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Malignant Hyperthermia

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Recommended Citation
Introduction:

According to the Malignant Hyperthermia Association of the United States (2015), “Malignant hyperthermia (MH) is a potentially fatal, inherited disorder usually associated with the administration of certain general anesthetics and/or the drug succinylcholine.” Malignant hyperthermia has been presented to me during hospital school days over the past year and I am especially interested in this topic. I choose this topic because I find it interesting and I have been presented with this disorder in the perioperative setting because it requires the use of low-flow/low-risk skills and procedures. Simulation is a recognized educational method for cumulative and integrative learning in a safe environment that resembles real clinical scenarios (p91). As clinicians we must educate ourselves and use all our resources including the MH hotline who is ran by ourselves and use all our resources including the MH hotline who is ran by the Malignant Hyperthermia Association of the United States.

Signs and Symptoms

As with all diseases and illnesses there are signs and symptoms that medical personnel should be aware of and be able to recognize. According to the Malignant Hyperthermia Association of the United States (2015), signs and symptoms for MH include:

• Increased heart rate
• Grossly increased body metabolism
• Muscle rigidity
• Vasomotor changes that may exceed 110 degrees Failing with muscle breakdown, derangements of body chemicals and increased acid content in the blood

More severe complications:

• Cardiac arrest
• Brain damage
• Internal bleeding or failure of other body systems

Malignant hyperthermia crisis can result in complications and it should be addressed quickly or death could occur.

Underlying Pathophysiology

Those who are susceptible to malignant hyperthermia experience MH have a mutation which causes the presence of abnormal proteins to build up in the muscle cells of their body. According the Klinger, Bodleicher, Girard, Gravino, Scholtès, & Lehmann (2014), the mutation is found on the ryanodine receptor type 1 (RyR1). Proteins that build up in the muscle cells can cause abnormal calcium to occur in the human body, but these individuals when exposed to certain anesthetic agents or in some cases extreme heat or strenuous exercise, it causes an abnormal release of calcium from the sarcoplasmic reticulum in the muscle cells. The sarcoplasmic reticulum is where calcium is stored and when this occurs it results in a sustained muscle contraction which increases metabolism and heat production. Once the muscle cells have been contracted for a period of time they are eventually depleting of adenosine triphosphate (ATP), which is the source of cellular energy. The muscle cells will no longer be able to recover and this will cause large amounts of potassium into the bloodstream which causes hyperkalemia. The hyperkalemia can cause ventricular arrhythmia. Myoglobin, muscle pigment, is also released during this and can cause injury to the kidneys. (Malignant Hyperthermia Association, 2015)

Significance of Pathophysiology

Understanding the pathophysiology about MH can be beneficial for many reasons. As stated by Ibstich (2013), it is crucial for medical personnel to make a more accurate diagnosis of perioperative fever or hyperthermia and subsequently choose the proper course of treatment. This would increase patient outcomes, decrease length of stays, etc. MH can have many poor outcomes if not treated promptly and accurately. Release of potassium causes hyperkalemia which can result in cardiac arrhythmias. Treating the high K will decrease the risk of cardiac arrhythmias and death. The release of myoglobin can be toxic to the kidneys, so making sure to persevere kidney function with fluids would indeed be beneficial. The patient’s body temperature must be controlled so the brain does not become injured. Wherever determining the hot body is going through during a MH crisis, those caring for the patient are able to undertake the treating causes more effectively.

Conclusion

Malignant hyperthermia can occur in a wide variety of areas and those working where MH can occur must be properly educated and prepared to recognize and act properly so poor patient outcomes don’t occur. However, according to Cain, Riess, Gettrust, & Novallia (2014) “Many clinicians are unprepared to manage an MH crisis in the perioperative setting because it requires the use of low-flow/low-risk skills and procedures. Simulation is a recognized educational method for cumulative and integrative learning in a safe environment that resembles real clinical scenarios” (p91). As clinicians we must educate ourselves and use all our resources including the MH hotline who is ran by the Malignant Hyperthermia Association of the United States.

Implications for Nursing Care

Nurses must be attentive and recognize when a patient is deteriorating. Patients must be closely monitored for malignant hyperthermia as it can happen during surgery and the first hour after anesthesia, which is the most crucial time. It also, can occur if the anesthetic or anesthetic-related drug is given in the emergency room or ICU for initiation. Nurses must recognize hemodynamic changes, rising carbon dioxide levels, increased temperature, muscle rigidity, and brownish colored urine. Once MH is suspected the nurse should notify the physician and use all resources to help assist with a patient whose body is going through an MH crisis. Orders will be given and a protocol should be followed. Dantrium must be reconstituted and pushed. Tubes/drains should be flushed with chilled saline as well as chilled intravenous fluids should be started. The patient should be moved to the intensive care unit and monitored closely. The nurse caring for the patient must make sure the patient is safe and cared for in an appropriate and timely manner.

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Additional Sources


