THE EFFECT OF AUGMENTED HEMODYNAMICS ON BLOOD FLOW DURING ARTERIOVENOUS CARBON DIOXIDE REMOVAL

JAYROE JB, WANG D, DEYO DJ, ALPARD SK, BIDANI A, ZWISCHENBERGER JB
ASAIO J 2003;49(1):30-4 CE1-15

Objective
Further define the limits of extracorporeal CO_2 removal through hemodynamic augmentation and evaluation peak end expiratory pressure (PEEP).

Study Design
Animal trial.

Study Population
8 adult sheep (Suffolk ewes).

Methods
Evaluate the effects of an alpha agonist (phenylephrine) and a beta agonist (isoproterenol) on shunt blood flow, MAP, HR and cardiac output over 48 hours of arteriovenous pumpless CO_2 removal (n = 5 animals and the effect of PEEP on these variables (n = 3 animals).

Results
Phenylephrine increased MAP from 2.4 % to 94.4 % of baseline without significant compromise in cardiac output (9.4 % of baseline at 95 % increase in MAP). Shunt flow through lung assist device increased up to 67 % of baseline.
Isoproterenol infusion increased cardiac output 33–146 % of baseline but decreased MAP 9-54 % and shunt flow through lung assist device (11–42 %).
CO_2 removal remained constant throughout the study.
At PEEP levels of 5, 10, 15, and 20 cm H_2O shunt flow was never decreased more than 2.7 % from baseline at zero PEEP.

Commentary
Extracorporeal CO_2 removal is dependent upon circuit blood flow. Pressure is essential in maintaining the driving force for blood through the gas exchange circuit. The alpha agonist is more efficient in maintaining MAP and augmenting shunt flow.