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Title: Venous air emboli with 15N2: pulmonary excretion and physiologic responses in dogs

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Abstract: Venous air embolism occurs with decompression sickness as well as during a wide variety of surgical procedures in hospitalized patients. We developed a canine model to allow documentation and quantitation of pulmonary excretion of intravascular air emboli both in a control air breathing state and during treatment. We utilized 15N2 (a stable, nonradioactive isotope of room air nitrogen, 14N2) as the nitrogen component of venous air emboli (1 ml.kg-1) given to 27 anesthetized mongrel dogs ventilated with room air (tidal volume = 15 ml.kg-1). End-tidal 15N2 was measured and the embolism diagnosed by increased levels in exhaled gases. Exhaled gases were also collected in Douglas bags and the 15N2 recovered was quantitated by a helium dilution technique. Systemic and pulmonary artery pressure changes and quantitation of excreted 15N2 were documented after embolism during a control state with continued room air (21% oxygen) ventilation, and after treatments with either a) 100% oxygen ventilation; b) compression to 2128 mmHg, or 2.8 atm abs, and room air ventilation; or c) a combination of 100% oxygen ventilation and 2.8 atm abs compression.

Increased end-tidal 15N2 was characteristic of all emboli, and use of 15N2 allowed accurate measurement of excreted gas during both room air and 100% oxygen ventilation. Embolic gas recoveries were not increased significantly by any of the treatments.

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