repeated vomiting or nausea
- Convulsions or seizures
- Inability to awaken from sleep
- Dilation of one or both pupils in the eyes
- Slurred speech
- Weakness in the arms or legs
- Loss of coordination
- Increased confusion
- Restlessness
- Agitation

Are there complications?

Complications can occur immediately or soon after the TBI, and the more severe the injury, the more severe the complications.

Altered consciousness is a common complication and can come in a variety of forms, including:

- **Coma.** When a person is in a coma, he or she is unaware and unresponsive. A coma may last a few days to a few weeks.
- **Vegetative state.** A person in a vegetative state is unaware but can respond physically to his or her surroundings. This person may open and close the eyes, make sounds, respond to reflexes, and move.
- **Minimally conscious state.** This is often a transition stage between coma or a vegetative state and improved recovery. A person in a minimally conscious state is somewhat aware of self or surroundings.
- **Locked-in syndrome.** A person experiencing a locked-in syndrome is fully aware of his or her surroundings but is unable to speak or move.

Other complications can develop after TBI and may include:

- **Seizure(s).** This often occurs during the first week after the TBI. When seizures continue to occur after 1 week, the patient may have post-traumatic epilepsy.
- **Fluid buildup.** Cerebrospinal (sehr-ee-bro-spy-null) fluid may build up in the spaces of the brain, causing swelling and pressure.

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- **Infection.** An infection can occur if the skull is fractured or there is a penetrating injury. If left untreated, the infection can spread to the nervous system.
- **Blood vessel damage.** Small or large vessel damage can lead to stroke, blood clots, or other problems.
- **Nerve damage.** Nerve damage can result in paralysis (puh-ral-uh-sis), double vision, loss of vision, loss of sense of smell, loss of facial sensation, or problems swallowing.
- **Cognitive problems.** Thinking skills, such as memory, problem solving, judgment, and decision making, may be affected by TBI.

When do I need medical attention?

If you or someone you know has experienced a head trauma and is showing signs of physical or behavioral changes, seek medical attention immediately so that the person can be stabilized under the care of a doctor to prevent further damage from occurring. The type of injury and the force of the impact often determine the degree of damage incurred.

What tests will I need?

If the person who experienced a TBI is conscious or if someone who witnessed the TBI is available, the doctor will ask questions about the injury to get a better sense of its severity, such as "Where was the head or other parts of the body struck?" or "How did the injury occur?"

Imaging tests may also be used to determine the severity of the injury, including:

- **Computerized tomography (CT) scan.** Your doctor may use a CT scan, made up of X-ray images, to check for fractures, bleeding, bruised brain tissue, and brain tissue swelling.
- **Magnetic resonance imaging (MRI).** An MRI creates an image of the brain, using radio waves and magnets. This test is often done after the patient's condition is stabilized.

Depending on symptoms, other tests may be performed, such as the **Glasgow Coma Scale** in which a doctor checks how well the patient can follow directions to move the eyes and limbs and how well the person can speak, or the doctor may insert an **intracranial pressure monitor** to keep a watchful eye on brain tissue swelling.

How is TBI treated?

Rest is often the best form of treatment for mild TBI. For more severe TBI, medication, surgery, and rehabilitation may be needed.

Medications can be used immediately following the injury to prevent or reduce further damage, including diuretics to reduce fluid pressure, antiseizure drugs to prevent seizure, or coma-inducing drugs to place the patient in a temporary coma in order to reduce the need for unnecessary oxygen supply to the brain.

Emergency surgery may be required to remove clotted blood, repair skull fractures, or to open the skull to drain extra fluid or relieve pressure.

Rehabilitation is needed by most people who experience a severe TBI and often begins in the hospital and continues at an inpatient rehabilitation unit. Rehabilitation involves many steps, including continuous care under physical, speech, and occupational therapists.

Joining a support group, following a routine, and avoiding distractions can help on the road to recovery. With time, patience, and perseverance, a person may be able to return to a normal way of life after TBI. For more information, visit the Brain Injury Association of America at http://www.biausa.org.

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