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Malignant Hyperthermia  

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Introduction

Malignant hyperthermia, also known as malignant hyperthermia syndrome (MHS), is a rare and potentially fatal pharmacogenetic disorder. It affects individuals who possess a defective dihydropyridine receptor (DHPR) gene, which is involved in the regulation of calcium ions in muscle cells. This condition is characterized by a rapid increase in body temperature, muscle rigidity, altered mental status, acidosis, and increased carbon dioxide production.

Signs and Symptoms

Early Signs

- Change in level of consciousness
- Hypertension
- Cyanosis
- Arousal
- Profound muscle rigidity
- Tachyarrhythmias
- Tachypnea
- Increased oxygen demand

Later Signs

- Severe muscle rigidity
- Acute hyperthermia
- Hypertension
- Decreased urine output
- Hyperkalemia
- Nausea or vomiting
- Confusion
- Coma

Underlying Pathophysiology

Malignant hyperthermia is rare and life threatening. Early recognition, diagnosis, and treatment with dantrolene sodium can reduce the mortality rate from 90% in the 1970s to less than 5% by 2006 (Rosenberg, et al., 2015). Many clinicians may be unprepared for a crisis, failing to acknowledge the early signs and symptoms of the condition until it has progressed to a dangerous state. The patient suffering from a MH crisis is based on how soon MH is suspected and how quickly the appropriate treatment is started.

- Stop the trigger agent immediately
- Continue anesthesia with intravenous opioids, sedatives, or nondepolarizing muscle relaxants if necessary
- Initiate Malignant Hyperthermia Response Team (MHRT) call
- Cool the patient if core temperature greater than 39°C using cold infusions or ice packs in the axilla or groin

Implications for Nursing Care

Given the gravity of the condition and its potential for devastating consequences, a prudent nurse or CRNA will do well to be prepared. The early warning signs of a reaction, and the correct steps to treat a crisis, are crucial.

As carper is the first line of defense in the OR, the early recognition of the condition is critical. A primary care nurse must be trained in recognizing the early signs and symptoms of a MH crisis.

References


Conclusion

Malignant hyperthermia is a rare, life-threatening, autosomal-dominant inherited disorder that may lead to a metabolic crisis of skeletal muscle in susceptible individuals following exposure to triggering agents such as volatile anesthetics or depolarizing muscle relaxants. Functionally altered calcium release channels cause influx of calcium into the sarcoplasmic reticulum, which leads rapidly to a fatal hypermetabolic state characterized by severe muscle rigidity, hyperthermia, and acidosis. Because of the variable clinical presentation of MH, ranging from onset of minor or moderate symptoms to complete MH crisis, a patient survival depends on early recognition of symptoms and prompt action with appropriate treatments. In clinics that use known MH triggering agents for induction and maintenance of general anesthesia, dantrolene must be available for immediate treatment, and those practitioners present must be trained in its use so that in the time of need the necessary skills and knowledge (Schneiderbanger, et al., 2014).