Traumatic Brain Injury : Information for patients and families

Vancouver General Hospital Intensive Care Unit

Myp Sekhon MD
Clinical Instructor, Staff Intensivist
Division of Critical Care Medicine
Vancouver General Hospital
University of British Columbia

FACULTY OF MEDICINE

Definition (s)

Severe Traumatic Brain Injury (TBI):

The brain is injured after a traumatic blow to the skull.

A TBI to the brain can result in many different injuries:

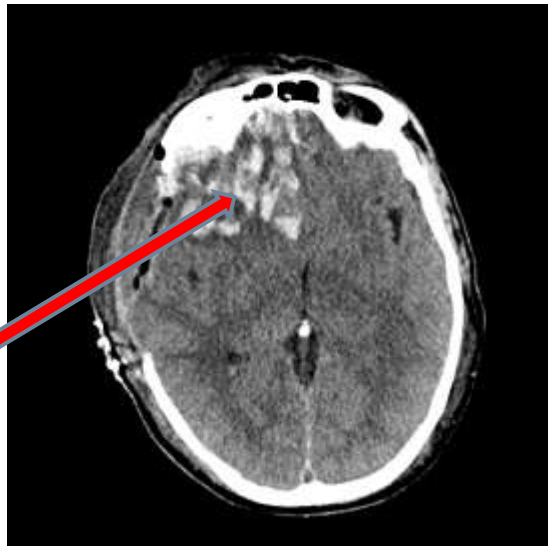
- Contusions (bruise in the brain)
- Hemorrhage (bleed inside or outside the brain)
- Edema (swelling of the brain)

Types of TBI

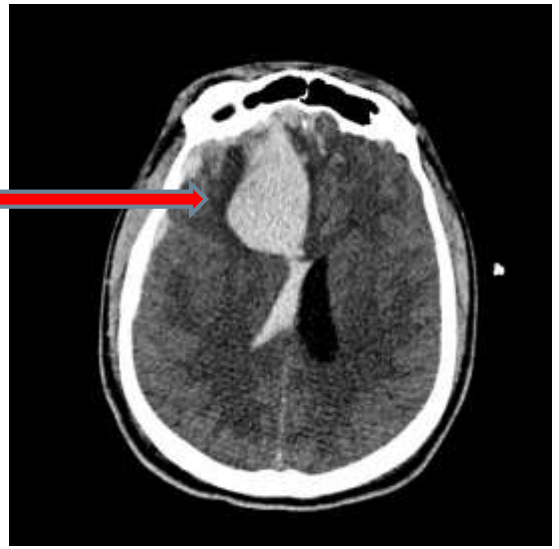
Contusion (bruise)

- This type of brain injury typically gets much worse before it gets better
- Days after the injury, significant swelling can occur which may squish other parts of the brain

A contusion (bruise) in the front of the brain



A bleed after trauma with surrounding swelling that is pushing on the healthy part of the brain



Types of TBI

Subdural or epidural hematoma

- The types of bleeds occur between the skull and the brain
- They can push on the underlying brain and further injure it
- Surgery may be nee

An epidural hematoma is located between the skull and brain. The bood (white) is squeezing the brain (grey)

Types of TBI

Diffuse axonal injury

- During blunt trauma, the brain is “shaken” inside the skull and undergoes microscopic damage in all areas
- This type of injury may not be seen on CT scan and a MRI may be required
- Small bleeds are usually located deep within the brain

What happens in the days after the TBI

The initial event causes local or widespread damage to the brain

After the injury, the brain starts to swell (edema) similar to any other part of your body that is injured

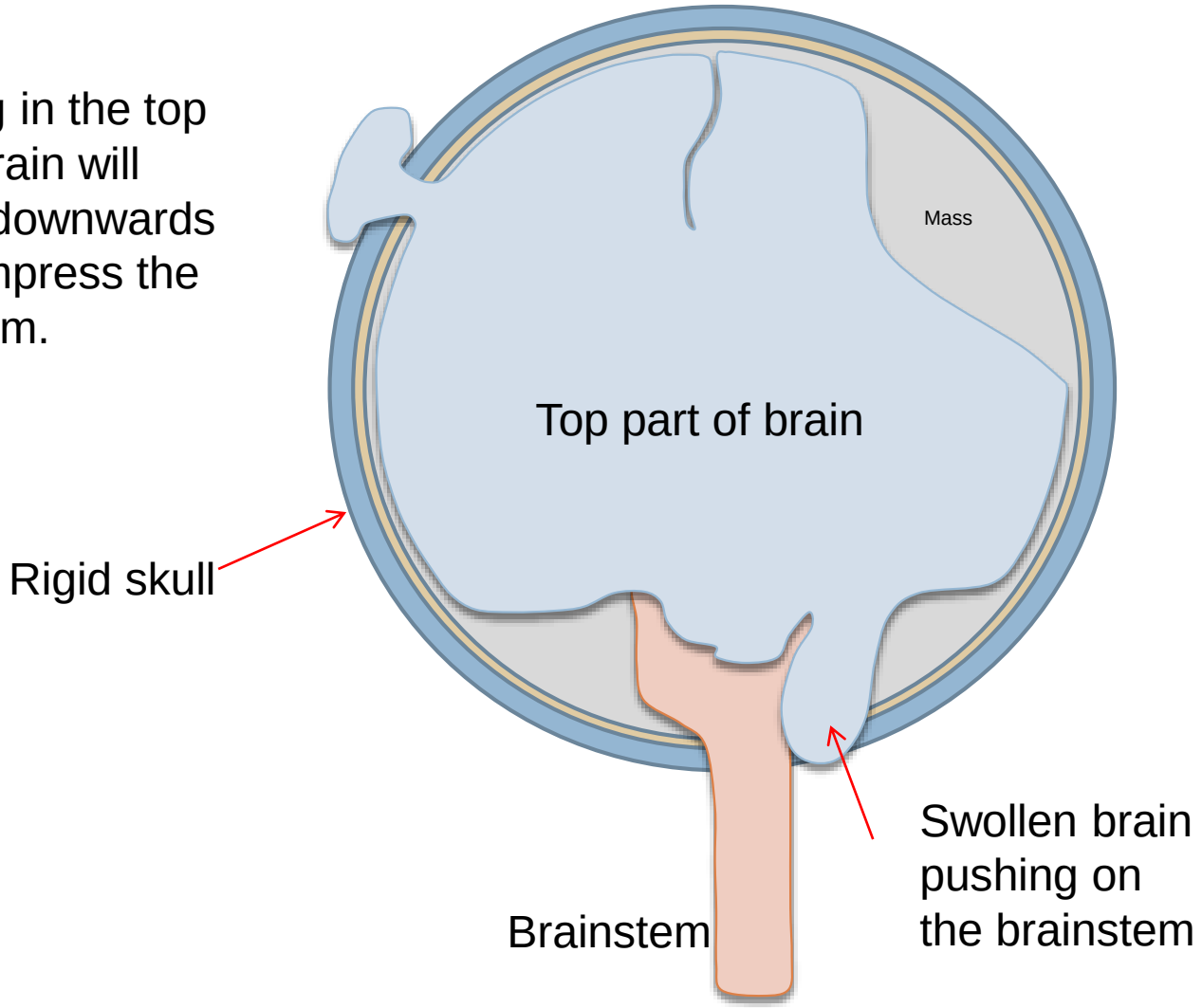
If the brain swelling increases too much, the pressure inside the skull can increase to dangerous levels

Because the skull is rigid, the top part of the brain (swollen) may move downwards and compress the brainstem (which controls the heart / lungs and carries all the signals from the brain to the body)

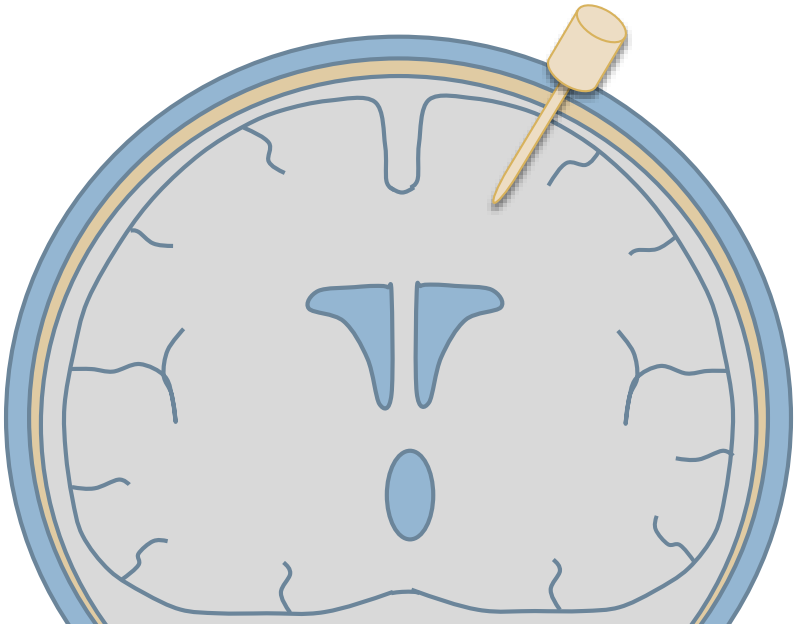
Therefore, we must prevent this from happening

Swelling after TBI

Swelling in the top of the brain will force it downwards and compress the brainstem.



How do we know if the swelling is getting worse?



To detect if the swelling is getting worse, we use thin wires that are placed into the brain to detect the pressure inside the skull

If the pressure is going up then the swelling may be getting worse

We also use CT scans for this purpose but they only

How is the pressure monitor inserted?

A neurosurgeon (brain surgeon) makes a hole the skull under sterile conditions to avoid infection

After the whole is made 2 wires are inserted through a “bolt” which holds then in place

One wire measures pressure

The other wire measures the amount of oxygen in the brain

A CT scan may be required to confirm position of the wires

Are there risks?

Yes, there are risks with this procedure as there are with any procedure

The main risks are causing a bleed (0.1% to 0.5%)

The other risk is infection (0.1% to 0.5%)

The risks of not knowing the pressure inside the skull (and putting the brainstem at risk by compression from brain swelling) usually outweigh the risks associated with the placement of wires

What do we do with the information of pressure and oxygen in the brain?

In our unit, we use treatments to decrease the pressure and prevent the brain swelling

These treatments include:

- Sedation medications (medically induced coma)
- Hypothermia (we may cool the patient with cold blankets to stop brain swelling – similar to putting ice on a sprained ankle)
- Increase the salts in the blood to shrink the swelling in the brain
- Control the amount of carbon dioxide in the body (the breathing machine – ventilator is needed for this)
- Surgery may be an option

What do we do with the information of pressure and oxygen in the brain?

Optimizing the amount of oxygen in the brain can keep the injured brain healthy and improve patient outcome

Treatments used to optimize oxygen in the brain:

- Increasing the blood pressure can deliver more oxygen to the brain
- Transfusing blood may help
- Decreasing the pressure in the skull with previous mentioned treatments can also accomplish this goal

What to expect with my family member?

Most patients will require many monitors to manage their brain injury

Traumatic brain injuries usually get worse before they get better

Most patients will be heavily sedated

The individual timeline of each patient varies tremendously

Take one day at a time and try not focus too far ahead as these brain injuries are unpredictable

Outline
Definition
Classification
Pathophysiology
Imaging / Herniation
Management
Protocol
De-escalating tx

What to expect with my family member?

We are here for you!

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