Malignant Hyperthermia

Anesthesia Guideline
University of Washington Medical Center
Department of Anesthesiology and Pain Medicine

Malignant Hyperthermia Emergency Hotline

1-800-644-9737

Prevention

MH Susceptible Patients

1) Find MH cart and take it to the operating room.

2) Ensure that additional doses of dantrolene are available (OR Satellite Pharmacy, OB Anesthesia Work Room)

3) Pretreatment with dantrolene for known susceptible patients is no longer routine.

4) Ensure that anesthetic vaporizers are disabled by removing, draining, or taping in the off position.

Change the carbon dioxide absorbent (soda lime or baralyme). Increase the fresh gas flow to > 10L/min for at least 90 seconds to flush the volatile agent from the machine. Place one of the “Vapor-Clean®” canisters on the inspiratory port of the anesthesia machine and the other canister on the expiratory port. Replace the reservoir bag and connect a new breathing circuit between the patient and the “Vapor-Clean®” canisters.

Look for

- Tachycardia
- Rigidity
- Hypercarbia
- Cardiac arrhythmias
- Respiratory and metabolic acidosis
- Unstable / rising blood pressure
- Cyanosis / mottling
- Myoglobinuria
Acute Phase Treatment

Immediately discontinue all volatile inhalation anesthetics and succinylcholine.

1) Hyperventilate with 100% oxygen at high gas flows; at least 10 L/min

2) CALL FOR HELP!! CALL FOR HELP!!

3) Notify the surgeons of nature of emergency

4) Circle system and CO2 absorbent need not be changed.

5) Administer dantrolene 2-3 mg/kg initial bolus rapidly with increments every 5-10 minutes up to 10 mg/kg total. Continue to administer dantrolene until signs of MH (e.g. tachycardia, rigidity, increased end-tidal CO2 and temperature elevation) are controlled. Occasionally, a total dose greater than 10 mg/kg may be needed. Each vial of dantrolene contains 20 mg of dantrolene and 3 grams mannitol. Each vial should be mixed with 60 ml sterile water for injection USP without a bacteriostatic agent.

6) Administer bicarbonate to correct metabolic acidosis as guided by blood gas analysis. In the absence of blood gas analysis, 1-2 mEq/kg should be administered.

7) Actively cool the hyperthermic patient. Use IV cold saline (not Ringer’s lactate). 15mL/kg q 15 min X 3. Lavage stomach, bladder, rectum and open cavities with cold saline. Surface cool with ice and hypothermia blanket. Monitor closely since over vigorous treatment may lead to hypothermia.

8) Treat arrhythmias with standard anti-arrhythmic agents (lidocaine 1-1.5 mg/kg; procainamide 3 mg/gk to max of 15 mg), with the exception of calcium channel blockers (may cause hyperkalemia and CV collapse). Arrhythmias will usually respond to treatment of acidosis and hyperkalemia.

9) Hyperkalemia is common and should be treated with hyperventilation, bicarbonate, intravenous glucose and insulin (10 units regular insulin in 50 mL 50% glucose titrated to potassium level or 0.15 u/kg regular insulin in 1 cc/kg 50% glucose). Life threatening hyperkalemia may also be treated with calcium administration (e.g. 2-5 mg/kg CaCl2).

10) Determine and monitor end-tidal CO2, arterial, central or femoral venous blood gases, serum potassium, calcium, clotting studies and urine output.

11) Ensure urine output of greater than 2 mL/kg/hr by hydration and/ or administration of mannitol (25 gm IV; 0.5 – 1.0 gm/kg) of furosemide (20 mg IV; 5-20 mg IV). Consider central venous of PA monitoring because of fluid shifts and hemodynamic instability that may occur.

Post Acute Phase

Observe the patient in an ICU setting for at least 24 hours since recrudescence of MH may occur, particularly following a fulminant case resistant to treatment.

1) Administer dantrolene 1 mg/kg IV q 6 hours for 24-48 hours post episode. After that, oral dantrolene 1 mg/kg q 6 hours may be used for 24 hours as necessary.

2) Follow ABG, CK, potassium, calcium, urine and serum myoglobin, clotting studies and core body temperature until such time as they return to normal values (e.g. 6 hours). Central temperature (e.g. rectal, esophageal) should be continuously monitored until stable.

3) Counsel the patient and family regarding MH and further precautions. Refer the patient to MHAUS. Fill out an Adverse Metabolic Reaction to Anesthesia (AMRA) report available through the North American Malignant Hyperthermia Registry (www.mhreg.org) at 1(888) 274-7899.