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Editorial

Does the use of rotational atherectomy procedure during percutaneous coronary interventions influence the frequency of procedure-related myocardial injury assessed by cardiac magnetic resonance?

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The usage of gadolinium-enhanced cardiac magnetic resonance (CMR) in the differentiation of heart failure related to dilated cardiomyopathy and coronary artery disease has been demonstrated in previously published studies. It currently remains one of the basic methods for assessing myocardial ischemia, which has been reflected in many international guidelines, including those of the European Society of Cardiology (1-3). Also, T2 mapping for myocardial edema, cine CMR for regional wall motion abnormalities, rest first pass and adenosine stress perfusion are well sanctioned methods of myocardial ischemia assessment, also used in patients with acute coronary syndromes (4-6).

Nowadays, procedural myocardial infarction (PMI) accompanying percutaneous coronary interventions (PCIs) are mostly determined by the 3rd Universal Definition of Myocardial Infarction (UDMI) (7). However, an increasing trend to modify this definition has appeared, and among others, the most popular new definition seems to be the one established by the Society for Cardiovascular Angiography and Interventions (SCAI) (8). In several studies, it has been noted that poorer prognosis after PMI in patients treated with PCI of native coronary arteries, expressed as increased mortality, is related to the amount of damaged myocardium which can be assessed by CMR (9,10). Troponin C (cTn) is considered a more sensitive marker of myocardial injury than creatinine kinase-myocardial band (CK-MB) (11). During a 1-year follow-up period, it has been demonstrated that only relatively large increases in CK-MB (more than 10 times over the upper, normal limit) significantly correlate with increased mortality in patients undergoing non-emergent PCI (12). However, some studies did not reveal a similar relationship with poorer clinical outcomes during follow-up after PCIs even for high levels of PMI markers, including the level of CK-MB (13). In their analysis, Lim *et al.* showed that according to the 3rd UDMI, cTn is oversensitive in the diagnosis of PMI in comparison to CK-MB, and it is identified in a large number of patients without evidence of PMI confirmed by CMR indicating that CK-MB is a better indicator of MI type 4a (14). Moreover, some publications indicate that the association of post-procedural level of markers of myocardial injury with long-term clinical outcomes expressed as major adverse clinical events mostly depends on greater atherosclerotic burden (15). This thesis is especially applicable to patients treated with rotablation, where multi-vessel disease of coronary arteries prevails in the angiographic presentation of coronary artery disease. Considering the above reports, a new PMI definition was proposed by the SCAI based on

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the level of myocardial necrosis indicators, which requires higher levels of those biomarkers for the diagnosis of PMI when compared to the 3rd UDMI (8). In a previously published study, we demonstrated that rotablation is associated with higher rates of intraprocedural myocardial infarction compared to the group of other patients treated with PCI without rotablation. However, this did not show statistical significance (16). Also, Stone *et al.* demonstrated that based on serum biomarkers of myocardial injury and cut points, the elective athero-rotablation with stent placement is associated with a higher rate of PMI compared to the elective PCIs without rotablation (17). The authors of that study justified this observation with the greater extent of atherosclerotic burden and calcifications, and indicated that this increased level of myocardial injury markers is rather procedure-related than a sign of real and significant clinical complications (18).

The novelty of the study published by McEntegart *et al.* is presented via the use of CMR in assessing the PMI in patients treated with rotablation (19). Although no control group was included in the study, it still delivers new insight. As suspected, the PMI rate is higher in this study when assessed by the 3rd UDMI (10% of patients) compared to the SCID definition (4% of patients). Unexpectedly, it increased after applying the CMR method in addition to the 3rd UDMI to 24%. It still remained elevated after seven days when assessed using CMR with late gadolinium enhancement (16% of participants) and after 6 months of follow-up (14% of all participants) when compared to PMIs diagnosed by each of the serum biomarkers separately. This observation causes some shame, due to the fact that it was expected that CMR would decrease the number of patients with confirmed PMI by the 3rd UDMI, especially, those where cTn was used as a cut point. Specific circumstances related to the rotablation procedure include the fact that debris released during rotablation is denser than in regular plastics, where debris is much softer and the occasional occlusion of small and peripheral vessels seems to be greater. On the other hand, the rate of perforations and dissections is also relatively high in the group of patients treated with rotablation compared to those treated without it (16). Based on this, the explanation of the presented results seems to be extremely difficult. Especially taking the results of previously published studies into account, in which the diagnosis of PMI using CMR was better correlated with CK-MB than troponin (20). Furthermore, Kim *et al.* confirmed that myocardial infarction diagnosed by CK-MB correlates with the CMR diagnosis in terms of infarct size (21). A similar relationship was observed in a recently published study performed in a group of patients undergoing off-pump coronary artery bypass operations, in which increased post-operative level of troponin was less often associated with the area of myocardial injury confirmed by CMR (22). Another fact deserving attention is the small group of patients which causes some paucity, in particular, there is no data regarding which of the methods of PMI diagnosis correlate best with follow-up major adverse cardiac events, including mortality (19). One of the reasons is the relatively short period of observation. This could be a crucial finding in this group of patients.

In summary, the results are interesting and promising, however, they require further multi-centre studies enclosing greater numbers of participants, preferably with a control group.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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