UNIVERSITÀ
DEGLI STUDI
FIRENZE

FLORE

Repository istituzionale dell'Università degli Studi di Firenze

Diagnostic accuracy of peak exercise echocardiography in coronary artery disease : comparison with thallium-201 myocardial

Questa è la Versione finale referata (Post print/Accepted manuscript) della seguente pubblicazione:

Original Citation:

Diagnostic accuracy of peak exercise echocardiography in coronary artery disease : comparison with thallium-201 myocardial scintigraphy / GALANTI G; R. SCIAGRA'; COMEGLIO M; TADDEI T; BONECHI F; GIUSTI F; MALFANTI PL; BISI G.. - In: AMERICAN HEART JOURNAL. - ISSN 0002-8703. - STAMPA. - 122:(1991), pp. 1609-1616.

Availability:

This version is available at: 2158/222298 since:

Publisher:

Mosby Year Book Incorporated:6277 Sea Harbor Drive:Orlando, FL 32887:(800)654-2452, (407)345-4000,

Terms of use:

Open Access

La pubblicazione è resa disponibile sotto le norme e i termini della licenza di deposito, secondo quanto stabilito dalla Policy per l'accesso aperto dell'Università degli Studi di Firenze (<https://www.sba.unifi.it/upload/policy-oa-2016-1.pdf>)

Publisher copyright claim:

(Article begins on next page)

- tion reassessed after a decade of new drugs. *J Clin Pharmacol* 1984;24:147-57.
25. Mitchell MF, Howell T, Sturridge MF, Terrar DA, Twist VW. Electrical properties and responses to noradrenaline of individual heart cells isolated from human ventricular tissue. *Cardiovasc Res* 1985;20:869-76.
 26. Mitenrieth G, Surawicz B, Kuo CS, Arita M. Primary T wave abnormalities caused by uniform and regional shortening of ventricular monophasic action potential in dog. *Circulation* 1985;71:668-74.
 27. Kass RS, Wiegers SE. The ionic basis of concentration-related effects of noradrenaline on the action potential of calf cardiac Purkinje fibres. *J Physiol (Lond)* 1984;349:643-61.
 28. Taggart P, Sutton P, Lab M, Dean J, Harrison F. The interplay between adrenaline and interbeat interval on ventricular repolarisation in the intact heart in situ. *Cardiovasc Res* 1990;24:884-95.
 29. Okada RD, Glover D, Gaffney T, Williams S. Myocardial kinetics of technetium-99m-hexakis-2-methoxy-2-methylpropyl-isocitrate. *Circulation* 1988;77:491-8.

Diagnostic accuracy of peak exercise echocardiography in coronary artery disease: Comparison with thallium-201 myocardial scintigraphy

To evaluate the accuracy of exercise two-dimensional echocardiography for the recognition of coronary artery disease, 53 patients (46 men and 7 women, age range 35 to 69 years) without either previous myocardial infarction or resting wall motion abnormalities, were studied. According to coronary angiography 26 had normal coronary arteries, 14 had one-vessel, seven had two vessel, and six had three-vessel disease. After withdrawal of any therapy, all patients underwent a single exercise stress test with a stress table during which cine-loop digitized echocardiographic images were acquired and 74 MBq of thallium-201 (Tl-201) were injected. Echocardiographic images were evaluated at rest and at peak exercise. Three-view planar scintigraphic images were collected immediately after exercise and 4 hours later. For the overall recognition of coronary artery disease, exercise echocardiography had 77.8% sensitivity and 65.4% specificity; myocardial scintigraphy had 100% sensitivity and 92.3% specificity; and exercise echocardiography had 92.6% sensitivity and 96.2% specificity (both NS versus myocardial scintigraphy). Global accuracy was 71.7% for exercise echocardiography, 94.3% for myocardial scintigraphy, and 96.2% for myocardial scintigraphy. For the classification of the individual involved coronary arteries, the sensitivity of myocardial scintigraphy was 84.8% and that of exercise echocardiography was 63% ($p < 0.01$); the related specificities were 98% and 98.2% respectively (NS). It may be concluded that exercise echocardiography is highly accurate for the recognition of coronary artery disease, whereas it appears less sensitive in the identification of the involved vessels, particularly in patients with multivessel disease. (AM HEART J 1991; 122:1609-1614)

Giorgio Galanti, MD, ^a Roberto Sciagrà, MD, Marco Comeglio, MD, Tamara Taddei, MD, Francesco Bonechi, MD, ^a Fabrizia Giusti, MD, Pierluigi Malfanti, MD, ^a and Gianni Bisi, MD. *Florence, Italy*

From Institute of Clinica Medica 1, ^aDepartment of Clinical Pathophysiology, Nuclear Medicine Unit, University of Florence.

Received for publication Dec. 12, 1990; accepted June 3, 1991.

Reprint requests: Dott. Giorgio Galanti, Istituto di Clinica Medica 1, Viale Morgagni 85, 50134 Firenze, Italy.

4/1/32790

In the last 10 years an ever-increasing interest has been focused on the use of echocardiography coupled with exercise stress testing for the diagnosis and evaluation of coronary artery disease. The well-known advantages of echocardiography over other

Fig. 1. Echocardiographic examination during upright bicycle exercise test with stress table.

imaging techniques, such as low cost, absence of radioactive exposure, and wide availability, would make this approach very attractive. Moreover, the remarkable technical advances of echocardiographic imaging and particularly the introduction of digital image processing with cine-loop and quad-screen format displays have simplified and made more accurate the comparison of baseline and stress data.

Several studies have already demonstrated the value of exercise echocardiography.¹⁻¹⁵ Some problems, however, remain to be solved in defining the true role of exercise echocardiography.^{16,17} The pre- and post-test referral biases limit the value of various previous reports.* Furthermore, many protocols have employed only post-exercise images† instead of those collected at peak exercise,^{1,3,22,23} which could be superior in identifying the magnitude of abnormalities.^{21,23,24} Finally, few data⁴ are available about the

comparison of exercise echocardiography with a simultaneously performed reference method such as thallium-201 (Tl-201) myocardial scintigraphy. Therefore the aim of this study was to compare the accuracy of peak exercise echocardiography with that of Tl-201 myocardial scintigraphy performed during the same exercise test, with respect to both the recognition of coronary artery disease and to the classification of the involved vessels, using coronary angiography as the reference standard.

METHODS

Patient population. From December 1988 through May 1990 among the inpatients and outpatients referred to our Nuclear Medicine Department for exercise myocardial scintigraphy with Tl-201 154 unselected patients were also simultaneously studied with exercise echocardiography. The indications for performing myocardial scintigraphy in these patients were the evaluation of typical or atypical chest pain in subjects with a nondiagnostic exercise electrocardiogram, the assessment of disease extent in patients with known coronary artery disease, and the prognostic evaluation of patients with previous myocardial infarction. The echocardiographic images were of good quality both at rest and during exercise in 144 patients (93.5%).

For the aims of the present study, patients presenting with the following features were selected: (1) absence of wall motion abnormalities on the resting echocardiogram; (2) no history of previous myocardial infarction, coronary artery bypass grafting, or coronary angioplasty; (3) those having recently undergone left heart catheterization with coronary angiography or being scheduled for it even before the results of myocardial scintigraphy were known; and (4) no history or investigational evidence (including two-dimensional echocardiography and color Doppler) of valvular heart disease or cardiomyopathy.

The final study group therefore included 53 subjects (46 men and 7 women; mean age 54.3 ± 7 years, range 35 to 69). Among them, 26 had a history of atypical chest pain, 22 of typical effort angina, and five of typical chest pain both at rest and during stress. According to the usual policy of our Nuclear Medicine Department for the diagnostic use of myocardial scintigraphy, β -blockers, calcium channel blockers, and nitrates were withdrawn in all patients 1 week, 48, and 24 hours, respectively, before the exercise study. Therapy was resumed after completion of the whole investigation. Informed consent to participate in the study was obtained from all patients.

Exercise testing. Exercise testing was performed in the morning after overnight fasting, using an electromagnetic braked bicycle ergometer equipped with a rigid and reclining straight back that was set at a 75-degree angle (stress table, Fig. 1). A twelve-lead electrocardiogram and blood pressure readings were monitored throughout the whole exercise program. The location of the precordial electrodes was sometimes slightly modified to avoid interference with the optimal echocardiographic window. Exercise testing was performed starting with a 25 W work load, which was

*References 2, 3, 5, 7, 18, and 19.

†References 4, 5, 10, 12, and 20 to 22.