Chapter 20

Head & Spinal Trauma

Chapter Goal

- Utilize assessment findings to formulate field impression & implement management plan for patients with head or neck injuries

Learning Objectives

- Describe MOI, assessment, & management of:
  - Maxillofacial injuries
  - Ear, eye, & dental injuries
  - Anterior neck injuries
  - Scalp or cranial nerve injuries
  - Skull fractures

- Identify types of traumatic brain injury based on understanding of pathophysiology & assessment findings

- Describe out-of-hospital care of traumatic brain injury patient
Learning Objectives

- Calculate Glasgow Coma Scale & pediatric trauma score when given appropriate patient information
- List 4 mechanisms of spinal injury
- List 3 types of devices used to assist spinal immobilization
- Identify 4 instances where rapid extrication techniques may be necessary

Learning Objectives

- Identify difference between open & closed bone injuries
- List 3 signs or symptoms of bone or joint injuries
- Identify 3 complications of musculoskeletal trauma
- List 3 complications of splinting

Head Trauma
Head Trauma

- Soft-tissue injuries to scalp
  - Very vascular
  - Pathophysiology
  - Assessment
    - Suspect spinal injury
    - Inspect head for bleeding
  - Management
    - Direct pressure or pressure dressings
    - Cover open wounds
    - Consider fluid replacement

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Head Trauma

- Skull fractures
  - Pathophysiology
    - Classified as:
      - Open
      - Closed
  - Described as:
    - Depressed
    - Nondepressed

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Head Trauma

- Assessment
  - Suspect skull fracture:
    - History of trauma
    - Altered LOC
    - Sluggish reaction, unequal, dilated pupils
    - Penetrating, impalement injury
    - Skull deformity
    - Blood & cerebrospinal fluid drainage
    - Raccoon eyes
    - Battle's sign
Head Trauma

- Management
  - Monitor LOC
  - Suspect facial & intracranial trauma, compromised airway, spinal injury

Head Trauma

Severe fracture of base of the skull

Head Trauma

Raccoon eyes

Battle's sign
Head Trauma

- Brain injuries
  - Categories
    - Mild diffuse
    - Moderate diffuse
    - Diffuse axonal
    - Focal injury
  - Types
    - Concussion
    - Contusion
    - Open injuries
    - Hematoma
    - Hemorrhage

Head Trauma

- Assessment
  - Headache
  - Unequal, dilated, nonreactive pupils
  - LOC
  - Evidence of alcohol/drug intoxication
  - Retrograde amnesia
  - Antegrade amnesia
  - Vomiting
  - Blood & cerebrospinal fluid drainage
  - Decorticate or decerebrate posturing
  - Paralysis
  - Comativeness, anxious, uncooperative
  - Coordination, equilibrium defects
  - Exposed brain tissue, bone fragments

Head Trauma

- Intracranial pressure
  - Findings of increase:
    - Level of responsiveness
    - Neurological deficits
    - Vomiting
    - Unequal pupils
    - Cheyne-Stokes respirations
    - Cushing reflex or triad
Head Trauma

- Management
  - Cerebral oxygenation while protecting C-spine
  - Intubate patients with GCS ≤8
  - Control bleeding
  - Have suction available
  - Establish IV
  - For fluid coming from nose or ears, apply loose dressings
  - Transport to appropriate facility
  - Monitor vital signs q 5 min

Maxillofacial Injury

- Classifications
  - Soft-tissue injuries
  - Facial fractures

- Major causes

- Assessment
  - Minor cuts, abrasions to lacerations, avulsions

- Management
  - Spinal stabilization
  - Airway assessment
  - Suction
  - Nasal, tracheal intubation
  - Ventilation, oxygenation
  - Control bleeding
  - Apply pressure
  - Dress open wounds
Maxillofacial Injury

- Facial fractures:
  - Fractures of mandible
    - Malocclusion
    - Numbness
    - Inability to open mouth
    - Difficulty swallowing, excessive salivation
  - Fractures of midface
    - Associated with CNS injury, spinal trauma
    - LeFort fracture: I, II, III

Maxillofacial Injury

- Facial fractures
  - Fractures of zygoma
  - Fractures of orbit
    - Blowout fracture
  - Fractures of nose
Maxillofacial Injury

Assessment
- Signs & symptoms of facial fractures:
  - Pain
  - Swelling
  - Ecchymosis
  - Lacerations, bleeding
  - Numbness
  - Malocclusion
  - Inability to move mouth
  - Visual disturbances
  - Limited ocular movement
  - Asymmetrical cheekbones
  - Orbital rim discontinuity
  - Crepitus

- Signs & symptoms of midface fractures:
  - Edema
  - Unstable maxilla
  - “Donkey face”
  - Epistaxis
  - Numbness
  - Nasal flattening
  - CSF rhinorrhea
  - Compromised airway

- Signs & symptoms of zygomatic fractures:
  - Flatness of cheek area
  - Numbness
  - Epistaxis
  - Altered vision

- Signs & symptoms of blowout fracture to orbit:
  - Periorbital edema
  - Subconjunctival ecchymosis
  - Double vision
  - Recessed globe
  - Epistaxis
Maxillofacial Injury

- Management
  - Suspect spinal injury
  - Assess airway
  - Suction
  - Consider oral & nasal intubation
  - Ventilation, oxygenation
  - Control bleeding
  - Control epistaxis

Eye, Ear, & Dental Trauma

- Ear trauma
  - Pathophysiology
    - Thermal injuries
    - Traumatic perforations
    - Serious complications
  - Assessment
    - Bleeding
    - Edema
    - Burns
    - Pain

Eye, Ear, & Dental Trauma

- Management
  - Lacerations & contusions
  - Thermal injuries
  - Chemical injuries
  - Traumatic perforation
  - Barotitis
Eye, Ear, & Dental Trauma

• Eye trauma
  ▶ Pathophysiology
  ▶ Common causes
  ▶ Corneal injuries
  ▶ Assessment
    ▶ Obvious trauma
    ▶ Loss of vision or blurred vision
    ▶ Partial loss of visual field

Avulsion of lid
Hyphema
Ruptured globe

Acid burn
Alkali burn
Eye, Ear, & Dental Trauma

- Management
  - Foreign body
  - Corneal abrasion
  - Blunt trauma
  - Penetrating injury
  - Chemical injury

- Place folded pad over closed eye

- Place second unfolded pad on top

- Apply tape to length of pad

- Secure pad
Eye, Ear, & Dental Trauma

- **Dental trauma**
  - Pathophysiology
    - Most common types
    - Permanent teeth
  - Assessment
    - Evidence of bleeding, missing teeth
    - Lacerations, avulsions
  - Management
    - Suction
    - Reimplanting

Eye, Ear, & Dental Trauma

- **Anterior neck trauma**
  - Cause
    - Damage may result in:
      - Skeletal, vascular structures
      - Nerve, muscles, glands of neck
  - Pathophysiology
    - Vessels at risk
    - Injuries associated with laryngeal & tracheal trauma
    - Mechanisms of injury

Eye, Ear, & Dental Trauma

- **Assessment**
  - Hematoma, edema
  - Airway compromise
  - Significant penetrating neck trauma
    - Shock
    - Bleeding
    - Tenderness
    - Crepitus
    - Pulse defect
    - Neuro defect
    - Dyspnea
    - Hoarseness
    - Stridor
    - Subcutaneous emphysema
    - Hemoptysis
    - Dysphagia
    - Ematemesis
Eye, Ear, & Dental Trauma

- Management
  - Stabilize head, neck
  - Provide high-concentration oxygen
  - Suction
  - Consider oral, nasal intubation
  - Control bleeding
  - Consider fluid replacement
  - Supine, Trendelenburg position

Spinal Trauma

- Stable vs. unstable spinal injuries
- Types of spinal injuries
  - Trauma affects different structures
- Damage occurs from
  - Indirect trauma
  - Direct trauma

Spinal Trauma

- Mechanisms of spinal injury
  - Flexion
  - Rotation
  - Extension
  - Vertical compression
  - Lateral bending
  - Spine pulled apart
Spinal Trauma

Assessment
- MOI
- Pain
- Tenderness
- Deformity
- Guarding
- Paralysis, numbness, tingling
- GSW
- Unexplained shock
- Priapism
- Incontinence

Complications
- Difficulty breathing
- Respiratory arrest
- Spinal shock
- Hemorrhage

Emergency care
- ABCs
  - Jaw thrust
  - High-concentration O2
  - Immobilize C-spine
  - Large bore IVs
Cervical Spine Immobilization

One-piece cervical spine immobilization device

Two-piece cervical spine immobilization device

Body Immobilization

- Measure patient’s neck
- Measure cervical collar

Applying vest-type device

- Apply cervical collar
- Move patient forward
Body Immobilization

- Slide device behind patient
- Bring patient to device

Body Immobilization

- Position device snugly against patient’s armpit; position groin straps
- Secure color-coded chest straps

Body Immobilization

- Secure leg straps
- Pad head as necessary
Body Immobilization
- Secure patient's head to device
- Reassess motor, sensory, & extremity circulation

Short Backboard
- Slide backboard into place
- Secure patient's torso

Short Backboard
- Secure patient's head
Transferring to Backboard

- Rotate patient in place; elevate legs

Transferring to Backboard

- Position patient onto long backboard; secure

Immobilizing Supine Patient

- Move patient’s head into in-line position
- Assess motor, sensory, & extremity circulation in all extremities
Immobilizing Supine Patient

- Position board alongside patient
- Assume position next to patient

Slowly roll patient to side

Slide backboard close to patient

Reassess, motor, sensory, & distal circulation in all extremities
In-line Stabilization

Position self & patient for logroll
Roll patient as a unit
Roll patient onto long backboard

Rapid Extrication

- When patient must be removed without full immobilization
  - Unsafe scene
    - Presence or threat of fire
    - Rising water
    - Danger of explosion
    - Danger of structure collapse
  - Life-threatening injuries
    - Cardiac/respiratory arrest
    - Cannot maintain airway while patient sitting
    - Uncontrolled bleeding
    - Signs & symptoms of severe shock
    - MOI indicates potential for rapid decompensation

Rapid Extrication

- Apply rigid C-collar
- Rotate patient toward long backboard
Rapid Extrication

- Continue to rotate patient onto long backboard, maintaining neutral alignment
- Slide patient onto long backboard

Rapid Takedown Procedure

Manually stabilize patient's head, neck
2nd rescuer applies collar

2nd rescuer positions board
2nd & 3rd rescuers reach under patient's arm to grasp board
Rapid Takedown Procedure

- Slowly lay board down
- Maintain head stabilization while lowering patient

Motorcycle, Football, & Other Helmets

- Access essential
- Remove helmets unless
  - Patient is obviously dead
  - Helmet is entangled into patient's head
  - Impaled object penetrates helmet & head
- Experts disagree about whether protective helmets should be removed in the field
Motorcycle, Football, & Other Helmets

- Immobilize head, neck
- Pull helmet off

Motorcycle, Football, & Other Helmets

- Maintain C-spine immobilization

Summary

- Spinal injury is trauma to spinal cord, vertebral column, or surrounding tissues
- Stable spinal injuries have low likelihood of further nerve damage
- Unstable injuries are high risk
- Improper patient movement, handling can lead to further neurological damage
Summary

- Major causes of maxillofacial trauma: motor vehicle crashes, home accidents, athletic injuries, animal bites, intentional violent acts, & industrial injuries
- With exception of compromised airway & potential for significant bleeding, damage to tissues of maxillofacial area is seldom life-threatening

Summary

- Injury to ears, eyes, or teeth may be minor or may result in permanent sensory functional loss & disfigurement
- Injuries to skull may include soft-tissue injuries to scalp & skull fractures
- Out-of-hospital management of head injury patient is determined by number of factors

Questions?