

Abstract

Background: As trans thoracic echocardiography (TTE) becoming an integrated tool in the intensive care unit, velocity time integral variations (%VTI) registered on trans thoracic echo before & after passive leg raising (PLR); [i.e. increase of velocity time integral (%VTi) 10% or higher after (PLR)], showed a sensitivity of **89.71 %** and specificity of **81.25 %**, an area under the curve > 0.95 for discriminating responder and non responder patients. In this study, we evaluated whether velocity time integral (VTi) as measured by transthoracic echocardiography (TTE) can be a predictor of responsiveness to fluid challenge in hemodynamically unstable patients and an initial assessment of left ventricular function.

Methods: one hundred critically ill patients who required intensive care unit admission. who fulfilled the inclusion criteria, at the start of admission, VTi was measured by bed side transthoracic echocardiography (TTE) with the patient in the supine position & after approx. 2 min of passive leg raising (PLR) and both are compared. Stroke volume was measured before & after fluid challenge of (250 ml N.S) and those with a change more than 15% considered responders while those less than 15% change are non-responders.

Results: Among the eligible 100 patients : **Responders group I** were 68% vs. 32% non-responders **group II** respectively and **.Responders(group I)** had a stroke volume change (Δ SV) after VE of 250 ml N.S greater than 15% vs. (Δ SV $< 15\%$) in **non-responders(group II)**. In responders **group I** VTi after PLR was, mean 17.5 ± 3.5 m/sec vs. 12.9 ± 3.1 m/sec before PLR respectively $P = 0.002$, While in non-responders **group II** VTi after PLR was ,mean 17.2 ± 6 m/sec vs. 13.1 ± 9 m/sec before PLR respectively. In responders **group I** SV after VE of 250 ml was, mean 81.14 ± 19.8 ml vs. 62.13 ± 16.7 ml before VE respectively, $P = < 0.001$, While in non-responders **group II** SV after VE of 250 ml was ,mean 71.8 ± 13.6 ml vs 68.16 ± 11.7 ml respectively . The area under the receiver operating characteristics curve (ROC) of transthoracic echocardiography Δ VTi in predicting fluid

responsiveness was >0.95 for discriminating responder and non-responder patients .

Conclusions: Volume expansion is the first-line therapeutic approach in critically ill patients with low CI. Unfortunately, approximately 50% of them do not respond to fluid administration. Moreover, in some of them circulatory failure can be worsened..(Δ VTi) as a morphometric index is as good as traditional volumetric dynamic indices in predicting response to fluid challenge. PaO_2 was lower in non-responders group II, suggesting the role of lung congestion on patient oxygenation.

Keywords: VTi ; (TTE) transthoracic echocardiography; fluid responsiveness.