Heart failure (HF) is a major cause of late morbidity and mortality after myocardial infarction even in the era of primary percutaneous coronary intervention (PCI). Several approaches exist for early identification of patients at risk of HF, including clinical and angiographic scoring, cardiac imaging and invasive coronary physiology, but these are not systematically integrated in current clinical practice.

Aim of the research was to determine the strength of the relationship between infarct size (IS) and/or microvascular obstruction (MVO) assessed early after primary PCI in ST-elevation myocardial infarction (STEMI) and subsequent all-cause mortality, reinfarction, and hospitalization for HF. Potential influence of factors related to patients characteristics (age, sex, smoking status, obesity etc.) or to time of the day or even ambient temperature was also considered.

A literature review was performed with keywords (“infarct size” and/or “left ventricular function” and/or “microvascular obstruction”) and (“heart failure” or “prognosis” after primary percutaneous intervention). No restrictions were applied in terms of geography or design of study. Publications related to the validation and/or comparison of methods to quantify infarct size or microvascular obstruction were discarded.

Search criteria yielded 23 references. After exclusion of validation studies, 12 publications were retained. Most of these papers were authored by the same group of investigators.

A pooled patient-level analysis from 10 randomized primary PCI trials (for a total of 2,632 patients) established that IS assessed within one month after reperfusion was strongly associated with all cause mortality and hospitalization for HF but not significantly related to subsequent infarction.

After adjustment for baseline covariates, every 5% increase in IS was independently associated with a 19% increase in 1-year all-cause mortality.

In this regard, 3 of the strongest baseline determinants of IS in patients undergoing primary PCI were anterior infarct location (LAD infarct artery), pre-PCI Thrombolysis in Myocardial Infarction (TIMI) 0/1 flow, and symptom onset-to-first device time, variables that also strongly correlate with mortality after primary PCI.

Pooled analysis of patient data from 7 of these 10 randomized primary PCI showed that MVO assessed within 7 days after reperfusion was significantly associated with all-cause mortality and hospitalization for HF but not related to subsequent infarction.

Microvascular obstruction (MVO) refers to the lack of perfusion in the coronary microcirculation despite revascularization of the epicardial vessel. MVO can be detected by coronary angiography, myocardial contrast echocardiography or by invasive measurement of the index of microvascular resistance (IMR) using a diagnostic guidewire. Cardiac magnetic resonance (CMR) is the most sensitive and specific technique.

Infarct size and microvascular obstruction after primary PCI are strongly associated with all-cause mortality and hospitalization for heart failure within one year. They may therefore be useful as endpoints in clinical trials and as important prognostic measures when caring for patients with STEMI. Innovative technologies limiting the extent of necrosis during STEMI will be of great individual and socioeconomic value.