

Prone Position and Lung Ventilation/Perfusion Matching in Acute Respiratory Failure Due to COVID-19

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Running title: Ventilation/perfusion in prone position in COVID19

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A 70 years old man (BMI 29 kg/m²), was admitted for acute respiratory failure consequent to SARS-COV-2 infection. He had no disease in his past medical history and took no medication. He was intubated and mechanically ventilated with tidal volume 6 mL/kg of IBW, respiratory rate 25/min, PEEP 12 cmH₂O, FiO₂ 0.6. Because of severe hypoxemia (PaO₂/FiO₂ 118 mmHg), the patient underwent prone positioning, which resulted in PaO₂/FiO₂ improvement (263 mmHg) after one hour (1). As previously attempted (2), we recorded images of lung ventilation and perfusion at the 5th intercostal space by Electrical Impedance Tomography (Pulmovista 500, Dräger Medical, Lübeck, Germany), with the patient supine and after one hour of pronation, maintaining the ventilator settings unchanged. Both ventilation and perfusion changed from supine to prone position (Figure 1). Ventilation increased in the dorsal half of the thorax (+20%), while in the same area perfusion decreased (-11%), moving toward the ventral areas. However, Global Inhomogeneity index (GI) (3) decreased for both ventilation and perfusion, overall increasing ventilation/perfusion matching in the lung, which may contribute to explain the observed improvement in oxygenation with prone positioning in patients with acute respiratory failure secondary to SARS-COV-2.

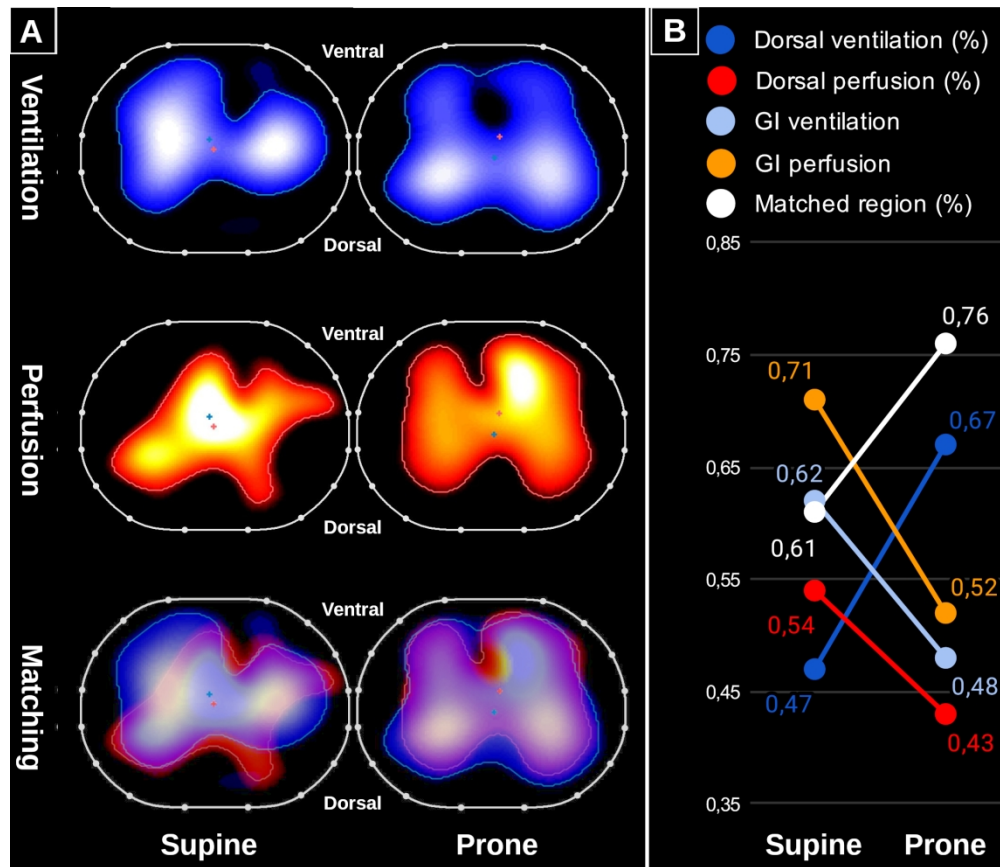
Figure 1

(A) Transverse thoracic Electrical Impedance Tomography images illustrating (from top to bottom) the distribution of tidal ventilation (blue-white gradient area), lung perfusion (red-yellow gradient area) and the two images overlaid. Images acquired with the patient in supine position and 1 hour after prone positioning.

(B) Plot illustrating the variations in ventilation and perfusion distribution, as recorded with electrical impedance tomography. GI = Global Inhomogeneity Index.

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