MALIGNANT HYPERTHERMIA IN A CHILD SUBMITTED TO AN URGENT SURGERY

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Background: Malignant hyperthermia (MH) is a hypermetabolic syndrome, with incidence of 1:15000, that occurs in susceptible individuals primarily by the use of the volatile inhalation anesthetic agents and the succinylcholine muscle relaxant. The aim of this case report is to discuss the malignant hyperthermia confirmed by familiar muscle biopsy.

Case Report: Female, 5 years old, 20Kg, ASA I, was submitted to appendectomy under balanced general anesthesia, maintenance with sevoflurane. She evolved with tachycardia and increased end-tidal carbon dioxide (EtCO₂=99 mmHg). Sevoflurane administration was stopped and manual ventilation was initiated with mapleson D and FiO₂ 100%. The gasometry indicated paCO₂=84.2 mmHg and pH=7.031. Dantrolene sodium 2.5 mg/kg was initiated and required 2 cycles. The patient presented tachyarrhythmia and evolved to bradycardia and cardiorespiratory failure. Cardiopulmonary resuscitation had to be provided. The second gasometry indicated pH=7.43 and paCO₂=30 mmHg. After all, the patient was maintained with continuous infusion of dantrolene for 48 hours. She awaits the possibility of muscle biopsy and after the parents' investigations, her father was tested positive for caffeine-halothane muscular contracture test.

Discussion: The hypermetabolism in MH causes an increase of carbon dioxide production, metabolic and respiratory acidosis, accelerated oxygen consumption, heat production, activation of the sympathetic nervous system, hyperkalemia, disseminated intravascular coagulation, and multiple organ dysfunction and failure. It is induced by an abnormal regulation of ryanodine receptors, producing a massive release of calcium in the sarcoplasmic reticulum of the striated muscle. The most frequent early clinical signs of MH include an increase of end-tidal carbon dioxide, tachycardia, muscle rigidity, tachypnea, and hyperkalemia.

Learning points: Dantrolene sodium is the antidote that decreases the loss of calcium from the sarcoplasmic reticulum in the skeletal muscle and restores normal metabolism. The challenges of the treatment of the MH are the difficulty of dilution of the dantrolene and the needs for diagnostic confirmation

References:

1. Kollmann-camajora A et al. Clinical protocol for the management of malignant hyperthermia. Rev Esp Anesthesiol Reanim 2017;64(1):32-40.
2. Schneiderbanger D et al. Management of malignant hyperthermia: diagnosis and treatment. Ther Clin Risk Manag. 2014;10:355-62.

Figure 1. Pathophysiologic changes during a malignant hyperthermia crisis.
Source. Ther Clin Risk Manag. 2014;10:355-62.

Figure 2. Dantrolene Sodium for malignant hyperthermia treatment.