Cardiovascular Accident (CVA) or Stroke

CVA aka…Stroke or Brain Attack

- Abrupt onset of neurological deficit from lack of blood supply to a specific part brain
- Time is tissue. Stroke is an Emergency! Immediate care is critical

Risk Factors

- Non-modifiable
  - Gender- males and females both affected
  - Age- advancing age
  - Race: African American, Hispanic, and American Indian
  - Family history-familial
  - Patient History-previous TIA or CVA
- Modifiable
  - Comorbidities- HTN, Heart disease, Atrial Fib, Diabetes, High Cholesterol,
  - Lifestyle habits-smoking, obesity, alcohol use, poor diet, stress, sedentary lifestyle
  - Oral contraceptives
  - Sickle cell anemia

Cerebral circulation

- Review cerebral circulation from A&P
  - Anterior circulation: internal carotid arteries branch into middle cerebral and anterior cerebral arteries
    - Supply: frontal, parietal, temporal lobes, basal ganglia, part of the diencephalon
  - Posterior Circulation: 2 vertebral arteries unite to form basilar artery
    - Supply: cerebellum, brainstem, part of the diencephalon, occipital, parts of temporal lobe
  - Circle of Willis: allows blood to flow from anterior and posterior circulation to protect from differential pressures, occlusion and ischemia
    - Communicating arteries in circle of willis connect anterior and posterior circulation
- Regulation of cerebral blood flow
  - Factors that affect cerebral blood flow

- Cerebral auto regulation provides protection from systemic BP changes
- Increased CO2-leads to increased blood flow and vasodilation, decreased CO2 levels decrease cerebral blood flow
- Low O2 levels increase cerebral blood flow to try to correct deficit
- Collateral circulation can happen to compensate for decreased blood flow
- IICP-increased intracranial pressure causes reduced cerebral blood flow

2 Classification of strokes: Ischemic and Hemorrhagic

❖ **Ischemic** –decrease in blood flow to the brain secondary to partial or complete occlusion

- Most common type of stroke is ischemic
- Thrombotic or embolic and TIA is often a precursor

▪ *Thrombotic stroke*

- Thrombus located in a cerebral vessel causes narrowing and occlusion of the blood flow

  Thrombus formation: plaque ruptures, platelet adhesion, clot formation
- Risk factors- Atherosclerosis, HTN and DM, TIA
- Characteristics
  - Symptoms progress over period while vessel narrows
    - At 72 hours infarction and cerebral edema peak- slow process
    - Collateral circulation may kick in since thrombotic is a gradual onset
    - No LOC change in first 24 hours because decrease in flow is slow
  - Often occur during or after sleep

▪ *Embolic stroke*

- Occlusion of cerebral artery by embolus, resulting in infarction and edema of area
- Plaque breaks off from inside layer of heart, enters circulation and lodges when the artery becomes too small or narrows
- Heart diseases associated with development of emboli:
  - atrial fib/ flutter, MI, Valvular disease and prosthesis, Rheumatic heart disease
  - Endocarditis, atrial septal defects
- S&S- can occur at any given time, Onset: can be seconds to minutes
- Investigate underlying cause to treat to prevent reoccurrence.

▪ TIA – Transient Ischemic Attack

- Temporary (transient) neurological deficit from decrease in blood flow to the brain.
- Passes without residual effects.

- Warning sign of cerebrovascular disease and a future bigger event like CVA.
- S&S
  - Diplopia, blurry vision, tinnitus, vertigo, vision loss in 1 eye temporarily
  - Motor and sensory impairments: paresthesia, paresis, ataxia
  - Difficulty talking, swallowing
  - Symptoms are temporary/transient
- Treatment- prevent platelet aggregation

❖ **<u>Hemorrhagic stroke</u>**

- Cerebral hemorrhage causes a lack of blood flow to brain tissue
  - females more than males
  - occur during activity with a rapid onset
  - sudden and severe headache
  - high mortality, two types of hemorrhagic stroke= Intracerebral & Subarachnoid

- *<u>Intracerebral</u>*
  - Deep cerebral blood vessel ruptures and bleeds directly into brain tissue
  - Causes:
    - HTN, blood vessel malformations (aneurysm bursts), coagulation disorder, anticoagulants, thrombolytics, trauma, brain tumor
  - S+S
    - Suddenly, progress over minutes to hours due to continued bleeding
    - varies depending on the amount of bleeding, location of bleeding
    - Nausea/Vomit/severe H/A, decreased LOC
    - HTN- the body tries to compensate for the blood loss, bp spikes
  - Complication-blood mass causes compression to the brain
- *<u>Subarachnoid</u>* – bleeding into subarachnoid space (between the pia and arachnoid)
  - Usually caused by a ruptured aneurysm
    - Aneurysm-thinning, degeneration of arterial walls, vessel balloons out
      - Most commonly occur @ circle of Willis
      - may result from congenital defect or traumatic injury.
      - many die with initial rupture or rebleeding after a rupture
      - N/V/severe H/A, seizures, and stiff neck

        - Complications
            - Cerebral vasospasms which narrows vessels causing vasoconstriction
            - 2nd episode of bleeding (rebleeding) is possible and can cause death
        - arteriovenous malformation-
            - tangled web of high-pressure arteries directly connected to veins that create a rupture risk
            - May result from a traumatic injury, or be congenital

- Diagnosis of Stroke
    - CT- STAT
    - MRI
        - More accurate to eval extent of damage
        - MRA –magnetic resonance imaging to look at cerebral vasculature
    - Cerebral Angiogram
        - Catheter threaded from femoral artery to carotid and contrast injected
            - Risk: dislodge emboli, vasospasm, further bleeding, allergy to dye
            - Post procedure assessments
    - Other Testing
        - Cardiac testing- EKG, CXR, Echo, holter monitor
- Clinical Manifestations of Stroke- can vary depending on: site and size of lesion, presence of collateral circulation
    - Standards
        - Goal-evaluate quickly
        - (BEFAST) Balance, Eyes, Face, Arms, Speech, Time assessment
        - call 3333 in hospital or 911 outside of hospital
    - Presenting Symptoms
        - unilateral numbness or weakness of face, arm, leg
        - confusion or other change in mental status
        - trouble speaking and/or understanding
        - visual disturbances
        - difficulty walking, dizzy, loss of coordination, balance issues
        - Hemorrhagic Stroke: N/V, seizures, sudden severe headache, htn, +LOC

- Motor
  - Weakness- contralateral: symptoms of stroke present on the opposite or contralateral side of the lesion because the pyramidal pathways cross at the medulla. R sided weakness correlates with L sided lesion and L sided weakness correlates with R sided lesion
  - middle cerebral artery is the only exception to contralateral symptoms
    - greater weakness in the upper extremity is noted compared to lower extremity in an MCA stroke
  - Characteristic motor manifestations
    - Impaired voluntary and coordinated movement, loss of tone, could have flaccid extremities or spastic, decreased/impaired reflexes
  - Motor effects are unilateral
    - hemiparesis-unilateral weakness
    - hemiplegia- unilateral paralysis
    - initially there is flaccid paralysis- loss of muscle tone, heavy limbs then followed by spastic paralysis-rigid tone, contractures, decreased ROM
  - Reflexes –initially hyporeflexic then can progress to hyperreflexic
- Communication
  - Lt hemisphere controls language in R handed and the majority of L handed
    - Difficulty with understanding and expressing speech, writing
  - Aphasias
    - global aphasias- all language function lost
  - dysarthria
    - slurred speech
  - Wernicke's area of the brain -receptive aphasia- temporal lobe lesion
    - speaks fluently but speech may not make sense: word salad.
  - Broca's area of the brain– expressive aphasia- frontal lobe lesion
    - difficulty speaking, affects speech production: choppy speech
- Affective Manifestations
  - loss of emotions
  - exaggerated or unpredictable emotional responses
  - emotional reactions complicated by depression/frustration

- Memory, learning, and judgment may be impaired
    - Can be frustrating/depressing
    - Difficulty making generalizations or with concrete thinking
  - L sided lesion
    - Memory problems r/t language
    - cautious in matters of judgment and slow in processes
    - Think LEFT, LANGUAGE, LENGTHY
  - R sided lesion
    - Problems with space and position
    - Quick and impulsive
    - Deficits with time and judgment
    - Think RIGHT, RAPID
- Spatial-Perceptual Alterations
  - More with Right hemisphere lesions
  - Incorrect perception of self and illness (brain damage on R side can cause a type of attention deficit)
    - Neglect Syndrome- patient will “deny” their own body parts. May refuse to acknowledge they have a hand or an arm on one side. One hand may not be there in the patient’s eyes/brain/thinking.
  - Incorrect perception of self in space
    - Difficulty determining where they are in regards to others/things
    - Homonymous hemianopsia – blindness occurs in same half of visual field of both eyes (pt only sees ½ of normal vision field).
  - Agnosia
    - Inability to recognize an object / unable attach meaning to object
    - Disorientating situations-holds coffee cup; doesn’t know what to do with it
  - Apraxia
    - Inability to perform sequential movements on command

- Prevention of Stroke is KEY
  - TIA therapy
    - Medications- Antiplatelets medications
      - ASA, Plavix (clopidogrel) and Ticlid (ticlopidine)

        - Oral anticoagulation for those with A-Fib
            - dabigatran (Pradaxa), warfarin (Coumadin)
        - Statins- Zocor (simvastatin) and Mevacor (lovastatin)
    - Surgery
        - Carotid Endarterectomy- remove the plaques in carotid
        - Transluminal angioplasty- Balloon in carotid to open vessel and stent prn
- Acute Care Ischemic Stroke:
    - Maintain patent airway: Oxygenate, Suction, Intubate PRN
    - Neuro Checks/NIH stroke scale as ordered or per stroke protocol
    - Fluid and electrolyte balance
        - Maximize blood volume while being cautious of cerebral edema, IICP
        - ADH secreted in response to stroke causes fluid retention, hyponatremia
        - Hypotonic solutions- (D5W) can lead to fluid retention- caution!
    - Blood pressure- Normal response after stroke for HTN-protective response of body to maintain cerebral perfusion.
        - Antihypertensives in a patient who does not qualify for fibrinolytics only if BP is severely high. Systolic BP > 220 or Diastolic > 120
        - Fibrinolytics-BP has to be a little bit lower, but still can be high.
    - Hydration-Adequate amount needed. Watch for overload, can exacerbate cerebral edema
    - IICP more common with hemorrhagic due to blood loss into tissue
        - Position: we want head midline positioned and HOB 30 degrees to help venous drainage in a hemorrhagic stroke patient.
        - diuretics to decrease cerebral edema
    - Glycemic control- maintain normal glycemic control to avoid hyper/hypoglycemia
    - Hyperthermia- can occur after stroke
    - Seizure-antiepileptics, seizure precautions
- Ischemic Stroke Drug Therapy
    - tPA- tissue plasminogen activator (Activase) for ischemic stroke
        - lyses the clot and breaks down the fibrin and fibrinogen in thrombus
        - Must be administered within the 3-hour window of the onset of s/s
        - Screening before administering:

- Coagulation disorder or are they already bleeding?
- Head trauma, stroke, or GI bleed within last 3 months?
- Major surgery within 14 days?

- Closely monitor for S+S bleeding during medication infusion
- Nursing care: multiple IV sites needed, foley, NGT, Control BP

- Prevent recurrence of stroke: antiplatelets, anticoagulants, and statins

- Ischemic Stroke Surgical Therapy
  - Mechanical embolus retrieval in cerebral ischemia – MERCI procedure
    - Corkscrew device inserted through femoral artery to the carotid and into the clot area, pulls clot out of body via the catheter tube it was inserted through
  - Angioplasty and stenting open blocked arteries
- Hemorrhagic Stroke Acute Care
  - Similar to ischemic stroke care except no clot buster med.
  - Maintain BP and optimize cerebral perfusion- BP to <160 SBP
  - Seizure prophylaxis
- Hemorrhagic Stroke Drug Therapy
  - HTN management-antihypertensives
  - Antiplatelet and anticoagulant therapy contraindicated
  - Nimodipine- Calcium channel blocker. Shown to prevent vasospasm, Hold if SBP <90 or AP < = 60
- Hemorrhagic Stroke Surgical Therapy
  - Evacuate hematomas with craniotomy if > 3 cm
  - Treatment of aneurysm
    - Platinum coils placed in aneurysm via a catheter, decreasing flow to the aneurysm-will close it out.
    - Clip aneurysm- clip off the blood supply.
  - AVM treatment
    - Radiation (gamma knife) applied causing AVM to clot off/surgical resection
    - Endovascular Embolization can be done

- "super glue" substance inserted into the AVM blood vessels which reduces the AVM size and reduces blood flow.
- Complication of hemorrhagic stroke: hydrocephalus, brain herniation, death.

- Nursing Assessment
  - respiratory, cardiac, and neurologic status
  - Neurologic status: NIH stroke scale, pupil, cerebellar, CN assessment, reflexes
- Acute Intervention
  - Respiratory System
    - age, immobility, dysphagia, LOC, can put patient at r/f pneumonia
    - NPO to prevent aspiration during acute phase of stroke to prevent aspiration
    - Artificial airway, Suction, position on affected side to aid drooling
    - IS, turn, C+DB- if patient has an untreated aneurysm don't have them coughing on purpose= will increase the ICP.
  - Neurologic System
    - assess for changes, LOC/Mental Status/Neuro Checks
    - NIH stroke scale- stroke severity, predicts outcomes, and communicates pt status
    - papillary response, motor strength and function, sensory response
  - Cardiovascular System
    - Fluid balance- gentle watch for fluid overload which can increase ICP
    - DVT prevention- EPC's, medications if ischemic to thin blood
  - Musculoskeletal System
    - ROM, exercise, when possible, short sessions but start early
    - affected side is positioned to prevent dependent edema
  - Integumentary System
    - position to prevent pressure, turning schedule, special mattress, seat cushions
    - hygiene, emollient application, and moving
  - Gastrointestinal System
    - constipation common-we want to prevent this
    - Fluids Adequate, ~ 2000ml/day but be careful not to overload
    - Laxatives and stool softeners, suppositories
  - Urinary System

        - Avoid indwelling foley if possible, Avoid retention and overdistention.
    - Nutrition
        - Maintain IV fluids
        - Parenteral (TPN; PPN) or tube feeds PRN
        - Ensure intact gag and swallow reflexes assessed.
        - Speech therapy
        - Procedure for feeding
        - Foods: Easy to swallow, Soft and thickened, No straws
        - Feeding- Place food on unaffected side, Small bites
        - After feeding- Mouth care, Leave upright 45-60 minutes
    - Sensory-Perceptual
        - Homonymous Hemianopsia-visual field loss
            - Place objects in patient field of vision, pt may have blind spot
            - Scan environment to look for hazards
            - Approach from side with intact vision so as to not startle pt
        - Neglect Syndrome
            - check affected side often- could develop sores, injuries
        - Other visual problems-diplopia, loss of corneal reflex, ptosis.
    - Coping

Discharge planning

- Rehabilitation
    - Emphasis placed on client's abilities, Physical, mental, social well-being
    - maintain and restore function and independence
    - Team approach: Client, Family are a vital part of rehab, RN, Physician, PT, OT, ST