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REVIEW TOPIC OF THE WEEK

Operationalizing the 2014 ACC/AHA Guidelines for Valvular Heart Disease

A Guide for Clinicians

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ABSTRACT

The 2014 American College of Cardiology/American Heart Association guidelines for valvular heart disease were released to help guide the clinician in caring for patients with this ever more prevalent and complex group of diseases and have been instrumental in providing a foundation of knowledge for the management of patients with valvular heart disease. However, there are many caveats in applying the guidelines to individual patients. As clinicians, we wish to outline important aspects to be considered by other clinicians, including the integration of the echocardiogram with the history and physical examination, recognition of discordant data within an echocardiographic examination, and proper interpretation of the cutoff measurements applied to timing of intervention. Decisions regarding management should be individualized to the institution, particularly when recommending early operation for an asymptomatic patient. Finally, all decisions should be individualized to each patient by not only recognizing specific comorbidities, but also understanding the patient's needs and preferences. (J Am Coll Cardiol 2016;67:2289–94) © 2016 by the American College of Cardiology Foundation.

Due to the aging of the population, the last 50 years have brought to medical practice an increasing number of patients presenting with age-related or degenerative valvular heart disease (1). Thus, the knowledge and skills in the diagnosis and treatment of valvular heart disease have become a progressively more important part of the core competencies of all cardiologists. In parallel, the diagnosis and management of patients with valvular heart disease have undergone a significant transformation since the American College of Cardiology (ACC)/American Heart Association (AHA) guidelines for the management of patients with valvular heart disease were first written in 1998 (2). There are now long-term data on the natural history of patients with the different valve diseases using objective measures of valve severity at baseline. The development of modern cardiovascular imaging modalities—such as 2-dimensional, Doppler, transesophageal, and 3-dimensional echocardiography; computed tomography (CT); and cardiac magnetic resonance (CMR)—has significantly enhanced the clinician's armamentarium for diagnosis and quantitation of valve severity. Continuous improvement in interventions for patients with valvular heart disease, including the refinement of valve repair and the development of newer-generation prostheses, has led to a lowered threshold for indications for valve intervention. In addition, less invasive interventions, such as transcatheter valve replacements and repair, have extended the population who can receive valve interventions to elderly, frail patients. On the basis of this accumulating knowledge, a new version of the ACC/AHA guidelines for the management of patients with valvular heart disease was released in 2014 to help guide the clinician in caring for patients with this ever more prevalent and complex group of diseases (3).

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ABBREVIATIONS AND ACRONYMS

CMR = cardiac magnetic resonance

CT = computed tomography

The Valvular Heart Disease Guidelines Committee was composed of experts in all areas of cardiovascular practice involving patients with valvular lesions, including clinicians, imagers, interventionalists, surgeons, and anesthesiologists. Much time and effort was put into creating class recommendations on the basis of evidence as well as the clinical experience of experts in valvular heart disease (4). However, because no guideline can be written to account for the richness of biological variability in our patients, there are many caveats in applying the results of these guidelines to patient care. We truly feel that a clinician who follows the recommendations of the guidelines 100% of the time is not properly doing his or her job as a physician. This paper outlines a clinical perspective for interpreting and implementing these guideline recommendations to provide optimal patient care.

INTEGRATION OF THE ECHOCARDIOGRAM WITH THE HISTORY AND PHYSICAL EXAMINATION

Echocardiography has rapidly evolved as the most important single diagnostic modality for patients with valvular heart disease. Two-dimensional echocardiography is able to visualize valve morphology and motion, provide concomitant information about the status of the left ventricle and other cardiac chambers, as well as evaluate other cardiac structures, such as aortic size and pericardial abnormalities. Doppler echocardiography now provides hemodynamic information regarding the severity of valve stenosis, valve regurgitation, and intracardiac and pulmonary pressures (5). However, the echocardiogram (or any other test) should not be used alone in clinical decision making for patients with valvular heart disease because no cardiac test is both 100% sensitive and 100% specific. A meticulous history and physical examination is of great importance in the evaluation of patients with valvular heart disease, for it establishes a "pre-test probability" of the severity of a valve lesion and its effect on the circulation and cardiac chambers. The results of a 2-dimensional and Doppler echocardiogram are most useful when applied as a diagnostic modality using the pre-test probability as a baseline. In patients with suspected coronary artery disease, the accuracy of a stress test is dependent upon the pre-test probability of coronary artery disease in the patient being studied. The same concept then applies to the diagnostic utility of an echocardiogram for patients with valvular heart disease (**Central Illustration**).

For instance, a patient may present with exertional symptoms of dyspnea and clinical findings of severe aortic stenosis, with a dampened carotid upstroke, a late-peaking systolic ejection murmur, and absent aortic component of the S_2. The Doppler echocardiogram might show a mild degree of aortic stenosis with a mean gradient <30 mm Hg and a valve area >1.2 cm^2. In this instance, the echocardiogram may have significantly underestimated the severity of aortic stenosis due to the inability of the echocardiographer to properly align the Doppler beam with the aortic velocity jet. The high pre-test probability from physical examination that the patient has severe aortic stenosis should cause the clinician to doubt the echocardiographic results, leading to additional investigation.

Another not uncommon example of the need for using the physical examination is the patient presenting with new-onset dyspnea in whom a loud holosystolic murmur and an early diastolic filling sound are heard at the apex. The echocardiogram may show a very narrow eccentric jet of mitral regurgitation that occupies <15% of the left atrial area, interpreted as a mild degree of mitral regurgitation. However, the history and physical examination suggest severe mitral regurgitation due to an unsupported segment of the posterior leaflet. If an echocardiographer relies only on regurgitant jet area for determination of mitral regurgitation severity, there will be a gross underestimation of the severity of regurgitation due to the loss of energy of the color flow jet as it impinges on the atrial wall.

The clinician also has to be aware of discrepancies contained within the echocardiographic report. A report may describe severe mitral regurgitation due to mitral valve prolapse on the basis of the calculation of a large effective orifice area of 0.4 cm^2 and a central jet of mitral regurgitation that occupies nearly two-thirds of the left atrial area in a patient with mitral valve prolapse. However, there may be normal left atrial and ventricular volumes. If the left ventricular and left atrial sizes are normal in an asymptomatic patient, severe chronic mitral regurgitation cannot be present. If 50% of left ventricular stroke volume is regurgitated into the left atrium, diastolic pressure has to be elevated and forward output has to be diminished, conditions that cause symptoms. In this case, the severity of mitral regurgitation is overestimated by using the proximal isovelocity surface area, which assumes that the regurgitation occurs throughout all of systole, whereas, in some patients with mitral valve prolapse, the regurgitation occurs in only very late systole (6). The physical examination would demonstrate a very late soft systolic murmur with no diastolic