Paeds Anaesthetic Emergencies – ATOTW 2013

Laryngospasm

Defn: *Reflex closure of the upper airway, caused by adduction of the vocal cords due to glottic muscular spasm, leading to narrowing of the laryngeal aperture complete or partial airway obstruction.*

Possible morbid sequalae of laryngospasm:

- Hypoxia
- Gastric aspiration
- Arrhythmia
- Pulmonary oedema
- Cardiac arrest

Clinical features
Stridor
Use of accessory muscles
Decreased tidal volumes\
Difficult ventilating pt
Desaturation or cyanosis
Bradycardia

Risk factors:

1. Anaesthetic
   a. Inadequate depth of anaesthesia
   b. Irritant volatile agents
   c. Inexperienced anaesthetist
2. Local stimulation of the larynx
   a. Secretions
   b. Blood
   c. Foreign bodies, instruments (laryngoscope,)
3. External factors
   a. Surgical stimulation
   b. Moving or transferring the patient
   c. Brewer-Luckhardt reflex (Anal or cervical stimulation)

Differential Diagnosis:

1. Bronchospasm
2. Inhaled foreign body
3. Laryngeal trauma
4. Recurrent laryngeal nerve damage

Management
100% FiO2 & Jaw thrust to open airway
Provide CPAP & Gentle BMV
Eliminate cause (pause surgery, deepen anaesthesia, remove secretions)
If fails to break, give Sux 2mg/kg or Propofol 0.5mg/kg IV.
Consider intubation if necessary
If bradycardia resolve hypoxia & Atropine 20mcg/kg

Suxmethonium Apnoea

 Prolonged neuromuscular blockade due to reduced plasma cholinesterase activity

Causes of Acquired plasma cholinesterase deficiency

- Hepatic failure
- Pregnancy
- Renal Failure
- Malignancy
- Burns
- Malnutrition
- Hypo-proteinemia
- Drugs: ketamine, COC, lithium.

Genetic variability causes

Allele types

- Usual (Normal)
- Atypical
- Silent
- Fluoride-resistant

Dibucaine Number

- Normal alleles- **80%** (of the enzyme is inhibited)
- Heterozygous for the abnormal allele- **40-60%**
- Homozygous- **<30%**

3 Phenotypes

1. Normal enzyme
2. Heterozygous (has 1 of the 3 possible abnormal genes) Typically block lasts 10-20 minutes.
3. Homozygous (2 abnormal genes) <0.01% of
4. population- lasts several hours until kidney excretion occurs

Management

- ABC
- Confirm with nerve stimulation to assess residual blockade
- Maintain adequate ventilation
- Maintain anaesthesia
- Transfer to ICU if ongoing sedation and ventilation is necessary
- Consider administration of FFP
- After recovery: refer for testing, counsel the patient and family.

Malignant Hyperthermia

Defn: *an autosomal dominant pharmaco-genetic disorder of skeletal muscle, induced by exposure to certain triggering anaesthetic agents. RYR1 Gene abnormality on chromosome 19q.*

Mortality rates now: 2-3%

Cause: mutation of the ryanodine receptor, on the surface of the sarcoplasmic reticulum.

Pathogenesis: Ryanodine receptor allows foe exaggerated calcium release from the SR, causing sustained muscle contraction. Reabsorbing the CA2+, uses large amounts of ATP, leading to production of excessive heat. ATP depletion and excessive heat, both causes muscle damage. Constituents 'leak' into circulation (potassium, myoglobin, creatine, phosphate, creatinine kinase).

Two most common triggers:

- Suxmethonium
- Volatile agents (H.I.D.S)

Management

According to the recommendations from the Association of Anaesthetists of Great Britain (AAGBI).

1. **Recognition**
2. **Immediate management**- Remove trigger, Call for help, Hyperventilate with FiO2 100%, Abandon surgery.
3. **Monitoring & treatment**- Dantrolene 2.5mg/kg IV bolus with repeat boluses up to 10mg/kg. Active cooling. Manage complications. Serial ABGs. Transfer to ICU. Monitor for: renal failure, or compartment syndrome.
4. **Further management-** Offer counselling and confirmatory testing.

Testing: Caffeine-halothane contractile testing is performed on a muscle biopsy specimen.

Anaphylaxis

Defn: *life-threatening allergic condition mediated by release of histamine & other substances from mast cells after exposure to an antigen.*

Common anaesthetic triggers

- Latex
- Antibiotics- penicillins
- Contrast media
- Nuts
- Colloids
- Muscle relaxants

specifically in children

Clinical features

- Cardiovascular collapse (88%)
- Erythema (48%)
- Bronchospasm (40%)
- Angioedema (24%)
- Cutaneous rash (13%)
- Urticaria (8%)

Grading

- Cutaneous reaction only: urticaria, erythema, angio-oedema
- As above but also hypotension, tachycardia or bronchospasm
- As II but more severe: collapse, arrhythmias
- Cardiac and/or respiratory arrest
- Death

Management

Immediate	Once stable consider:
Stop trigger Call for help Deliver 100% FiO2 Adrenaline** Fluid bolus 20mg/kg	IV Hydrocortisone IV Chlorphenamine Bronchodilators if persistent wheez

Mast Cell Tryptase Measure peaks at 1-2 hours and 24 hour baseline

Table 1: Drug doses in anaphylaxis

Age	IV adrenaline (1:10 000) Suggested increments	IM adrenaline (1:1000)	Chlorpheniramine (IM or slow IV)	Hydrocortisone (IM or slow IV)
< 6 mths	5mcg (0.05ml)	150mcg (0.15ml)	250mcg/kg	25mg
6 mths – 6 yrs	10mcg (0.10ml)	150mcg (0.15ml)	2.5mg if over 1 year	50mg if over 1 year
6 – 12 yrs	25mcg (0.25ml)	300mcg (0.3ml)	5mg	100mg
> 12 yrs	50mcg (0.50ml)	500mcg (0.5ml)	10mg	200mg

Bronchospasm