Anaesthesia for ECT
Session 2
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CHAPTERS

5. Monitoring
6. Patient care during ECT
7. Anaesthetic emergencies
   • Suxamethonium apnoea
   • Cardiac arrest
   • Malignant hyperpyrexia
   • Anaphylaxis
   • DNACPR
Chapter 4

Anaesthetic Monitoring

Association of Anaesthetists - AAGBI
Recommended Monitoring Standards
2007, 2009
Anaesthetic Monitoring

- Why and what we monitor
- How does the monitoring work?
  - Information provided
  - Limitations
- Normal values
Anaesthetic Monitoring

Why Monitor?

- Early warning system
- Detect changes in the patient's cardio-respiratory status
- Detects problems with the patient and / or equipment
Anaesthetic Monitoring

What Monitors do we Use?

1. You!
2. ECG
3. Blood pressure
4. Pulse oximeter
5. Capnography
Anaesthetic Monitoring

ECG

○ Detects and amplifies electrical activity of heart muscle and conduction system

○ Information about
  1. Heart rate
  2. Heart rhythm
  3. Myocardial ischaemia

○ Normal rate 60-100
○ Decreases during stimulus
○ Increases during seizure
○ Returns to normal during recovery
Correct lead placement

**RED** – Right arm

**YELLOW** – Left arm

**GREEN** – Left abdomen or leg

Beware -
- Poor lead adhesion
- Poor connections
- Interference
- Movement artifact
Anaesthetic Monitoring

Blood Pressure

- NIBP = Non invasive blood pressure

- Blood pressure cuff inflates above systolic blood pressure

- Detection of pulse on deflation
  Onset = systolic bp
  Maximal pulsation = mean arterial pressure
  Disappearance of pulsation = diastolic bp
Position – mid-point of upper arm

Cuff Size - measure circumference.
- Inflatable part should cover roughly 80% of the arm circumference
- Should cover 2/3rds of upper arm length

Can use cuff on calf (readings are higher)
Normal values:
- Systolic 100-140 mmHg
- Diastolic 60-90 mmHg

Blood pressure falls after induction

Blood pressure is higher during and after the seizure

Problems with NIBP:
- Intermittent monitoring device
- Irregular heart rhythm – e.g. AF
- Interference from movement
Anaesthetic Monitoring

**Pulse Oximeter**

- **Provides**
  1. Oxygen saturation (SpO2)
  2. Pulse rate

- **Method**
  - Measures haemoglobin oxygen saturation as a percentage

- **Probes**
  - Finger (toe) or ear probes

- **Poor signal**
  - Cold, dehydration, fear, nail varnish
Anaesthetic Monitoring

**Pulse Oximeter**

**NORMAL**
SpO$_2$ > 94%
Administer O$_2$ if SpO$_2$ < 95%

SpO$_2$ < 90%

Falling SpO$_2$

EMERGENCY?
Anaesthetic Monitoring

Capnography

- Measures exhaled CO$_2$
- Uses IR light to detect CO$_2$ molecules
- Indicates
  - Respiratory rate
  - Airway obstruction
  - Breathing circuit problems
  - Confirms successful intubation
  - (Cardiac output)
Anaesthetic Monitoring

Recovery Area - 1st Stage Recovery

- Oxygen until SpO₂ adequate on air
- Frequent record of observations
  - minimum of every 5 minutes
    - Consciousness
    - Heart rate, blood pressure
    - Respiratory rate
    - Symptoms (e.g. pain, sickness)
    - Blood sugar for diabetics

- Temperature monitoring, 12 lead ECG & nerve stimulator must be available
Chapter 6
Patient Care During ECT
Patient Care During ECT

- Preparation for ECT
- Fasting times
- Management in recovery
  - Airway management
  - Suction & IV fluids
- Discharge from recovery
  - Cannula removal
- Discharge from ECT Suite
Patient Care During ECT

Preparation for ECT

Checklist

1. ID & allergy wristbands
2. Consent
3. Notes/drug chart/results
4. Check fasting status
5. Remove jewellery/dentures/hearing aids/contact lenses
6. Toilet?
7. Loose clothing
8. Record observations
The Principles of Anaesthesia
Fasting Times

- **Fasting for anaesthesia**
  - Eat and drink up to 6 hours prior to ECT treatment
  - Clear fluids up to 2 hours before treatment

- **Controversies**
  - Tea and coffee - skimmed milk?
  - Chewing gum?

- **Agree guidelines with anaesthetist**
The Principles of Anaesthesia

Management in 1st Stage Recovery

- Appropriately trained staff
  - Ratio 1 : 1 + 1
  - Airway management, IV drugs, BLS / ILS
- Adequate monitoring
- Appropriate recognition of adverse events & emergencies
The Principles of Anaesthesia

Management in 1st Stage Recovery

- Controversies
  - ODP’s and Anaesthetic Nurses required?
  - Nurse in the recovery position?
The Principles of Anaesthesia

Airway Management

- If airway present, leave in until fully awake
- Patient breathing?
- Airway obstruction?
  1. Noisy breathing
  2. Snoring
  3. See-saw breathing
- Chin lift, head tilt
The Principles of Anaesthesia

Suction & Care of IV Fluids

- **Suction – Clear the airway**
  - Blood, saliva, vomit
  - Prevent pulmonary aspiration
  - If necessary –
    Head down, lateral tilt position

- **IV Fluids**
  - Ensure drip running at correct rate
  - No air bubbles in tubing
  - Avoid disconnection
The Principles of Anaesthesia

Discharge from Recovery

- Agreed local criteria with anaesthetist
- Fully conscious, maintaining airway
  - Breathing satisfactory
  - Cardiovascular stability
    - Observations approximate to pre-ECT values
- Comfortable
  - Pain controlled, no nausea or vomiting
The Principles of Anaesthesia

IV Cannula Removal

- Protect patient’s IV cannula!
- Must remain in place until the patient leaves the 1st stage recovery area
Agreed criteria -

- Escort available
- Alert & oriented
- Steady on feet
- Comfortable
- Able to eat & drink

Appropriate information for outpatients

- Supervision, alcohol, driving, cycling, heavy machinery, legal documents etc.
Chapter 7
Anaesthetic Emergencies
Anaesthetic Emergencies

1. Suxamethonium Apnoea
2. Cardiac arrest
3. Malignant hyperpyrexia
4. Anaphylaxis

ECTAS Standard - Specific protocols required
Anaesthetic Emergencies
Suxamethonium
Apnoea
Anaesthetic Emergencies

Suxamethonium Apnoea

- Prolonged paralysis – 10 mins to 24 hrs!
- Prolonged auction of suxamethonium
- Inherited plasma cholinesterase deficiency
  - Up to 5% minor deficiency
  - 1 in 3000 severe deficiency
- Reduced enzyme levels also in
  - Pregnancy
  - Liver failure
  - Starvation
**Anaesthetic Emergencies**

**Suxamethonium Apnoea**

- Confirm with nerve stimulator
- Supportive therapy
  - Wait for the suxamethonium to wear off
  - Keep anaesthetised / sedated
  - Intubate & ventilate
- Transfer to local critical care area -
  - Ventilator
  - Infusion pump
  - Monitor
  - Local protocol essential
Anaesthetic Emergencies
Cardiac Arrest
Anaesthetic Emergencies

Cardiac Arrest

- Rapid confirmation
  - Signs of life?
  - Breathing?
  - Pulse?
- Summon help - 2222
- Prompt action – BLS / ILS / ALS training
- Equipment / drugs / personnel / investigations
- Transfer to local critical care area
Collapsed/sick patient

Shout for HELP and assess patient

Signs of life?

NO

Call resuscitation team

CPR 30:2
With oxygen and airway adjuncts

Apply pads/monitor
Attempt defibrillation if appropriate

Advanced Life Support when resuscitation team arrives

YES

Assess ABCDE
Recognise and treat
Oxygen, monitoring, IV access

Call resuscitation team if appropriate

Hand over to resuscitation team
Anaesthetic Emergencies
Malignant Hyperthermia
Abnormal sustained muscle contraction and increased metabolism
Triggered by volatile anaesthetics & suxamethonium
Abnormality of skeletal muscle receptors
Inherited condition
• 1 in 5000 to 1 in 50,000-100,000
Mortality now < 10%
Anaesthetic Emergencies

Malignant Hyperthermia

1. Sustained muscle contraction
   - Masseter spasm

2. Increased metabolism
   - Tachycardia
   - ↑ CO₂ production
   - ↑ O₂ consumption
   - Labile BP
   - ↑ temperature
   - Acidosis & increased potassium
Management

1. Make diagnosis!
2. Remove triggers
3. Summon help – Cardiac arrest team
4. Dantrolene
5. Supportive treatment
   - Intubate / ventilate / sedate / support bp
   - Active cooling – ice packs
6. Transfer to local critical care area
Dantrolene

- Skeletal muscle relaxant
- Available within 5 mins
- 20mg bottles (pack of 12)
  - Mix with 60ml water – tricky!
- Big dose! – 2.5mg/Kg
- For 80kg patient
  - 10 bottle (200mg) initial bolus
  - Repeat 4 bottle bolus as required
  - Maximum up to 40 bottles!
# 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 ETCO₂ AND
- Unexplained tachycardia AND
- Unexplained increase in oxygen requirement
  (Previous uneventful anaesthesia does **not** rule out MH)

### 2. Immediate management
- **STOP** all trigger agents (anaesthetic vapoors, etc.)
- **CALL FOR HELP**. Allocate specific tasks (action plan in MH kit)
- Install and breathing system and **HYPERVENTILATE** with 100% O₂ high flow
- Maintain anaesthesia with intravenous agent
- ABANDON/FINISH surgery as soon as possible

### 3. Monitoring & treatment

#### Give dantrolene

**DANTROLENE**
- 2.5mg/kg immediate i.v 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.

#### TREAT:
- **Hyperkalaemia**: calcium chloride, NaHCO₃, glucose/insulin
- **Arrhythmias**: magnesium/amiodarone/metoprolol
  - AVOID calcium channel blockers - interaction with dantrolene
- **Metabolic acidosis**: hyperventilate, NaHCO₃
- **Myoglobinuria**: forced alkaline diuresis (mannitol/furosemide + NaHCO₃) may require RRT later
- **DIC**: FFP, cryoprecipitate, platelets
- Check plasma CK as soon as able

#### Continuous monitoring
- Core & peripheral temperature
- ETCO₂
- SpO₂
- ECG
- Invasive blood pressure
- CVP

#### Repeat bloods
- ABG
- U&Es (potassium)
- FBC (haematocrit/platelets)
- Coagulation

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

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The UK MH Investigation Unit, Academic Unit of Anaesthesia, Clinical Sciences Building, St James's University Hospital Trust, Leeds LS9 7TF. Direct line: 0113 206 5270. Fax: 0113 206 4140. Emergency Hotline: 07547 609601 (usually available outside office hours). Alternatively, contact Prof Hopkins or Dr Halsall through hospital switchboard: 0113 243 3144.

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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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Anaesthetic Emergencies
Anaphylaxis
**Anaphylaxis**

- Severe, life threatening allergic response
- Usually within minutes of exposure to trigger
- Massive release of histamine from mast cells
- 1 in 10000-20000 anaesthetics

- Cardiovascular collapse
- Bronchospam
- 10% mortality
Presenting features:

- No pulse 26%
- Difficulty breathing/ventilating 23%
- Flushing 18%
- Desaturation 11%
- Cough 7%
- Rash 6%
- ECG changes 2%
**Anaphylaxis algorithm**

- **Anaphylactic reaction?**
  - Airway, Breathing, Circulation, Disability, Exposure

- **Diagnosis - look for:**
  - Acute onset of illness
  - Life-threatening Airway and/or Breathing and/or Circulation problems
  - And usually skin changes

- **Call for help**
  - Lie patient flat
  - Raise patient’s legs

- **Adrenaline**

- **When skills and equipment available:**
  - Establish airway
  - High flow oxygen
  - IV fluid challenge
  - Chlorphenamine
  - Hydrocortisone
  - Monitor:
    - Pulse oximetry
    - ECG
    - Blood pressure

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1 Life-threatening problems:
- Airway: swelling, hoarseness, stridor
- Breathing: rapid breathing, wheeze, fatigue, cyanosis, SpO₂ < 92%, confusion
- Circulation: pale, clammy, low blood pressure, faintness, drowsy/coma

2 Adrenaline (give IM unless experienced with IV adrenaline)
- IM doses of 1:1000 adrenaline (repeat after 5 min if no better)
  - Adult: 500 micrograms IM (0.5 mL)
  - Child more than 12 years: 500 micrograms IM (0.5 mL)
  - Child 6-12 years: 300 micrograms IM (0.3 mL)
  - Child less than 6 years: 150 micrograms IM (0.15 mL)

3 IV fluid challenge:
- Adult: 500 – 1000 mL
- Child: crystalloid 20 mL/kg
- Stop IV colloid if this might be the cause of anaphylaxis

4 Chlorphenamine
- IM or slow IV
  - Adult or child more than 12 years: 10 mg
  - Child 6 - 12 years: 5 mg
  - Child 6 months to 6 years: 2.5 mg
  - Child less than 6 months: 250 micrograms/kg

5 Hydrocortisone
- IM or slow IV
  - Adult: 200 mg
  - Child: 100 mg
  - Child: 50 mg
  - Child: 25 mg

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**Resuscitation Council (UK)**

*March 2008*
Management

- Stop giving any potential trigger
- Summon help – Cardiac arrest team?
- 100% O₂ - Intubate & ventilate
- IV Adrenaline
- IV fluid resuscitation
- Secondary treatment
  - Hydrocortisone, chlorpheniramine
- Arrange transfer to local critical care area
Anaesthetic Emergencies
Do Not Attempt Resuscitation Instructions
Should DNACPR instructions for ECT patients be suspended whilst the patient is undergoing ECT?
Any Questions?