Stroke

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What is a Stroke?

- Occurs when there is ischemia (inadequate blood flow) to a part of the brain or hemorrhage into the brain = death of brain cells
- Movement, sensation or emotions are lost or impaired when the area of the brain that controls them is affected
- Stroke is also described by the term brain attack - communicates the urgency of recognizing the symptoms of stroke & treating a medical emergency
- Strokes are classified as ischemic or hemorrhagic
What is A Stroke

The following video is an animation video. “This animation describes that a stroke is a “brain attack” that occurs when the blood supply to the brain is interrupted, causing the affected brain tissue to die.”

https://www.youtube.com/watch?v=BDk9wRbW40Q
Risk Factors for Strokes

- Non-modifiable factors: age, gender, ethnicity, race, family history, hereditary & low birth rate
- Modifiable factors: hypertension, heart disease, diabetes, increased serum cholesterol, smoking, excessive alcohol consumption, obesity, physical inactivity, poor diet & drug abuse
- Major cause of stroke is atherosclerosis which can lead to thrombus formation & contribute to emboli
What Happens During A Stroke

The following video is by CNN reporter Jacque Wilson Smith which explains what happens during a stroke.

Pathophysiology

1. Stroke

2. Production of pro-inflammatory cytokines

3. Immature myeloid cell proliferation
   - Egress from the bone marrow into the systemic circulation

Suppression of adaptive immune responses

- Peripheral immune suppression
- Increased susceptibility to infections such as pneumonia and UTIs

Blood-brain barrier
- Recruitment
- Activation

Dampering of excessive inflammation in the brain
- Increased angiogenesis
- Secretion of anti-inflammatory molecules

MDSCs
- Damaged or dying cells
- Activator microglia
HOW STROKES AFFECT BRAIN FUNCTION

Right Hemisphere
(stroke on right side – left body affected)
- Attention span
- Impulse control
- Movement on left side of body
- Initiates activities you want to do
- Drawing skills
- Remembering visual objects
- Recognition of faces
- Awareness of the left side of the body
- Emotional stability
- Measuring distances of objects to body

Left Hemisphere
(stroke on left side – right body affected)
- Motor speech
- Expressive speech
- Movement on right side of body
- Emotion control
- Understanding math
- Writing
- Locating body in space
- Reading numbers and letters
- Recognizing objects
- Remembering written information
Stroke Signs

“Stroke is the third leading cause of death in the United States. On The Doctors, Freda Lewis-Hall shares her thoughts on this important health issue and what we can do to prevent stroke. She also emphasizes how it's crucial to call 9-1-1 when you think someone's having a stroke. Act F-A-S-T. Check your local CBS listings to see the whole show.”

https://www.youtube.com/watch?v=mBPJp7H4bo8
Stroke — there’s treatment if you act FAST.

F — Face; look uneven?
A — Arm; one arm hanging down?
S — Speech; slurred speech?
T — Time; call 911 NOW!
Types of Strokes

- **Ischemic stroke** - results from inadequate blood flow to the brain from the partial or complete occlusion of an artery & account for approximately 80% of all strokes
  - Thrombotic stroke - occurs from injury to a blood vessel wall & formation of a blood clot; the lumen of the blood vessels becomes narrowed (if it becomes occluded, infarction occurs)
  - Embolic stroke - occurs when an embolus lodges in and occludes a cerebral artery = infarction & edema of the area supplied by the vessel involved

- **Hemorrhagic stroke** - results from bleeding into the brain tissue or into the subarachnoid space or ventricles & account for approximately 15% of all strokes
  - Intracerebral hemorrhage - bleeding within the brain caused by a rupture of a vessel
  - Subarachnoid hemorrhage - when there is intracranial bleeding into the CSF-filled space between the arachnoid and pia mater membranes on the surface of the brain (usually caused by aneurysm)

- The Following video explains Brain Stroke, Types of, Causes, Pathology, Symptoms, Treatment and Prevention, Animation:

  - [https://www.youtube.com/watch?v=EY98RInP-A4](https://www.youtube.com/watch?v=EY98RInP-A4)
Thrombotic Stroke

Blood clot (thrombus) blocks flow of blood in brain.

Embolic Stroke

Fatty plaque or blood clot (embolism) breaks away and flows to brain where it blocks an artery.

Cerebral Hemorrhage

Break in blood vessel (aneurysm) in brain.
Hemorrhagic Stroke:
- Blood vessels rupture
- Blood leaks into brain tissue

Ischemic Stroke:
- Blood clots stop the flow of blood into brain tissue
Hemorrhagic Stroke (Brain Hemorrhage)

“This 3D medical animation shows the events leading to a hemorrhagic stroke (brain hemorrhage), including anatomy and physiology and treatment.”

https://www.youtube.com/watch?v=bp1HRfpOUo0
Hemorrhagic Stroke Treatment

*Endovascular Procedures*

Endovascular procedures may be used to treat certain hemorrhagic strokes similar to the way the procedure is used for treating an ischemic stroke. These procedures are less invasive than surgical treatments, and involve the use of a catheter introduced through a major artery in the leg or arm, then guided to the aneurysm or AVM; it then deposits a mechanical agent, such as a coil, to prevent rupture.

*Surgical Treatment*

For strokes caused by a bleed within the brain (hemorrhagic stroke), or by an abnormal tangle of blood vessels (AVM), surgical treatment may be done to stop the bleeding. If the bleed is caused by a ruptured aneurysm (swelling of the vessel that breaks), a metal clip may be placed surgically at the base of the aneurysm to secure it.
Transient Ischemic Attack (TIA)

- Is a transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction of the brain
- Symptoms last less than 1 hour and TIA's are mostly resolved
- Can be related to atherosclerosis
- Treated with antiplatelet drugs to prevent stroke
Mini Stroke- Transient Ischemic Attack (TIA)

“Dr. Fritz Schmutz, MD, Interventional Radiologist practicing at Eastern Idaho Regional Medical Center, talks about mini strokes, also known as transient ischemic attacks (TIA). Mini strokes are warning signs of a full-blown stroke event and a patient should immediately go to a Primary Stroke Center to be evaluated by stroke specialists.”

https://www.youtube.com/watch?v=QUiWX0o41dY
Ischemic Stroke Treatment

**tPA, the Gold Standard**

For ischemic strokes the tissue plasminogen activator (tPA, also known as IV rtPA, given through an IV in the arm). tPA works by dissolving the clot and improving blood flow to the part of the brain being deprived of blood flow. If administered within 3 hours (and up to 4.5 hours in certain eligible patients), tPA may improve the chances of recovering from a stroke. A significant number of stroke victims don’t get to the hospital in time for tPA treatment; this is why it’s so important to identify a stroke immediately.

**Endovascular Procedures**

Another treatment option is an endovascular procedure* called mechanical thrombectomy, strongly recommended, in which trained doctors try removing a large blood clot by sending a wired-caged device called a stent retriever, to the site of the blocked blood vessel in the brain. To remove the brain clot, doctors thread a catheter through an artery in the groin up to the blocked artery in the brain. The stent opens and grabs the clot, allowing doctors to remove the stent with the trapped clot. Special suction tubes may also be used. The procedure should be done within six hours of acute stroke symptoms, and only after a patient receives tPA.
Merci Retrieval System Removes Blood Clots

“The Doctors demonstrate an amazing procedure from Concentric Medical, Inc that removes blood clots from the brain of stroke victims.”

https://www.youtube.com/watch?v=BOABQ9K20gc
How Is The Procedure Merci Removal System Done?

- If there is concern that a patient may have suffered a stroke, the patient is quickly brought to the Emergency Department.
- Detailed imaging studies (CT or MRI scans) are performed to determine if the patient is a candidate for treatment.
- If it is felt the patient may gain benefit from the Merci device, they are brought to a specially equipped room called an angiography suite.
- The doctors insert a small catheter, or tube, through blood vessels towards the blocked vessel within the brain.
- The catheter is carefully snaked through the clot.
- Next, the catheter is slowly pulled back to expose a wire contained within the catheter.
- As the wire is released, it forms a corkscrew shape.
- The wire is then slowly pulled back, trapping the clot.
- Once the clot is trapped within the wire, it can be retrieved from the body and blood flow is restored.
Clinical Manifestations of a Stroke

- Can affect many body functions including: motor activity, bladder/bowel elimination, intellectual function, spatial-perceptual alterations, personality, affect, sensations & communication
- Motor deficits include: impairment of mobility, respiratory functions, swallowing, speech, gag reflex & self-care abilities
- May experience aphasia (total loss of comprehension & use of language) when a stroke damages the dominant hemisphere or dysphasia (difficulty related to the comprehension or use of language) due to partial disruption or loss
- Many experience dysarthria, which is a disturbance in the muscular control of speech
- Difficulty controlling emotions & both memory and judgement may be impaired
Clinical Manifestations of a Stroke Continued

- Spatial-perceptual problems such as:
  - Denying their illnesses or their own body parts
  - Neglecting all input from the affected side & difficult with spatial orientation
  - Agnosia which is the inability to recognize an object by sight, touch or hearing
  - Apraxia which is the inability to carry out learned sequential movements on command
- Diagnostic tool: brain imaging- either MRI or CT scan
Acute Phase Following a Stroke

- Management of the respiratory system is a priority because patients are vulnerable to respiratory problems after a stroke.
- Monitoring patient's neurological status to detect changes suggesting extension of the stroke, increased ICP, vasospasm, or recovery from stroke symptoms.
- Maintaining homeostasis in cardiovascular system due to stroke patients having decreased cardiac reserves secondary to cardiac disease.
- Maintain optimal function in musculoskeletal system by preventing joint contractures and muscular atrophy.
- Skin of patient is more susceptible to breakdown due to loss of sensation, decreased circulation & immobility.
- May need to place patients on stool softeners or fibre due to constipation after a stroke.
Acute Phase Following a Stroke Continued

- Primary urinary problem is poor bladder control = incontinence
- IV infusions to maintain fluid and electrolyte balance may be needed, as well as, for medications
- Assessing swallowing ability
- A common problem after a stroke is homonymous hemianopsia which is blindness in the same half of each visual field
- Usually discharged from acute care setting to home, intermediate or long-term care facility or rehab facility
- Patients level of independence in performing ADL’s is a key component for planning discharge
Collaborative Care: Prevention

- Health management focusing on:
  a. BP control
  b. Blood glucose control
  c. Diet & exercise
  d. Smoking Cessation
  e. Limiting Alcohol Consumption
  f. Routine Health Assessments
- Prevent the development of a thrombus or embolus in patients with TIA’s; Antiplatelet drugs chosen for treatment
- Surgical interventions: carotid endarterectomy, transluminal angioplasty, stenting & extracranial-to-intracranial artery bypass
8 Habits to Prevent a Second Stroke

- Slim Down
- Get Active
- Quit Smoking
- Limit Drinking
- Eat Right
- Manage Your Medications
- Lower Blood Pressure
- Monitor Related Conditions
Collaborative Care: Acute Care for Ischemic Strokes

- Preserving life, preventing further brain damage & reducing disability
- Treatments differ depending on the type of stroke & change as patient progresses from acute to rehab phase
- Elevated BP is common after stroke as protective response to maintain cerebral perfusion
- Fluid and electrolyte balance must be controlled carefully to promote perfusion & decrease further brain injury
- tPA administered IV used to re-establish blood flow through a blocked artery to prevent cell death in patients with the acute onset of ischemic stroke symptoms
- May be treated with platelet inhibitors & anticoagulants if the patient stroke was caused by thrombi or emboli
- Surgical interventions: immediate evacuation for aneurysm-induced hematomas or cerebellar hematomas, mechanical embolus retrieved in cerebral ischemia to go inside blocked artery & pulls out clot for ischemic strokes
- Patient stabilized for 12-24 hrs, collaborative care shifts from preserving life to lessening disability & attaining optimal function
Nursing Assessment - Acute Phase

During the acute phase, a neurologic flowsheet is maintained to provide data about the following important measures of the patient’s clinical status:

- Change in level of consciousness or responsiveness.
- Presence or absence of voluntary or involuntary movements of extremities.
- Stiffness or flaccidity of the neck.
- Eye opening, comparative size of pupils, and pupillary reaction to light.
- Color of the face and extremities; temperature and moisture of the skin.
- Ability to speak.
- Presence of bleeding.
- Maintenance of blood pressure.
Post-Acute Phase

During the post-acute phase, assess the following functions:

- Mental status (memory, attention span, perception, orientation, affect, speech/language).
- Sensation and perception (usually the patient has decreased awareness of pain and temperature).
- Motor control (upper and lower extremity movement); swallowing ability, nutritional and hydration status, skin integrity, activity tolerance, and bowel and bladder function.

Continue focusing nursing assessment on impairment of function in patient’s daily activities.
Nursing Goals for Patient

1. Patient maintains a stable or improved level of consciousness
2. Patient attains maximum physical functioning
3. Patient attains maximum self-care abilities & skills
4. Patient maintains stable body functions (Ex: bladder control)
5. Patient maximizes communication abilities
6. Patient maintains adequate nutrition
7. Patient avoids complications of stroke
8. Patient maintains effective personal & family coping
Nursing Intervention

Nursing care has a significant impact on the patient’s recovery. In summary, here are some nursing interventions for patients with stroke:

- **Positioning.** Position to prevent contractures, relieve pressure, attain good body alignment, and prevent compressive neuropathies.
- **Prevent flexion.** Apply splint at night to prevent flexion of the affected extremity.
- **Prevent adduction.** Prevent adduction of the affected shoulder with a pillow placed in the axilla.
- **Prevent edema.** Elevate affected arm to prevent edema and fibrosis.
- **Full range of motion.** Provide full range of motion four or five times a day to maintain joint mobility.
- **Prevent venous stasis.** Exercise is helpful in preventing venous stasis, which may predispose the patient to thrombosis and pulmonary embolism.
- **Regain balance.** Teach patient to maintain balance in a sitting position, then to balance while standing and begin walking as soon as standing balance is achieved.
- **Personal hygiene.** Encourage personal hygiene activities as soon as the patient can sit up.
Nursing Interventions Continued

- **Manage sensory difficulties.** Approach patient with a decreased field of vision on the side where visual perception is intact.
- **Visit a speech therapist.** Consult with a speech therapist to evaluate gag reflexes and assist in teaching alternate swallowing techniques.
- **Voiding pattern.** Analyze voiding pattern and offer urinal or bedpan on patient voiding schedule.
- **Be consistent in patient’s activities.** Be consistent in the schedule, routines, and repetitions; a written schedule, checklists, and audiotapes may help with memory and concentration, and a communication board may be used.
- **Assess skin.** Frequently assess skin for signs of breakdown, with emphasis on bony areas and dependent body parts.
Rehabilitation

- Process of maximizing the patient’s capabilities & resources to promote optimal functioning
- Maximizes patients abilities
- Requires a team approach to benefit patient and family
- Team consists of: rehab nurse, neuropsychologist, occupational therapist, certified rehab counsellor, physiotherapist, physician, recreational therapist, social worker & SLP
- Emphasizes musculoskeletal functions of eating, toileting, and walking, as well as, determining an appropriate daily caloric intake for the patient
- Bowel management program implemented for problems with bowel control, constipation & incontinence
- Patients frequently have perceptual deficits and exhibit emotional responses that aren't appropriate for a situation
- They may experience sensory, intellectual, communicative, function, role behaviour, emotional, social & vocational losses
Rehabilitation Continued

- Family members must cope with 3 aspects of the patient’s behaviour:
  - Recognition of behavioural changes from neurological deficits that are not changeable
  - Responses to multiple losses by both patient and the family
  - Behaviours that may have been reinforced during the early stages of stroke as continued dependency

- Open communication, info regarding total effects of stroke, education regarding stroke treatment & therapy are key in helping the patient and their family recover
References


Nucleus Medical Media. (2012, Feb 6). Hemorrhagic Stroke (Brain Hemorrhage) [Video File]. Retrieved from https://www.youtube.com/watch?v=bp1HRfpOUo0
References


