cardiovascular disease. Prevention of an acute coronary event is certainly preferable to a relatively better outcome thereafter.

References


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Recurrent angina and the problem of inadequate/inappropriate revascularization

Recurrent or persistent angina following revascularization procedures, whether this is CABG and/or PCI, is a relatively frequent, and surely challenging, clinical event. In a recent issue, Abbate et al.1 provided an effective and complete review on this problem; however, we believe that one further comment should be made regarding the ‘coronary’ causes of this clinical condition.

The concept behind every revascularization procedure is that evidence of inducible ischaemia in the myocardial territory downstream to a functionally significant stenosis can be demonstrated. However, it has to be acknowledged that there are at least two limitations to the clinical application of this concept in the real world: first, the spatial resolution of non-invasive tests, particularly in the case of multivessel disease. Secondly, while being considered the gold standard, coronary angiography is far from being a perfect tool for the investigation of stenosis. Angiography systematically underestimates eccentric stenoses, and, most importantly, provides no information regarding the functional importance of a coronary lesion (i.e. the existence of dynamic component and/or the cumulative haemodynamic effect of multiple or long lesions). The systematic use of more sensitive and specific tools, such as intravascular ultrasound and, particularly, the study of fractional flow reserve, dramatically reduces the quote of patients who would otherwise be categorized in the group of those ‘with suspected ischaemia and no evidence of coronary artery disease at angiography’.2

From this perspective, until these techniques will be more systematically used, patients with recurrent angina will often happen to belong to one of two categories: (i) those who received treatment for lesions that were significant at angiography, but were not functionally significant (i.e. lesions with a fractional flow reserve >0.75) and (ii) patients who did not receive treatment for lesions that were functionally, but not angiographically, significant (i.e. fractional flow reserve <0.75). In the first group, the persistence of angina could be because of microvascular disease or other non-coronary causes as described by Abbate et al.;1 in the latter, to the failure to treat a source of ischaemia (i.e. inappropriate revascularization). We have to admit that such ‘failures’ are not remote possibilities as much as a daily clinical problem for interventional cardiologists. Therefore, we feel that the study of fractional flow reserve should be encouraged when re-evaluating patients for recurrent angina (Table 3 of Abbate et al.).

In sum, we would like to suggest that among the coronary causes of recurrent angina (Table 2 of Abbate et al.), besides incomplete revascularization, physicians should also be aware (and beware) of inappropriate revascularization. Admittedly, this condition is often the result of our incapacity, given the current technologies (and the cost of more accurate technologies), to identify adequately the functional significance of angioplasty in moderate coronary stenoses.

References


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Recurrent angina and the problem of inadequate/inappropriate revascularization: reply

We thank Drs Gori and Fineschi for their interest in our work and the opportunity to engage in a scholarly discussion focusing on recurrent angina after coronary revascularization, which indeed is still a major clinical challenge.1

They clarify that anginal status and non-invasive imaging tests may not be enough to guide revascularization strategies in order to correctly identify inadequately revascularized patients, yet avoiding inappropriate revascularizations. In this setting, other invasive tests such as intracoronary ultrasound (ICUS) and measurement of fractional flow reserve (FFR) have established roles. Nonetheless, ICUS and FFR, while useful, are also far from perfect. A recent systematic review of 21 studies concluded that there is only moderate concordance between FFR and the reference non-invasive imaging tests which, despite their...