Detection of intracardiac masses has long been recognized as a strength of transthoracic 2-dimensional echocardiography (TTE) (1). The sensitivity and specificity of TTE for detection of left ventricular thrombus (LVT) was established by comparison of “adequate” TTEs on highly select patients with surgical or post-mortem findings (2–4). It quickly became and remains the preferred method to detect LVT.

In this issue of *JACC*, Weinsaft et al. (5), report performance characteristics of clinical TTE for detection of LVT in a consecutive series of patients with left ventricular dysfunction from a dedicated cardiac magnetic resonance (CMR) registry. A research protocol delayed-enhancement CMR (DE-CMR), shown to have high sensitivity and specificity for detecting LVT (6), was performed to evaluate for LVT and compared with a “clinical TTE” performed within 1 week of registry DE-CMR. For this and another study comparing CMR and TTE for detecting LVT (7), all CMR patients were included regardless of TTE quality although the selection criteria were not clearly described. The prevalence of LVT in the article by Weinsaft et al. (5) DE-CMR was 10% and TTE 12% but there was substantial “discordance” between the 2 techniques. Clinical/pathology endpoints at 6-month follow-up were higher in patients with LVT detected by DE-CMR, which the investigators feel “support DE-CMR as an appropriate reference standard.” The sensitivity, specificity, and predictive value of clinical TTE for detection of LVT compared with the DE-CMR reference standard are reported noting that use of an echocardiographic contrast agent, a method reported to increase the predictive value of TTE for LVT detection (8–10) was infrequent. As the investigators stress, this should not be considered a direct comparison of the 2 methods. An “intent to image” comparison of the 2 imaging modalities in a general population where those with “inadequate” TTEs and “contraindicated” DE-CMR were excluded may show different results. The predictive value of TTE was higher when the clinical indication was to evaluate for LVT and the quality of the TTE high. Smaller “intracavitary” and mural LVT, regardless of size, were more commonly detected by DE-CMR than by clinical TTE. The investigators conclude that routine clinical echo can yield misleading results concerning detection of LVT (5).

The dismal performance of routine TTE in contrast to DE-CMR raises concern regarding the reliability of TTE for detecting LVT. Original reports of the reliability of TTE for detecting LVT were from adequate TTE studies of high-risk patients, focused on detecting LVT (2–4). Inadequate or inconclusive TTEs have been reported in a high percentage of patients being evaluated for LVT (9,11) when echo contrast was not used. In part, this may explain the poor performance of TTE in the investigators’ report. Nevertheless, the observations point out potential limitations of routine clinical TTE for detecting LVT, particularly when the indication is not specific and echo contrast is used infrequently. These results send clear messages to clinicians and echocardiographers.

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From the Cardiology Division, Department of Internal Medicine, Hennepin County Medical Center and the University of Minnesota, Minneapolis, Minnesota. Oliver MS, Young JT. T’aint What You Do (It’s the Way That You Do It). Available at: http://www.youtube.com/watch?v=XS6XN5TCWig&t=1m08s. Accessed April 14, 2011. The authors have reported that they have no relationships to disclose.
First is the importance of the specific indication for TTE. If LVT was the indication, TTE’s sensitivity for detecting LVT nearly doubled in the study by Weinsaft et al. (5). If the indication is vague, TTE becomes a “screening” tool and its performance is reduced. The second relates to the technical performance of TTE. Useful techniques for detection of LVT and avoidance of false positives by TTE include attention to the LV apex (the most common site for LVT) where multiple depths of field, high transducer frequency, nonstandard acoustic windows, varying gain and sensitivity settings and verification on more than view are important (3,12). Previous and serial TTEs can also be valuable in understanding the anatomy of the left ventricle and correctly identifying normal structures. As the investigators stress, second harmonic imaging is particularly helpful in improving detection of LVT (8–10).

A prospective comparison of TTEs and DE-CMRs from multiple centers for detection of LVT would be welcomed but will likely show that both are reliable methods if performed well in selected populations. Ella Fitzgerald’s popular 1939 recording says it well “T’aint what you do (it’s the way that you do it)” and applies to performance of TTE, DE-CMR, and comparisons of diagnostic tests.

As with any diagnostic test, clearly defining the clinical indication enhances its predictive value. High-risk clinical settings for LVT include: 1) stroke, transient ischemic attack, or systemic embolism; 2) recent myocardial infarction—particularly the first 3 months following anterior infarction; 3) left ventricular aneurysm; and 4) decreased left ventricular systolic performance. For these clinical indications, TTE should include the basic imaging described here including echo contrast unless findings are unequivocal. The use of echo contrast is limited by cost and was undoubtedly affected by the U.S. Food and Drug Administration’s “black box” warning (13), which may have inadvertently limited the clinical use of a valuable adjunct to TTE. The frequency of serious adverse events reported for perflutren (an echo contrast agent) should allay any safety concerns (14–16). Support by professional societies for echo contrast to improve overall image quality and accuracy of interpretation seems appropriate.

The observations by Weinsaft et al. (5) should influence clinical practice and guide further investigation. When detection of LVT would influence treatment, clinicians should not rely on suboptimal TTEs; another diagnostic test such as DE-CMR or CT scan (17) should be performed. The natural history of LVT with contemporary treatment of acute myocardial infarction and congestive heart failure is variably reported (18–21) and the embolic potential of LVT in various clinical settings continues to be unclear as is the efficacy of anticoagulation for primary prevention of embolism, its duration, and endpoint (18,22,23). Both TTE and DE-CMR could play complimentary roles in further defining both the incidence and embolic potential of LVT.

**References**


19. Rabbani LE, Waksmonski C, Iqbal SN, et al. Determinants of left ventricular thrombus formation after primary percutaneous coronary interven-