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Role of Detection of Myocardial Viability by Dobutamine Stress Echocardiography in Patients after Myocardial Infarction

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Role of Detection of Myocardial Viability by Dobutamine Stress Echocardiography in Patients after Myocardial Infarction

To the editors:

Optimization of selection between medical or conservative treatment for patients with coronary artery disease including those after myocardial infarction (MI) remains an important clinical problem. The role of detection of viable myocardium in the area of postinfarction dyssynergy for this selection is not completely determined. The purpose of this study was to assess the role of dobutamine stress echocardiography (DSE) for detection of myocardial viability and the value of this data in selection of treatment strategy in patients after MI.

Methods
After DSE, 45 patients were randomly assigned to groups A (medical therapy, n = 25) and B (percutaneous transluminal coronary angioplasty [PTCA], n = 20). 7 ± 2 weeks after PTCA, patients in group B underwent control echocardiography. Based on the number of viable segments (VS) by DSE and type of treatment, all patients were further divided into 4 follow-up subgroups and the incidence rates of coronary events were compared.

Results
The best regional contractility reversal was observed in segments with a biphasic and with "worsening" response to dobutamine – $p < 0.05$ compared with sustained improvement and no change. The number of VS correlated with the amount of ejection fraction (EF) increase after PTCA. In the presence of ≥ 4 VS, EF increased by ≥ 5 %. In group A, patients with viable myocardium had a complication rate of 71 %, while patients without viability showed a complication rate of 17 %. In group B these rates did not differ significantly. Regression analysis showed that the presence of 4 VS was an independent factor of prognosis which had opposite effects in groups A and B.

Discussion
Using DSE for predicting local contractility improvement after revascularisation
Analysis of changes in segment function after revascularisation in patients of group B allowed criteria to be specified for the test interpretation: segments with a biphasic response, hypokinetic segments with worsening response and akinetic segments with worsening at low dose dobutamine infusion should be considered viable, while segments showing sustained improvement, no change, or akinetic segments with worsening at high dose dobutamine infusion are likely to be irreversibly damaged (non-viable).

The above stress echocardiographic criteria of viability exhibited 81 % sensitivity and 93 % specificity in prediction of local contractility reversal. The high predictive value of these criteria, which are not generally used, can be explained by the contemporary pathologic concepts of chronic contractile dysfunction. They imply that in most cases the dysfunctional myocardium consists of a mixture of scar, non-ischaemic myocardium, hibernating or stunned tissue, the proportion of which determines its resting function, response to dobutamine and the potential for contractile reversal [1].

Beyond this must be discussed which variables, besides the stress echocardiographic, allow patients with viable myocardium to be identified. It looks attractive to use the ECG markers for this purpose, since they are easily obtained and their interpretation is real-time and objective. Our results show that ST segment elevation and/or T-wave pseudonormalisation during DSE can be used as the second-line viability marker.

There was a tendency towards a higher incidence of viability in patients after non-Q-wave MI and early after MI but it did not reach statistical significance. However, our results did not confirm those reported by Pfisterer et al. [2], stating that viability may exist for not more than 3 months after MI.

Using DSE for predicting global contractility improvement after revascularisation and for risk-stratification of coronary events
The value of DSE for predicting regional wall motion abnormality after revascularisation was estimated in a number of studies. However, the possibility to predict the restoration of global contractility of the left ventricle (LV) [3] – which is of clinical importance – is less explored.

In this study, the number of viable myocardial segments correlated with the extent of EF change after revascularisation. In the presence of 4 or more viable segments we observed an increase in global contractility by 5 % or more. The described criterion yielded a 86 % sensitivity and specificity in predicting a significant ejection fraction (EF) increase after PTCA.

Hence, DSE not only allows the viable myocardium to be reliably identified, but also predicts whether its amount is sufficient to maintain substantial increase of global LV function after revascularisation. Among patients with essentially reduced EF (< 40 %) it allows those individuals in whom revascularisation will result in an improvement of prognosis and functional condition to be identified [4]. In these patients the detection of this amount of viability by DSE should be an essential argument in favor of revascularisation.

The importance of identifying patients with a substantial volume of viability in the dysfunctional area for stratification of prognosis is supported in this study by the analysis of the subsequent course of illness and incidence of coronary complications depending on the amount of viable myocardium and the type of therapy. We observed a tendency towards a greater incidence of events in patients with a substantial amount of viable myocardium on medical therapy and in patients without large amounts of viability who underwent revascularisation. In the case of medical therapy, the presence of 4 viable segments was an independent predictor of coronary complications, while in the PTCA group, on the other hand, the absence of 4 viable LV segments in patients was a factor which increased the probability of coronary events.

Thus, the presence of a significant amount of viable myocardium in the dysfunctional area of LV which can be detected by DSE, is the factor increasing the probability of a recurrent acute coronary syndrome in patients on medical therapy, irrespectively of the global LV function. This result confirms the conclusion of Bonow [5] that viable dysfunctional tissue may become a substrate for recurrent coronary events. Revascularisation eliminates the adverse influence of this factor. Observation on a larger number of patients and for a longer period will allow final conclusions on the expediency of revascularisation in patients with a viable myocardium with normal or insignificantly reduced EF, i. e., in patients usually referred to as a "low risk" group.

References:

1. Kaul S. The response of the dysfunctional myocardium to dobutamine: "The eyes see what the mind knows!". J Am Coll Cardiol 1996; 27: 1608–11.
2. Pfisterer ME, Buser P, Osswald S, Weiss P, Bremerich J, Burkart F. Time dependence of left ventricular recovery after delayed recanalization of an occluded infarct–related coronary artery: findings of a pilot study. J Am Coll Cardiol 1998; 32: 97–102.
3. Gheorgiade M, Bonow RO. Chronic heart failure in the United States. A manifestation of coronary artery disease (Review). Circulation 1998; 97: 282–9.
4. Risum O, Nitter-Hauge S, Abdelnoor M, Levorstad K, Arafa O, Svennevig JL. Mortality and morbidity after coronary artery bypass surgery related to pre–operative left ventricular ejection fraction: a follow-up study. Eur Heart J 1996; 17: 874–9.
5. Bonow RO. Identification of viable myocardium (Review). Circulation 1996; 94: 2674–80.

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