The effects of passive leg raising may be detected by the plethysmographic oxygen saturation signal in critically ill patients.


Author information:
(1)Service de réanimation-médecine intensive, Centre Hospitalier Universitaire de Bicêtre, Hôpitaux universitaires Paris-Sud, Assistance publique - Hôpitaux de Paris, 78, rue du Général Leclerc, F-94 270, Le Kremlin-Bicêtre, France. alex.beurton@gmail.com.
(2)Inserm UMR S_999, Université Paris-Sud, Le Kremlin-Bicêtre, France. alex.beurton@gmail.com.
(4)Inserm UMR S_999, Université Paris-Sud, Le Kremlin-Bicêtre, France.

BACKGROUND: A passive leg raising (PLR) test is positive if the cardiac index (CI) increased by > 10%, but it requires a direct measurement of CI. On the oxygen saturation plethysmographic signal, the perfusion index (PI) is the ratio between the pulsatile and the non-pulsatile portions. We hypothesised that the changes in PI could predict a positive PLR test and thus preload responsiveness in a totally non-invasive way.

METHODS: In patients with acute circulatory failure, we measured PI (Radical-7) and CI (PiCCO2) before and during a PLR test and, if decided, before and after volume expansion (500-mL saline).

RESULTS: Three patients were excluded because the plethysmography signal was
absent and 3 other ones because it was unstable. Eventually, 72 patients were analysed. In 34 patients with a positive PLR test (increase in CI ≥ 10%), CI and PI increased during PLR by 21 ± 10% and 54 ± 53%, respectively. In the 38 patients with a negative PLR test, PI did not significantly change during PLR. In 26 patients in whom volume expansion was performed, CI and PI increased by 28 ± 14% and 53 ± 63%, respectively. The correlation between the PI and CI changes for all interventions was significant (r = 0.64, p < 0.001). During the PLR test, if PI increased by > 9%, a positive response of CI (≥ 10%) was diagnosed with a sensitivity of 91 (76-98%) and a specificity of 79 (63-90%) (area under the receiver operating characteristics curve 0.89 (0.80-0.95), p < 0.0001).

CONCLUSION: An increase in PI during PLR by 9% accurately detects a positive response of the PLR test.