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Trauma to the Head, Neck, and Spine
OBJECTIVES

31.1 Define key terms introduced in this chapter. Slides 13–15, 17, 19, 28

31.2 Describe the components and function of the nervous system and the anatomy of the head and spine. Slides 13–15

31.3 Describe types of injuries to the skull and brain. Slides 17–19, 22

continued
31.4 Describe the general assessment and management of skull fractures and brain injuries. Slides 22–23

31.5 Describe specific concerns in the management of cranial injuries with impaled objects. Slide 21

continued
31.6 Describe specific concerns in the management of injuries to the face and jaw. Slide 21

31.7 Define nontraumatic brain injuries. Slide 22

31.8 Explain the purpose and elements of the Glasgow Coma Scale. Slide 23

continued
OBJECTIVES

31.9 Discuss the assessment and management of open wounds to the neck. Slides 25–26
31.10 List types and mechanisms of spine injury. Slide 28
31.11 Discuss the assessment and management of spine and spinal cord injury. Slides 29–31

continued
OBJECTIVES

31.12 Discuss issues in the immobilization of the head, neck, and spine, specifically for the following: applying a cervical collar; immobilizing a seated patient, including rapid extrication for high priority patients; applying a long backboard; rapid extrication from a child safety seat; immobilizing a standing patient; and immobilizing a patient wearing a helmet. Slides 34–39
31.13 Discuss issues in selective spine immobilization. Slides 28, 30–31
MULTIMEDIA

- Slide 32  Spinal Injuries Video
- Slide 40  KED Overview Video
• Understanding the anatomy of the nervous system, head, and spine
• Understanding skull and brain injuries and emergency care for skull and brain injuries
• Understanding wounds to the neck and emergency care for neck wounds

continued
CORE CONCEPTS

• Understanding spine injuries and emergency care for spine injuries
• Understanding immobilization issues and how to immobilize various types of patients with a potential spine injury
Topics

• Nervous and Skeletal Systems
• Injuries to the Skull and Brain
• Wounds to the Neck
• Injuries to the Spine
• Immobilization Issues
Nervous and Skeletal Systems
Nervous System

• Controls thought, sensations, and motor functions
• Central nervous system
  – Brain, spinal cord
• Peripheral nervous system
  – Vertebral nerves
  – Cranial nerves
  – Body’s motor and sensory nerves
Anatomy of the Head

- Cranium
- Facial Bones (14)
  - Mandible
  - Maxillae
  - Nasal bones
  - Malar (zygomatic)
Anatomy of the Spine

- Vertebrae
  - Cervical (7)
  - Thoracic (12)
  - Lumbar (5)
  - Sacral (5)
  - Coccyx (4)
Injuries to the Skull and Brain
Injuries to the Skull and Brain

- **Scalp injuries**
  - Lots of blood vessels
  - Profuse bleeding
- **Skull injuries**
  - Open head injury
  - Closed head injury
Brain Injuries

- Traumatic Brain Injuries (TBI)
  - Concussion
  - Contusion
    - Coup
    - Contrecoup
  - Laceration
  - Hematoma
    - Subdural Hematoma
    - Epidural Hematoma
    - Intracerebral Hematoma
Intracranial Pressure
Think About It

• Does my patient have a serious or potentially serious head injury? Should the patient be transported to a trauma center?
• Do my patient’s complaint and MOI indicate spinal stabilization? Is immobilization warranted?
Injuries to the Head and Face

• Cranial injuries with impaled objects
  – Stabilize object in place

• Injuries to the face and jaw
  – Primary concern: Airway
  – When possible, position to allow for drainage from mouth
Nontraumatic Brain Injuries

- Many signs of brain injury may be caused by an internal brain event (hemorrhage, blood clot)
- Signs are the same as for traumatic injury, except no evidence of trauma and no MOI.
Glasgow Coma Scale (GCS)

- May use GCS in addition to AVPU for ongoing neurological assessment
- Considerations for use of GCS
  - Eye opening
  - Verbal response
  - Motor response
- Do not spend extra time at the scene calculating GCS
Wounds to the Neck
Wounds to the Neck

- Large, major vessels close to surface create the potential for serious bleeding.
- Pressure in large vein is lower than atmospheric pressure.
- Great possibility of air embolus being sucked through.
- Treatment: stop bleeding, prevent air embolism.
Treatment: Open Neck Wound

- Ensure open airway
- Place gloved hand over wound
- Apply occlusive dressing
- Apply pressure to stop bleeding
- Bandage dressing in place
- Immobilize spine if MOI suggests cervical injury
Injuries to the Spine
Injuries to the Spine

- Assume possible cervical-spine injury if MOI exerts great force on upper body or if soft-tissue damage to head, face, or neck
- Spinal cord is a relay between most of body and brain for sending messages
- Neurogenic shock: form of shock resulting from nerve paralysis; causes uncontrolled dilation of blood vessels
Assessment: Spinal Injury

- Paralysis of extremities
- Pain without movement
- Pain with movement
- Tenderness anywhere along spine
- Impaired breathing
- Deformity
- Priapism
- Loss of bowel or bladder control
Treatment: Spinal Injury

• Provide manual in-line stabilization
• Assess ABC’s
• Rapidly assess head and neck; apply rigid cervical collar
• Rapidly assess for sensory and motor function

continued
Treatment: Spinal Injury

- Apply appropriate spinal immobilization device
- Reassess sensory and motor function
Spinal Injuries Video

Click [here](#) to view a video on the subject of treating cervical injuries.
Immobilization Issues
Applying a Cervical Collar

- Always maintain manual stabilization
- Use in conjunction with a long backboard
Immobilizing a Seated Patient

- Low priority: Use a short board or vest-immobilization device
- High priority: Maintain manual stabilization while moving patient
Applying a Long Backboard

- Log roll patient
- Pad voids between board and head/torso
- Secure head last
- If pregnant, tilt board to left after immobilizing
Standing Patient

- Rapid takedown
  - Requires three providers, cervical collar, and long backboard
Patient Found Wearing a Helmet

• When to leave helmet in place
  – Fits snugly, allowing no movement
  – Absolutely no impending airway or breathing issues
  – Removal would cause further injury
  – Proper spinal immobilization can be done with helmet in place

continued
Patient Found Wearing a Helmet

- When to remove helmet
  - Interferes with ability to assess and manage airway
  - Improperly fitted
  - Interferes with immobilization
  - Cardiac arrest
Click [here](#) to view a video on the use of a vest-style extrication device.
Chapter Review
Chapter Review

- The two main divisions of the nervous system are the central nervous system and the peripheral nervous system.
- Maintain a high index of suspicion for head or spine injury whenever there is a relevant mechanism of injury.

continued
• Provide cervical spine stabilization before beginning any other patient care when head or spine injury is suspected.
• Altered mental status is an early and important indicator of head injury. Monitor and document your patient’s mental status throughout the call.
Chapter Review

• A traumatic brain injury is any injury that disrupts function of the brain and may include anything from a slight concussion to a severe hematoma.

• Always secure the torso to the backboard before the head.
Remember

• The key components of the nervous system are the brain and the spinal cord. These organs regulate thought, sensations, and motor functions.
• The skull, vertebrae, and cerebrospinal fluid efficiently protect the brain and spinal cord.
Remember

• In a closed head injury, the skull remains intact. This is dangerous, for the skull is a closed container with little room for bleeding or swelling.

• Neck wounds are at risk for massive bleeding and air entry, causing emboli.
Remember

- The spine is injured most often by compression or excessive flexion, by extension, or rotation from falls, by diving injuries, and by motor-vehicle collisions. These injuries can interrupt nervous system control of body functions.
Remember

• In-line immobilization of 33 spinal bones is the essential component of spinal injury immobilization.

• Specific procedures apply to different immobilization and extrication situations. EMTs should be proficient in handling the basics of these procedures.
Questions to Consider

• Does my patient have a mechanism of injury that would indicate the need for spinal immobilization?
• Do my patient’s potential head or spine injuries require prompt transport to a trauma center?
Critical Thinking

• You are treating a patient with a head injury. He has an altered mental status and a significant MOI to the head. Your partner thinks you should hyperventilate. When should you hyperventilate? What are the signs and symptoms that would indicate this is necessary?
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