Abstract

Introduction:
Prediction of fluid responsiveness in hemodynamically unstable patients with spontaneous breathing activity has been a clinical challenge. It has been best assessed by passive leg raising test. Preejection period, the time from the onset of ventricular depolarization to the beginning of left ventricular ejection, is a systolic time interval found to decrease with greater preload1. The effect of passive leg raising test on the pre-ejection period has not been studied in this context.

Objectives:
Our objective was to test whether fluid responsiveness could be predicted by the response of pre-ejection period to passive leg raising test. We also examined whether baseline end expiratory inferior vena cava diameter could predict fluid responsiveness in this category of patients.

Methods:
Thirty patients with spontaneous breathing activity considered for fluid loading were included. We used transthoracic echocardiography to measure stroke volume, and pre-ejection period before and during passive leg raising test as well as before and after fluid loading (500 ml saline 0.9 % over 15 minutes). An increase in stroke volume of 15 % or more after volume expansion defined fluid responders. We also measured baseline end expiratory inferior vena cava diameter obtained from the subcostal window.

Results:
19 patients were responders (63.3 %). Passive leg raising test induced-changes in stroke volume of ≥ 9.3 % predicted fluid responsiveness with a sensitivity of 100 % and specificity of 81.8 %, the area under receiver operating characteristic curve (AUC) was 0.96; 95 % confidence interval (CI) [0.91,1.0], meanwhile, passive leg raising test induced changes in pre-ejection period of ≤−5.0 % predicted fluid responsiveness with a sensitivity of 94.7 % and a specificity of 45.5 %, the AUC was 0.62; 95 % CI [0.4,0.85]. Baseline inferior vena cava diameter (in cm) failed to identify responders vs. nonresponders (1.20 ± 0.37 vs 1.38 ± 0.51 respectively, p = 0.36).

Conclusions:
In hemodynamically unstable patients with spontaneous breathing activity, passive leg raising test-induced increase in stroke volume of ≥ 9.3 % accurately predicted fluid responsiveness, while passive leg raising test-induced decrease in pre-ejection period of≤−5.0 % was sensitive, but not specific in the prediction of fluid responsiveness. Baseline inferior vena cava diameter failed to identify fluid responders.

Key words:
Fluid responsiveness, passive leg raising test, echocardiography, spontaneous breathing activity