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Jejunal tissue oxygenation and microvascular flow motion during hemorrhage and resuscitation.

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The relationship between flow motion and tissue oxygenation was investigated during hemorrhage/retransfusion with and without dopamine in 14 pigs. During 45% bleed, jejunal microvascular hemoglobin O(2) saturation (HBjO(2)) and mucosal tissue Po(2) (Po(2)muc) were recorded in seven control and seven dopamine-treated animals. Mean arterial pressure and systemic O(2) delivery decreased during hemorrhage and returned to baseline after retransfusion. Hemorrhage decreased Po(2)muc from 33 +/- 2.8 to 13 +/- 1.6 mmHg and HBjO(2) from 53 +/- 4.9% to 32 +/- 3.9%, respectively, in control animals. During reperfusion, Po(2)muc and HBjO(2) remained low. Dopamine increased Po(2)muc from 28 +/- 4.3 to 45 +/- 4.6 mmHg and HBjO(2) from 54 +/- 5.7% to 69 +/- 1.5% and attenuated the decrease in Po(2)muc and HBjO(2) during hemorrhage. After retransfusion, dopamine restored Po(2)muc and HBjO(2) to baseline. Control animals developed rhythmic HBjO(2) oscillations with increasing amplitude (frequency, 4.5 to 7.6 cycles/min) and showed an inverse relationship between Po(2)muc and HBjO(2) oscillation amplitude. Dopamine prevented regular flow motion. The association between decreased Po(2)muc and increased oscillations in HBjO(2) after normalization of systemic hemodynamics and O(2) transport in control animals suggests a cause-and-effect relationship between low tissue Po(2) and flow motion activity within the jejunal microcirculation.

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