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Original Article

Fractional Flow Reserve-Guided Multivessel Angioplasty in Myocardial Infarction

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Abstract

Background:

In patients with ST-segment elevation myocardial infarction (STEMI), the use of percutaneous coronary intervention (PCI) to restore blood flow in an infarct-related coronary artery improves outcomes. The use of PCI in non-infarct-related coronary arteries remains controversial.

Methods:

We randomly assigned 885 patients with STEMI and multivessel disease who had undergone primary PCI of an infarct-related coronary artery in a 1:2 ratio to undergo complete revascularization of non-infarct-related coronary arteries guided by fractional flow reserve (FFR) (295 patients) or to undergo no revascularization of non-infarct-related coronary arteries (590 patients). The FFR procedure was performed in both groups, but in the latter group, both the patients and their cardiologist were unaware of the findings on FFR. The primary end point was a composite of death from any cause, nonfatal myocardial infarction, revascularization, and cerebrovascular events at 12 months. Clinically indicated elective revascularizations performed within 45 days after

primary PCI were not counted as events in the group receiving PCI for an infarct-related coronary artery only.

Results:

The primary outcome occurred in 23 patients in the complete-revascularization group and in 121 patients in the infarct-artery-only group that did not receive complete revascularization, a finding that translates to 8 and 21 events per 100 patients, respectively (hazard ratio, 0.35; 95% confidence interval [CI], 0.22 to 0.55; P<0.001). Death occurred in 4 patients in the complete-revascularization group and in 10 patients in the infarct-artery-only group (1.4% vs. 1.7%) (Hazard ratio, 0.80; 95% CI, 0.25 to 2.56), myocardial infarction in 7 and 28 patients, respectively (2.4% vs. 4.7%) (Hazard ratio, 0.50; 95% CI, 0.22 to 1.13), revascularization in 18 and 103 patients (6.1% vs. 17.5%) (Hazard ratio, 0.32; 95% CI, 0.20 to 0.54), and cerebrovascular events in 0 and 4 patients (0 vs. 0.7%). An FFR-related serious adverse event occurred in 2 patients (both in the group receiving infarct-related treatment only).

Conclusions:

In patients with STEMI and multivessel disease who underwent primary PCI of an infarct-related artery, the addition of FFR-guided complete revascularization of non-infarct-related arteries in the acute setting resulted in a risk of a composite cardiovascular outcome that was lower than the risk among those who were treated for the infarct-related artery only. This finding was mainly supported by a reduction in subsequent revascularizations. (Funded by Maasstad Cardiovascular Research and others; Compare-Acute ClinicalTrials.gov number, NCT01399736.).

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