Impact of the elevation of biochemical markers of myocardial damage on long-term mortality after percutaneous coronary intervention: results of the CK-MB and PCI study

We read with great interest the paper ‘Impact of the elevation of biochemical markers of myocardial damage on long-term mortality after percutaneous coronary intervention: results of the CK-MB and PCI study’ by Cavallini et al.1

This large cohort follow-up study is of particular relevance for the interventional cardiologist, as it gives further data about the impact of procedure-induced myocardial necrosis on long-term outcome following PCI.

However, we would like to comment on the dissociation between creatine-kinase MB and troponin I elevation, with the former exhibiting an almost linear correlation with mortality (in Figure 1 of their paper), which is not apparent for the latter (Figure 2 of their paper). According to the authors, troponin I is an extremely sensitive marker that detects even reversible myocardial injury caused by procedure-induced ischaemia or very minor myocardial necrosis, which does not influence the long-term prognosis.

Although we agree with authors about the sensitivity of the troponin assay, we believe that a methodological problem might have played a role in determining their result. In a recent paper, we were able to demonstrate a strong linear correlation between the mass of new myocellular necrosis (as measured by delayed-enhancement MRI) and post-procedural (24 h) troponin I absolute elevation (∝ = 0.84, P < 0.001).2

In their study, Cavallini et al. chose to grade troponin I elevation by the peak ratio, calculated by dividing the maximum post-procedural level of the marker by its upper reference limit or by its baseline value if the baseline value was above the upper reference limit. For troponin I, the upper reference limit for cTnI was 0.15 μg/L. Thus, in a stable patient with no pre-procedural cTnI elevation, a peak ratio of 10 (at the extreme right end in Figure 2) would mean an absolute cTnI elevation of only 1.5 μg/L, whereas in a patient with a baseline cTnI of 1, the same peak ratio would mean an absolute cTnI elevation of 10 μg/L. If these two values were interpolated in the regression curve obtained from our data, they would translate to about 2 vs. 13 g of new myocardial necrosis. Moreover, in our paper, few (four out of 50) patients, all with normal pre-procedural cTnI, showed an absolute troponin I elevation of between 0.2 and 1 μg/L (the latter being the upper limit of normal in our laboratory), and no new areas of hyperenhancement were seen by MRI, probably because troponin I is even more sensitive than MRI in detecting small, patchy necrosis. In these patients, it is very unlikely that trivial myocardial damage will alter prognosis.

This lack of relationship would be an important finding, challenging the current European Society of Cardiology/American College of Cardiology guidelines that recognize elevation of cardiac troponins within 24 h of a PCI procedure in the definition of myocardial infarction.3

We appreciated the comments by Porto et al. concerning the different prognostic impact of the increases in creatine kinase MB (CK-MB) and troponin I (cTnI) emerging from our study. They suspect that a methodological problem associated with the calculation of the cTnI ratio may have conditioned our results. In line with the Joint Ad Hoc Committee of the European Society of Cardiology and American College of Cardiology for the Redefinition of Myocardial Infarction,1 we defined CK-MB and cTnI elevations as any post-procedural level above the upper reference limit (or an increase of >50% over baseline when the baseline level was already high),4 a definition that does not mention the CK-MB or cTnI ratio. However, we did use the CK-MB and cTnI ratios to explore the relationship between the degree of marker elevation and the risk of death. In accordance with the available literature, we graded peak CK-MB or cTnI elevation on the basis of the ratio between the observed post-procedural peak value of the marker and its upper reference limit (or the baseline value, when high). Although we agree that calculating the peak ratio in the case of high baseline levels is arbitrary and may lead to an underestimate of the degree of elevation, we consider it a reasonable attempt to separate the amount of myocardial damage due to the interventional procedure per se from that attributed to pre-procedural myocardial necrosis. How to make a qualitative and quantitative biochemical assessment of an ongoing ischaemic insult superimposed on a recently damaged myocardium is still a matter of debate,1,3 and all of the proposed methodologies have some limitations. In this regard, even the absolute increase in marker values suggested by Porto et al. is susceptible to criticism as it does not take into account the potential spontaneous post-procedural increase in the marker during the.

References