

# When to go to the ER after a head injury & what to expect



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**In US – 200,000 teenagers treated annually in emergency departments for sport-related head injuries**





# Symptoms of a Concussion

- Headache, vomiting, dizziness, poor balance, sensitivity to noise or light, ringing in the ears, blurred vision, poor concentration, memory problems or amnesia
- **Only 9% result in a loss of consciousness**



# When to go to the ED

- Loss of consciousness
- Amnesia
- Any abnormal behavior
- Loss of coordination or balance
- Confusion, lethargy, slurred speech, visual changes
- Worsening headache
- Vomiting
- Numbness or tingling or weakness in any extremity
- Neck pain
- Blood or clear fluid from nose or ears

# Post-traumatic Amnesia (Retrograde & Anterograde)

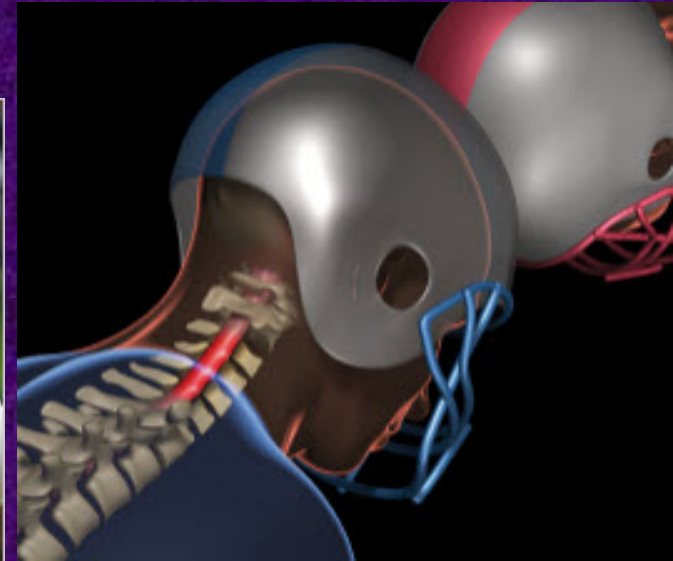
- Do you remember what happened?
- Repetitive questions
- Give the athlete 3 unassociated words to remember, and periodically ask for recall
- Example: Red, Menlo, Atherton



# Don't forget about the spine



Spine injuries and head injuries often occur together



# Cervical Spine Injury

- Incidence of spine injury increases with increasing severity of head injury

GCS

C-Spine Injury

13-15	1.5 - 5%
9-12	6 - 10%
<9	10 - 15%

# What are we looking for?

- Does the patient need a CT Scan of the head?
- Does the patient need to be seen by a Neurosurgeon?
- Is it safe for the patient to go home?
- Does the patient need to be admitted for observation?
- Does the patient have any other injuries or medical conditions?



# Tests generally not performed in Emergency Departments



# What size are your pupils?



# Glasgow Coma Scale

total score of 15 is normal

- Eye opening: 1-4
- Motor response: 1-6
- Verbal response: 1-5



# Glasgow Coma Scale

- Eye opening

- Spontaneous 4
- To speech 3
- To pain 2
- None 1

# Glasgow Coma Scale

- Motor response

- Obeyes commands 6
- Purposeful response to pain 5
- Withdrawal to pain 4
- Flexion response to pain 3
- Extension response to pain 2
- None 1

# Glasgow Coma Scale

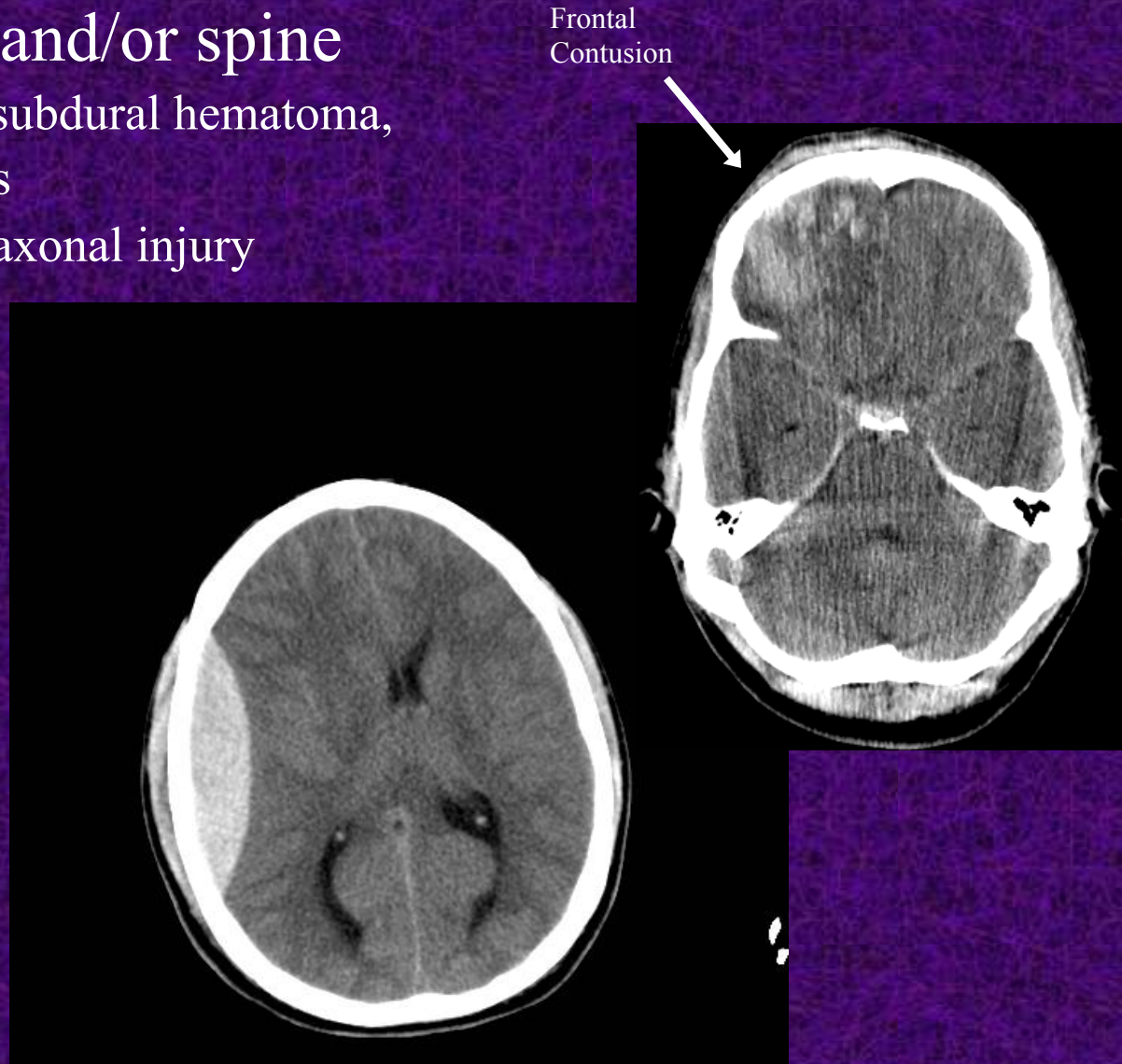
- Verbal response

–Oriented	5
–Confused	4
–Inappropriate	3
–Incomprehensible	2
–None	1



# Radiographic Studies

- CT scan of Head and/or spine
  - focal--epidural, subdural hematoma, contusions
  - diffuse--diffuse axonal injury
- Plain films
  - Waste of time
- MRI scan



# To scan or not to scan?



# What are the dangers of a CT scan?

- CT emits a significant dose of ionizing radiation
- A CT of the head = 100 Chest X-rays!
- 24% increased cancer risk in young children
- For every 1,000 children who have an abdominal CT scan, 1 will develop cancer as a result of scan
- FDA - 15,000 people estimated to die each year in US of cancer due to radiation from CTs



- ✓ International Consensus Statement on Sport-Related Concussion
- ✓ American Academy of Neurology
- ✓ American Medical Society for Sports Medicine
- ✓ American Academy of Pediatrics
- ✓ American College of Emergency Physicians

“Emergency CT scans of the brain are not needed or recommended in the vast majority of concussions”

# New Orleans Head CT Rule

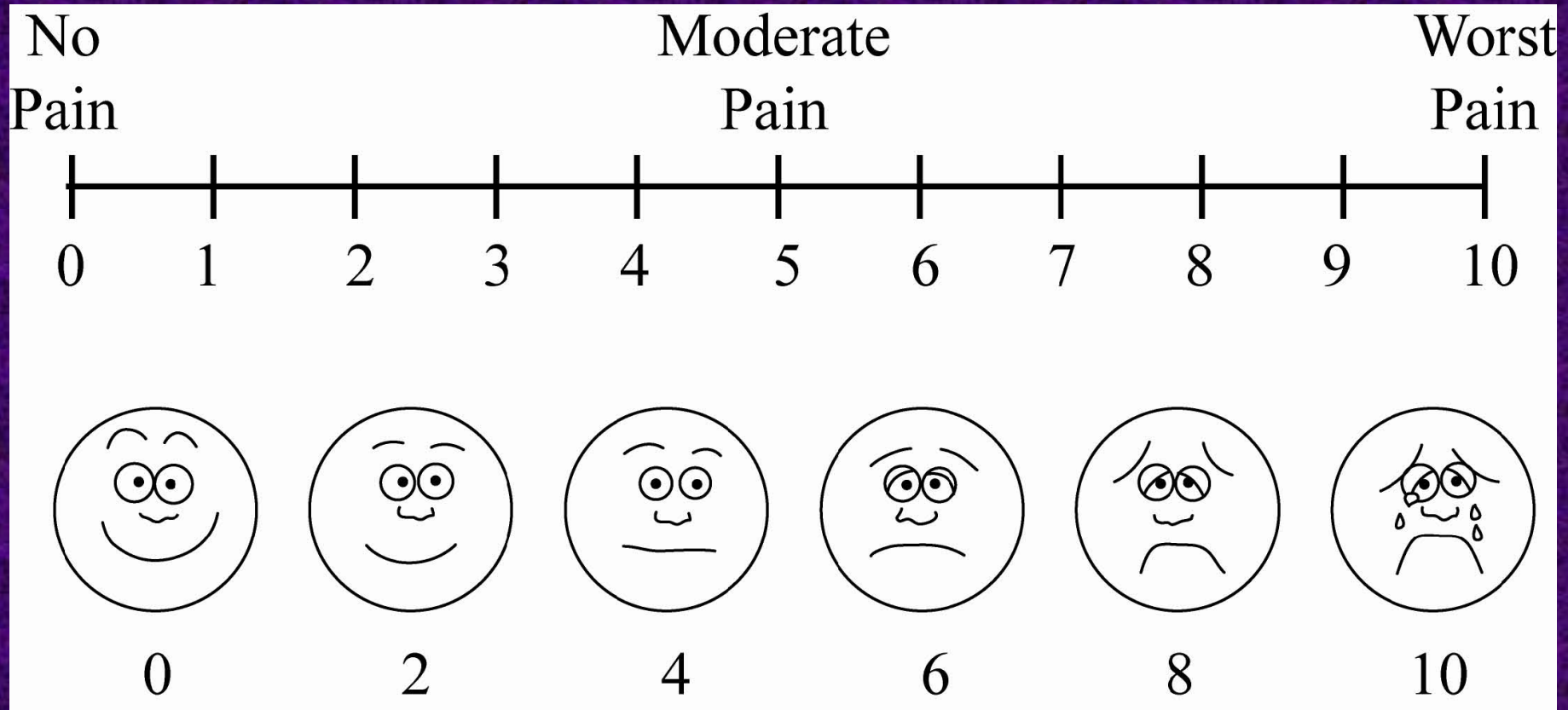
- Headache
- Vomiting
- Drug or alcohol intoxication
- Persistent anterograde amnesia
- Visible trauma above the clavicle
- Seizure

# Everyone has a headache





# How bad does it hurt?



It's an 11 !!



# Canadian Head CT Rule

- GCS  $< 15$  in ED (2 hours post-injury)
- Suspect Skull Fracture
- Two or more episodes of Vomiting
- Retrograde amnesia to event  $> 30$  minutes
- Dangerous mechanism (fall from 3 or more feet, hit by car or ejected from vehicle)



# Signs of a Basilar Skull Fracture



# Neuroimaging for Concussion

- Head CT Clinical Rules
  - New Orleans Criteria
    - Very high sensitivity
    - Estimated to reduce CT imaging by 23%
  - Canadian Head CT Rule
    - Very high sensitivity
    - Estimated to reduce CT scanning by 46%
  - Both decision rules have subsequently been validated

When in doubt, observe or MRI



# Discharge Instructions

- When to return
  - Worse headache
  - Vomiting
  - Any altered level of consciousness or behavior
- No need to wake up every 2 hours
- Follow-up with primary care provider or Neurologist and school trainer/coach