EDITORIAL

Hyperglycemia as a risk factor in postinfarction patients

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Diabetes is a recognized risk factor of increased morbidity and mortality especially in patients with ischemic heart disease and after myocardial infarction [1]. The need for early diagnosis and treatment of diabetes is well recognized, but still seems to be underappreciated. Hyperglycemia is frequently lingering for a long time before fully apparent diabetes is identified. Hyperglycemia is the key factor in the pathogenesis of diabetic cardiomyopathy and atherosclerosis observed in coronary and peripheral vasculature [1–3]. The estimations from the American Diabetes Association indicate that about 57 million (19%) Americans have prediabetes (fasting glucose between 100–125 mg/dL) and 24 million (8%) have diabetes [4]. It means that over one-quarter of the US population is affected by hyperglycemia. Hyperglycemia leads not only to advanced and disseminated coronary disease but it also triggers adverse mechanisms resulting in myocardial fibrosis and collagen deposition in the myocardium, recognized clinically as diastolic dysfunction [5].

In this issue of "Cardiology Journal", Gąsior et al. [6] present an important study evaluating the prognostic significance of blood glucose levels evaluated at admission to the hospital in a large cohort of 1,310 acute ST-elevation myocardial infarction patients. Briefly summarizing primary findings, 26.9% of patients were diagnosed with diabetes, and 82% of these patients had hyperglycemia (defined as glucose level > 140 mg/dL). Among the remaining 958 patients without diabetes, hyperglycemia was detected in 39.5% patients. This observation emphasizes that a very significant proportion of patients admitted for acute myocardial infarction might have unrecognized prediabetic state or even diabetes. It is possible that an incidental glucose elevation might be related to a stress and catecholamine surge in the setting of chest pain and acute myocardial ischemia. It also could be that some of these individuals were not in fasting state for prior few hours but it is unlikely that such a high number of patients had glucose elevation > 140 mg/dL as an expression of adrenergic response or diet. A limitation of this retrospective study includes lack of follow-up data regarding diagnostic tests for diabetes. Nevertheless, this study raises awareness of the magnitude of the problem, underappreciated by family physicians or cardiologists.

This study also importantly stresses that the risk of hyperglycemia in nondiabetic patients in the setting of acute myocardial infarction should not be neglected. What should clinicians learn from the study of Gąsior et al. [6]? First of all, elevated glucose levels might be considered as a marker of multivessel and frequently disseminated coronary disease, which is associated with more advanced myocardial damage and worse outcome. In-hospital mortality in patients with acute myocardial infarction with multivessel disease is elevated. In the study by Gąsior et al. [6] non-diabetic patients with hyperglycemia had six-fold higher mortality that those without hyperglycemia. The long-term mortality was also two-fold higher. Therefore, these patients after myocardial infarction should be directed to special track of aggressive monitoring and treatment including aggressive statin therapy, glucose control, in addition to standard measures used in postinfarction patients including cardiac rehabilitation, described so elegantly by Piotrowicz and Wolszakiewicz [7] in the same issue of the journal.

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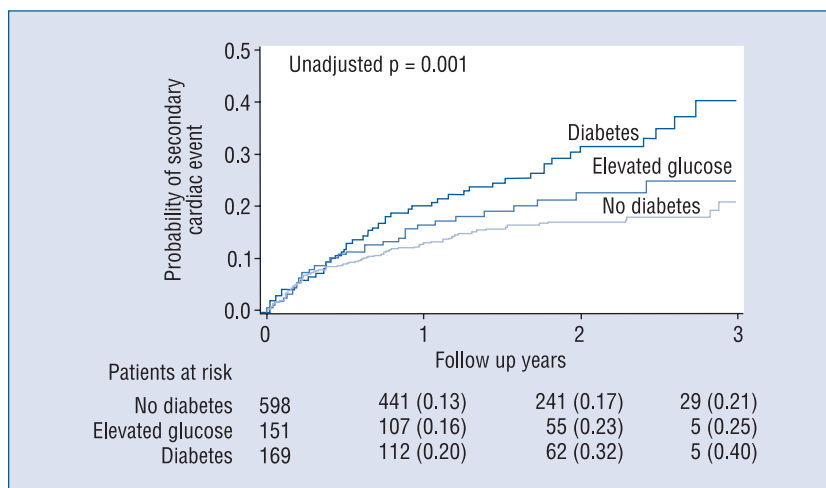
Figure 1. Cumulative probability of cardiac events defined as unstable angina requiring hospitalization, nonfatal myocardial reinfarction, or death in 918 stable postinfarction patients with diabetes, elevated glucose (no diabetes recognized), and no diabetes (no elevated glucose). Of note, despite a clear trend, there is no significant difference between two lower curves.

The study by Gąsior et al. [6] also indicates the need for prophylactic screening for diabetes, which should be systematically done at older age and regardless of age in patients with signs and symptoms of ischemic heart disease. Systematic screening is likely to identify a significant number of patients with diabetes or pre-diabetic states, conditions which would require counseling regarding weight, diet, exercise, and treatment, if needed [8]. This proactive approach will contribute to an earlier diagnosis of metabolic conditions leading to a progression of atherosclerosis, acute coronary syndromes, and diabetic myocardial remodeling. There are already known large benefits of restrictions related to smoking in public places measured by significant decline in a number of patients admitted to hospitals due to acute coronary syndromes [9]. Diabetes and pre-diabetic states are the next big challenge of public health systems, especially in light of growing obesity in modern societies. The implementation of widespread use of proactive measures aiming to diagnose and treat metabolic syndrome, pre-diabetic states, and diabetes is likely to bring similar effects to those observed after restriction of smoking or replacement of animal fats in diets.

We also learned from the study by Gąsior et al. [6] that their diabetic patients had mean blood glucose levels of 253 mg/dl, which again could be exacerbated by stress, but this level definitely calls for considering more aggressive therapy in patients with diabetes in the chronic setting. Under-controlled diabetes is one of the important prerequisites for development of vascular and myocardial complications of diabetes. Postinfarction patients with diabetes and also those with elevated glucose levels have increased risk of recurrent coronary syndromes. In the analysis of 918 stable postinfarction patients from the THROMBO study [10], we found that 151 of 749 (20%) of nondiabetic patients had fasting glucose ≥ 100 mg/dL levels measured 2 months after myocardial infarction. One could argue whether this threshold is too liberal but according to the American Diabetes Association pre-diabetes is diagnosed when fasting glucose levels ranges from 100–125 mg/dl. These patients had a mean fasting glucose level of 120 ± 27 mg/dL. Figure 1 shows the cumulative probability of cardiac events defined as unstable angina requiring hospitalization, nonfatal myocardial reinfarction or death in postinfarction patients from enrollment (2 months after myocardial infarction). Patients were identified as those with treated diabetes, no diabetes and no glucose elevation, and no recognized diabetes but with fasting glucose ≥ 100 mg/dL. A 2-year event rate (which was a mean follow-up in this study) was 32% in diabetic patients, 23% in non-diabetic patients with elevated glucose, and 17% in nondiabetic patients with glucose < 100 mg/dL. Although the difference between the two latter groups did not reach significance, there was a clear trend indicating that patients similar to those reported by Gąsior et al. [6] have worse outcome that those with low levels of glucose even when evaluated in a stable postinfarction period, not in acute phase of myocardial infarction.

Elevated blood glucose level in postinfarction and ischemic heart disease patients remains an underappreciated clinical parameter. A more proactive approach to detecting and addressing hyperglycemia and diabetes could significantly change the practice of medicine and could influence the epidemiology of cardiovascular morbidity and mortality in general. Preventing diabetic cardiomyopathy and vasculopathy will be as rewarding as restriction of smoking.

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