Role for insulin in acute myocardial infarction: ruled out or hard to prove?

The only large randomized trials to investigate treatment focused on hyperglycaemia in MI patients were the Diabetes Insulin–Glucose in Acute Myocardial Infarction (DIGAMI) studies. In the first DIGAMI, the combination of insulin–glucose infusion followed by intensive insulin treatment resulted in both better glucose control and a reduction in hospital mortality from 11.1 to 9.1% (NS) and an absolute mortality reduction of 7.5% after 1 year. However, DIGAMI 2 could not confirm either the beneficial effect of early or sustained insulin treatment. During the first 24 h, intensive insulin treatment resulted in a decrease in glucose level from 12.7 to 9.1 mmol/L vs. 12.7 to 10.0 mmol/L in control patients.

Is the role for insulin in acute MI ruled out? Yes, based on the current literature there is no evidence to support insulin treatment. Nevertheless, positive effects of insulin during myocardial ischaemia have been described in experimental studies. They depend on the influence on reduced fatty acid oxidation, increased glucose oxidation, and diminished apoptosis of myocardial cells to induce myocardial survival. These effects, however, could only be obtained soon after the initiation of myocardial ischaemia. Furthermore, there is a large amount of clinical evidence to support the concept that hyperglycaemia has an unfavourable effect. Hyperglycaemia during MI is short lived and strict glucose control should be obtained as soon as possible after symptom onset. Unfortunately, in the DIGAMI 2, the time delay between hospital admission and randomization, i.e. insulin treatment, averaged 8.6 h.

Is the role for insulin hard to prove? Yes, in MI patients, it is not easy to obtain glucose levels within the set range of 7.0–10.0 mmol/L within 24 h after admission. In critically ill patients, strict glucose was obtained, although it took ~24 h to reach target levels.

Another striking aspect of the DIGAMI 2 study may be important to explain the results. Only one out of five hyperglycaemic/ diabetes patients was treated with either coronary artery bypass grafting or primary percutaneous coronary intervention. To finally answer the question whether or not insulin therapy is of benefit in acute MI, MI patients should be treated with optimal modern reperfusion therapy and randomized to early, goal-directed insulin treatment. For instance, aiming of a glucose level of 7.0 mmol/L within 4 h after presentation and a more strict control thereafter.

References


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refractory cases, acknowledging that we have no evidence-based data, preferring the less toxic and less expensive drugs (e.g. azathioprine and methotrexate), and tailoring the therapy on the single patient (e.g. cyclophosphamide should be used only in severe cases and avoided in young fertile women because it can cause infertility) and, importantly, with the patient informed consent.

References

3. Maisch B, Seferovich PM, Ristic AD, Erbel R, Judd RM, Heitner JF, Klem I. Presence and absence of delayed enhancement (DE) in patients with left ventricular dysfunction (LVD) using DE-CMR to evaluate the presence or absence of delayed enhancement (DE). In the setting of subendocardial or transmural DE, this pattern is consistent with the presence of coronary artery disease (CAD), and ischaemic cardiomyopathy (ICM) is the most likely diagnosis. However, if the pattern of DE is not of the ischaemic type, non-ischaemic cardiomyopathies (NICM) is likely to be present. A single pilot study presented last year at AHA Scientific Sessions by Patel et al. evaluated this approach showing its potential clinical utility.

We would like to point out that our group has recently addressed this issue in 71 patients with LVD without clinical suspicion of CAD as the underlying cause who underwent catheterization and CMR. Twenty-one of the 26 patients with angiographically proven CAD showed subendocardial or transmural DE, whereas only four of the 45 patients without obstructive CAD showed it (P < 0.001). Thus, we found an overall sensitivity of 81%, specificity of 91%, and diagnostic accuracy of 87% in determining the presence of obstructive CAD. Our findings are consistent with previous studies that evaluated patients with known CAD, suggesting that DE may be useful in distinguishing LVD related or not to CAD. As we have shown and in line with the results of Patel et al., this differentiation is also feasible in patients with LVD of unclear aetiology.

Late gadolinium enhancement improved information obtained from angiographic data, which may have important diagnostic, prognostic, and therapeutic implications. As suggested by McCrohon et al., patients with subendocardial or transmural scarring and unobstructed coronary arteries may have systolic dysfunction due to a silent previous MI and may be incorrectly diagnosed by coronary angiography as patients with NICM. In contrast, patients without scarring and with one-vessel disease with no proximal stenosis of a major coronary artery should be considered as having NICM from a diagnostic and prognostic point of view. As the absence of DE-CMR excludes the presence of significant CAD, it may be unnecessary to perform diagnostic coronary angiography routinely in this setting.

However, as Mahrholdt et al. conclude, in addition to the diagnostic utility of DE-CMR, its independent prognostic value will need to be determined.

References