Endothelin-1 concentrations and optimisation of arterial oxygenation and venous admixture by selective pulmonary artery infusion of prostaglandin E1 during thoracotomy.

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摘要

Abstract

In order to improve arterial oxygenation and venous admixture during one lung ventilation, the effect of selective infusion of prostaglandin E1 into the pulmonary artery of the ventilated lung was investigated in 12 adult patients undergoing thoracotomy. Patients' bronchi were intubated with a Mallinckrodt bronchial tube and ventilated with 66% oxygen in air. Cardiopulmonary factors such as systemic and pulmonary arterial pressures, pulmonary vascular resistance, blood gas analyses, cardiac output and airway pressure were measured before and during one-lung ventilation; venous admixture (Qs/Qt) was calculated. Serial blood samples were taken from the pulmonary artery of the ventilated lung for endothelin-1 estimation. One lung ventilation reduced the mean PaO2 from 42.1 (2.3) kPa to 11.8 (1.4) kPa ($p < 0.001$) and increased Qs/Qt from 10.8 (3.2)% to 39.2 (4.7)% ($p < 0.001$). Pulmonary vascular resistance also increased from 167 (24) dyne.s.cm-5 to 262 (38) dyne.s.cm-5 ($p < 0.05$) with a corresponding increase of plasma endothelin-1 ($p < 0.05$). After 30 min of one lung ventilation, PGE1 was infused continuously into the pulmonary artery of the ventilated lung at a rate which increased incrementally from 0.04-0.10 micrograms.kg-1.min-1. PaO2 increased to 20.7 (2.6) kPa ($p < 0.01$) and Qs/Qt decreased to 30.6 (3.5)% ($p < 0.05$). During the infusion, pulmonary vascular resistance reduced to 173 (30) dyne.s.cm-5 ($p < 0.01$). The plasma endothelin-1 concentration reached a plateau between the end of one lung ventilation (before closing the thorax) and 6 h postoperatively. This correlated inversely with the pre-operative forced expiratory volume in one second ($r = -0.68$, $p < 0.005$), declining to normal values 72 h after operation. The selective infusion of PGE1 into the pulmonary artery of the ventilated lung corrected pulmonary vasoconstriction and improved both arterial oxygenation and venous admixture during one lung ventilation for thoracotomy.