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# Assessment of microvascular oxygen saturation in gastric mucosa in volunteers breathing continuous positive airway pressure.

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OBJECTIVE: Adequate oxygenation of the gastrointestinal mucosa to preserve its barrier function is a basic objective in the prevention of multiple organ failure. Sustaining a positive airway pressure during the entire respiratory cycle remains a cornerstone in the therapeutic regimen to improve systemic oxygenation. Whereas increased systemic oxygenation during breathing continuous positive airway pressure has been shown, the impact of continuous positive airway pressure on regional oxygenation in the gastrointestinal tract has not yet been evaluated. We hypothesized that continuous positive airway pressure decreases microvascular oxygen saturation in gastric mucosa. DESIGN: Prospective, randomized study. SETTING: University department of anesthesiology. PARTICIPANTS: Twelve healthy volunteers. INTERVENTIONS: Incremental increases of continuous positive airway pressure (0, 5, and 10 cm H(2)O) and subsequent release of continuous positive airway pressure. MEASUREMENTS AND MAIN RESULTS: We continuously measured microvascular oxygen saturation in gastric mucosa by reflectance spectrophotometry. Systemic oxygen saturation, end-tidal Pco(2), respiratory rate, heart rate, and arterial blood pressure were obtained noninvasively. In every volunteer, microvascular oxygen saturation in gastric mucosa was reduced corresponding to the level of continuous positive airway pressure, although systemic variables, especially systemic oxygen saturation, did not change. Continuous positive airway pressure reduced microvascular oxygen saturation in gastric mucosa from 59 +/- 7% (baseline with 0 cm H(2)O continuous positive airway pressure, mean +/- sd) to 54 +/- 8% ($p < .05$) during 5 cm H(2)O continuous positive airway pressure and to 50 +/- 9% ($p < .05$) during 10 cm H(2)O continuous positive airway pressure, returning to 59 +/- 7% during spontaneous breathing with 0 cm H(2)O continuous positive airway pressure. End-tidal Pco(2), respiratory rate, as well as hemodynamic variables, remained stable. CONCLUSIONS: Reflectance spectrophotometry meticulously monitored changes in microvascular oxygen saturation in gastric mucosa during breathing continuous positive airway pressure. Microvascular oxygen saturation in gastric mucosa decreased with increasing levels of continuous positive airway pressure despite steady systemic variables. These results suggest that the impact of altering airway pressures on splanchnic oxygenation is not mirrored necessarily by concomitant changes in systemic circulation. Moreover, if these findings also apply to critically ill patients, monitoring microvascular oxygen saturation in gastric mucosa would be useful to further optimize the setting of ventilation variables.

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