MALIGNANT HYPERTHERMIA A CASE REPORT
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APOLLO CHILDRENS HOSPITAL
• 13 year old girl - admitted for posterior scoliosis correction.
• History of recurrent respiratory tract infections.
• Delayed motor milestones.
• Pre-operative pulmonary function testing showed restrictive lung disease.
CASE Contd.

- NPO for 8 hours
- IV induction - atropine, fentanyl and thiopentone
- Intubated with 6.5 cuff ed ET tube
- Desflurane with nitrous oxide and atracurium was used for maintenance
CASE Contd.

• Baseline measurements
  SpO$_2$ at 99%, NIBP at 110/68, HR at 86/min, ETCO$_2$ at 38 mmHg, skin temperature at 35.5°C

• 3 hours post induction
  HR-146/min, ETCO2-90, T-39.3°C, SpO2-83%
CASE Contd.

- What is your impression?
- DOPE ruled out
- 100% oxygen started
- Pressure support & rate increased
CASE Contd.

- ABG – 7.16/74/106/16/-4

What is your interpretation?

- Combined metabolic & respiratory acidosis.
CASE Contd.

• Na-131, K-4.3, Cl-97, Ca-1.2 (mmol),

• Sugars- 132, lactate-2.4

• ECG- sinus tachycardia
What is the differential diagnosis?

- Iatrogenic heating
- Sepsis
- Thyroid storm
- Pheochromocytoma
- Neuroleptic malignant syndrome
• What is the probable diagnosis?
  MALIGNANT HYPERTHERMIA

• Most common drug implicated in MH?
  ALL inhalational anaesthetics except nitrous oxide & Succinyl choline
Drugs safe in MH?
- Nitrous oxide, local and IV anaesthetics
- Non depolarising muscle relaxants

Who are predisposed to develop MH?
- Children with myopathy
• Earliest clinical sign in MH?

Rise in ETCO$_2$
• What is the management plan?
  Cooling & controlled ventilation

• What is the drug of choice?
  DANTROLENE SODIUM
CASE Contd.

• Operative procedure abandoned

• NS bolus started

• Manual hyperventilation with 100% oxygen

• Cooling – external/internal
CASE Contd.

• Patient shifted to PICU

• First dose of dantrolene sodium given

• Skin temperature rapidly decreased to 37.5°C and EtCO2 decreased by approximately 30 mmHg with dantrolene

• Controlled ventilation, central cooling and repeat doses of dantrolene continued
CASE Contd.

- Skin temperature maintained between 36-36.5°C
- Fluid rate continued at one & half times maintenance
- EtCO2 decreased to 38 and blood gas stabilized within two hours.
- Patient remained stable and was extubated after 14 hours.
CASE Contd.

• CPK was elevated (852-7806-3426-1243-544-78)

• Urine myoglobin was negative

• Renal and thyroid function tests were within normal limits

• Muscle biopsy showed destructive myopathic changes possibly secondary to malignant hyperthermia
MALIGNANT HYPERTHERMIA - DISCUSSION

- Rare life-threatening condition

- Triggered by exposure to general anesthetics (Inhalational anesthetic agents and depolarising muscle relaxants)

- Autosomal dominant disorder

- Ryanodine receptor gene mutation – calcium channel receptor in sarcoplasmic reticulum.
Increased calcium release

sustained muscle contraction

hypermetabolic state

cellular hypoxia

worsening acidosis

MODS

PATHOGENESIS
CLINICAL CRITERIA

• Respiratory acidosis (ETCO2 above 55 mmHg or arterial pCO2 above 60 mmHg)

• Heart involvement (unexplained sinus tachycardia, VT/VF)

• Metabolic acidosis (BE < -8, pH <7.25)

• Muscle rigidity (generalized rigidity including severe masseter muscle rigidity)
CLINICAL CRITERIA

• Muscle breakdown (CK >20,000/L units, cola colored urine or excess myoglobin in urine or serum, potassium above 6 mmol/l)

• Temperature increase (rapidly increasing temperature, T >38.8°C)

• Other (rapid reversal of MH signs with dantrolene, elevated resting serum CK levels)

• Family history (autosomal dominant pattern)
COMPLICATIONS

- Rhabdomyolysis
- Compartment syndrome
- Renal failure
- Arrhythmias
- Coagulopathy (DIC)
- ARDS
- MODS
DIAGNOSIS

• Score equal to or greater than 6 – more likely MH

• Susceptibility testing

• Muscle testing – caffeine halothane contracture testing

• Genetic testing – RYR mutation
TREATMENT

• Avoidance/discontinuation of trigger agents

• Dantrolene (Azumolene)/ fluids/ urine output

• Cooling

• Treatment of complications
TAKE HOME MESSAGE

- Suspect MH
- Availability of dantrolene
- Cooling/hyperventilation
- Testing of relatives
THANK YOU