

Display Settings: Abstract

J Cardiothorac Vasc Anesth. 2012 Jul 11. [Epub ahead of print]

The Hemodynamic and Respiratory Effects of Cuirass Ventilation in Healthy Volunteers: Part 1.

McBride WT, Ranaldi G, Dougherty MJ, Siciliano T, Trethowan B, Elliott P, Rice C, Scolletta S, Giomarelli P, Romano SM, Linton DM.

Department of Cardiac Anaesthesia, Royal Victoria Hospital, Belfast, UK.

Abstract

OBJECTIVE: Negative-pressure ventilation (NPV) by external cuirass (RTX; Deminax Medical Instruments Limited, London, UK) in intubated patients after cardiac surgery improves hemodynamics measured by pulmonary artery catheter (PAC)-based methods, with an increased cardiac output (CO) and stroke volume (SV), without changing the heart rate (HR). The less-invasive pressure recording analytical method (PRAM) (Mostcare; Vytech Health srl, Padova, Italy) allows radial artery-based monitoring of the CO, SV, SV variation, and cardiac cycle efficiency (CCE). The authors investigated the hypothesis that NPV improves PRAM-based hemodynamics and arterial blood gas analysis in spontaneously breathing subjects.

DESIGN: A clinical investigation.

SETTING: A teaching hospital.

PARTICIPANTS: Ten healthy volunteers.

INTERVENTIONS: Subjects underwent 5 consecutive experimental ventilation modalities lasting 5 minutes: (1) baseline (no cuirass ventilation), (2) mode 1: cuirass ventilation with a continuous negative pressure of -20 cmH₂O, (3) first rest period (no cuirass ventilation), (4) mode 2: cuirass ventilation in control mode of 12 breaths/min at -20 cmH₂O, and (5) second rest period.

MEASUREMENTS AND MAIN RESULTS: PRAM parameters were analyzed throughout the final minute of each experimental modality, which concluded with arterial blood gas sampling. Both NPV modes significantly reduced HR without changing CO or systemic vascular resistance. Mode 1 significantly increased CCE and decreased SVV. PO₂ decreased in both rest modes compared with baseline. This was prevented by NPV. In 5 smokers, PO₂ significantly increased in the control mode compared with first rest period. The control mode NPV improved oxygenation with a reduced PCO₂ and reciprocally increased pH.

CONCLUSIONS: Five minutes of NPV improves hemodynamics and oxygenation in healthy subjects.

Copyright © 2012 Elsevier Inc. All rights reserved.