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For patients

Head Injury

A head injury occurs as a result of trauma to the scalp, skull or brain and may be classified as closed (no cut to the skin) or penetrating (skin and/or bone of the skull is broken). Head injury symptoms may occur immediately following trauma or develop slowly over time.

Your doctor may perform a physical and neurologic exam along with head CT, head MRI or head x-ray to assess the nature and severity of your injury and determine appropriate treatment. While patients with minor head injuries may be observed and treated with medication, more serious traumatic brain injuries may require emergency care to remove blood clots or relieve pressure on the brain.

What is a head injury?

A head injury occurs as a result of trauma to the scalp, skull or brain. Head injuries are classified as closed, in which there is no cut or laceration (http://www.radiologyinfo.org) to the skin, or penetrating (http://www.radiologyinfo.org) , in which the skin and/or bone of the skull is broken. Traumatic brain injuries range from mild (called mild traumatic brain injury) to severe.

The symptoms of a head injury may occur immediately following trauma, or they may develop slowly over several hours or days. Specific types and symptoms of head injuries include:

- Concussion (http://www.radiologyinfo.org) : Also called a mild traumatic brain injury. This includes injuries to the brain that are caused by a blow to the head or body, a fall, or another trauma that jars or shakes the brain inside the skull. People who suffer from concussions may not always exhibit symptoms that are apparent to others. Symptoms of a concussion and minor head injuries include:
    - loss of consciousness for a few seconds to a few minutes
    - confusion; memory and/or concentration problems
    - dizziness
    - headache
    - memory loss (amnesia) of events before the injury or immediately after it
    - nausea and vomiting
    - altered level of consciousness, such as being drowsy or difficult to awaken
- Contusion (http://www.radiologyinfo.org) : A bruise of the brain tissue often associated with swelling (edema (http://www.radiologyinfo.org)) and an increase in pressure within the skull, called intracranial pressure (http://www.radiologyinfo.org) (ICP). Symptoms of raised pressure within the brain and skull include:
    - dilated pupils
    - high blood pressure
    - low pulse rate and abnormal breathing.
- Fracture: A crack or break in the skull, with or without a laceration to the skin. Symptoms of a skull fracture include:
    - tenderness
    - swelling
    - skull deformity

    - bruising around the eyes or behind the ear
    - clear fluid leaking from the nose or ear
- Bleeding: Bleeding in the brain, also called a hemorrhage (http://www.radiologyinfo.org) , is a potentially life-threatening condition and in many cases may require urgent attention by a neurosurgeon. A brain hemorrhage occurs when a blood vessel in the brain bursts, causing bleeding into surrounding tissue, swelling and increased intracranial pressure (http://www.radiologyinfo.org) . Blood may also collect and form a clot, called a hematoma (http://www.radiologyinfo.org) . In an epidural hematoma (http://www.radiologyinfo.org) , the clotting occurs between the inside of the skull and the outer, strong membranous covering of the brain (called the dura mater (http://www.radiologyinfo.org)). Blood that collects beneath the dura mater is called a subdural hematoma (http://www.radiologyinfo.org) . Symptoms of bleeding in the brain, which may gradually worsen or suddenly appear, include:
    - sudden severe headache
    - seizures
    - nausea or repeated vomiting
    - lethargy
    - weakness in an arm or leg
    - loss of consciousness.
- Shear injury (http://www.radiologyinfo.org) (also called diffuse axonal injury): This type of injury results when the brain bounces violently against the inside of the skull. Nerve fibers (http://www.radiologyinfo.org) that extend from central body of a nerve cell (http://www.radiologyinfo.org) are stretched or torn, permanently damaging the brain cells and causing other complications within the nervous system. The main symptom of a shear injury is a prolonged loss of consciousness.

In infants and toddlers who cannot communicate, signs of a head injury include:

- a child that is not acting or behaving normally
- vomiting
- scalp lacerations and swelling
- seizures (http://www.radiologyinfo.org)

Patients who exhibit symptoms of a head injury should seek immediate medical attention.

How is a head injury evaluated?

The treatment of head injuries depends on the type of injury and the patient's condition. To assess the severity of a head injury, a physician may perform a physical and neurologic exam and imaging tests such as:

- *CT scan of the head (https://www.radiologyinfo.org/en/info/headct) :* Computed tomography (CT) (http://www.radiologyinfo.org) scanning combines special x-ray equipment with sophisticated computers to produce multiple images or pictures of the head and brain. Physicians use CT of the head to detect bleeding, swelling, brain injury and skull fractures. *See the Safety page (https://www.radiologyinfo.org/en/info/safety-xray) for more information about CT.*
- *MRI of the head (https://www.radiologyinfo.org/en/info/mri-brain) :* Magnetic resonance imaging (MRI) (http://www.radiologyinfo.org) uses a powerful magnetic field, radio frequency pulses and a computer to produce detailed pictures of organs, soft tissues, bone and virtually all other internal body structures. In select patients, physicians use MRI of the brain, including special MR scanning techniques called diffusion-weighted imaging, diffusion tensor imaging (http://www.radiologyinfo.org) and MR spectroscopy (http://www.radiologyinfo.org) , to help diagnose brain injuries that not have readily apparent abnormalities on a more routine MR scan.
- *X-ray of the head*: An x-ray (http://www.radiologyinfo.org) involves exposing a part of the body to a small dose of ionizing radiation (http://www.radiologyinfo.org) to produce pictures of the inside of the body. Physicians occasionally use an x-ray of the head to detect and assess skull fractures. However, such an exam is rarely performed today, as it is not able to assess

the brain at all and the CT scan can show most fractures of the skull more clearly than a head x-ray. Moreover, it is clearly understood by physicians that it is more important to determine if there is an underlying brain injury to determine the proper treatment of the patient. For this purpose, CT, and if needed, MRI are the preferred imaging techniques.

How is a head injury treated?

Consider seeking immediate medical attention with any form of head injury as the consequences of unrecognized or inappropriately treated head injury may be potenaatially serious.

Patients with minor head injuries will be observed and treated for symptoms, including pain medication for headache and medications to control nausea and vomiting. If you have symptoms of a simple concussion, you should avoid being overly active. Your physician will advise you as to when you can return to your normal daily routine and sporting activities.

More serious, traumatic brain injuries will require individualized and often emergency care, such as surgery to remove blood clots and relieve pressure on the brain.

Which test, procedure or treatment is best for me?

- *Acute Mental Status Change, Delirium, and New Onset Psychosis (https://www.radiologyinfo.org/en/info/acs-acute-mental-status-change-delirium-psychosis)*
- *Headache (https://www.radiologyinfo.org/en/info/acs-headache)*
- *Headache-Child (https://www.radiologyinfo.org/en/info/acs-headache-child)*
- *Head Trauma (https://www.radiologyinfo.org/en/info/acs-head-trauma)*
- *Trauma Head Child (https://www.radiologyinfo.org/en/info/acs-trauma-head-child)*

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