

TOWARD AMBULATORY ARTERIOVENOUS CO₂ REMOVAL: INITIAL STUDIES AND PROTOTYPE DEVELOPMENT

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Objective

Evaluate optimal vascular access and a lung prototype for pumpless extracorporeal CO₂ removal in ambulatory patients.

Study Design

Experimental animal study.

Study Population

5 adult sheep (22–46 kg).

Methods

6 and 8 mm grafts were anastomosed end to side to the carotid artery and jugular vein, then tunnelled to exit the skin. Four access methods were tested to perfuse this AV loop:

1) two 14 F dialysis needles, 2) 12 and 14 F arterial and venous cannulae placed into the graft but short of the arterial anastomosis, 3) the same arterial cannula advanced upstream past the anastomosis, and 4) transecting the loop graft and connecting it end to end to the artificial lung.

Results

Blood flow through the artificial lung amounted to 100–150 ml/min in 1), 300 ml/min in 2), 900 ml/min in 3), and in 4) 500–900 ml/min were achieved with a 6mm graft loop, and up to 2000 ml/min with an 8 mm graft.

The authors consider long term ambulatory extracorporeal carbon dioxide removal using a tunnelled arteriovenous graft feasible with a low resistance artificial lung.

Commentary

Potential solution for CO₂ retention in end stage COPD patients to decrease work of breathing.

