Week 5 Assignment 2

Myocardial Infarction

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According to VanMeter and Hubert (2014, p. 234), coronary artery disease is the number one leading cause of death in the United States, in both men and women. Coronary artery disease refers to damage of the coronary arteries. Normally, these vessels supply nutrients, oxygen, and blood to the heart. Damage can occur to these arteries by plaque, or waxy cholesterol deposits, building up in the artery (“Coronary Artery Disease,” 2014). These plaque deposits can continue to accumulate and cause a decrease in blood flow. Ultimately the continued buildup can completely occlude the vessel and harden over time or can lead to the rupture of the vessel (“Coronary Heart Disease,” n.d.). Coronary artery disease is not something that develops immediately, but instead takes time to develop. Because of this, signs of this disease are usually unnoticeable until a person experiences a myocardial infarction (“Coronary Artery Disease,” 2014).

A myocardial infarction (MI) is more commonly known as a heart attack. The word myocardial refers to the heart muscle, and the word infarction refers to tissue death. A MI occurs from a complete blockage in the coronary artery. This results in a lack of blood flow to the heart muscle. A lack of blood flow deprives the heart muscle of necessary nutrients and oxygen for adequate cell function. Without these vital nutrients, the cells begin to die causing an infarction. Myocardial infarctions are most commonly cause by atherosclerosis of the coronary vessels. As stated previously, the build up of atherosclerotic plaques, usually attached to a thrombus, can lead to coronary artery disease and ultimately to the development of a MI (VanMeter & Hubert, 2014, p. 234).

Another method by which infarction can occur, other than a buildup in the artery, is by a vasospasm of the vessel with only a partial atheroma occlusion (VanMeter & Hubert, 2014, p. 240). This will result in a complete occlusion and therefore a cease in blood flow. Also, infarction can result if there is a thrombus that has developed in a different place in the body and has broken off, becoming an embolus. The embolus can then travel and get lodged in the coronary artery or in one of it’s smaller branches and cause an occlusion (VanMeter & Hubert, 2014, p. 240).

There are several risk factors that can lead to damage of the coronary arteries. Those most common risk factors include, but are not limited to smoking, high cholesterol, high blood pressure, high blood sugar, obesity, and poor diet and exercise (“Heart Attack,” 2013). Without changing habits that lead to these factors, repeated injury can occur to the blood vessels. With repeated insult, buildups and blockages can occur in the coronary arteries and can lead to a myocardial infarction. Some other factors are age and a family history of myocardial infarctions (“Heart Attack, 2013).

Early detection and diagnosis of a myocardial infarction is key to treatment of a patient. One of the most commonly known signs of a myocardial infarction is acute substernal pain, which radiates to the left arm, jaw or neck (VanMeter & Hubert, 2014, p. 241). The pain is usually described as a “crushing pain” that is unable to be relieved. All people do not experience these variants of pain. Some experience what is known as a silent myocardial infarction, where no substernal pain is apparent (VanMeter & Hubert, 2014, p. 241). For instance, women can experience a lesser form of pain and more commonly mistake this as indigestion (VanMeter & Hubert, 2014, p. 241). Other initial symptoms and signs of a myocardial infarction can include, hypotension, pallor, fever, dizziness, nausea, vomiting, dyspnea and anxiety (VanMeter & Hubert, 2014, p. 241).

The first step in diagnosing a MI is a health professional noting the signs and symptoms of the patient. However, based on the signs and symptoms of a myocardial infarction some differential diagnoses can include angina (chest pain), an aortic dissection, cardiac tapenade, and acute pericarditis (“Acute Myocardial Infarction,” n.d.). Identification of signs and symptoms are accompanied by taking the patient’s family history along with looking at some of the following test results.

An electrocardiogram (ECG) test is one of the most common ways to confirm the diagnosis of a heart attack. Electrocardiograms are used to monitor the electrical activity of the heart. An ECG is useful in determining whether or not the patient has a regular or irregular heart rhythm, as well as the strength of the electoral signals going to various parts of the heart (“Heart Attack,” 2013). A usual indication that a person is experiencing a MI is if there is an ST elevation on their ECG reading. Not only is an ECG useful for detection, but it can be used to further monitor the patient as well (VanMeter & Hubert, 2014, p. 240-243).

Blood tests are key when diagnosing a myocardial infarction. When a myocardial infarction occurs, the immediate area where the vessel is occluded becomes inflamed and damaged. The damage leads to cell death and necrosis. The necrotic cells releases enzymes into the blood, which can be tested for, through blood work (VanMeter & Hubert, 2014, p. 242). An increase in general blood protein levels can help suggest an MI, as well as detection of increased levels of some enzymes exclusive to heart tissue. Some of these specific enzymes include creatine phosphokinase with M and B subunits and lactic dehydrogenase (VanMeter & Hubert, 2014, p. 242). The most specific blood test for heart tissue damage, which is very helpful in diagnosis, is a troponin test (VanMeter & Hubert, 2014, p. 242). This tests for elevated troponin levels.

Usually if the myocardial infarction is still in progress, the physician will preform a coronary angiography. This is a test that is done to view inside of the coronary blood vessels in order to observe any blockages (“Heart Attack,” 2013). A coronary angiography uses a special dye, which is released into the body via cardiac catheterization. This procedure includes a small flexible tube being inserted into the body usually starting at the arm, neck or inguinal area, and ultimately being threaded along the coronary arteries (“Heart Attack,” 2013). After the dye is released, a particular type of x-ray is taken to view the coronary arteries for blood flow and any blockages to the heart.

As previously stated, early detection and diagnosis of a myocardial infarction is critical. The faster an MI is diagnosed, the faster it can be treated. Quick treatment can restore blood flow to the heart and decrease the possibility or extent of permanent damage. According to VanMeter & Hubert (2014, p. 241), if blood flow is restored to the heart muscle within 20 minutes of onset, permanent damage is extremely unlikely. However, treatment for a MI can begin for a patient prior to arrival at the hospital. If a MI is suspected, taking aspirin can help reduce the risk for further clotting by thinning the blood. Nitroglycerine tablets are usually administered to also decrease workload on the heart and increase blood flow through the coronary artery (“Heart Attack,” 2013). Upon arrival to the hospital, if it is within the first hour of the myocardial infarction, blood thinners such as heparin or warfarin are administered to prevent further clotting. Also thrombolytic drugs, that are more commonly known as “clot busting agents” like streptokinase, can be given to the patient to help break up the occlusion and return blood flow to the muscle (VanMeter & Hubert, 2014, p. 242). Above, coronary angioplasty was mentioned as a method of diagnosis; however, it is also used in the treatment of a MI. Upon finding the clot, the physician uses a particular procedure to open the blocked vessel. If needed, stent is placed within the coronary artery in order to keep the vessel open (“Heart Attack,” 2013). The goal of treatment is to return blood flow to the heart. Based on the circumstances this can include defibrillation, thrombolytic medication to break up the clot, or coronary angioplasty to break up the clot.

Twenty-five percent of cases of those who suffer from a MI, result in sudden death within an hour of onset (VanMeter & Hubert, 2014, p. 242). Prognosis for patients who have experienced a MI depends greatly on the severity of damage during the initial infarct. Reoccurrence or complications result in death of 30%-40% of patients within the first year of their initial heart attack (VanMeter & Hubert, 2014, p. 242). After a myocardial infarction, patients are strongly encouraged to make certain changes to their diet, exercise more regularly, and keep their stress levels low (VanMeter & Hubert, 2014, p. 242). Also a regimen of low dose aspirin is encouraged in order to reduce the risk of future thrombi developing (VanMeter & Hubert, 2014, p. 242).

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