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The non-invasive coronary flow reserve predicts exercise capacity in patients undergoing cardiac rehabilitation

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Background: The benefit of exercise on peripheral muscles is established but the exact role of the coronary microcirculation in exercise capacity after cardiac rehabilitation (CR) is unclear. Objective: Our aim was to test the relationship between non-invasive coronary flow reserve (CFR) and exercise capacity in patients undergoing CR after acute myocardial infarction (AMI).

Methods: CFR was performed by transthoracic Doppler echocardiography in the left anterior descending artery 24 h after angioplasty (CFR1) and after 20 sessions of CR program (at 4±1 months) (CFR2) in 60 consecutive patients (57±11 years, 30% women) with an anterior AMI successfully treated by primary coronary angioplasty. CFR was performed in a modified parasternal view using intravenous adenosine infusion (0.14 mg/kg/min within 2 minutes). CR program consisted of a half hour of fractioned exercise added of a half hour session of general gymnastics and body building.

To test the exercise capacity, symptom limited exercise echocardiography was performed just after the CFR2, in a semi-supine position, starting at 25 watts, with 20–25 watts increments of workload every two minutes.

Results: CFR was measured successfully in all patients, and CFR2 was significantly higher than CFR1 (2.9 ± 0.65 vs 1.9 ± 0.4 , $p < 0.001$). Though CFR1 was correlated to left ventricular systolic function and its improvement at follow-up (all, $p < 0.01$), CFR2 was independently related to exercise capacity (mean workload 100 ± 30 watts, percent maximal heart rate $83 \pm 12\%$, no ischemia, no new wall motion abnormalities in all tests) after adjusting for age, sex, and body mass index ($r = 0.6$, $p < 0.01$).

Conclusion: CFR predicts exercise capacity in patients undergoing a CR program after AMI. The improvement of CFR contributes to cardiac performance.