Traumatic Brain Injury Assessment

Head injury is any trauma to the scalp, skull, or brain. In serious cases, it is referred to as traumatic brain injury (TBI). The most common causes of a TBI are motor vehicle accidents and falls. Assessment findings differ from one person to another and depend on the location and severity of the injury, but may include symptoms such as a change in level of consciousness, personality changes, amnesia, increased intracranial pressure, diplopia, and posturing.



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Assessment

Change in LOC

Delta Halo

A change in level of consciousness is the most sensitive and reliable indicator of a patient’s neurologic status. It can range from mild to severe, depending on the severity of the injury. Flattening of affect, change in orientation, or a decrease in level of attention are examples.

Personality Changes

Three-faced-mask

In addition to a change in LOC, patients may also present with personality changes. This may include saying or doing things out of character including restlessness or irritability.

Amnesia

Memory-eraser

Amnesia, or a loss of memory, may occur as a result of brain damage due to trauma.

Increased Intracranial Pressure

Up-arrow Pressure-cooker Cranium

As intracranial pressure (ICP) increases, cerebral perfusion decreases, leading to tissue hypoxia. Because the severity of increased ICP usually correlates with the severity of symptoms, it is important to monitor for signs of increasing ICP. This includes findings such as projectile vomiting and a classic but late sign known as Cushing’s triad: (1) increased systolic blood pressure, (2) bradycardia, and (3) respiratory dysfunction. The sympathetic nervous system is activated as a compensatory mechanism to maintain cerebral perfusion. This activation causes the increased systolic blood pressure. The increased blood pressure causes homeostatic activation of the parasympathetic nervous system, which through the vagus nerve leads to bradycardia. Separately, increased ICP affecting the brainstem causes compression of respiratory centers and leads to irregular breathing patterns.

Diplopia

Double-vision of eyes

Diplopia, or double vision, may occur with a traumatic brain injury. The patient may also experience blurred vision and changes in extraocular eye movements.

Posturing

Model posturing

With increasing ICP, the patient manifests changes in motor ability. Noxious stimuli may elicit decorticate or decerebrate posturing. Decorticate (flexor) posture is flexion of arms, wrists, and fingers with adduction in upper extremities, and extension, internal rotation, and plantar flexion in lower extremities. In decerebrate (extensor) posture, the arms are stiffly extended, adducted and hyperpronated, with plantar flexion of feet. A good way to remember the difference is to think of decorticate (to the cord - pulling arms and hands to the spinal cord) and decerebrate (has lots of “e”s in the word for extensor).

Location of Injury

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Basilar Skull Fracture

Bass-sailor

The location of injury often determines the signs and symptoms manifested. For example, a basilar skull fracture is a linear fracture involving the base of the skull and may present with raccoon eyes (periorbital ecchymosis) or Battle’s sign (postauricular ecchymosis). Rhinorrhea (CSF leakage from the nose) or otorrhea (CSF leakage from from the ear) often confirms that the dura has been damaged.

Halo or Ring Sign

Ring Sign

To determine if fluid leaking from the nose or ear is CSF, one can look for the halo or ring sign. This is done by allowing the leaking fluid to drain onto a white gauze pad or towel and observe for the results. If CSF is present, the blood will pool into the center of the pad and a yellowish ring will encircle the blood, forming a “halo” or “ring”.

Considerations

Intracranial Bleeding

Skull Goblet filled with Blood

With any traumatic brain injury there is the potential for intracranial bleeding. An epidural hematoma results from bleeding between the dura and inner surface of the skull, while a subdural hematoma is bleeding between the dura mater and the arachnoid layer of the meninges. An intracerebral hematoma occurs from bleeding within the brain tissue, potentially from rupture of intracerebral vessels.

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