The effects of dopamine and epinephrine on hemodynamics and oxygen metabolism in hypoxic anesthetized piglets

ABSTRACT

Epinephrine is more effective than dopamine at increasing cardiac output during hypoxia in this model. Although epinephrine preserves the SAP/PAP ratio, dopamine shows preferential pulmonary vasoconstriction, which might be detrimental if it also occurs during the management of infants with persistent fetal circulation. Dopamine, but not epinephrine, increases portal flow and total hepatic flow during hypoxia.

INTRODUCTION

Introduction Among the inotropes available for cardiovascular support in critically ill newborns, dopamine and epinephrine (adrenaline) are commonly used in neonatal intensive care units. With increasing clinical and animal data showing that hemodynamic responses to inotropes in newborns differ from those in adults and older children, it is uncertain whether these agents are appropriate in the treatment of shock or hypotension in sick newborns who are at risk for the development of persistent fetal circulation and necrotizing enterocolitis. Indeed, the appropriate catecholamine in various clinical situations also remains undetermined for the critically ill adult. The adrenoceptors in the pulmonary and mesenteric vasculature mature differently. For example, the neonatal pulmonary vasculature appears to be deficient in dopaminergic receptors, whereas α, β and dopamin-ergic receptors are present in the mature mesenteric vas-culature. The functional maturity and expression of the various adrenoceptors in the newborn vary greatly. We have previously reported the responses of the pulmonary and mesenteric circulation to dopamine and epinephrine infusions in anesthetized normoxic and hypoxic piglets. In this acutely instrumented hypoxic model, epinephrine, at a low dose (0.2 μg kg-1 min-1), produced a pulmonary vasodilatation; in comparison, dopamine had no such effect. However, there are no data on the effects on mesenteric hemodynamics and oxygen metabolism of infusions of either dopamine or epinephrine during hypoxia. The objectives of this study were to evaluate the effects of dopamine and epinephrine infusions in hypoxic piglets on systemic, pulmonary, and mesenteric circulations, and on systemic and splanchnic oxygen metabolism.

CONCLUSION

During severe alveolar hypoxia in the newborn piglet, epinephrine increases cardiac output whereas dopamine has no effect. Epinephrine preserves the SAP/PAP ratio, whereas dopamine causes pulmonary vasoconstriction. Epinephrine has no effect on splanchnic blood flow, whereas dopamine increases both portal and total hepatic flow. A reconsideration of the approach to the sick newborn infant is warranted.