Abstract: The instantaneous response of the collateral circulation to isometric physical exercise in patients with non-occlusive coronary artery disease (CAD) is not known. Thirty patients (age 59 +/- 9 years) undergoing percutaneous coronary intervention because of stable CAD were included in the study. Collateral function was determined before and during the last minute of a 6 min protocol of supine bicycle exercise during radial artery access coronary angiography. Collateral flow index (CFI, no unit) was determined as the ratio of mean distal coronary occlusive to mean aortic pressure both subtracted by central venous pressure. To avoid confounding due to recruitment of coronary collaterals by repetitive balloon occlusions, patients were randomly assigned to a group 'rest first' with CFI measurement during rest followed by CFI during exercise, and to a group 'exercise first' with antecedent CFI measurement during exercise before CFI at rest. Simultaneously, coronary collateral conductance (occlusive myocardial blood flow per aorto-coronary pressure drop) was determined by myocardial contrast echocardiography in the last 10 consecutive patients. Overall, CFI increased from 0.168 +/- 0.118 at rest to 0.262 +/- 0.166 during exercise (P = 0.0002). The exercise-induced change in CFI did not differ statistically in the two study groups. Exercise-induced CFI reserve (CFI during exercise divided by CFI at rest) was 2.2 +/- 1.8.
Overall, rest to peak bicycle exercise change of coronary collateral conductance was from 0.010 +/- 0.010 to 1.109 +/- 0.139 mL/min/100 mmHg (P< 0.0001); the respective change was similar in both groups. In patients with non-occlusive CAD, collateral flow instantaneously doubles during supine bicycle exercise as compared with the resting state. ClinicalTrials.gov Identifier: NCT00947050.