

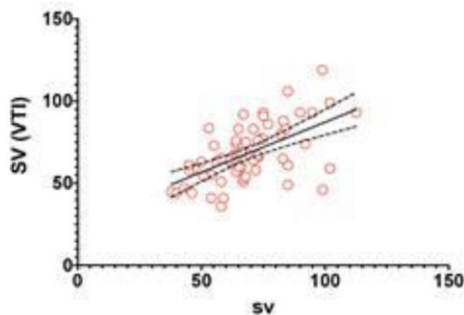
440 Assessing cardiac output by echocardiography: is contrast always better?

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Aims: Contrast echocardiography is very useful in clinical cardiology. It is mainly performed for the assessment of global left ventricular (LV) function, left ventricular ejection fraction (LVEF), and stroke volume (SV), thanks to improved visualization of endocardial LV borders. Contrast echocardiography, however, is not always easily available, it is more expensive than an ordinary echocardiography and it can be contraindicated in some situations (e.g. in the presence of egg allergy). This study aimed to compare the estimation of cardiac output during traditional transthoracic echocardiography and after the injection of (Sonovue) contrast.

Methods and results: Patients who underwent an echocardiography with and without injection of (Sonovue) contrast between April 2019 and September 2021 were enrolled in the study. A complete transthoracic echocardiography was performed and Sonovue contrast was then injected. End-diastolic and end-systolic left ventricular volume in apex 4 and 2 chamber views, biplane LVEF with Simpson's formula, end-diastolic and end-systolic left ventricular diameters in parasternal long axis were measured prior and after injecting contrast. Left ventricular outflow tract diameter (LVOTd) was measured and LV outflow tract velocity time integral was traced in order to calculate LVOT VTI SV, as the product of LVOT cross sectional area (assuming that LVOT is circular) to the LVOT VTI. LVOT VTI SV obtained during traditional echocardiography was compared to LVEF SV, calculated as the difference between end-diastolic and end-systolic volume traced after injecting Sonovue contrast. Seventy-eight patients were enrolled in the study. Forty-two had history of CAD, 22 presented dilatative cardiomyopathy, 2 hypertrophic cardiomyopathy (HCM), 1 arrhythmogenic right ventricular dysplasia; 16 had atrial fibrillation, 66 arterial hypertension, and 20 diabetes. The main indications for contrast echocardiography were measurement of EF (39 cases) and exclusion of thrombi in LV apex (18 cases). Other indications were suspect of HCM, atrial myxoma or LV non-compaction. LVOT VTI stroke volume was calculated in 64 patients (LVOT diameter was not well visualized in 8 patients and LVOT VTI could not be measured in 14 patients due to poor acoustic windows). In the same patients LVEF Stroke Volume was also calculated. A strong correlation (P -value < 0.0001) between LVOT stroke volume and LVEF Stroke Volume was found (Figure 1).

Conclusions: Contrast echocardiography is very useful in clinical practice, however, requires trained physicians and its use is not widespread. This study demonstrates that estimating cardiac output through LVOT VTI SV, in patients with suboptimal echo images can be equally accurate as measuring LVEF SV with contrast echocardiography. This could be particularly useful in the acute settings when contrast echocardiography isn't always feasible and knowing cardiac output can be important for therapeutic implications.



440 Figure 1