Patients with echocardiographic aortic valve calcium or mitral annular calcium have an increased prevalence of moderate or severe coronary artery calcium diagnosed by cardiac computed tomography

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The association between aortic valve calcium (AVC) and mitral annular calcium (MAC), as diagnosed by two-dimensional echocardiography, was investigated in 138 patients (76 women and 62 men, mean age 64±8 years) seen in a private cardiology practice at the New York Medical College. Coronary artery calcium (CAC) scores were diagnosed by 64-multislice computed tomography. AVC was present in 25 of 57 patients (44%) with moderate or severe CAC (a

CAC score of more than 100) and in 15 of 81 patients (19%) with no or mild CAC (a CAC score of 0 to 100), $P<0.001$. Moderate or severe AVC was present in nine of 57 patients (16%) with moderate or severe CAC, and in two of 81 patients (2%) with no or mild CAC, $P<0.005$. MAC was present in 18 of 57 patients (32%) with moderate or severe CAC, and in seven of 81 patients (9%) with no or mild CAC, $P<0.001$. Moderate or severe MAC was present in eight of 57 patients (14%) with moderate or severe CAC, and in two of 81 patients (2%) with no or mild CAC, $P<0.001$.

Key Words: Aortic valve calcium; Cardiac computed tomography; Coronary artery calcium; Coronary artery disease; Echocardiography; Mitral annular calcium

Patients with valvular aortic stenosis have a higher prevalence of coronary artery disease (1-3) and a higher incidence of new coronary events (3,4) than patients without valvular aortic stenosis. Patients with mitral annular calcium (MAC) have a higher prevalence of coronary artery disease (2,5) and a higher incidence of new coronary events (6,7) than patients without MAC. The present study reports the association between aortic valve calcium (AVC) and MAC, as diagnosed by two-dimensional echocardiography. Moderate to severe coronary artery calcium (CAC) scores were diagnosed by cardiac computed tomography (CT) (8).

METHODS

The association between AVC and MAC, as diagnosed by two-dimensional echocardiography, was investigated in 138 patients (76 women and 62 men, mean age 64±8 years) seen in a private cardiology practice at the New York Medical College. CAC scores were diagnosed by cardiac CT (8). A CAC score of 1 to 100 was considered mild. A CAC score of 101 to 400 was considered moderate. A CAC score of more than 400 was considered severe. AVC and MAC were diagnosed as mild, moderate or severe.

Scans for CAC scoring were obtained using a Siemens Somatom Sensation Cardiac CT system (Siemens AG, Germany). Calcium scoring was performed as a component of a complete cardiac CT study that included 64-multislice coronary CT angiography, or as a stand-alone procedure in patients referred for calcium scoring alone. Calcium scans were

performed using a spiral scanning protocol (rotation time 0.33 ms, slice collimation 0.6 mm, slice width 3.0 mm, pitch factor 0.2, increment of 1.5 mm, kernel B35) or using a sequential scanning protocol with electrocardiogram triggering (rotation time 0.33 ms, slice collimation 0.6 mm, slice width 3.0 mm, kernel B35). Calcium scoring was performed by one of two cardiologists experienced in cardiac CT, using a TeraRecon Aquarius workstation (TeraRecon Inc, USA).

Student's t tests were used to analyze continuous variables, and χ^2 tests were used to analyze dichotomous variables.

RESULTS

Table 1 shows the prevalence of AVC, moderate or severe AVC, MAC, and of moderate or severe MAC in patients with a moderate or severe CAC score and in patients with no or a mild CAC score. Table 1 also lists levels of statistical significance.

DISCUSSION

Patients with valvular aortic stenosis have a higher prevalence of coronary artery disease (1-3) and a higher incidence of new coronary events (3,4) than patients without valvular aortic stenosis. Patients with MAC have a higher prevalence of coronary artery disease (2,5) and a higher incidence of new coronary events (6,7) than patients without MAC.

The present study showed that patients with AVC or with MAC have a significantly higher prevalence of moderate or severe CAC scores than patients without AVC or MAC

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TABLE 1
Prevalence of aortic valve calcium, moderate or severe aortic valve calcium, mitral annular calcium and moderate or severe mitral annular calcium in patients with a moderate or severe coronary artery calcium score versus no or a mild coronary artery calcium score

Variable	Moderate or severe (n=57), n (%)	None or mild (n=81), n (%)	P
Aortic valve calcium	25 (44)	15 (19)	<0.001
Moderate or severe aortic valve calcium	9 (16)	2 (2)	<0.005
Mitral annular calcium	18 (32)	7 (9)	<0.001
Moderate or severe mitral annular calcium	8 (14)	2 (2)	<0.001

($P < 0.001$). These data support the hypothesis that AVC and MAC are types of atherosclerosis (9). The presence of AVC or MAC should alert the physician to the possible presence of coronary artery disease.

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