

Letter

Interactions between the increase in venous return and right ventricular functionMassimo Bertolissi¹ and Ugo Da Broi²¹Senior Staff Consultant, Second Department of Anaesthesia and Intensive Care Medicine, Azienda Ospedaliera S Maria della Misericordia, Udine, Italy²Consultant, Second Department of Anaesthesia and Intensive Care Medicine, Azienda Ospedaliera S Maria della Misericordia, Udine, ItalyCorrespondence: Massimo Bertolissi, bertolissi@rodax.net

Published online: 7 May 2003

Critical Care 2003, **7**:247 (DOI 10.1186/cc2188)This article is online at <http://ccforum.com/content/7/3/247>

© 2003 BioMed Central Ltd (Print ISSN 1364-8535; Online ISSN 1466-609X)

The present article is a response to the letter written by McHugh [1] regarding our recent publication in *Critical Care* [2].

Our intention was to make a second complete haemodynamic evaluation with the legs still elevated, in order to investigate the duration of changes observed at time point 3 (1 min after the legs were simultaneously raised at 60°). However, this was not possible because our surgeons did not permit a further loss of time. For this reason we did not examine the haemodynamic effects of head-down tilt.

Several authors have reported, however, that the haemodynamic effects of passive leg elevation (PLE) vanish with time, and rarely exceed a 10 min duration [3]. Boulain and other workers have recently shown that PLE produces a rapid and sustained rise in stroke volume over a period of 4 min, and that the amount of blood volume shifted from the legs toward the central compartment during the postural change is about 300 ml [4,5].

Considering the effects of PLE on the right ventricle (RV) with a reduced basal ejection fraction [2] (no variations in the coronary perfusion pressure and the cardiac index, and a marked reduction in RV compliance), we believe that a quick increase in preload, even lasting a few minutes, can be harmful because it can decompensate the RV oxygen supply/demand ratio. The manoeuvre of PLE should therefore be performed slowly and progressively in such a coronary patient.

Moreover, we can extrapolate the meaning of our results for the clinical conditions characterized by hypovolaemia and right ventricular failure. One example is the transplanted heart during the immediate postoperative period, when hypovolaemia frequently coexists with a small and well contracting left ventricle, and with a dilated and low

contracting RV [6]. If we proceed to a rapid infusion of fluids in such a condition, we can obtain an opposite result due to a further deterioration of the right ventricular function.

Finally, we underline that in clinical practice the achievement of the goals described is not always so obvious, because the RV function is often unknown to the physician. In fact, the usual haemodynamic monitoring data (filling pressures, cardiac output, mixed venous oxygen saturation) are not able to explore the right ventricular function, with the exclusion of those obtained from transoesophageal echocardiography.

Competing interests

None declared.

References

1. McHugh G: **Passive leg elevation and head-down tilt: effects and duration of changes.** *Crit Care* 2003, **7**:246.
2. Bertolissi M, Da Broi U, Solando F, Bassi F: **Influence of passive leg elevation on the right ventricular function in anaesthetized coronary patients.** *Crit Care* 2003, **7**:164-170.
3. Wong DH, Tremper KK, Zaccari J, Hajduczek J, Konchigeri HN, Hufstедler SM: **Acute cardiovascular response to passive leg raising.** *Crit Care Med* 1988, **16**:123-125.
4. Boulain T, Achard JM, Teboul JL, Richard C, Perrotin D, Ginies G: **Changes in BP induced by passive leg raising predict response to fluid loading in critically ill patients.** *Chest* 2002, **121**:1245-1252.
5. Rutlen DL, Wackers FJT, Zaret BL: **Radionuclide assessment of peripheral intravascular capacity: a technique to measure intravascular volumes changes in the capacitance circulation in man.** *Circulation* 1981, **64**:146-152.
6. Levy JH, Michelsen L, Shanewise J, Bailey JM, Ramsay JG: **Post-operative cardiovascular management.** In *Cardiac Anesthesia*. Edited by Kaplan JA, Reich DL, Konstadt SN. Philadelphia: WB Saunders Company; 1999:1233-1257.