Traumatic brain injury

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Diagnosis

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Traumatic brain injuries are usually emergencies and consequences can worsen rapidly without treatment. Doctors usually need to assess the situation quickly.

Glasgow Coma Scale

This 15-point test helps a doctor or other emergency medical personnel assess the initial severity of a brain injury by checking a person's ability to follow directions and move their eyes and limbs. The coherence of speech also provides important clues.

Abilities are scored from three to 15 in the Glasgow Coma Scale. Higher scores mean less severe injuries.

Information about the injury and symptoms

If you saw someone sustain an injury or arrived immediately after an injury, you may be able to provide medical personnel with information that's useful in assessing the injured person's condition.

Answers to the following questions may be beneficial in judging the severity of injury:

- How did the injury occur?
- Did the person lose consciousness?
- How long was the person unconscious?
- Did you observe any other changes in alertness, speaking, coordination or other signs of injury?
- Where was the head or other parts of the body struck?
- Can you provide any information about the force of the injury? For example, what hit the person's head, how far did he or she fall, or was the person thrown from a vehicle?
- Was the person's body whipped around or severely jarred?

Imaging tests

- **Computerized tomography (CT) scan.** This test is usually the first performed in an emergency room for a suspected traumatic brain injury. A CT scan uses a series of X-rays to create a detailed view of the brain. A CT scan can quickly visualize fractures and uncover evidence of bleeding in the brain (hemorrhage), blood clots (hematomas), bruised brain tissue (contusions), and brain tissue swelling.
- **Magnetic resonance imaging (MRI).** An MRI uses powerful radio waves and magnets to create a detailed view of the brain. This test may be used after the person's condition stabilizes, or if symptoms don't improve soon after the injury.

Intracranial pressure monitor

Tissue swelling from a traumatic brain injury can increase pressure inside the skull and cause additional damage to the brain. Doctors may insert a probe through the skull to monitor this pressure.

Treatment

Treatment is based on the severity of the injury.

Mild injury

Mild traumatic brain injuries usually require no treatment other than rest and over-the-counter pain relievers to treat a headache. However, a person with a mild traumatic brain injury usually needs to be monitored closely at home for any persistent, worsening or new symptoms. He or she may also have follow-up doctor appointments.

The doctor will indicate when a return to work, school or recreational activities is appropriate. It's best to limit physical or thinking (cognitive) activities that make things worse until your doctor advises that it's OK. Most people return to normal routines gradually.

Immediate emergency care

Emergency care for moderate to severe traumatic brain injuries focuses on making sure the person has enough oxygen and an adequate blood supply, maintaining blood pressure, and preventing any further injury to the head or neck.

People with severe injuries may also have other injuries that need to be addressed. Additional treatments in the emergency room or intensive care unit of a hospital will focus on minimizing secondary damage due to inflammation, bleeding or reduced oxygen supply to the brain.

Medications

Medications to limit secondary damage to the brain immediately after an injury may include:

- **Diuretics.** These drugs reduce the amount of fluid in tissues and increase urine output. Diuretics, given intravenously to people with traumatic brain injury, help

reduce pressure inside the brain.

- **Anti-seizure drugs.** People who've had a moderate to severe traumatic brain injury are at risk of having seizures during the first week after their injury.

  An anti-seizure drug may be given during the first week to avoid any additional brain damage that might be caused by a seizure. Continued anti-seizure treatments are used only if seizures occur.

- **Coma-inducing drugs.** Doctors sometimes use drugs to put people into temporary comas because a comatose brain needs less oxygen to function. This is especially helpful if blood vessels, compressed by increased pressure in the brain, are unable to supply brain cells with normal amounts of nutrients and oxygen.

Surgery

Emergency surgery may be needed to minimize additional damage to brain tissues. Surgery may be used to address the following problems:

- **Removing clotted blood (hematomas).** Bleeding outside or within the brain can result in a collection of clotted blood (hematoma) that puts pressure on the brain and damages brain tissue.
- **Repairing skull fractures.** Surgery may be needed to repair severe skull fractures or to remove pieces of skull in the brain.
- **Bleeding in the brain.** Head injuries that cause bleeding in the brain may need surgery to stop the bleeding.
- **Opening a window in the skull.** Surgery may be used to relieve pressure inside the skull by draining accumulated cerebral spinal fluid or creating a window in the skull that provides more room for swollen tissues.

Rehabilitation

Most people who have had a significant brain injury will require rehabilitation. They may need to relearn basic skills,

such as walking or talking. The goal is to improve their abilities to perform daily activities.

Therapy usually begins in the hospital and continues at an inpatient rehabilitation unit, a residential treatment facility or through outpatient services. The type and duration of rehabilitation is different for everyone, depending on the severity of the brain injury and what part of the brain was injured.

Rehabilitation specialists may include:

- **Physiatrist,** a doctor trained in physical medicine and rehabilitation, who oversees the entire rehabilitation process, manages medical rehabilitation problems and prescribes medication as needed
- **Occupational therapist,** who helps the person learn, relearn or improve skills to perform everyday activities
- **Physical therapist,** who helps with mobility and relearning movement patterns, balance and walking
- **Speech and language pathologist,** who helps the person improve communication skills and use assistive communication devices if necessary
- **Neuropsychologist,** who assesses cognitive impairment and performance, helps the person manage behaviors or learn coping strategies, and provides psychotherapy as needed for emotional and psychological well-being
- **Social worker or case manager,** who facilitates access to service agencies, assists with care decisions and planning, and facilitates communication among various professionals, care providers and family members
- **Rehabilitation nurse,** who provides ongoing rehabilitation care and services and who helps with discharge planning from the hospital or rehabilitation facility
- **Traumatic brain injury nurse specialist,** who helps coordinate care and educates the family about the injury and recovery process
- **Recreational therapist,** who assists with time management and leisure activities

- **Vocational counselor,** who assesses the ability to return to work and appropriate vocational opportunities and who provides resources for addressing common challenges in the workplace

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Coping and support

A number of strategies can help a person with traumatic brain injury cope with complications that affect everyday activities, communication and interpersonal relationships. Depending on the severity of injury, a family caregiver or friend may need to help implement the following approaches:

- **Join a support group.** Talk to your doctor or rehabilitation therapist about a support group that can help you talk about issues related to your injury, learn new coping strategies and get emotional support.
- **Write things down.** Keep a record of important events, people's names, tasks or other things that are difficult to remember.
- **Follow a routine.** Keep a consistent schedule, keep things in designated places to avoid confusion and take the same routes when going to frequently visited destinations.
- **Take breaks.** Make arrangements at work or school to take breaks as needed.
- **Alter work expectations or tasks.** Appropriate changes at work or school may include having instructions read to you, allowing more time to complete tasks or breaking down tasks into smaller steps.

- **Avoid distractions.** Minimize distractions such as loud background noise from a television or radio.
- **Stay focused.** Work on one task at a time.

By Mayo Clinic Staff

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