Types of Brain Injury

The skull is the hard bony covering that encases and protects the brain. The brain is soft, like firm Jell-O. When the head moves, the brain moves inside the skull.

When the head is hit or moved with force, the brain moves at a different speed than the skull. The brain can be bruised or parts may be stretched so much that damage occurs, called shearing. Bleeding may also occur, causing other problems.

This overview of some types of brain injury includes signs of brain injury and treatment options. Talk to your doctor and healthcare team if you have questions.

Concussion

A concussion is the most common type of traumatic brain injury. It results from a fall or hit to the head that causes the brain to twist and turn inside the skull. A concussion may cause bruising, bleeding or swelling of the brain. A skull fracture may occur along with a concussion.

Signs of a concussion include:
- A brief change in consciousness
- Confusion
- Headache
- Nausea or vomiting
- Fatigue or tired with no energy
- Blurred vision
- Sleeping problems
- Memory loss
- Personality changes

A concussion is normally not life-threatening, but it can be serious. If your signs get worse after 7 to 10 days, see your healthcare provider. Medicines may be used to treat dizziness or headache, but time and rest is needed most for brain healing.

Resources for more information

- MedlinePlus
  https://medlineplus.gov

- Brain Injury Association of America
  1-800-444-6443
  www.biausa.org

- Brain Injury Association of Ohio
  1-866-644-6242 or
  1-614-481-7100
  www.biaoh.org

- brainline.org
  1-703-998-2020
  www.brainline.org

- HandsOn Central Ohio
  Call 2-1-1, 24 hours a day.
  https://handsoncentralohio.org
  Visit the website for a directory of resources and programs.
A hematoma is a form of brain injury that involves a pool or collection of blood outside of the brain’s blood vessels. The blood vessels may be torn as a result of skull fractures or shearing injuries. Hematoma may develop right after a brain injury or later, causing brain swelling, higher pressure in the skull or coma. More than one type of hematoma can occur.

Types of hematoma:

- **Epidural hematoma**: Epidural means above the dura. The dura is the tough outer cover layer on your brain between your brain and your skull. The bleeding is between this layer and your skull.
- **Subdural hematoma**: Subdural is below the dura. The bleeding is between the brain and the dura layer.
- **Intracerebral hematoma**: Intra means inside and cerebral means brain. The bleeding is inside the brain tissue.

Treatment of hematoma:

Surgery may be done to remove the hematoma. Whether surgery is done depends on where the hematoma is and whether it is getting larger or causing any problems. Recovery depends on the seriousness of the injury and whether other brain injuries occurred with the hematoma.

Contusion means bruise. It is another form of traumatic brain injury. When the head is hit, the brain moves back and forth inside the skull. When the brain is pushed up against the ridges and sides of the skull, bruising to the brain can occur.

Because a big force is needed to create a contusion, the person may also have other brain injuries. These could include bleeding inside the brain, skull fractures or more than one contusion.

**Contusions can cause:**

- Brain swelling
- Higher pressure inside the skull
- Coma
- Seizures
- Brain damage

It often takes a long time for the person to recover from this injury. The location of the contusion and the amount of damage impacts recovery time.
This means bleeding in the brain. It is a moderate to severe form of brain injury. The site of the bleeding is used to name the type of hemorrhage.

- **Subarachnoid hemorrhage**: bleeding over the outer surface of the brain.
- **Intraventricular hemorrhage**: bleeding into the fluid filled chambers of the brain, called ventricles. The cerebrospinal fluid (CSF) becomes blood tinged.
- **Intracerebral hemorrhage**: bleeding into the brain tissue.

**Signs of hemorrhage include:**
- Sudden severe headache
- Change in wakefulness or confusion
- Nausea and vomiting
- Irritable
- Restless
- Light sensitivity
- Stiff neck
- Seizure
- Weakness in arms or legs
- Back and leg pain or stiffness
- Fever

Treatment depends on the severity and location of the bleed. Treatment may include surgery and medicines. Recovery depends on how severe the bleeding is and whether there are problems from the bleeding.

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**Diffuse axonal injury (DAI)**

An injury where the brain slides back and forth inside the skull, causing the brain's nerves to be stretched or torn. Damage to the brain may be widespread. When the nerves are torn, they die. It is a moderate to severe form of brain injury.

**Signs seen with this injury include:**
- Coma
- Abnormal movement of arms and legs
- Higher pressure inside the skull
- High blood pressure
- High body temperature

The recovery process can take a long time. The person with this injury may be in a coma for months.

**Anoxia**

Injury to the blood flow of the brain may cause anoxia (an-ox-ee-a) or a lack of oxygen to the brain. The brain does not store extra oxygen and is very sensitive to changes in oxygen levels.

**Signs of anoxia may include:**
- Memory loss
- Higher pressure in the brain, called intracranial pressure
- Loss of consciousness

**Treatment of anoxia includes:**
- Supporting breathing and blood pressure
- Giving medicine to reduce brain swelling
- Treating the cause of anoxia, if possible

How long and how much of the oxygen supply was blocked determines lasting effects, which may include:
- Minor loss of function
- Changes in behavior or speech
- Memory changes
- Visual changes up to blindness
- Seizures
- Long term coma
- Brain death