Bedside Evaluation of Pulmonary Embolism by Electrical Impedance Tomography

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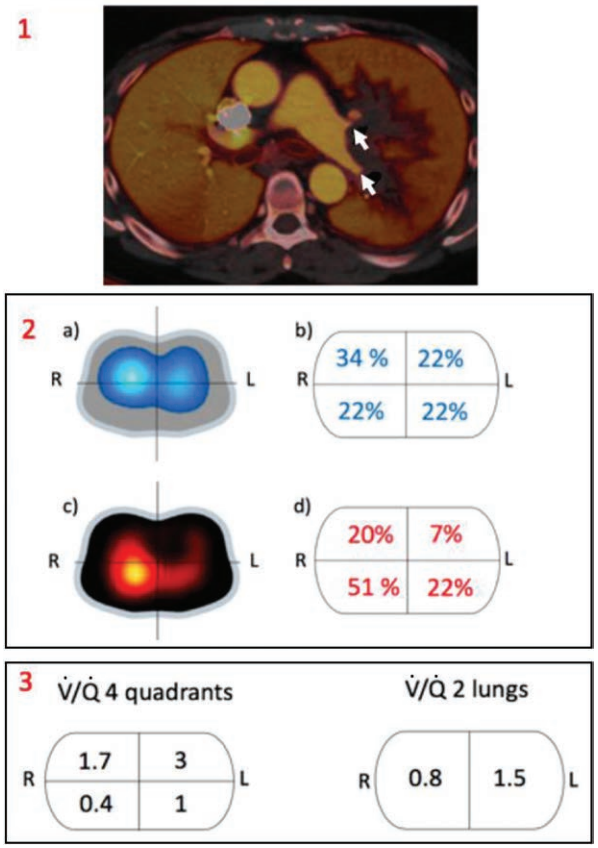

Electrical impedance tomography allows bedside real-time functional imaging of lung ventilation without the use of radiation.[1] In addition, by intravenous injection of a small amount of normal saline, electrical impedance tomography enables evaluation of the pulmonary blood flow.[2] Ventilation and perfusion maps allow for the construction of functional ventilation/perfusion images.[2]

A 57-year-old woman developed hemodynamic instability while undergoing a left radical nephrectomy. A computed tomography angiography showed emboli obstructing the left pulmonary artery (*panel 1*, *white arrows*). In the post-surgical intensive care unit, electrical impedance tomography was performed as a complimentary assessment.

Panel 2 shows the ventilation and perfusion maps of this patient's lungs. In *panel 2a*, the ventilated regions of the lungs are illustrated in *blue*. In *panel 2b*, the chest is subdivided into four quadrants, and the *numbers* represent the relative contribution to the ventilation of each quadrant. Ventilation distribution was uniform. In *panel 2c*, the pulmonary perfusion is illustrated in *red*. The *numbers* in *panel 2d* represent the relative perfusion for each quadrant. There was marked hypoperfusion of the left (L) upper lobe. *Panel 3* illustrates the calculated ventilation/perfusion ratio ($\dot{V}/\dot{Q}$) for each quadrant. This ratio was increased in the left upper lobe. Thus, electrical impedance tomography findings mirrored the anatomical information obtained by computed tomography.

Electrical impedance tomography has been successfully used to evaluate the distribution of ventilation to determine the best end-expiratory pressure in patients with acute respiratory distress syndrome and/or obesity.[1,3] As shown in this image, bedside ventilation/perfusion images can also assist the anesthesiologist to discriminate ventilation from perfusion abnormalities during acute pulmonary derangement.

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Competing Interests

The authors declare no competing interests.

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