EMC 370 Introduction to Medical Emergencies

05 Stroke

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Outcomes

At the completion of this lecture, the learner will be able to:

- Define stroke, TIA, and intracranial hemorrhage. (5-3.48; 5-3.57)
- Discuss the pathophysiology of stroke, TIA, and intracranial hemorrhage. (5-3.44 ;5-3.52; 5-3.54)
- Discuss the assessment findings used for stroke and TIA.(5-3.46; 5-3.50 ; 5-3.58-59)
- Identify the need for rapid intervention and transport of a stroke patient. (5-3.47)

Outcomes, continued

- Discuss the management of stroke. (5-3.47)
- List the common causes, risks, epidemiology, and prevention of stroke and TIA. (5-3.43; 5-3.53)
- Integrate stroke and TIA pathophysiology, field assessment, and treatment. (5-3.52; 5-3.61)

Definitions and Concepts

- Stroke: disruption in the blood supply to a particular area of the brain, with two main mechanisms of injury:

  a) blood vessel occlusion

  "brain attack" → ischemia, infarction, and neuronal death

  b) blood vessel rupture

  leads to a direct mass effect, cell trauma, ICP, and the release of toxins

Stroke Epidemiology

- Third leading cause of death in the United States
- Rate declining in western countries (probably due largely to BP control)
- Over 700,000 patients annually in US suffer strokes
- 20 % (roughly) die within one year of occurrence
- 20 % (roughly) fully recover
- Stroke remains the most disabling disease among the elderly
- 3,000,000 stroke survivors alive today
- Annual cost of stroke: estimated at $30 billion

Historical Figures

- Franklin Delano Roosevelt
  - age 63, intracerebral hemorrhage
  - near the end of World War II
  - died within a few hours

Taken from: n.? .

Historical Figures

- Louis Pasteur
  - age 46
  - coma and near death
  - survived
  - worked for another 25 years

  Taken from: n.? .

Stroke Risk Factors

- Hypertension
- Heart disease
- Carotid artery disease
- History of TIA
- Diabetes
- Smoking
- Age over 55
- Male gender
- Excessive alcohol consumption

Stroke Risk Factors (cont.)

- TIA (transient ischemic attack)
  - one-third of patients who experience a TIA will stroke within 5 years if left untreated.
- Hypertension
  - greatest treatable risk factor
  - systolic and diastolic are both factors
- Smoking
  - raises the risk two to six times
  - if patient can stop, risk from smoking declines
- Heart disease
  - heart as a source of emboli (atrial fibrillation)

Categories of Stroke

- Hemorrhagic (15 %)
- Nonhemorrhagic or Ischemic (85 %)
  - Thrombotic
  - Embolic
    - carotid origin
    - heart source (atrial fib)
  - Spasm (rare)
  - Shock

Hemorrhagic Stroke

Bleeding into or around the brain

- Intracerebral (ICH)(-cerebellar, -brain stem)
- Subarachnoid (SAH)
- Subdural
- Epidural

- Course:
  - may be slow (subdural)
  - may be gradual over hrs ("sentinel bleed") (SAH)
  - may be sudden, severe over only seconds (SAH)

Hemorrhagic Stroke

Bleeding into or around the brain

- Causes of SAH and intracerebral (ICH) (-cerebellum, brain stem)
  - hypertension
  - cocaine
  - Berry aneurysm rupture

Ischemic Strokes

- TIA – "mini-stroke"
  - < 24 hr
  - changing, usually within 2 -15 minutes
- RIND – reversible (not really) ischemic neurovascular disorder
  - > 24 hr
  - improving LOC +/or focal deficits

Ischemic Strokes

- Completed Stroke
  - fixed
  - usually neither progressive, nor improving
- "In Evolution"
  - potentially progressive and deteriorating

Thrombotic Strokes

- Thrombotic
  - clot in cerebral vessels
  - Clot may form in the carotid vessel causing a flow problem
  - course: slow to form
  - onset: "sudden" onset upon awakening

Embolic Strokes

- Embolic
  - large clot in the carotid travels to cerebral vessels
  - onset: sudden onset while awake
  - clot may form in another area: heart
    - R/O MI
    - R/O dysrhythmia

Shock Ischemia

- Shock-ischemia
  - Hypotension due to a number of causes
    - heart block
    - dysrhythmias
    - iatrogenic (over aggressive Tx of CHF,…)
  - Course
    - sudden onset
    - then s/s may wax and wane

DDx of Acute Stroke

- Hypoxia
- Shock
- Hypertensive encephalopathy
- Metabolic / toxic
  - Hypoglycemia
  - DKA
  - NKHHC
  - drug toxicity
  - Wernicke's encephalopathy

DDx of Stroke (cont.)

- Metabolic / toxic
  - endocrine (hypothyroid)
  - uremia
- Seizure with persistent neuro signs
  - usually arm paralysis
  - " Todd's paralysis"
- Vascular
  - migraine (complicated)
  - vasculitis (lupus)

DDx of Stroke (cont.)

- Mass lesions
  - trauma: subdural/epidural hematoma
  - tumor or abscess
- Bell's palsy
- Infectious
  - meningitis
  - encephalitis
- Psychiatric

Prehospital Stroke History

- Cardinal signs: Focal injury or deficit
  - **F**ace **"FAST"**
  - **A**rm / leg
  - **S**peech
  - **T**ime / onset
- Other signs
  - Visual
  - Ataxia
  - Seizures

Prehospital History

Associated signs

- chest pain
- headache
- nausea / vomiting
- neck pain

Past Medical History

- BP
- DM
- Heart Disease
- History of
  - Arrhythmias
  - Cardiac Meds
  - Sickle Cell
  - Smoking
  - Alcoholism
  - Prior TIAs

Stroke Treatment Plan

C A B C D E and **C O_2 M_3 E B I G**

- **C -** spine, if any question of trauma, immobilize
- **A -** suction : avoiding both FBAO + ↑ ICP
- **B -** assure adeq TV, rate, O2 (assure sat. > 90%)
  if and only if indicated, give ↑ RR
  ↑ RR most rapid lowering of ↑ ICP (RR:20 - 25)
- **C -** pulse / skin / BP / cardiac monitor
  - IV NS in AC KVO rate (10 mL / hr.)
- **D -** AVPU / pupils / FAST survey / drug Tx *
- **E -** Expose / Elevate HOB

Treatment Plan

Be prepared for and treat causes or complications of:

- low resp rate / volume (treat hypoxia)
- low blood pressure (treat shock)
- low heart rate / block (treat shock)
- seizures
- elevated BP
- hypoglycemia
- dysrhythmias
- increased ICP

Stroke Treatment Plan

CABCDE and

- **C** spine, if any question of trauma
- **O2** NRB or NC ; O2 "may be beneficial" (AHA:I-209)
- **M3** BP / cardiac / O2 sat. pulse oxymetry
- **E** expose (correct hyperthermia)
- **B** blood for labs ("all the tubes" - red, purple, + blue)
- **I** IV NS or LR 10 (10 - 50) mL / hr
- **G** glucose check
- **F A S T** prehospital stroke scale

Treatment Plan

Document *t PA* clot-lysis therapy

- Inclusion criteria
  - > age 18
  - clinical diagnosis of ischemic stroke
    F A S T screen
  - well established time of onset < three hours
- Exclusion criteria

Treatment Plan

t PA clot-lysis therapy indicated if

- Inclusion criteria are met
- Exclusion criteria are absent

"7 **D** s of stroke management" (AHA p. I-205)

- **D** etction
- **D** ispatch
- **D** elivery to a "stroke center"
- **D** oor
- **D** ata
- **D** ecision
- **D** rug "goal of door to drug in 60 minutes"

t PA Exclusion Criteria

- Active bleeding
  - Intracerebral, evidence or suspicion
  - GI
- Anticoagulant therapy
  - current meds include oral anticoagulant
    - coumadin
    - Heparin
- Pretreatment SBP > 185
- Pretreatment DBP > 110

t PA Exclusion Criteria

- "stroke" may, in fact, be a diabetic emergency
  - blood glucose is < 50 or > 400
- Neurological status
  - minor stroke syndrome (TIA - like)
  - rapidly improving
- Onset of symptoms cannot be determined
  - patient awakens with stroke
  - often not witnessed or exact onset simply cannot be recalled by patient or family (? < 3 hours)

t PA Exclusion Criteria

- Seizure at the onset of stroke
- PMH of head injury
  - recent serious head trauma (< 3 months)
  - recent stroke (< 3 months)
  - known anatomical lesions
    - Aneurysm
    - malignancy, intracranial
    - A-V malformation
- Recent surgery
- Medications
  - anticoagulants

t PA Exclusion Criteria

Timing of ***t PA***

- ***0 - 3*** hr of the stroke onset
  - " Class I " (AHA 2000)
    - these data are now considered controversial
    - some would say Class Indeterminant (≈ Hoffman, EMA)
- ***3 - 5*** hr of the stroke onset
  - Class Indeterminant, at best Clark, # 65 , p. I – 215
  - Class III , at worst
  - may be harmful ; unacceptable ; evidence strongly suggests or confirms harm [≈ Hoffman, EMA]

t PA Exclusion Criteria

- **A** ctive bleeding (intracerebral, or GI)
- **T** aking anticoagulants already
- **P** ressure (SBP > 185 ; DBP > 110)
- **A** ccucheck < 60 or > 400
- **N** eurological signs are minor or are improving
- **O** nset cannot be determined
- **S** eizure
- **T** rauma , recent
- **A** natomical (Aneurysm, Malignancy, A-V malformation)
- **R** ecent surgery
- **T** ime > 3 hr

Summary

We have discussed:

- Definition of stroke and TIA.
- Etiology and pathophysiology of stroke and TIA.
- Common stroke risks, epidemiology,and prevention.
- Assessment findings in stroke and TIA.

Summary, continued

- Various mimics (DDx) of stroke
- Need for rapid intervention and transport of patient with stroke and TIA
- Management of stroke and TIA
- Do's, don'ts, and controversy.