An Anesthetic Technique for Malignant Hyperthermia That Would Make MacGyver Proud
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Case Presentation: A 15 year old girl, 63 kg, presented for wisdom teeth extraction. She had a history of muscle weakness and subsequent biopsy proven mutation of the ryanodine-1 receptor. The muscle biopsy was performed under general anesthesia via TIVA and was uneventful. The anesthetic plan was for an IV induction, nasal intubation, TIVA, with spontaneous ventilation with oxygen/air.

Case presentation continued: No flushed anesthesia machine was available and due to scheduling time restraints we decided to start the machine flush, and in the meantime, use an independent ventilator support setup. The patient was induced with 3 mg/kg propofol and 1 mcg/kg fentanyl, and was placed on a propofol infusion at 300 mcg/kg/min and remifentanil 1 mcg/kg/min. The trachea was nasally intubated. Ventilation was assisted with a Mapelson circuit attached to the auxiliary oxygen flowmeter on the anesthesia workstation. In addition an end tidal CO2(ETCO2) connector from the Philips monitor was incorporated in the circuit for continuous respiratory monitoring.

Discussion: In addition to flushing the circuit, or creating a novel clean circuit, activated charcoal filters were recently introduced and have been shown to rapidly (2 min) and dramatically reduce volatile agents to an acceptable concentration of <5 parts per million (ppm).

Review pathophysiology: RYR-1 mutation causes uncontrolled “leaking” of calcium from the sarcoplasmic reticulum (SR). This is accentuated during a “triggering” anesthetic and the dramatic increase in intracellular calcium leads to heat production, O2 consumption, and contraction of muscle. Dantrolene blocks calcium release from SR thus ending the cycle.

References:
1) MH cellular image from quizlit.com
4) Activated charcoal filter photo from www.dynasthetics.com

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