Malignant Hyperpyrexia - implications for obstetric anaesthetic management (GL764)

Approval

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<tr>
<th>Approval Group</th>
<th>Job Title, Chair of Committee</th>
<th>Date</th>
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<tbody>
<tr>
<td>Maternity &amp; Children’s Services Clinical Governance Committee</td>
<td>Chair, Maternity Clinical Governance meeting</td>
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Change History

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<tr>
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**Overview:** Malignant Hyperpyrexia is an inherited condition which causes a severe hypermetabolic state when the susceptible individuals are exposed to triggering agents, specifically suxamethonium and volatile anaesthetics.

**Midwives when a woman is admitted in labour:**
- Duty anaesthetist to be contacted on 142. Consultant anaesthetist to be informed (bleep 149 weekdays 8 – 8.30pm, other times bleep 322 or go through switchboard)
- Keep nil by mouth or small volumes of water orally
- Regular Ranitidine
- Intravenous cannula in situ
- Regular observations throughout labour: at least hourly Temperature, Pulse Rate, Respiratory Rate and Blood Pressure, pulse oximetry and/or blood gas monitoring as indicated.
- Avoid aorto-caval occlusion at all times.
- Fetal monitoring throughout labour. Remember the genetics of the condition are such that it is possible for the baby to have malignant hyperpyrexia if the father has the condition, even if the mother is not affected.

**Anaesthetist should:**
- Check Dantrolene with water are available and location known. Emergency stock usually stored in South Wing recovery.
- Ensure that there is a set of TIVA pumps available and patient height and weight is recorded

**Pain relief in labour:**
- Pethidine, Remifentanil and nitrous oxide are considered safe.
- In doses used clinically ephedrine is probably safe
- Local anaesthesia can be used as normal for episiotomy and suturing
- Epidural/spinal very strongly indicated if operative delivery looks likely

**Anaesthesia for Operative Delivery or post-partum intervention:**
- Regional anaesthesia if possible
If General anaesthesia is inevitable take the following steps:

- GET HELP
- Vapour free machine no longer required. Use standard anaesthetic machine with disposable circuit (available in anaesthetic room between theatre 17 and 18). Remove vaporisers, switch to auxiliary circuit and flush system with 100% oxygen.
- Monitor ECG, BP, SpO2, FiO2, ET Co2, temperature.
- Pre-oxygenation, cricoid pressure, left lateral tilt.
- Propofol or thiopentone and long acting relaxant (Consider 0.8 - 1 mg/kg Rocuronium) for induction and intubation.
- Calculate the dose of sugammadex in case of intubating problems
- NB: do not give suxamethonium
- Consider a Target controlled total intravenous anaesthetic (Midazolam bolus, Propofol and Remifentanil infusion)
- If the mother is unaffected, but there is a possibility that the baby may be affected, it is acceptable to use suxamethonium. But agents that may cross the placenta must be avoided e.g. inhalational agents. Give further doses thiopentone or propofol or a propofol infusion until delivery after which isoflurane may be commenced.
- Carbetocin, Oxytocin, Neostigmine, Glycopyrrolate may all be used.

There is additional advice about malignant hyperpyrexia and anaesthesia on the anaesthetic page of the intranet.

If signs of malignant hyperpyrexia occur then:

- Follow AAGBI guidance (see appendix)
- Check trigger agent not being given by mistake
- Give 100% O2
- Sedate with benzodiazepine and opiates
- Actively cool with ice and cold iv fluids
- Take bloods for gases and electrolytes
- Start IV Dantrolene as soon as available: 2.5mg/kg bolus. Repeat 1mg/kg boluses until the condition improves (up to 10mg/kg).
- Caution: Dantrolene may cause uterine atony
- Treat hyperkalaemia: Calcium chloride, Glucose/insulin, NaHCO3
- Treat arrhythmias: Magnesium / amiodarone / metoprolol. Avoid calcium channel blockers.
- Treat metabolic acidosis: Hyperventilate, NaHCO3
- Treat DIC: FFP, cryoprecipitate, platelets
- Check plasma CK
- Consider alternative diagnoses
- Arrange transfer to ICU
- Arrange short and long term follow up

References:
3. AAGBI Safety Guideline. Malignant Hyperthermia Crisis

Appendix 3 – see over page
# Malignant Hyperthermia Crisis

**AAGBI Safety Guideline**

Successful management of malignant hyperthermia depends upon early diagnosis and treatment; onset can be within minutes of induction or may be insidious. The standard operating procedure below is intended to ease the burden of managing this rare but life threatening emergency.

## 1 Recognition
- Unexplained increase in ETCO$_2$ **AND**
- Unexplained tachycardia **AND**
- Unexplained increase in oxygen requirement
  (Previous uneventful anaesthesia does not rule out MH)
- Temperature changes are a late sign

## 2 Immediate management
- STOP all trigger agents
- CALL FOR HELP, Allocate specific tasks (action plan in MH kit)
- Install clean breathing system and **HYPERVENTILATE** with 100% O$_2$ high flow
- Maintain anaesthesia with intravenous agent
- ABANDON/FINISH surgery as soon as possible
- Muscle relaxation with non-depolarising neuromuscular blocking drug

## 3 Monitoring & treatment
- Give **dantrolene**
- Initiate active **cooling** avoiding vasoconstriction

**TREAT:**
- **Hyperkalaemia:** calcium chloride, glucose/insulin, NaHCO$_3$
- **Arrhythmias:** magnesium/amiodarone/metoprolol **AVOID** calcium channel blockers - interaction with dantrolene
- **Metabolic acidosis:** hyperventilate, NaHCO$_3$**−**
- **Myoglobinemia:** forced alkaline diuresis (mannitol/furosemide + NaHCO$_3$**−**); may require renal replacement therapy later
- **DIC:** FFP, cryoprecipitate, platelets
- Check plasma CK as soon as able

**DANTROLENE**
- 2.5mg/kg immediate iv bolus.
- Repeat 1mg/kg boluses as required to max 10mg/kg

**For a 70kg adult**
- Initial bolus: 9 vials dantrolene
  20mg (each vial mixed with 60ml sterile water)
- Further boluses of 4 vials dantrolene 20mg repeated up to 7 times.

**Continuous monitoring**
- Core & peripheral temperature ETCO$_2$
- SpO$_2$
- ECG
- Invasive blood pressure
- CVP

**Repeated bloods**
- ABG
- U&E (potassium)
- FBC (haematocrit/platelets)
- Coagulation

## 4 Follow-up
- Continue monitoring on ICU, repeat dantrolene as necessary
- Monitor for acute kidney injury and compartment syndrome
- Repeat CK
- Consider alternative diagnoses (sepsis, phaeochromocytoma, thyroid storm, myopathy)
- Counsel patient & family members
- Refer to MH unit (see contact details below)

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**Your nearest MH kit is stored**

This guideline is not a standard of medical care. The ultimate judgement with regard to a particular clinical procedure or treatment plan must be made by the clinician in the light of the clinical data presented and the diagnostic and treatment options available.

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