Echocardiography

Assessing the Performance of Hand-Carried Echocardiographic Devices

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A new generation of hand-carried ultrasound devices has been developed that are small, lightweight (roughly 6 lbs), and relatively inexpensive. Although these devices do not provide the same image quality as standard echocardiographic machines and have limited Doppler capabilities, it has been suggested that they might be used as an alternative to the stethoscope in a variety of clinical settings.

Physician-Performed Point-of-Care Echocardiography Using a Laptop Platform Compared with Physical Examination in the Cardiovascular Patient

Spencer KT, Anderson AS, Bhargava A, et al.
J Am Coll Cardiol. 2001:37:2013–2018.

This study was motivated by recent observations that the skills of physical examination (PE) required to evaluate patients with suspected heart disease have been declining owing to the increase in advanced technology and the limited time available for bedside teaching. Because standard echocardiography is generally not immediately available at the time of initial patient contact, when questions arise concerning cardiac diagnoses, point-of-care (POC) echocardiography using one of these hand-held devices might therefore offer the potential for immediate diagnosis by the examining physician without requiring further follow-up.

Although point-of-care echocardiography improved on diagnoses from physical examination, it still failed to detect a number of important lesions, including hypertrophic cardiomyopathy in three of six patients studied.

In this study, 36 patients had a complete cardiovascular examination by four board-certified cardiologists. The physicians subsequently imaged each patient with a miniaturized echocardiographic platform. The yield of PE and POC echocardiography were compared using a complete echocardiographic study as the gold standard.

The PE failed to detect 59% of the overall cardiovascular findings. Physician-performed echocardiography with the prototype device missed 29% of the overall cardiovascular pathology. When considering only the major cardiovascular findings, the cardiologist PE still failed to correctly detect 43%. Point-of-care echocardiography reduced this to 21%, without significant variation among physicians. The lesions most frequently missed by PE included mitral and tricuspid regurgitation, along with the diastolic murmurs of mitral stenosis and aortic regurgitation. Left and right ventricular dysfunction was also poorly characterized by PE. Although POC echocardiography improved on these diagnoses, it still failed to detect a number of important lesions, including hypertrophic cardiomyopathy in three of six patients studied.

How Useful Is Hand-Carried Bedside Echocardiography in Critically Ill Patients?

Goodkin GM, Spevack DM, Tunick PA, Kronzon I.
J Am Coll Cardiol. 2001:37:2019–2022.

This study compared a hand-carried echocardiographic device (HC) with standard echocardiography in critically ill patients. In this study, the HC device missed a clinical finding related to the reason for referral in 31% of patients. In 19% of patients, a clinically important finding separate from the indication for echocardiography was also missed. The total number of patients with one or more missed findings was 36, or 45% of the study group. Most of the findings missed by HC were related to the absence of a true spectral Doppler capability. Two-dimensional imaging is also superior on standard echocardiographic devices. The authors concluded that although the hand-carried device was able to provide important anatomic information, it fell short of standard echocardiography in the evaluation of critically ill patients.

These two studies combine to suggest that although the current generation of hand-carried devices provides information that is clearly superior to that obtainable by PE, it falls short of that provided by a standard echocardiographic device. Because these studies were performed by trained echocardiographers or sonographers, the results obtained by less skilled operators would likely not be as good. Although it is likely that these devices will

improve with time, the time required to perform an examination and variability in image quality between patients will still remain a problem.

Which Is the Better Method for Assessing Changes on Doppler Echocardiograms?

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Echocardiographic techniques are commonly used to noninvasively assess cardiac valvular structure and function. The detection and quantitation of valvular regurgitation generally relies on color Doppler imaging and is reported using a semiquantitative scale (ie, mild, moderate, or severe). When serial studies are preformed, differences are often noted in the subjective perception of severity grade. These differences can either be reported based on the independent examination of serial studies or the side-by-side comparison of studies.

Specificity of Doppler Echocardiography for the Assessment of Changes in Valvular Regurgitation: Comparison of Side-by-Side Versus Serial Interpretation

Weissman NJ, Panza JA, Tighe JF Jr, et al.
J Am Coll Cardiol. 2001:37:1614–1621.

This study examines the specificity of two different methods for assessing change in aortic, mitral, and tricuspid valvular regurgitation in subjects (n = 219) from the placebo arm of a randomized, double-blind, clinical trial.

These data suggest that side-by-side comparison for assessing change in valvular regurgitation is more reliable than the independent evaluation of serial studies.

Three echocardiograms were recorded over a 10-month period. An initial and a 3-month echocardiogram were read as independent groups, blinded to all parameters except sequence. The initial and 10-month echocardiograms were read side by side, blinded to all parameters including sequence. The specificity of the serial versus side-by-side method for determining change in mitral regurgitation grade was 55.8% versus 93.2% ($P < .001$); tricuspid regurgitation 63.8% versus 97.6% ($P < .001$); and atrial regurgitation 93.7% versus 96.6% ($P = .08$). Most of the change occurred in the differentiation of none versus physiologic/mild regurgitation and was of limited clinical significance. The percentage of echocardiograms interpreted as non-evaluateable was lower for the side-by-side method than for the serial evaluations. These data suggest that side-by-side comparison for assessing change in valvular regurgitation is more reliable and has a higher specificity and minimal data loss when compared to the independent evaluation of serial studies. The findings of this study are important, because although side-by-side comparison is more difficult unless the data are stored digitally, it appears to be the better technique for accurate evaluation of changes in the severity of regurgitation. ■

Lipid Disorders

Antioxidants as Adjuvant Therapy for Cardiovascular Disease

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A dilemma currently facing primary care providers, internists, and particularly cardiologists is whether to recommend the use or the discontinuation of antioxidants as adjuvant therapy for the prevention of cardiovascular disease and events. It is quite common in the course of taking a history that patients will present a list of medicines they are currently taking that includes an antioxidant cocktail of at least Vitamin E and C. Recent data on antioxidants' safety and efficacy provided by the recent HOPE (Heart Outcomes Prevention Evaluation) Trial and the trial by Cheung et al (reviewed below) not only bring into question the usefulness of antioxidant therapy but also expose potential pitfalls of such therapy. This certainly impacts our approach to patients who inquire as to the benefit of these antioxidants. Our love affair with current antioxidant therapies