Aortic Dissection
The Diagnostic Dilemma Resolved

Acute aortic dissection is the most common aortic pathology in the United States needing emergent diagnosis and treatment. The prognosis is decidedly dismal, with a mortality rate of 25 percent within an hour of the event, 50 percent cumulative mortality at one week, and 90 percent at one year in untreated or unrecognized cases.1 Prompt and accurate diagnosis is critical in determining the outcome of this medical and surgical emergency. Available technologies include angiography, contrast-enhanced computed tomography (CT), magnetic resonance (MR) imaging, and combined transthoracic-transesophageal echocardiography. It is important to remember that one or more of these technologies should be employed when the suspicion of acute aortic dissection has been entertained after using the mundane, often forgotten, but very useful methodology called history and physical examination. The issue of which of the available technologies to utilize in order to provide the best care to the patient is a subject of debate.

The principles involved in choosing the investigation for the diagnosis of aortic dissection from a surgeon's perspective can be summed up in three essential steps: (1) confirmation of dissection, (2) determination of ascending aortic involvement, and (3) demonstration of abnormal anatomic features.2 However, there are several other important issues to be considered in choosing the imaging modality best suited to making or excluding the diagnosis of aortic dissection. These include the rapidity with which the test can be obtained in a given hospital; the skill of the interpreting physician and technologist performing the examination; the experience with the technique in a given center; the proven cost-benefit advantage (let us not forget the era in which we are living); and the specificity, sensitivity, and positive predictive accuracy of the test. If we keep all of these factors in mind while selecting the imaging modality or a combination of complementary modalities, we will be able to deliver high-quality care at a reasonable cost, without jeopardizing safety, in our patients with suspected aortic dissection.

Angiography, considered one of the gold standards for the diagnosis of aortic dissection, has at best an accuracy rate of 95 percent to 99 percent.3 False-negative results are not uncommon and are shown in one of the cases reported by Chan in this issue of Chest (see page 406). The procedure itself has a defined mortality and morbidity. Erbel and his colleagues,4 in a multicenter European trial involving 164 patients with suspected aortic dissection, demonstrated that angiography had a sensitivity of 88 percent and specificity of 94 percent.

The sensitivity and specificity of contrast-enhanced CT are as good as, and in most instances better than, those of angiography. Pooled data indicate that it has a sensitivity of 82 percent and a specificity of 100 percent.5 In the multicenter European trial reported by Erbel and his colleagues, sensitivity and specificity were 83 percent and 100 percent, respectively.

Magnetic resonance imaging has been shown to have high sensitivity and specificity of up to 98 percent, as reported by Christopher and his col-
leagues, who reviewed pooled data in the literature.

Transcatheter echocardiography has a positive predictive accuracy of 91 percent. However, combined transcatheter-transesophageal echocardiography has a sensitivity of 98 percent and a specificity of 99 percent, approaching those of MR imaging and CT, according to the analysis of pooled data reported by Christopher et al. The multicenter European trial reported similar sensitivity and specificity using single-plane transesophageal echocardiography (TEE). Chan has already alluded to the advantage of biplane TEE in obviating the so-called blind spot of the aorta, and investigations in preliminary stages confirm the high degree of accuracy in making the diagnosis of aortic dissection using biplane TEE.

Several advantages of the combined echocardiographic technique need to be highlighted in recommending its use as a modality of choice. It fulfills all three steps of investigation from the surgeon's perspective (ie., making the diagnosis, determining the ascending aortic involvement, and defining abnormal anatomy). This imaging modality has further advantages over other technologies in that it can be performed with rapidity in locations such as the emergency and trauma unit, bedside, and critical care unit; it does not require moving the patient to the machine; it does not require mobilizing a large team of skilled personnel (in most instances, it is performed by a single trained echocardiologist); it allows evaluation of other intracardiac features at the same time, such as aortic valve regurgitation, pericardial effusion, and left ventricular systolic function; and it is not as expensive as some of the other modalities.

Combined echocardiographic examination in skilled hands will provide the surgeon with all the information needed to proceed with the operation without encountering surprises after opening the chest in the very large majority of patients. This has been well documented in the article by Chan. Even the nonbelievers must come to grips with the fact that this imaging modality offers one of the best alternatives in patients with suspected aortic dissection, given the number of recent publications documenting its utility and reliability in making the diagnosis.

At our institution, we have noted a change in the trend of diagnostic modality utilized for aortic dissection toward combined echocardiography or CT scan from angiography between the years 1980-85 and 1986-90. Preliminary analysis from 242 patients with a confirmed diagnosis of aortic dissection between 1980-90 demonstrates a decrease in the utilization of angiography (15 percent) in favor of CT scan (34 percent), or combined echocardiography (19 percent) (personal communication, Drs. Peter Spittel and A. Jamil Tajik) in the years 1986-90.

The issue not addressed by Chan in his report, as well as in all other published studies, is documenting the speed with which combined echocardiography can make the diagnosis in comparison to angiography or other radiologic modalities. It is obvious to all but the skeptics that this should be the case, but the nonbelievers are likely to ask for double-blind prospective studies documenting this, and, sadly, they are lacking.

Notwithstanding the usefulness of combined echocardiography, one must point out the limitations, including the fact that not all patients are echogenic, that introduction of a TEE probe may not be possible in up to 2 percent of patients, and that false-positive and false-negative results are apt to occur in the best-trained hands given the nature of disease and technological limitations. However, these limitations are not unique to echocardiography, and each of the available modalities has its inherent limitations. Hence, one must not feel obligated to use a single modality in all cases, and use of complementary imaging tools is acceptable.

Lest it be forgotten, it should be emphasized that if there is a suspicion of aortic dissection and any one of the imaging modalities provides equivocal or unsatisfactory data, it behooves us as physicians to perform sufficient tests until the diagnosis is completely ruled out, since we must never forget that at the end of the catheter or the transducer or the magnet or the roentgen tube lies a human being, just like one of us.

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REFERENCES

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