ANESTHETIC PHARMACOLOGY

Hypercapnia Shortens Emergence Time from Inhaled Anesthesia in Pigs

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BACKGROUND: Anesthetic clearance from the lungs and the circle rebreathing system can be maximized using hyperventilation and high fresh gas flows. However, the concomitant clearance of CO₂ decreases PACO₂, thereby decreasing cerebral blood flow and slowing the clearance of anesthetic from the brain. This study shows that in addition to hyperventilation, hypercapnia (CO₂ infusion or rebreathing) is a significant factor in decreasing emergence time from inhaled anesthesia.

METHODS: We anesthetized seven pigs with 2 MACPIG of isoflurane and four with 2 MACPIG of sevoflurane. After 2 h, anesthesia was discontinued, and the animals were hyperventilated. The time to movement of multiple limbs was measured under hypocapnic (end-tidal CO₂ = 22 mm Hg) and hypercapnic (end-tidal CO₂ = 55 mm Hg) conditions.

RESULTS: The time between turning off the vaporizer and to movement of multiple limbs was faster with hypercapnia during hyperventilation. Emergence time from isoflurane and sevoflurane anesthesia was shortened by an average of 65% with rebreathing or with the use of a CO₂ controller (P < 0.05).

CONCLUSIONS: Hypercapnia, along with hyperventilation, may be used clinically to decrease emergence time from inhaled anesthesia. These time savings might reduce drug costs. In addition, higher PACO₂ during emergence may enhance respiratory drive and airway protection after tracheal extubation.