Sports Related Injuries including Prehospital Traumatic Brain Injuries and Commotio Cordis

Kiel Ambulance Training Series in partnership with Aurora Sports Medicine Athletic Trainer

Sports Related Injuries

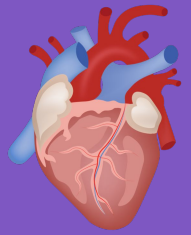
According to a John Hopkins study there are about 30 million children and teenagers who participate in organized sports annually. An out of those 30 million participants, injuries occur to more than 3.5 million athletes or 12%.

Although 12% may seem like a small number, sports related injuries contribute to 21% of all traumatic brain injuries in youth.

Contact sports remain the highest type of athletic activity to cause injuries. Baseball has the highest fatality rate in youth sports.

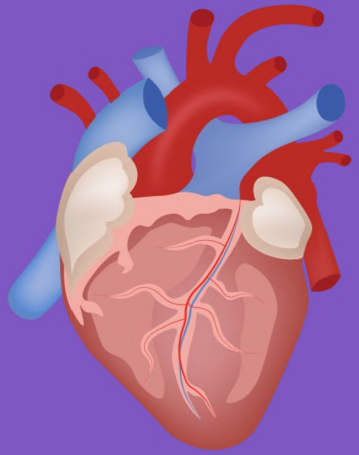
Two areas of focus tonight are

Commotio Cordis



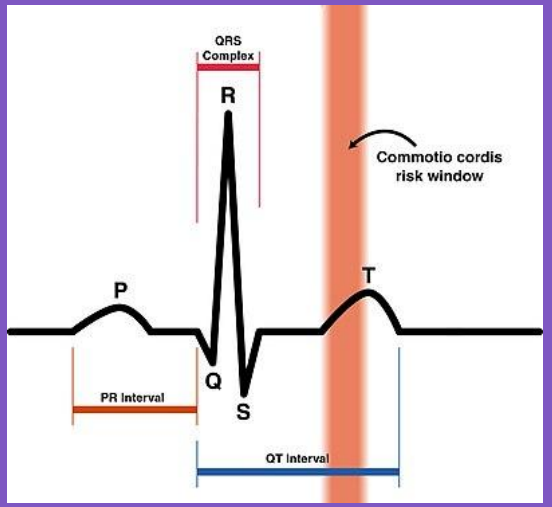
Traumatic Brain Injuries

Commotio Cordis



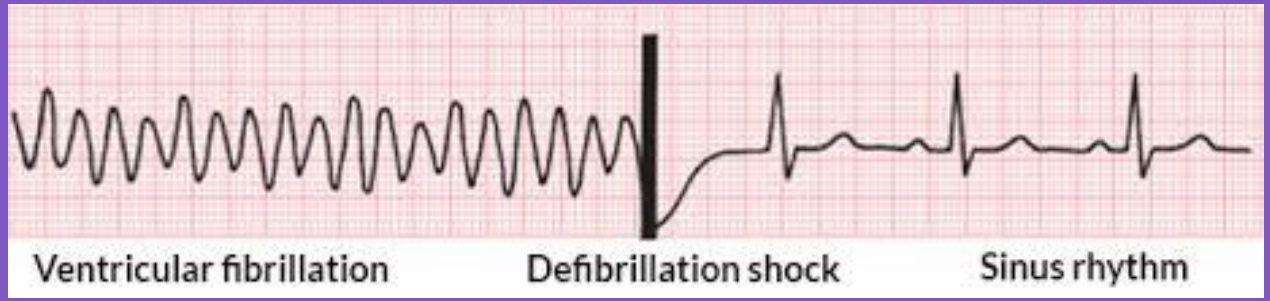
Commotio Cordis

Commotio cordis is a rare event that occurs when blunt force is taken to the chest during a specific point in the cardiac cycle. If rapid treatment is not provided, commotio cordis has a 97% fatality rate.



Commotio Cordis

Ventricular fibrillation (v-fib) is the most common cardiac arrhythmia caused during commotio cordis, and rapid defibrillation required to restore normal cardiac electrical activity.



Commotio Cordis -EMS

Prehospital treatment of commotio cordis starts with early recognition and fast defibrillation.

Standard resuscitation protocols or post resuscitation protocols should be followed.

Rapid transport to an appropriate cardiac center is preferred. This is a scenario when air medical should be considered.

*Remember to take into consideration potential c-spine injuries.

Commotio Cordis -EMS

https://youtu.be/r1Z9Vd53yhI?si=jHwkgYhtdzX4He1f

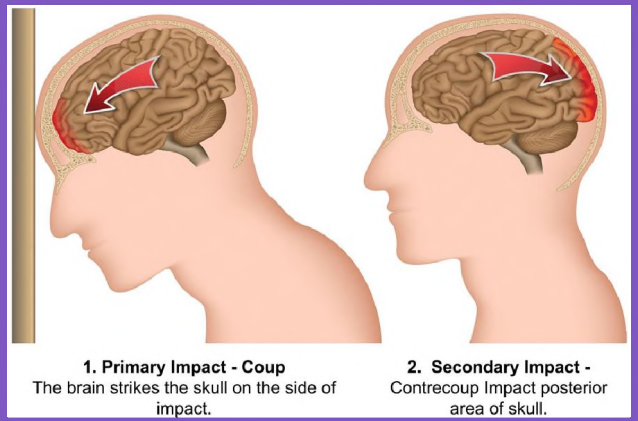
Traumatic Brain Injuries

Traumatic Brain Injuries

A traumatic brain injury (TBI) is when there is a sudden external physical assault, that damages the brain. The damage can be focal (one area of the brain) and diffuse (multiple areas of the brain).

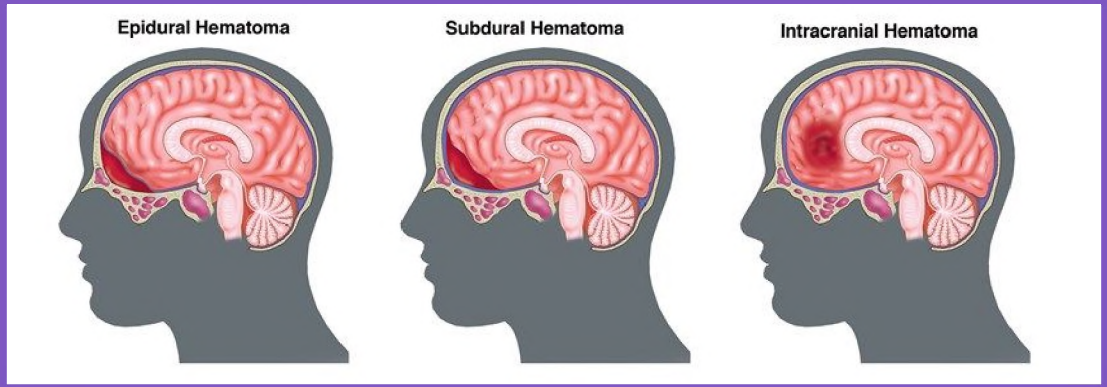
Severity can range from a mild concussion to bleeding to coma and death.

Traumatic Brain Injuries



1. Primary Impact - Coup
The brain strikes the skull on the side of impact.

2. Secondary Impact -
Contrecoup Impact posterior area of skull.



Traumatic Brain Injuries

Primary Brain Injury

❖ Definition – Damage to the brain from the biomechanical effects of the trauma, causing:

- Ischemia
- Anoxia/hypoxia or
- Shear injury

Secondary Brain Injury

❖ Definition – The result of one or more of the following:

- Hypoxia
- Hypotension (decreased cerebral blood flow)
- Increased intracranial pressure (ICP)
- Hyper- or hypoglycemia
- Metabolic disturbances
- Seizures

Traumatic Brain Injuries Signs and Symptoms

Loss of consciousness	Nausea and/or vomiting
Appears dazed and confused	Dizziness
Confusion	Sensitivity to light or noise
Slow to move or answer questions	Concentration or memory problems
Balance problems	Unable to recall recent event
Headache or head pressure	Does not feel right

Traumatic Brain Injuries

Avoid the three “H” Bombs

Hypoxia

Hypotension

Hyperventilation

Traumatic Brain Injuries

Respiratory:

Assess rate, depth, quality, and effectiveness of ventilation every 5 minutes and as needed

- Hypoxia occurs in 40% of severe TBI
- Assess for hypoxia
- Important indicators of hypoxia:
  - SpO2 < 90%
  - Central cyanosis

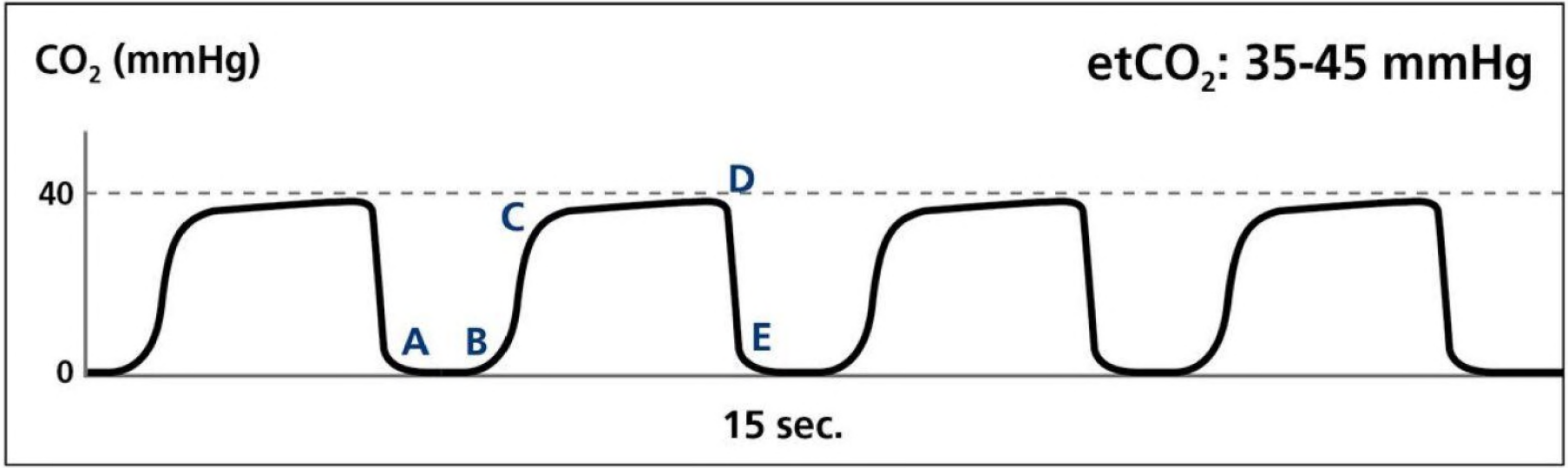
Traumatic Brain Injuries

Hyperventilation produces a rapid decrease in the arterial partial pressure of carbon dioxide, which causes cerebral vasoconstriction, decreased cerebral blood flow, and lower intracranial pressure (ICP), giving the brain more room to swell.

• Hyperventilation can decrease the cerebral blood flow, potentially to the point of ischemia.

❖ Take Home Message: Monitor End-Tidal CO_2 closely if capnography is available.

Traumatic Brain Injuries



Traumatic Brain Injuries

Research identifies potential harm that can come from hyperventilating a TBI patient without signs of brain herniation (posturing, unresponsive, respiratory arrest)

• Hyperventilation is a short term measure used in specific severe TBI patients (herniation) until definitive diagnostic or therapeutic interventions can be initiated.

Traumatic Brain Injuries

Circulation:

- Look for visible signs of “shock”
- Assess SBP every 5 minutes & as needed
  - Adult critical threshold level < 90 mm Hg
  - Child and infant levels are lower
  - Use age/size appropriate BP cuff

Traumatic Brain Injuries

Circulation:

- Look for visible signs of “shock”
  - Cool, clammy skin
  - Rapid shallow respirations
  - Rapid weak or irregular pulse
  - Confusion
  - Low blood pressure

- Assess SBP every 5 minutes & as needed
  - Adult critical threshold level < 90 mm Hg
  - Child and infant levels are lower
  - Use age/size appropriate BP cuff

Traumatic Brain Injuries

- Any episode of hypotension can worsen outcome from TBI.
- A decrease in mean arterial pressure (MAP) can decrease cerebral blood flow and cerebral perfusion pressure.
- Systolic BP is used as an indicator of MAP in prehospital care

MAP= ((2x diastolic)+systolic)/3 Normal range is 70-110

Take Home Message: Maintaining Blood Pressure is Critical

Traumatic Brain Injuries

Treatment:

- Protect C-spine alignment, consider facial trauma
- Document GCS
- Airway support per scope of practice
- Intubate severe TBI patients
- Correct hypoxia

Traumatic Brain Injuries

- The goal is to maintain normotension and adequate tissue perfusion.

- A single episode of hypotension doubles mortality and increases morbidity.

- Fluid resuscitation to maintain a systolic BP >90.

Traumatic Brain Injuries

Brain Targeted Therapy

- Glucose for hypoglycemia
- Sedatives for agitation
- Analgesics for pain
- Paralytics for ET intubation

Traumatic Brain Injuries

Destination Considerations

- GCS 14-15 --- Hospital Emergency Room
- GCS 9-13 --- Trauma Center
- GCS < 9 --- Trauma Center with severe TBI capabilities

Traumatic Brain Injuries

- Clinical practice should be evidence-based
- Do early and repeated neurological assessments
- Identify patients with severe TBI (GCS < 9)
- Avoid hypoxia, keep SaO_2 > 90%
- Avoid hypotension, keep SBP > 90mmHg
- Hyperventilate only for clinical signs of herniation
- Triage and transport TBI to appropriate facilities based on severity

EMS and Sporting Events

If you are providing a medical stand-by at a sporting event where a medical trainer or other health care professional is providing primary medical care, it is important to have a face to face conversation with this individual commonly called a “MEDICAL TIMEOUT”.

EMS and Sporting Events

Medical TimeOut:

- Discuss the event for the day.
- Discuss how EMS will be contacted if needed.
- Discuss if there any known medical issues with the athletes.
- Any other pertinent information regarding medical emergencies during the event.

Questions

Treating athletes with injuries is a team event.

https://www.youtube.com/watch?v=yQe83lVD-bg

Hands on

We will go over equipment and how to remove certain equipment.

We will discuss proper ways to transfer patients.

We will break into 4 small groups for scenarios.