UNDERSTANDING THE PROGNOSTIC SIGNIFICANCE OF LEFT VENTRICULAR APICAL ANEURYSMS IN HYPERTROPHIC CARDIOMYOPATHY

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Hypertrophic cardiomyopathy (HCM) is a myocardial disease defined by focal or diffuse thickening of the left ventricular (LV) wall which is unexplained by abnormal loading conditions. This very simple definition belies a complex spectrum of morphological and functional abnormalities that result in a heterogeneous clinical phenotype which predisposes to sudden cardiac death, heart failure or stroke.

More than 30 years ago, Alfonso and colleagues reported the rare coincidence of sustained monomorphic ventricular tachycardia and apical LV aneurysm in two of 51 consecutive individuals with ventricular tachycardia (VT) on Holter monitoring (1). In one patient, VT arose from the lateral border of the aneurysm and in the second, had a right bundle branch block morphology with extreme left axis deviation. Following these descriptions, reports on the phenomenon of apical aneurysm formation were limited largely to a few case reports, but with the widespread use of cardiac magnetic resonance (CMR), there has been a renewed interest in its prognostic relevance, culminating in the designation of LV aneurysms as a 'reasonable criterion for prophylactic ICD implantation' in recent AHA/ACC HCM guidelines (2).

In this issue of the Journal, Lee and Colleagues report a retrospective, single centre cohort of 160 patients with HCM and LV apical aneurysms, diagnosed on echo or CMR and selected from a larger cohort of 5300 patients evaluated over 24 years (INSERT REFERENCE). Over a mean follow up of 6.2 ± 4.8 years from aneurysm detection, there was a high incidence of stroke or LV thrombus (24%), sudden cardiac death (SCD) equivalents (9%), and LV systolic dysfunction (9%). A novel finding was an association between aneurysm size and the incidence of malignant ventricular arrhythmia.

The implicit premise of this paper is that the prediction and prevention of SCD in HCM remains a major unmet need that justifies the search for new and better markers of risk that guide clinical decision making with respect to ICD implantation. However, evidence that this conjecture is true is increasingly difficult to sustain, as large registries and prospective observational cohorts report a low annual incidence of malignant ventricular arrhythmia and a clear relation between potentially fatal arrhythmic events and known clinical markers of risk (3,4). Of course, within the noise of large patient cohorts, lurk complex scenarios that may be exceptions to the rule; the question posed by this paper is whether LV apical aneurysms represent one such harbinger of poor outcomes.

While the authors are to be congratulated on collating the largest published series of HCM related LV apical aneurysms to date, their data must be interpreted with great care. The first and perhaps most important question is the representativeness of their cohort. The findings are broadly in line with the only other major series on this subject reported by Rowin et al (5) that suggested patients with LV apical aneurysm should be offered a primary prevention ICD based on the very high rate of SCD events; However, the vast majority of SCD events were ICD interventions for monomorphic VT– an otherwise rare occurrence in patients with HCM – and a large proportion of patients with events had strong, well established risk factors for SCD in HCM (a history of sustained VT/VF and reduced LV ejection fraction).

Importantly, both studies have a substantial risk of inclusion bias, given their retrospective design and the lack of systematic re-evaluation of cardiac imaging in the larger cohorts from which patients are selected, a necessary prerequisite to determine the true prevalence and clinical significance of LV aneurysms in the general HCM population.

Further evidence that these published cohorts are atypical comes from The Hypertrophic Cardiomyopathy Registry (HCMR) an NHLBI-funded study which has prospectively enrolled 2755 patients, all of whom underwent cardiovascular magnetic resonance imaging (6). The prevalence of LV apical aneurysms was 3% and comparison of patients in HCMR with those in the current study and that by Rowin et al reveal important differences, not least a substantially lower rate of atrial fibrillation (AF), non-sustained VT, as well as less extensive myocardial scarring. This suggests that the high rate of ventricular arrhythmia, and in particular sustained monomorphic VT, in these two studies reflects a bias towards an extreme on the spectrum of LV aneurysm formation. It should, however, be acknowledged that HCMR probably has a degree of selection bias towards less severe cases.

The study by Lee and Colleagues also suggests that LV apical aneurysms (and their size) are an independent risk factor for the combination of stroke and LV apical thrombus, but not for stroke alone. Very importantly, almost 50% of the patients with a stroke had documented AF before or after the event. While it is reasonable and prudent to anticoagulate patients with LV thrombus, these data do not support the routine use of prophylactic anticoagulation in patients with aneurysms and no thrombus. Once again, the HCMR study has shown a low rate of AF in patients with LV aneurysms and no relation with incident AF (7).

The message of this and other recent papers is that LV aneurysm formation is an important phase of disease progression that, when associated with other characteristics of advanced disease such as impaired LV systolic function, extensive myocardial scar and non-sustained ventricular arrhythmia, represents a high-risk phenotype that might justify ICD implantation. Nevertheless, there are insufficient data to suggest that LV aneurysms should be the sole arbiter for clinical decision making. Similarly, the study underlines the importance of an assessment of thromboembolic risk based on the occurrence of AF and the well-established risk marker of left atrial dimension, independent of the size of LV aneurysms or the presence LV thrombus.

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