

COMMON TRAUMATIC INJURIES AND THEIR TREATMENT

Injuries may be due to blunt or penetrating forces. Blunt injuries occur when an outside force strikes the body. These injuries occur as a result of a motor vehicle crash, a fall or an assault. Penetrating trauma occurs when an object, such as a bullet or knife, pierces the body. Sometimes, patients have both types of injuries.

In this section of the handbook, we describe some of the common types of injuries people have and how they are typically treated. The trauma staff can give you more details about your loved one's injuries. At the end of the book there is a place for you to list these injuries.

HEAD INJURIES

A traumatic brain injury, sometimes called a TBI, is an injury to the brain due to blunt or penetrating trauma. There are many types of brain injuries:

- **Cerebral concussion:** brief loss of consciousness after a blow to the head. A head scan does not show this injury; a mild concussion may produce a brief period of confusion; it is also common to have some loss of memory about the events that caused the injury.
- **Cerebral contusion:** contusion means bruising, so a cerebral contusion is bruising of the brain; this can occur under a skull fracture. It can also be due to a powerful blow to the head that causes the brain to shift and bounce against the skull.
- **Skull fracture:** cracks in the bones of the skull caused by blunt or penetrating trauma; the brain or blood vessels may also be injured.
- **Hematomas:** Head injuries and skull fractures may cause tearing and cutting of the blood vessels carrying blood into the brain. This may cause a blood clot to form in or on top of the brain. A blood clot in the brain is referred to as a hematoma. There are several types of hematomas:
 - **Subdural hematoma:** bleeding that occurs when a vein on the outside of the brain is damaged; a blood clot slowly forms and puts pressure on the outside of the brain.
 - **Epidural hematoma:** bleeding that occurs when an artery on the outside of the brain is injured; a blood clot can occur quickly and put pressure on the outside of the brain.
 - **Intracerebral hematoma:** bleeding inside the brain itself; it usually happens when blood vessels rupture deep within the brain.

A traumatic brain injury that is described as “mild” implies that there was little or no loss of consciousness at the time of injury. These types of injuries often are not reported or treated. Neurological exams may appear normal, which makes it hard to diagnose the injury, but symptoms often show up later. Such symptoms may include foggy memory, a hard time solving problems, headaches, dizziness, nausea, fatigue, mood swings, anxiety, depression, disorientation and delayed motor response.

Diagnosis and Evaluation

The trauma team watches patients with a head injury very closely, including:

- Checking the patient's pupils with a light
- Checking the level of consciousness. They use the Glasgow Coma Scale (GCS) to find out how badly the brain has been injured. The GCS includes testing for eye opening, talking and movement. Scores range from a high of 15 (normal) to a low of 3 (coma from injury or drugs).
- Checking to see if patients react to touch or if they feel dull, sharp or tingling feelings.

When doctors think that a patient has a brain injury, they often order a scan of the brain (CT scan). This scan can find out if there is swelling, bleeding or a blood clot.

When the patient is more stable, doctors may evaluate the patient's level of functioning using the Rancho Los Amigos Scale, often called the Ranchos Scale. The Ranchos Scale has eight levels that describe how well patients can think and how they act. It ranges from level 1 (lowest level of functioning) to Level 8 (highest level of functioning). It also gives better information about the severity of the brain injury.

Treatment

Doctors base treatment for a brain injury on the type and location of the injury. Treatments may include:

- Drugs to lower brain pressure, drugs to lower anxiety and drugs that change the fluid levels in the brain
- Intracranial pressure monitor (ICP), which measures pressure in the brain. There are two types of monitors: a tube placed in the brain that only measures brain pressure, and a tube placed into a small space in the brain that measures brain pressure and also drains fluid from the brain to lower the pressure on the brain.
- Craniotomy, which is an opening in the skull to remove a clot and lower brain pressure. This is done in the operating room.
- Shunt, which is a tube placed to drain excess fluid in the brain. This is done in the operating room.
- Craniectomy, which involves removing a part of the skull bone to give the brain more room to swell. This type of surgery may also be done when a clot is removed. The skull bone is replaced when the patient is better (usually several months later).

CHEST INJURIES

Chest injuries may be life threatening if the lungs are bruised. The goal of early trauma care is to protect breathing and blood flow. Types of chest injuries include:

- Rib fractures: the most common type of chest injury; they can be very painful but will usually heal without surgery in three to six weeks.
- Flail chest: two or more ribs are broken in more than two places and the chest wall is not working as it should during breathing.
- Hemothorax: blood pools in the chest cavity, often due to rib fractures.
- Pneumothorax: air collects in the chest cavity due to an injured lung.
- Hemo-pneumothorax: both air and blood collect in the chest cavity.
- Pulmonary contusion: bruising of the lung; if severe, it can be life threatening because bruised lung tissue does not use oxygen well.

Diagnosis and Evaluation

Doctors often use a chest X-ray or CT scan to find out more about the injury. They can tell how the lung is using oxygen by taking some blood from an artery. They may need to open the chest to examine and treat the injury.

Treatment

The goals are to increase oxygen to the lungs, control pain and prevent pneumonia. Doctors and nurses may ask the patient to cough and do deep-breathing exercises, which help the lungs heal. They will also tell the patient to stop smoking. The doctor will order drugs to treat pain and soreness.

It is important that the patient take part in the healing process. It greatly reduces the risk of other problems, such as pneumonia or lung collapse, that may need to be treated with a ventilator (breathing machine).

ABDOMINAL INJURIES

Blunt or penetrating trauma to the abdomen can injure such organs as the liver, spleen, kidney or stomach.

The injuries may be:

- Lacerations (cuts)
- Contusions (bruises)
- Ruptures (severe tearing of the tissue)

Diagnosis and Evaluation

There are many ways to diagnose an abdominal injury, including:

- physical examination
- CT scan
- a blood count to check hemoglobin and hematocrit, two measures of blood loss
- ultrasound

- surgery called a laparotomy in which the surgeon makes an incision in the abdominal area

Treatment

Treatment depends on the organ that is injured and the severity of the injury. It may range from watching the patient closely to surgery. Many injuries to the kidney, spleen or liver can be treated without surgery. Often, however, severe injuries to the abdomen require a number of surgeries.



Simple



Greenstick

BONE, LIGAMENT AND JOINT INJURIES

Blunt and penetrating trauma can harm bones, ligaments and joints.

Types of fractures or broken bones include:

- Open or compound fracture: a broken bone pushes through the skin; it is serious because the wound and the bone may get infected.
- Closed fracture: the broken bone does not pierce the skin.
- Greenstick fracture: a bone is partly bent and partly broken; occurs most often in children.
- Spiral fracture: a break that follows a line like a corkscrew.
- Transverse fracture: a break that is at right angles to the long axis of the bone.
- Comminuted fracture: a bone that is broken into many pieces.
- Hairline fracture: a break that shows on an X- ray as a very thin line that does not extend entirely through the bone; all parts of the bone still line up perfectly.



Comminuted



Hairline



Compound



Spiral

Diagnosis

Doctors can usually see whether most bones are broken by using regular X-rays. However, for other bones, doctors may use a CT scan. To find out if there is any damage to joints or ligaments, doctors may do a magnetic resonance imaging scan (MRI).

Treatment

Treatment for a broken bone depends on the type, severity and location and whether the tissue around the bone is damaged. A doctor may choose to treat a fracture in several different ways:

- a cast, sling or splint
- closed reduction: moving the limb or joint to its normal position without open surgery. Pain or sedation drugs are used during the procedure.
- open reduction: Surgery that returns the bone to its normal position. Surgeons may use pins, wires, plates and/or screws to hold the bone together.
- external fixator: the surgeon puts pins in the bone above and below the break and connects the pins to bars outside the skin that hold the bones together to heal. The doctor takes the fixator off after the fracture heals.

SPINAL CORD INJURY

Blunt or penetrating trauma can injure the spinal cord. Two main types of injury can occur:

- Quadriplegia (also called tetraplegia): injury to the spinal cord from the first cervical vertebra (C1) to the first thoracic vertebra (T1) level (see section under Anatomy). This means the patient has paralysis of (cannot move) the arms and legs. Injury at or above the C4 level affects breathing and patients often need a ventilator (a breathing machine).
- Paraplegia: injury to the spinal cord from the second thoracic vertebra (T2) to the 12th thoracic vertebra (T12), causing paralysis of both legs and possibly the chest and abdomen.

Doctors may also say the patient has a complete or an incomplete injury:

- A complete spinal cord injury means that the patient cannot move and has no feeling. It does not always mean that the spinal cord has been cut in two.
- An incomplete spinal cord injury means that the patient has some movement or feeling. Incomplete injuries may be to back, front or central part of the spinal cord. With injury to the back part of the spinal cord, the patient may have movement but be unable to feel that movement. With injury to the front part of the cord, the patient may lose movement but may be able to feel touch and temperature. An incomplete injury may get better in time. It is hard to know when or if full function will return.

Diagnosis and Evaluation

Doctors use physical exams, X-rays, CT scans and Magnetic Resonance Imagry (MRI) scans to diagnose a spinal cord injury. X-rays do not show the spinal cord itself but do show damage to the vertebral column or the bones around the spinal cord. CT scans and MRIs give the best picture of the spinal cord and bones. Sometimes doctors cannot do an MRI because of other injuries the patient has, because of the patient's weight, or because the patient has a pacemaker, monitor or other metal device. In these cases, doctors use other tests to evaluate the patient.

Treatment

In the first 12 hours after a blunt spinal cord injury, doctors often give steroids to the patient to reduce spinal cord swelling and improve recovery from the injury. If the spinal cord was cut in two, no treatment can reduce paralysis.

Patients need special attention to bladder and bowel function and skin care. They may need surgery to give support to the spine. Surgery may not change paralysis but will allow the patient to sit up. Talk with the surgeon about the goals of surgery. In any case, getting out of bed improves healing and the sense of well-being and lowers the risk of pneumonia, pressure sores and blood clots.

Patients with spinal cord injuries receive special attention to prevent pressure sores and a condition called autonomic dysreflexia:

- Pressure sores (also known as pressure ulcers or decubitis) are breakdowns in the skin caused by constant pressure on one area and decreased blood flow from not moving. Pressure sores can occur on the bottom, hips, back, shoulders, elbows and heels. Skin redness is the first sign that a sore may be starting, so it is important to check the skin every day to prevent these sores. If a sore occurs, it can take many months to heal or even need surgery. Moving the patient from side to side and propping up the feet can help prevent pressure sores.
- Autonomic dysreflexia may occur when the spinal cord injury is at or above the T6 level. It means that messages about blood pressure control are not being sent as they should be. As a result, when blood pressure goes up due to pain (for instance), it may not return to normal once the pain is

treated. High blood pressure can cause a stroke, so it is very important to know the warning signs and find the cause. Signs of autonomic dysreflexia include headache, seeing spots or blurred vision, sweating, or flushing (redness) of the skin.