Chapter 28

Neurological Emergencies

Chapter Goal

- Use assessment findings to formulate field impression & implement treatment plan for patients with neurological emergencies

Learning Objectives

- Discuss general pathophysiology of nontraumatic neurological emergencies
- Discuss general assessment findings associated with nontraumatic neurological emergencies
- Identify need for rapid intervention & transport of patients with nontraumatic emergencies
- Discuss management of nontraumatic neurological emergencies
Learning Objectives

• Discuss pathophysiology of coma & altered mental status
• Discuss assessment findings associated with coma & altered mental status
• Discuss management of coma & altered mental status
• Discuss pathophysiology of seizures
• Discuss assessment findings associated with seizures
• Describe & differentiate major types of seizures

Learning Objectives

• List most common causes of seizures
• Discuss pathophysiology of syncope/weakness
• Discuss assessment findings associated with syncope/weakness
• Discuss management of syncope/weakness
• Discuss pathophysiology of headache
• Discuss assessment findings associated with headache

Learning Objectives

• Discuss management of headache
• Define the term stroke
• Discuss pathophysiology of stroke
• Describe causes of stroke
• Discuss assessment findings associated with stroke
Learning Objectives

- Discuss management of stroke
- Recognize signs & symptoms related to stroke
- Define the term *transient ischemic attack (TIA)*
- Discuss pathophysiology of TIA
- Discuss assessment findings associated with TIA
- Discuss management of TIA

Learning Objectives

- Recognize signs & symptoms related to TIA
- Differentiate among neurological emergencies on basis of assessment findings
- Correlate abnormal assessment findings with clinical significance in patients with neurological complaints
- Develop patient management plan based on field impression in patients with neurological emergencies

Pathophysiology, Assessment, Management

- Anatomy & physiology review
  - CNS functions affected by neurological problems:
    - Cognitive systems
    - Cerebral homeostasis
    - Motor control
    - Sensation
Types of CNS disorders

- Vascular
- Infectious
  - Meningitis
  - Encephalitis
  - Brain abscess
- Neoplastic
- Degenerative
  - Alzheimer’s disease
  - Multiple sclerosis
  - Parkinson’s disease

Types of CNS disorders (cont’d)

- Inflammatory
  - Rheumatoid arthritis
  - Systemic lupus erythematosus
- Congenital
- Allergic & autoimmune
- Traumatic
- Endocrine & metabolic
Pathophysiology, Assessment, Management

Assessment findings
- History
  - General health
  - Previous medical conditions
  - Medications
  - Experience with same complaint
  - Time of onset
  - Seizure activity

Physical evaluation
- General appearance
- LOC
- Speech
- Skin
- Posture, gait
- Vital signs
- Head, neck
- Thorax, lungs
- Cardiovascular
- Nervous system

Management
- Airway, ventilatory support
- Circulatory support
- Pharmacological interventions
- Nonpharmacological interventions
- Transport considerations
- Psychological support, communication
Cerebral Ischemic Syndromes: Stroke & TIA

• Stroke
  ▶ Types
    • Embolic
    • Hemorrhagic

Cerebral Ischemic Syndromes: Stroke & TIA

• Stroke
  ▶ Pathophysiology & thrombolytic therapy
    • Ischemic penumbra
    • Restoration of arterial blood flow in thrombotic stroke within 3 hours improves neurological outcome
    • Thrombolytic therapy
      ▶ Limiting criteria for inclusion

Cerebral Ischemic Syndromes: Stroke & TIA

• Stroke
  ▶ Risk factors
    • Age
    • Gender
    • Race
    • Hypertension
    • Cigarette smoking
    • Cardiac dysrhythmias
    • Birth control pills
    • Alcohol consumption
    • Elevated blood cholesterol levels
    • Cocaine use
Cerebral Ischemic Syndromes: Stroke & TIA

● Stroke
  ■ Patient assessment
    ■ Paralysis, hemiplegia
    ■ Facial droop
    ■ Cincinnati Prehospital Stroke Scale
      ■ Facial droop
      ■ Arm drift
      ■ Speech

● Stroke (cont’d)
  ■ Other signs/symptoms
    ■ Seizures
    ■ Dizziness
    ■ Sudden partial/total loss of vision
    ■ Loss of consciousness
    ■ Stiff neck, headache
    ■ Altered LOC
    ■ Airway problems, hypoventilation
    ■ Cardiac dysrhythmias
    ■ Nausea, vomiting
    ■ Pupillary abnormalities

● Stroke
  ■ Management
    ■ Maintain airway, support ventilation, including intubation, as needed
    ■ Administer high-concentration O₂
    ■ Give nothing by mouth; be prepared for vomiting
    ■ Monitor closely for changes in mental, respiratory status
    ■ Provide calm & reassurance
    ■ Start IV line
    ■ Monitor ECG
    ■ Measure blood glucose if unconscious
Cerebral Ischemic Syndromes: Stroke & TIA

- **TIA**
  - Mini-strokes that completely resolve within minutes to hours
  - Patient should be transported to hospital for evaluation

Seizures & Epilepsy

- **Seizures**
  - Types
    - Generalized major motor seizures
      - Tonic-clonic
    - Focal motor seizures
      - Simple partial
    - Behavioral seizures
      - Petit mal
      - Psychomotor/complex-partial
    - Status epilepticus
  - Causes
    - Infection
    - Fever
    - Trauma
    - Stroke
    - Tumor
    - Noncompliance with prescribed medication
    - Metabolic abnormalities
    - Drug/alcohol withdrawal
    - Drug overdose
    - Hypertensive emergency
    - Liver/kidney failure
Seizures & Epilepsy

- Seizures
  - Patient assessment
    - FACTS
      - Focus
      - Activity
      - Color—also stands for cocaine
      - Time
      - Secondary information
  - Aura
    - Pattern for generalized seizures:
      - Aura may occur
      - Patient develops glassy-eyed stare; becomes unresponsive
      - Unconsciousness rapidly develops
      - Alternating tonic-clonic activity
      - Patient may hold breath; become cyanotic
      - Patient may drool, foam at mouth, vomit
      - Patient may become incontinent
      - Seizure generally lasts <5 min
    - Postictal state

- Seizures & Epilepsy
  - Management
    - Administer high-concentration O₂
    - Maintain airway
      - No airway devices or bite bars
    - Assist ventilation
    - Suction
    - Do not restrain
    - Start IV
    - Check blood glucose level
    - Monitor ECG
    - Monitor O₂ saturation
    - Transport in coma position
Seizures & Epilepsy

- Seizures
  - Specific pharmacological therapy
    - Benzodiazepines
      - Diazepam
      - Lorazepam

Coma & Altered LOC

- Causes
  - Within brain
    - Head trauma
    - Intracranial bleeding
    - Stroke
    - Tumor
    - Infection
    - Seizure
  - Outside nervous system
    - Blood chemistry abnormalities
    - Hypertensive emergency
    - Kidney/liver failure
    - Endocrine abnormalities
    - Vitamin deficiencies
    - Drugs
    - Psychiatric problems

- Patient assessment
  - Gather information
  - Pay attention to:
    - Abnormal breathing
    - Trauma
    - Abnormal pupil response
    - Evidence of drug abuse
    - Abnormal BP
**Coma & Altered LOC**

- Management
  - Maintain airway, intubate if necessary
  - High-concentration O₂
  - Immobilize if spinal injury suspected
  - Monitor vital signs
  - Transport in coma or supine position
  - Be prepared for vomiting, airway problems
  - Start IV
  - Measure blood glucose
    - Administer 50% dextrose per local protocol
  - Administer naloxone if no response to glucose
  - Monitor ECG

**Coma & Altered LOC**

- Syncope/weakness
  - Monitor ECG
  - “Myoclonal jerks”

**Headache**

- Head pain for any reason
- Most minor
  - Fever
  - Anxiety
  - Tension
- Serious conditions
  - Brain tumors
  - Intracranial bleeding
  - Hypertensive emergency
  - Meningitis
  - Poisoning
Headache

- Pathophysiology
  - Vascular
    - Migraine
    - Autimmune diseases
  - Nonvascular
    - Meningitis
    - Tumor
    - Muscle spasm

Headache

- Patient assessment
  - Pain
  - Visual disturbances
  - Nausea, vomiting
  - Vertigo
  - Stiffness
  - Neurological deficit
  - ↑ BP
  - Unequal, pinpoint pupils
  - Photophobia

Headache

- Management
  - Monitor ABCs
  - Reduce bright lights
  - Ice pack
  - O2 via nasal cannula
Summary

- Most neurological emergencies affect ≥1 major CNS functions

- Mnemonic **VINDICATE** is helpful for remembering various conditions leading to disease

- Most important observation: airway assessment

---

Summary

- Many persons are relatively hypertensive as result of loss of cerebral autoregulation

- ECG monitoring is important

- Blood glucose reading should be obtained & abnormal levels managed according to local protocols

- Cerebral ischemic syndromes are result of disrupted circulation to brain

---

Summary

- More profound & often permanent damage occurs following stroke, which may be due to either hemorrhage or occlusion

- Prompt recognition important—some will be candidates for thrombolytic therapy

- Seizure is sudden episode of abnormal brain cell electrical activity resulting in period of atypical muscular activity or abnormal behavior
Summary

- Coma is state of unconsciousness characterized by absence of spontaneous eye movements, response to painful stimuli, & vocalization
- Careful attention should be given to airway & breathing function
- Consider rapid onset of severe headache to be due to intracranial bleeding until proven otherwise

Questions?