Pathophysiology of Migraine

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Introduction
Migraine is a primary headache disorder and is ranked 13th among all diseases worldwide that cause disability (International Headache Society, 2013). There are more than 37 million Americans who experience migraine, and migraine is most commonly experienced by individuals between the ages of 15 and 64 years (Minen, Tanev, & Friedman, 2014). It is estimated that the healthcare costs in the United States are $13.8 billion annually (Il&am, 2012). Migraine is often misdiagnosed and underdiagnosed by healthcare providers. The pathophysiology of migraine is complex and not fully defined; however, progress in understanding migraine pathophysiology has advanced in the last 20 years. An understanding of migraine pathophysiology is necessary to provide accurate and preventative treatment to individuals suffering from migraine.

Signs and Symptoms
According to the International Classification of Headache Disorders (ICHD), a headache is diagnosed as a migraine when at least five headache attacks of the following criteria have occurred. The headache attacks last 4 to 72 hours. The headache includes two of the following four characteristics: unilateral location, pulsating quality, moderate or severe pain intensity and is aggravated by or caused avoidance of routine physical activity. The headache is accompanied by at least one of the following: nausea or vomiting, photophobia or phonophobia, or both. According to the National Headache Society, 2014, a migraine has two main subtypes, migraine without aura and migraine with aura. Migraine without aura is a clinical syndrome characterized by the temporary focal neurological symptoms that precede or accompany the headache and it affects approximately 90% of migraine sufferers (International Headache Society, 2013).

A migraine attack consists of four phases that include premonitory (predrome), aura, headache and resolution (postdrome); however, not every migraine sufferer experiences all four phases. The premonitory phase may occur hours or days before the headache and may be a warning that a migraine attack is forthcoming. The aura phase is the neurological symptoms that usually occur prior to the onset of the migraine attack. The headache phase is often the most debilitating part of the migraine attack and the headache pain can range from mild to severe. The resolution phase is the recovery period immediately following the headache which may last hours or days.

Common symptoms of the premonitory and resolution phase may include hyperactivity, hyperventilation, feeling of well being or euphoria, depression, sleep disturbances, anxiety, fatigue, nausea, paresthesia, photophobia, phonophobia, confusion, hot flashes and chills, nasal congestion and/or runny nose, dry mouth or thirst, increased/loss of hearing, confusion, dizziness, hemiplegia, food cravings, increased thirst, increased urination, euphoria, depression, sleep issues, fatigue, nausea, diarrhea, vertigo, palpitations, chest pain, increased/decreased appetite, hyperactivity/hypoactivity, feelings of well being or euphoria, depression, anxiety, poor concentration, irritability, mood lability, abdominal pain, dysphoria, somnolence, drowsiness, headache, increased/decreased sleep, memory difficulties, perceptual changes, phonophobia, photophobia, or both.

Pathological of Migraine
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Migraine Pathways

Underlying Pathophysiology
Over the last several decades the understanding of migraine pathophysiology has advanced significantly. However, the exact mechanism of this disorder is not yet well understood (Charles, 2013). Migraine is a complex brain disorder that is generally hereditary. The predominant neurovascular abnormalities that supply the sphenoid sinus in the cranium supply a brain stem that is responsible for the regulation of blood pressure, heart rate, and autonomic functions (Silberstein, 2012). The neurovascular abnormalities that supply the brain stem and the symphysis between the brain stem and the hypothalamus have been the focus of much research (Charles, 2013). The neurovascular abnormalities that supply the brain stem and the symphysis between the brain stem and the hypothalamus have been the focus of much research (Charles, 2013).

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Significance of Pathophysiology
An understanding of migraine pathophysiology provides clarification in the approach to treatment. Activation of the trigeminovascular system causes peripheral sensitization, the early stage of a migraine attack. Treatment during this phase of the migraine may terminate the attack fully (Ward, 2012, p. 758). If the migraine is not treated further, the central sensitization phase of the attack becomes much harder to treat (Ward, 2012, p. 758). If the migraine attack becomes chronic with medication overuse, such as rescue medication may not always resolve a migraine attack. For those individuals who experience frequent attacks or the attacks do not consistently respond to specific diagnostic criteria or effective treatment options, the patient obtains medical care in the emergency department. Healthcare: The Journal of Headache and Pain, 5(4), 1131-1145. doi:10.1186/1163-5458-5-1131.

Implications for Nursing Care
It is vital for healthcare professionals to have a good understanding of the pathophysiology of migraine, in order to accurately diagnose this neurological disorder and provide effective treatment. Healthcare providers will need to perform a general and neurological exam of the patient and obtain a detailed, dedicated headache history from the patient. Clinicians need to provide patient education regarding the disease process including the four phases of migraine, the triggering factors of migraine and the importance of identifying and avoiding these triggers as well as the appropriate use of medications and the significance of the timing of their use. A useful tool for healthcare providers to utilize is the International Classification of Headache guides.

Conclusion
Migraine pathophysiology is complex and not fully defined; however, scientific advances have allowed healthcare providers to find correlations between the clinical features of migraine and changes in the brain that have enhanced our diagnostic accuracy for migraine (Ward, 2012, p. 753). The question of whether migraine is primarily a vascular or neural abnormality has been essentially decided. Vascular changes represent an epiphenomenon and migraine is a disorder of brain excitability and sensory dysmodulation that causes head pain along with associated features (Ward, 2012, p. 753). Migraine is usually a hereditary brain disorder. Understanding hereditary brain alterations allows for optimal migraine treatment. More knowledge concerning the underlying central nervous system abnormalities that make up migraine (Ward, 2012, p. 753).

References
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