

Injuries to the Head and Spine

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Anatomy Review

■ Skull

- Protects the brain
- Made up of several bones with seam like sutures
- Regions of the scalp-frontal, occipital, parietal, temporal
- Bones of face
 - Orbits
 - Mandible
 - Maxillae
 - Nasal bones
 - Zygomatic bones

Anatomy Review

- Spine

- 33 stacked vertebrae

- Cervical 7

- Thoracic 12

- Lumbar 5

- Sacral 5

- Coccyx 4

- How many in each area?

Anatomy Review

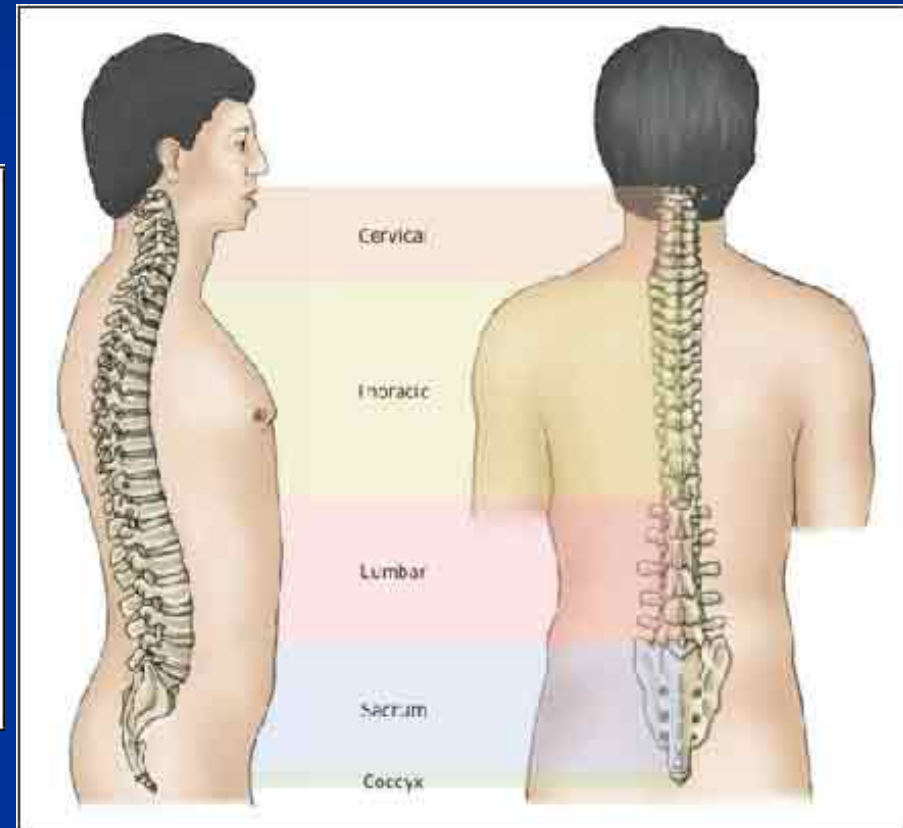
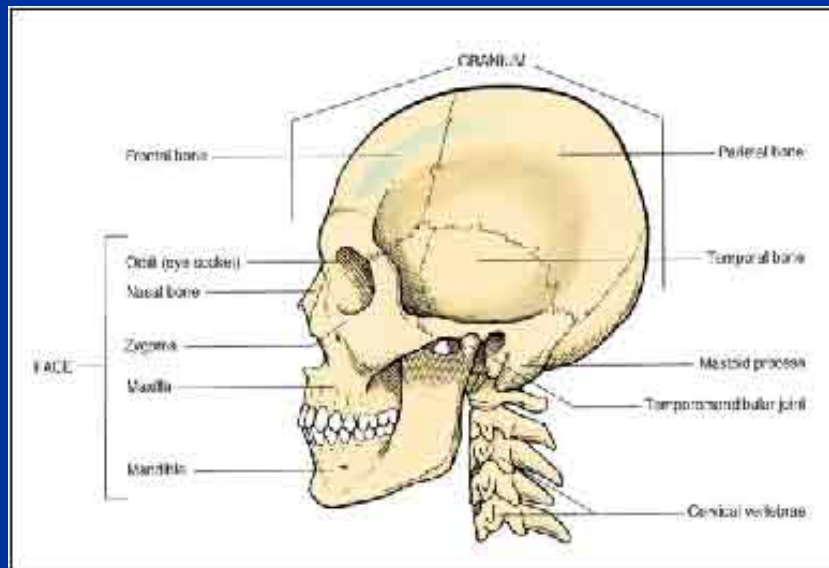
■ CNS

- Controls all basic bodily functions and responds to external stimuli
- Composed of: brain, spinal cord, and major nerves
- How low does the cord go?

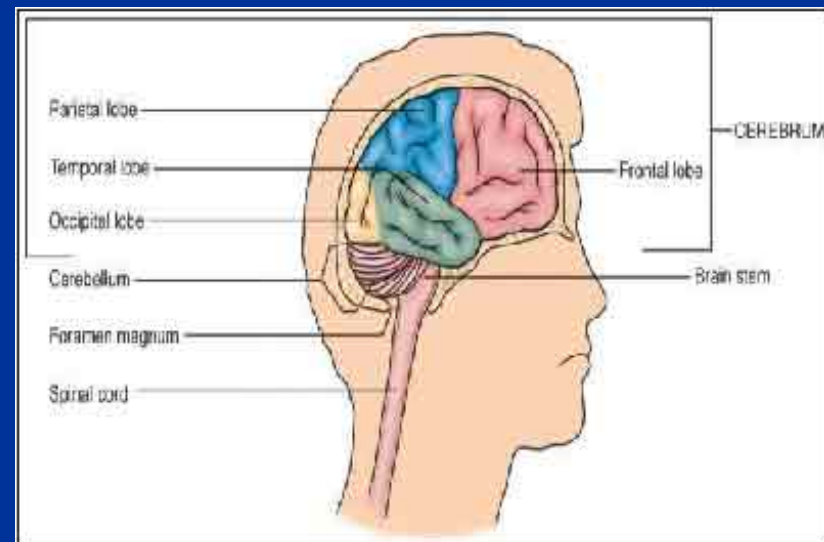
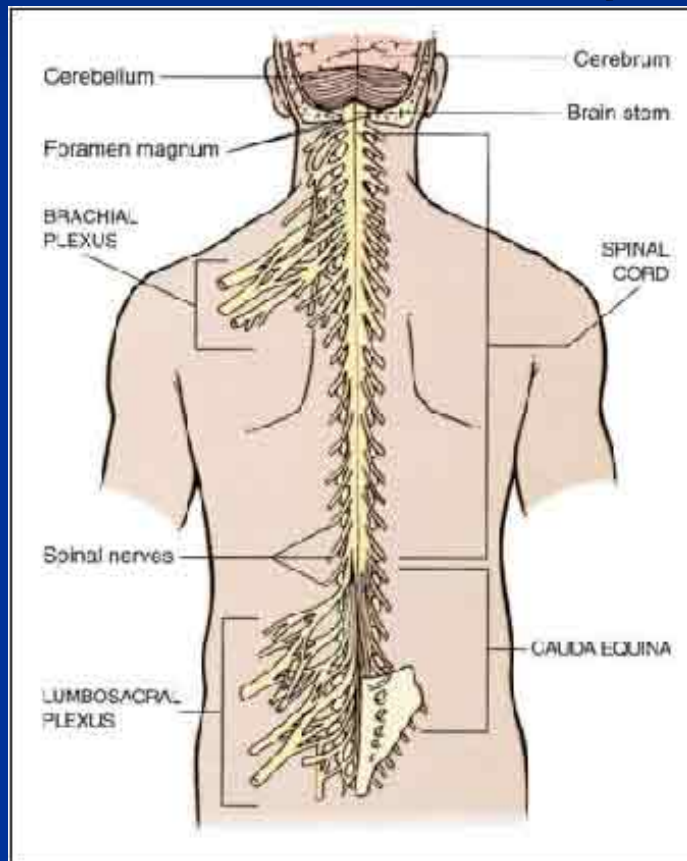
■ PNS

- Complete network of motor and sensory nerve fibers connecting the CNS to the rest of the body

Anatomy and Physiology of the Skeletal System



Anatomy and Physiology of the Nervous System



Injuries to the Spine

- MOIs that can cause spinal damage
 - Flexion (anterior bending)
 - Extension (posterior bending)
 - Lateral
 - Rotation
 - Compression
 - Distraction
 - Penetration

Assessment of Spinal Injuries

- Size up: High index of suspicion
 - MVAs
 - Motorcycle crashes
 - Pedestrian vs. automobile
 - Falls
 - Blunt trauma
 - Sporting injuries
 - Hangings
 - Diving accidents or near drowning where diving may have been involved
 - Penetrating trauma to head, neck, or torso

Assessment

- If you think there is a possibility of a spinal injury—
treat as if there IS a spinal injury
- Immediately take steps to manually control C-Spine
- Maintain manual C-Spine control until patient is
immobilized on LSB (note C-Collar alone not adequate!)
- Patient's ability to walk, move extremities, experience foot
sensation, or lack of pain to column does NOT rule out
possibility of column or cord damage.
- Pay careful attention the patient's breathing
 - Correct immediately PRN while maintaining C-Spine control
 - Consider jaw thrust maneuver, be prepared to provide PPV

Jaw Thrust



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Assessment

- Conduct focused Hx and PE
- General S/Sx of spinal injury:
 - Pain-in provoked pain in area of injury, along spine, in lower legs
 - Tenderness
 - Deformity of spine
 - Soft tissue injury assoc. w/trauma
 - Paralysis
 - Painful movement
 - Parasthesias (pins and needles)
 - Loss of bowel, bladder; pianism, impaired breathing

Assessment

- General points to keep in mind during rapid assessment:
 - Assume any unresponsive trauma patient has a spinal injury
 - Remember that patients that deny tenderness in area of spine may still have a spinal injury
 - Never ask a patient to move to test spine for pain

Assessing Responsive Patient

- Perform brief neuro exam:
 - Can you move your fingers and toes?
 - Squeeze my fingers (compare)
 - Push against my hands like pressing gas pedal (compare)
 - Can you feel it when I touch your fingers, toes?
- During SAMPLE Hx ask:
 - What happened?
 - Does your neck and/or back hurt?
 - Can you move hands/feet?
 - Do you have any pain, numbness or tingling in arms or legs?
 - Did you move or did anyone move you before I got here?



Assessing Unresponsive Pt: S/Sx

- Tenderness of spine in area of injury
- Deformity of spine
- Soft tissue injuries associated w/spinal injury
- Loss of sensation or paralysis below the level of suspected spinal injury
- Loss of sensation or abnormal sensation
- Priapism
- Evidence of bladder or bowel incontinence
- Impaired breathing
- Pain along spinal column
- Pain in buttocks or legs



Immobilization

- Spinal immobilization devices (pg. 559, Fig 22-7)

- Indications

- Use with any suspected spinal injury based on Hx, PE, S/Sx
 - Use in conjunction with long and short backboards

- Precautions

- C-Spine immobilization devices alone do not provide adequate immobilization
 - Manual immobilization must be maintained until Pt is secured to board

Immobilization

- Manual in-line stabilization
 - Place the head in a neutral in line position unless the patient complains of pain or the head is not easily moved into position
 - Place head in alignment with spine
 - Maintain constant manual inline immobilization until the patient is properly secured to a LSB
- C-collars
 - Should be rigid and properly sized
 - An improperly sized collar will do more harm than good.



Immobilization

- Short spinal immobilization devices
 - Several different types, such as vest and short board
 - Become familiar with the type used by your service
 - Provide stabilization and immobilization to the head, neck and torso
 - Used to immobilize non critical sitting patients with suspected spinal injuries
 - General application:
 - Provide and maintain manual C-Spine control
 - Assess PMS in all extremities
 - Assess the cervical area
 - Size and apply a rigid C-Collar

- Position the immobilization device behind the patient
- Secure the patient's torso to the device using chest and groin straps
- Evaluate how well the patient is secured to the device
- Evaluate the position of the head against the device and pad PRN to maintain a neutral, inline position
- Secure the Pt's head to the device
- Pivot and lower the patient to a supine position on a LSB
- Immobilize the Pt to LSB
- Reassess PMS in all extremities

Immobilization

- Full body spinal immobilization devices
 - Several types
 - Stabilize head, neck, torso, pelvis, extremities
 - Used to immobilize patients found in lying, standing or sitting positions
 - Sometimes used in conjunction with short spinal immobilization devices
 - General application:
 - Provide C-Spine control manually
 - Assess PMS in all extremities
 - Assess the cervical area

- Size and apply rigid C-Collar
- Position the full body spinal immobilization device beside Pt
- Move the Pt onto device using the log-roll technique, suitable lift or carry, or scoop stretcher
- Pad any voids between the patient and the board
 - Adult-under head or torso PRN
 - Infant and child-under the shoulders to the heels to establish a neutral position
- Immobilize the patient's torso to the device by applying straps across the pelvis and superior chest
- Immobilize the Pts head to device using head blocks, straps and head immobilization device such as towel rolls
- Immobilize the Pts legs to the device by applying straps above and below knees
- Release C-Spine

- Advise responsive patients to keep arms crossed across chest/abd
- Reassess PMS

Notice the “X”!!!



General Emergency Care

- Perform good size up with attention to MOI
- Ensure scene safety/BSI
- Establish and maintain C-Spine Control
- Perform initial assessment
- Assess PMS in all extremities
- Assess the C-Spine and anterior neck for injury
- Size and apply rigid C-Collar

General Emergency Care

- Select appropriate method and device based upon condition and position of the Pt
 - If Pt is lying on the ground, use LSB and log roll
 - Pt in sitting position and is stable, use short spine device
 - A child may be immobilized in child safety seat
 - If Pt is standing, use a LSB and standing takedown technique
 - Pt found sitting but is unstable or in danger, use LSB and rapid extrication technique

Rapid Extrication Indications

- Unsafe scene
- Unstable patient condition
- Path blocked to more seriously injured patient



General Emergency Care

- Once Pt is immobilized to LSB, reassess PMS in all extremities
- Transport the patient performing an on going assessment enroute



- Seventy percent of all motor vehicle accidents result in a head injury.



Head Injuries

- Scalp and facial injuries
 - Very vascular and may bleed more than expected
 - All injuries to facial structures can produce partial or complete obstruction of the airway
- Skull injuries
 - Fx of bones with possible injuries of the brain
 - S/Sx:
 - MOI with substantial force
 - Severe contusions, deep lacerations or hematomas of the scalp
 - Deformities of the skull such as depressions or sudden “step-offs”
 - Blood or clear fluid leaking from nose or ears
 - Bruising around eyes (Raccoon sign)
 - Bruising behind ears over mastoid process (Battle sign)

Battle's Sign



Raccoon Eyes



Head Injuries

■ Brain injury

- Severity can vary widely
 - Lacerations or contusions
 - Hematomas
 - Damage at cellular level
- Open head injury (Fig 22-25, p.582)
- S/Sx
 - Altered mental status
 - Ranges from brief LOC to confusion to complete unresponsiveness
 - Use GCS
 - Any of the signs suggestive of skull injury
 - Nausea and/or projectile vomiting
 - Loss of neuro function
 - Seizures
 - Unequal pupils



Head Injury Assessment

- Perform thorough size-up
- Determine MOI if possible
- Take appropriate BSI precautions
- Perform an initial assessment
 - C-Spine injury?
 - Mental status? (AVPU)
 - Protect ABCs
 - Conduct focused Hx/PE
- Be careful when palpating during the PE!

Emergency Care-Head Injury

- Ensure scene safety and personal safety
- Assume spinal injury exists and treat accordingly
- Maintain open airway, ensure adequate oxygenation
- Complete spinal immobilization
- Closely monitor patient status and VS
- Control bleeding
- Transport to closest appropriate facility

Helmet Removal

- Many different patient populations are likely to wear helmets.
- Types: vary greatly
- Indications for leaving helmet in place:
 - Helmet does not interfere with assessment and monitoring of airway and breathing
 - There are no current or impending airway or breathing problems
 - The patient can be adequately immobilized with the helmet in place
 - The patient's head rests snugly in the helmet, ensuring there is no movement of the head after the helmet is secured to the LSB

Helmet Removal

- General rules for helmet removal
 - Vary depending on design of helmet
 - As a general rule, follow procedures in Skill Summary 23-30, and Skill Summary 21-31 pg. 586-588
 - Ensure that C-Spine control is maintained!