

# Need for more action when young hearts are broken

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Acute myocardial infarction (AMI) rarely occurs among young adults. Its incidence depends on the cut-off age, and it is estimated that less than 5% of all patients with AMI are younger than 40 years old.<sup>1</sup> Patients with premature AMI have a different risk factor profile than their older counterparts. They are characterized by a higher rate of smoking and genetic lipid disorders, and a lower rate of hypertension and diabetes mellitus. In addition, young patients have less extensive atheromatous lesions in the coronary arteries and a relatively high proportion of normal or near-normal coronary arteries on angiography.<sup>1-4</sup>

The exact pathogenetic mechanism of premature AMI remains largely unknown and involves the interplay of multiple genetic and environmental factors related to the atherothrombotic process. It has been proposed that occlusive thrombus formation over a ruptured vulnerable atherosclerotic plaque is the main mechanism, while coronary spasm may be a significant player, particularly in the setting of normal or near-normal coronary arteries.<sup>4,5</sup>

In this issue of *Polish Archives of Internal Medicine*, Trzeciak et al<sup>6</sup> provided data from the Polish Registry of Acute Coronary Syndromes (PL-ACS), a multicenter, prospective study of consecutively hospitalized patients with acute coronary syndrome (ACS) in Poland. In their analysis, only patients with the diagnosis of ST-segment elevation myocardial infarction (STEMI) and non-STEMI (NSTEMI) were included. The patients were followed for 12 months, and the trends in the clinical presentation, treatment methods, and outcomes were analyzed. To overcome the limitation of a low event rate, the authors analyzed the characteristics of young patients in the years 2009–2010 in comparison with the years 2012–2013. The main findings were as follows: 1) an increase in the percentage of NSTEMI and in the number of patients treated invasively in the years 2012–2013 compared with the years 2009–2010; 2) a steadily low in-hospital mortality (<2%) throughout the whole

study; 3) a high prevalence of smoking (~75%); and 4) a low (<30%) participation rate in cardiac rehabilitation (CR) programs. Notable findings included the relatively low prevalence of hypercholesterolemia (~34%) and family history of premature coronary artery disease (CAD) (~16%), as well as the relatively low in-hospital use of statins (~72%) in both studied periods.

The strength of this study was the large number of young patients with CAD that were recruited, while the main limitation was the short time interval between the analyzed periods. This limitation, coupled with the short follow-up was probably the main reason for not revealing differences in the outcomes during the 1-year follow-up between the studied periods.

Several key messages emerge from this important study. First, it confirms the major clinical shift in the diagnosis of NSTEMI at the expense of STEMI, which has been noted during the last decade as a result of the widespread use of high-sensitivity cardiac troponin. Second, the high rate of invasive treatment in both studied periods confirms the substantial progress in the field of ACS management that has been observed in the last years in Poland.<sup>7</sup> The good access to catheterization laboratories has largely contributed to the favorable in-hospital and 1-year prognosis of young patients. Third, it emphasizes the role of smoking in the development of premature AMI, since smoking was the most frequent risk factor in this age group. The high prevalence of smoking in the current study is in line with many studies that have consistently reported a prevalence of smoking of more than 75% among patients with premature AMI.<sup>8-10</sup> The impact of smoking on premature AMI was explored by Panagiotakos et al<sup>10</sup> who found that young smokers have a 6-fold higher risk of developing AMI compared with non-smokers and that the risk increased exponentially in relation to the pack-years of cigarette smoking. Furthermore, continuation of smoking after AMI was the most powerful prognostic factor for

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the recurrence of coronary events.<sup>9</sup> In the current study, there were no data on the smoking status of patients during follow-up. Our group has reported that persistence of smoking among 237 survivors of STEMI of 35 years or less was associated with about 2.5-fold higher risk of recurrent cardiac events compared with nonsmokers during a median follow-up of 9.1 years, and this association was independent from other conventional risk factors for CAD.<sup>9</sup>

The deleterious influence of smoking in young individuals has been attributed to its multiple atherothrombotic effects, since it causes endothelial dysfunction, enhances thrombosis, promotes inflammation, and induces coronary vasoconstriction. These pathophysiological mechanisms accelerate atherogenesis, destabilize coronary plaques, and can induce premature coronary atherosclerosis even in patients who would, otherwise, be at a lower risk due to the shorter exposure to other classic risk factors.<sup>9</sup>

The association of smoking with premature CAD highlights the importance of applying an effective antismoking policy to reduce the development of CAD, particularly of premature CAD. In addition, smoking cessation in patients after AMI is one of the most effective measures to reduce the recurrence of cardiovascular events.<sup>9</sup> Antismoking consultation should be offered to all hospitalized smokers before discharge. Hospitalization may boost the patient's receptivity to smoking cessation interventions by increasing perceived vulnerability. After discharge, smokers, particularly those with a high level of dependence, should be enrolled in CR programs or referred to specialized antismoking centers.

Another key message of the study is that it shows a therapeutic gap regarding lipid-lowering medication, because fewer than 75% of young patients were on statin treatment during hospitalization. This is a rather unexpected finding, which stands in contrast to the progress achieved in the field of invasive treatment of patients with ACS in Poland. Most studies report that more than 90% of patients with AMI are on lipid-lowering medication at discharge.<sup>4</sup> Therefore, there is the potential to offer greater benefit to young patients after AMI by prescribing statins to all of them and ensuring good adherence on a long-term basis.

Finally, the study reminds us about the discrepancy between guideline recommendations for CR and existing clinical practice. CR is a class I recommendation for patients after AMI,<sup>11</sup> and it usually includes exercise training, risk factor modification, stress management, and psychological support. Despite the benefits on survival and quality of patients' life, CR is underused worldwide.<sup>12</sup> Data from the EUROASPIRE III survey, which was conducted in 22 European countries, showed that about 45% of the patients eligible for CR were advised by physicians or other health care professionals to attend a CR program.<sup>13</sup> Ades et al<sup>14</sup> reported that the participation

rates for CR in the United States range from only 20% to 30%, and they suggested strategies to improve referral and enrollment to CR.

The occurrence of AMI in young individuals, although uncommon, is associated with a substantial personal and societal burden. It is also worrying that an increasing number of younger patients with CAD has been recorded over the last decades, and this is mainly due to their unhealthy lifestyle patterns.<sup>15</sup> Although the treatment pattern of ACS has improved, it is essential to apply effective preventive measures to minimize premature CAD. The 3 key components of the preventive strategy in young people should be no smoking, healthy eating, and regular physical exercise.

**Note** The opinions expressed by the author are not necessarily those of the journal editors, Polish Society of Internal Medicine, or publisher.

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