Editorial Comment

Q Waves in Hypertrophic Cardiomyopathy: A Reassessment*

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Q waves in hypertrophic cardiomyopathy. The 12 lead electrocardiogram (ECG) in patients with hypertrophic cardiomyopathy has long intrigued investigators and students of this disease (1-10). This interest has, in part, been due to the bizarre and striking alterations and varied ECG patterns often found in patients within the broad clinical spectrum of hypertrophic cardiomyopathy. Although no single ECG pattern is characteristic of the majority of patients, the most common abnormalities include increased QRS voltage, T wave inversion and pathologic Q waves. These prominent, deep and relatively narrow Q waves, which occur in about 25% to 33% of patients (1,6,7), appear most often in younger individuals (10) and occur in several patterns, that is, most commonly in the inferior and lateral leads and less frequently in the anterior leads (1-4,6,7,9). It has been recognized since the early 1960s that the Q waves in hypertrophic cardiomyopathy can mimic the appearance of those that are characteristic of myocardial infarction due to coronary artery disease (2-4,9) and such ECG patterns have even been referred to as pseudoinfarction (9). In some patients with hypertrophic cardiomyopathy and chest pain, the mistaken belief that Q waves represented healed myocardial infarction has resulted in an incorrect diagnosis of ischemic heart disease.

Origin of Q waves. Through the years the origin of waves in hypertrophic cardiomyopathy has been debated. It has been suggested that Q waves may result from myocardial fibrosis, a common finding (although to varying degrees) in the left ventricular wall of patients with hypertrophic cardiomyopathy studied at necropsy (9). In support of this view is our observation (11,12) that, to date, all patients with hypertrophic cardiomyopathy and documented transmural fibrosis (in the absence of coronary atherosclerosis) have had prominent Q waves on ECG. However, many patients with nontransmural ventricular scarring do not have prominent Q waves and often those patients with the most striking Q waves do not appear to have important left ventricular fibrosis.

Most early observers (3,4,9,13,14) favored the proposition that Q waves in hypertrophic cardiomyopathy resulted from disturbed or exaggerated initial electrical activation and depolarization of the ventricular septum (increased magnitude of the 0.02 s mean instantaneous QRS vector). This theory achieved widespread acceptance because particularly marked hypertrophy of the ventricular septum was initially believed to be a characteristic morphologic feature of virtually all patients with hypertrophic cardiomyopathy (2-4) and also because it was perceived that the abnormal “myopathic” ventricular muscle could itself harbor intrinsically different electrophysiologic properties.

However, prior studies from our laboratory (1,10,15) of 225 patients within the broad clinical spectrum of hypertrophic cardiomyopathy, utilizing two-dimensional echocardiography and 12 lead electrocardiography, demonstrated that Q waves occur relatively uncommonly in patients with marked thickening of the anterior basal ventricular septum (that is, in 20% to 25% of such patients). Among patients who had hypertrophic cardiomyopathy with the most marked left ventricular wall thickening (“giant hearts” with septal thickness >35 mm) (15), Q waves proved to be particularly uncommon and were identified in only 15%. In fact, in our experience (1) Q waves occur most frequently in young patients (<18 years of age) who have hypertrophic cardiomyopathy characterized by a more unusual pattern of left ventricular hypertrophy in which there is no or relatively mild anterior septal thickening and the predominant hypertrophy is present in other regions of the left ventricular wall. These observations suggested to us that, contrary to prior perceptions, Q waves in hypertrophic cardiomyopathy could not be explained solely on the basis of ventricular septal hypertrophy. However, the precise explanation for these particular ECG alterations remained unresolved.

The present study. In this issue of the Journal, Lemery et al. (16) have again examined the question of Q waves in hypertrophic cardiomyopathy by studying 67 patients with echocardiography and electrocardiography at St. Georges Hospital in London. Only a minority of their patients (28%) showed an abnormal Q wave pattern and most of these apparently had substantial septal hypertrophy. Nevertheless, it was possible to identify a relation between the presence of Q waves and an increased ratio of basal ventricular septal thickness to either right ventricular wall thickness or posterior left ventricular free wall thickness. The predictive accuracy of these calculated thickness ratios with regard
to Q waves was almost 90%. On the basis of these data, the authors (16) have offered the hypothesis that Q waves form in this disease because electrical forces of the hypertrophied ventricular septum are unopposed by those of the right ventricle and left ventricular posterior wall. Consequently, the data and conclusions of Lemery et al. (16) support the viewpoint of several other investigators that Q waves in hypertrophic cardiomyopathy are not simply related to exaggerated depolarization of a greatly hypertrophied ventricular septum. Indeed, this has been our contention as well as that of Mori et al. (17), who reported Q waves to be more common in the presence of combined ventricular septal and right ventricular hypertrophy.

The fact that this question regarding the origin of Q waves in hypertrophic cardiomyopathy—initially raised in the original descriptions of the disease in the early 1960s (2–4)—is not yet completely resolved is perhaps most indicative of the inherent complexity of hypertrophic cardiomyopathy itself, a disease so diverse in its expression that it persists in keeping us thinking, guessing and searching.

References