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Ischemic Strokes

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Introduction

Stroke or cerebrovascular accident (CVA) is the third leading cause of death in the United States (Mvundura, McGruder, Khoury, Valdez, & Yoon, 2011). Ischemic strokes make up about 86% of the strokes that occur, (Patel, & White, 2011) hemorrhagic and cryptogenic strokes make up for the other 15%. The topic that is going to be covered in the poster is ischemic stroke. There are many risk factors that can lead to ischemic strokes and a few different things that cause ischemic strokes. I have chosen ischemic strokes as a topic because I have worked with this patient population for 8 years and it has always interested me. Since this disease affects around 800,000 people a year (Iadecola, & Anrather, 2011), this makes it an interesting topic to follow along and see what can be done to decrease the risk and new treatment options that are available.

Signs and Symptoms

- Weakness on one side of the body
- Slurred or incoherent speech
- Droop on one side of the face
- Visual changes
- Loss of sensation
- Other neurologic deficits based on location of stroke

(Kent &Thaler, 2015)

Risk factors

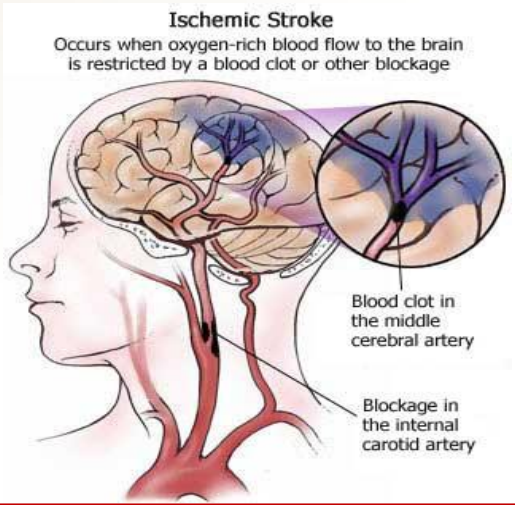
- Hypertension
- diabetes mellitus
- cigarette smoking
- alcohol consumption
- coronary artery disease
- peripheral vascular disease
- atrial fibrillation
- carotid stenosis
- Dyslipidemia
- previous stroke or transient ischemic attack
- family risk
- African American or Hispanic race
- Stress
- environmental factors
- women's risk factors- hormone therapy, contraceptives, pregnancy- associated disorders (Bushnell & McCullough, 2014) (Mvundura, 2011) (Sen, et al, 2013)

Significance of pathophysiology

- Once the process of blood flow restriction starts then the immune and inflammatory response begins. At this point the risk factors have nothing to do with the process.
- The most beneficial thing to do once the stroke happens would be to suppress the process of inflammation and the body's immune response. (Bang, Ovbiagele, & Kim, 2015)

Underlying Pathophysiology

- An ischemic stroke is caused by either a thrombotic event or an embolic event. In a thrombotic event platelets accumulate in the artery until it is occluded. In an embolic event a clot travels until it occludes a vessel. (Iadecola & Anrather, 2011)
- When a person has an ischemic stroke the blood flow is cut off to a portion of the brain the lack of blood flow prevents oxygen and glucose to that portion and prevents the brain from producing ATP. (Iadecola & Anrather, 2011)
- Immunity and inflammation play a large role in the events after the initial insult to the brain. There is a thought that the brain and the immune system communicate bidirectionally. (Picascia, et al, 2015)
- After intracranial arterial occlusion and hypoxia, the event that leads to cell death is the influx of cytoplasmic calcium (Ca+) that activates calcium dependent hydrolytic enzymes and nitric oxide production. This initiates the coagulation cascade and activation of complement, platelets, and endothelial cells. (iadecola & Anrather, 2011)
- Neutrophils infiltrate the site within 24 hours. (Iadecola & Anrather, 2011)
- Oxidative stress and inflammatory mediators help to breakdown the blood brain barrier. (Picascia, et al, 2015)
- In the perivascular space there is activation of macrophages and mast cells causing the release of vasoactive mediators, proteases along with tumor necrosis factor (TNF) and pro-inflammatory molecules. (Picascia, et al, 2015)
- Danger associated molecular pattern (DAMP) are released. High-mobility group box 1(HMBG1) is one of the main DAMP molecules involved in ischemic strokes. DAMP's bind to toll-like receptors (TLRs) which activates and amplifies the innate response that can exacerbate ischemic damage. (Picascia, et al ,2015)
- Since there is a bidirectional interaction between the brain and immune system there is an immunosuppression that occurs after a stroke. It is marked by a lymphopenia and anti-inflammatory cytokines. There are also many subtypes of T cells that are present after a stroke. (Iadecola & Anrather, 2011)
- Antibodies against central nervous system antigens develop after an ischemic stroke. This suggests a humoral immune response to the stroke. This may be related to the long term outcome of the stroke patient. (Iadecola & Anrather, 2011)
- Microglia and macrophages remove the dead cells. Tumor growth factor-beta and interleukin 10 help with tissue repair and anti-inflammatory properties. Insulin growth factor 1 and vascular endothelial growth factor help to establish a favorable environment for re-growth. (Iadecola & Anrather, 2011)



Nursing care

- Monitor neurologic status closely
- Monitor cardiac status
- Physical, occupational, and speech therapy
- Prevention of complications, like venous thromboembolisms, infection, etc.
- Appropriate treatments to prevent future strokes, like antiplatelet medications or blood thinning medications, lipid lowering medications, blood pressure medications, management of diabetes mellitus and lifestyle modifications.
- Appropriate discharge planning; whether patient should go to a skilled facility, or having outpatient therapy.

(Bernheisel, Schlaudecker, &Leopold, 2011)

Conclusion

Strokes are a very big issue since they are the number one cause of disability in the United States, according to Patel and White, 2011. The biggest way to alter the amount of strokes that happen are to prevent them. More and more risk factors are being found that contribute to strokes. Once the inflammatory and immune response begins once triggered by hypoxia it cannot be reversed. Slowing the inflammatory and immune responses triggered by stroke should be an area of further research since these processes can make the ischemic damage worse and alter the outcome of the patient.

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