the subject of the SSS will continue to stimulate pooling of our information in this difficult area.

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Single Plane Vs Biplane Studies In Coronary Artery Disease

To the Editor:

In the recent article by Kostuk and associates (Circulation 47: 242, 1973) the value of lateral plane radioisotope angiography in assessing left ventricular performance in acute myocardial infarction was presented. This noninvasive technique was shown to be reasonably accurate in reflecting infarct size and subsequent course. Of note is that in attempting to verify the validity of single plane studies in coronary artery disease, a comparison was made of ejection fractions obtained from single plane radioisotope determination versus biplane cineangiograms. In their study, an excellent correlation was obtained with an $r$ value of 0.91 for ejection fractions. Although Sandler and Dodge$^1$ have shown the reliability of single plane angiograms in people with diffuse myocardial disease, recent studies$^2$ have suggested that in coronary artery disease, marked discrepancies may exist between single plane and biplane calculations. This is not surprising in that the lateral or RAO projection does not visualize the posterior lateral or anteroseptal areas. As these areas are frequently well preserved, it has been noted that the ejection fraction, as calculated from the lateral or RAO projection, is frequently underestimated. Because of the unpredictability of which walls are involved in the heart of a given patient, there is no way of predicting the accuracy of a single plane study. Moreover, with sequential studies, unpredictable changes in wall segments may occur and further discrepancies or false values introduced. Thus, it would seem that although there is a temptation to use the simplified single plane approach in coronary artery disease, a note of caution should be sounded in regard to the possibility of errors due to the variable segmental involvement so characteristic of coronary artery disease.

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The authors reply:

To the Editor:

We appreciate Dr. Vogel's interest in our report$^1$ and his comments. Certainly, we concur that calculations of ejection fraction based on a single plane method should be interpreted with caution. As we noted in our report, resolution with isotope angiography is less satisfactory than that possible with injection of contrast media. Nevertheless, because of the innocuous nature of isotope angiography, it is particularly well suited for serial studies in critically ill patients.

We have previously demonstrated that the selection of a specific radiographic projection may influence apparent mean velocity of fiber shortening at the left ventricular minor equator in patients with regional abnormalities of ventricular wall motion.$^2$ However, ejection fraction is calculated from derived radii obtained after planimetry of a projected image obtained in a selected plane. Accordingly, calculated ejection fraction is less likely to be influenced appreciably by regional abnormalities of wall motion although alterations in either area or length at end systole might cause some under-estimation of this parameter. Because of this potential difficulty we compared ventricular volumes and ejection fractions calculated by biplane cineangiographic analysis to the same parameters calculated by the single plane method. As noted,$^1$ values obtained with the two methods correlated closely in 46 patients, 22 of whom exhibited segmental wall motion abnormalities due to coronary artery disease. Because of the possible hazard of injection of contrast medium this comparison was not performed in patients with acute myocardial infarction. Furthermore, in 15 patients values for ejection fraction obtained from the single plane radioisotope angiogram correlated closely ($r = 0.94$) with values calculated from biplane cineangiograms.

The directional changes in ejection fraction detected with the isotope angiographic method appear to be useful in critically-ill patients. Serial changes reflect alterations in ventricular performance as indicated in our recent report. Thus, although conclusions based on single plane studies must be interpreted with caution as Dr. Vogel suggests, utilization of the convenient method described is of considerable value in the assessment of ventricular performance in patients with acute myocardial infarction.

References
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