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Effects of norepinephrine and phenylephrine on intestinal oxygen supply and mucosal tissue oxygen tension.

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OBJECTIVES: To investigate effects of intravenous norepinephrine (NE) and phenylephrine (PE) on intestinal oxygen supply in an autoperfused, innervated jejunal segment. **DESIGN AND SETTING:** Prospective, randomized animal study in an animal research laboratory. **MATERIALS AND METHODS:** In 24 anesthetized and normoventilated pigs a segment of the jejunal mucosa was exposed by midline laparotomy and antimesenteric incision. Mucosal oxygen tension (PO_{2muc} ; Clark-type surface oxygen electrodes), microvascular hemoglobin oxygen saturation (HbO_2 , tissue reflectance spectrophotometry), and microvascular blood flow (perfusion units, PU; laser Doppler velocimetry), systemic hemodynamics, mesenteric-venous acid base and blood gas variables, and systemic acid base and blood gas variables were recorded after a resting period and at 20-min intervals during infusion of NE (0.01, 0.05, 0.1, 0.5, 1, 2 micrograms \times kg⁻¹ \times min⁻¹; n = 8) or PE (0.1, 0.5, 1, 2, 5, 10 micrograms \times kg⁻¹ \times min⁻¹; n = 8) and in controls (n = 8) without treatment. **RESULTS:** NE infusion led to significant tachycardia, an increase in cardiac output, and systemic oxygen delivery and consumption while PE progressively increased mean arterial pressure with only small effects on systemic blood flow. NE or PE infusion did not affect mesenteric venous oxygen tension (baseline: PE 53 \pm 5, NE, 52 \pm 4.2 mmHg), mesenteric oxygen extraction ratio (baseline: PE 0.29 \pm 0.08, NE 0.3 \pm 0.06), jejunal microvascular blood flow (baseline: PE 254 \pm 127, NE 282 \pm 72 PU), PO_{2muc} (baseline: PE 31 \pm 9.1, NE 33 \pm 11 mmHg), and HbO_2 (baseline: PE 52 \pm 9.6%, NE 58 \pm 11.6%). **CONCLUSION:** Despite major differences in systemic hemodynamics jejunal tissue oxygen supply is not affected by progressively increasing intravenous infusion of norepinephrine and phenylephrine.

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