

MANAGEMENT OF MALIGNANT HYPERTHERMIA

YOU'VE ONLY GOT A FEW MINUTES...

Know who is susceptible:

Malignant Hyperthermia may occur in any patient, including patients who have previously had uneventful general anaesthesia.

MH is more likely with:

- Diagnosed malignant hyperthermia susceptibility after halothane/cafeine contracture test on biopsied muscle
- Malignant Hyperthermia susceptible relatives
- Significantly & consistently raised resting serum CK
- Several very rare muscle disorders

Know the signs & symptoms:

NOT ALL NEED TO BE PRESENT TO INITIATE TREATMENT

Early:

- Prolonged masseter muscle spasm after suxamethonium
- Inappropriately raised end tidal carbon dioxide during controlled ventilation or tachypnoea during spontaneous respiration
- Inappropriate tachycardia
- Cardiac arrhythmias; particularly ventricular ectopic beats

Developing:

- Rapid rise in temperature (0.5°C per 15 minutes)
- Progressive metabolic and respiratory acidosis (ABG)
- Hyperkalaemia
- Profuse sweating
- Cardiovascular Instability
- Decreased SpO₂ or mottling of skin
- Generalised muscular rigidity

Late:

- 'Cola' coloured urine - due to myoglobinuria
- Generalised muscle ache
- Grossly raised serum CK
- Coagulopathy
- Cardiac arrest

Differential diagnoses:

- Inadequate anaesthesia or machine malfunction
- Sepsis or infection
- "Thyroid storm"
- Serotonin syndrome
- Ecstasy or other recreational drugs
- Pheochromocytoma
- Neuroleptic Malignant Syndrome
- Intracerebral infection or haemorrhage
- Inadvertent overheating

Management:

IMMEDIATE MANAGEMENT WITH DANTROLENE IS ESSENTIAL

Stop the TRIGGER

- Declare an emergency and where possible stop the surgery
- Turn off volatile agent and **HYPERVENTILATE** with very high flows (15L/min) of 100% O₂ (Do not waste time changing the circuit or the anaesthetic machine)
- Commence non triggering anaesthesia (TIVA)

GIVE DANTROLENE AS A PRIORITY

- Dantrolene 2.5 mg/kg IV initial push and repeat as necessary
- Dosing is the same per kg for paediatric patients
- Mobilise other sources of dantrolene (you may need at least 36 ampoules)
- Mix each ampoule with 60 mls sterile water

SIMULTANEOUSLY TREAT THE LIFE THREATENING EFFECTS:

• *Treat the hyperkalaemia*

- Hyperventilate and treat the acidosis
- CaCl₂ 10% (0.15 ml/kg = 10mls = 7 mmol in adults)
- Insulin 0.15 u/kg + dextrose 50% 0.5 ml/kg (10 u + 50 ml in adults)

• *Cool the patient if T > 38.5°C*

- IV normal saline at 4°C: surface cooling with ice
- Consider peritoneal lavage with normal saline at 4°C

• *Treat the acidosis*

- Hyperventilate to at least normocapnia
- Consider sodium bicarbonate 0.5 mmol/kg IV as necessary to maintain pH >7.2

• *Treat arrhythmias (if resistant consider hyperkalaemia as cause)*

- Lignocaine 1-2 mg/kg
- Amiodarone 2-3 mg/kg over 15 minutes

IN ADDITION TO ROUTINE ANAESTHETIC MONITORING

- Monitor core temperature
- Insert an arterial line
- Send urgent bloods
- ABG, U+E, FBC, CK, & COAG (urine myoglobin)
- Repeat frequently to monitor success of therapy
- insert urinary catheter
- Maintain urine output above 2 ml/kg/hr
- Insert central venous line
- DO NOT delay Dantrolene therapy with attempted CVL placement

When the patient is stabilised:

ALL PATIENTS WITH KNOWN OR SUSPECTED MH REACTIONS SHOULD BE ADMITTED TO ICU

- Monitor the patient for at least 24 hrs post
- Recurrence may occur...LARGE amounts of Dantrolene may be needed in the first 24 hrs

Give early consideration to:

- Mobilising additional sources of dantrolene
- Transferring patients with fulminant reactions to major centres after stabilisation

Notify your local MH Investigation Unit of ANY clinically suspicious reactions so that patients & family members can be investigated in the future

NEW ZEALAND: Department of Anaesthesia. Palmerston North Hospital. 64 6 356 9169
NEW SOUTH WALES: Department of Anaesthesia. Westmead Children's Hospital. 61 2 9845 0000
VICTORIA: Department of Anaesthesia. Royal Melbourne Hospital. 61 3 9342 7000
WESTERN AUSTRALIA: Department of Anaesthesia. Royal Perth Hospital. 61 8 9224 1038
Further resources and referral instructions are available at www.malignanthyperthermia.org.au

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