Prevalence of Hypertrophic Cardiomyopathy and its Association with Mitral Anular Calcium in Elderly Patients*

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We investigated the prevalence of hypertrophic cardiomyopathy (HC) and its association with mitral anular calcium (MAC) detected by Doppler echocardiography in 379 unselected elderly patients in a long-term health care facility. HC was present in 17 of 379 patients (4 percent). Of 17 patients with HC, ten (59 percent) had asymmetric septal hypertrophy, and seven (41 percent) had idiopathic hypertrophic subaortic stenosis with resting gradients of 20 to 110 mm Hg across the left ventricular outflow tract. The mean age of patients with HC was 85 ± 7 years compared with 82 ± 8 years in patients without HC (difference not significant); MAC was present in 13 of 17 patients (76 percent) with HC and in 176 of 362 (49 percent) without HC (p < 0.025). (Chest 1988; 94:1295-96)

Material and Methods

Technically adequate M-mode and two-dimensional echocardiograms and continuous-wave and pulsed Doppler echocardiograms were obtained in 379 unselected elderly patients in a long-term health care facility. The 379 patients included 93 men and 286 women, mean age 82 ± 8 years (range, 62 to 100). M-mode and two-dimensional echocardiograms and continuous-wave and pulsed Doppler echocardiograms were obtained with an Advanced Technology Laboratories Ultramark 4 ultrasound system using a 3.0-MHz transducer or with a General Electric Pass II ultrasound system using a 3.3-MHz transducer. Asymmetric septal hypertrophy was diagnosed when the ratio of the interventricular septum to posterior wall thickness exceeded 1.3 and the septal thickness exceeded 15 mm in the absence of other acquired or congenital heart disease likely to cause asymmetric septal hypertrophy.7 Idiopathic hypertrophic subaortic stenosis (IHSS) was diagnosed when asymmetric septal hypertrophy coexisted with systolic anterior motion of the anterior mitral leaflet.4 Only systolic anterior motion that appeared independent of the motion of the posterior wall of the left ventricle was considered significant and was included. MAC was diagnosed as previously described.7 Left ventricular outflow tract flow velocity and possible outflow tract gradient were evaluated in all patients. Doppler spectrum characteristics of dynamic left ventricular outflow tract obstruction included increased left ventricular outflow tract velocity (2.0 m/s or more) and late systolic peaking of flow velocity with "ski-slope" appearance (Fig 1). The echocardiograms and Doppler echocardiograms were interpreted by an experienced echocardiographer (IK). χ² analysis was used to analyze data.

Results

Hypertrophic cardiomyopathy was present in 17 of 379 patients (4 percent), in three of 92 men (3 percent), and in 14 of 286 women (5 percent). Of 17 patients with hypertrophic cardiomyopathy, ten (59 percent) had asymmetric septal hypertrophy, and seven (41 percent) had IHSS with left ventricular outflow tract obstruction at rest and gradients across the left ventricular outflow tract ranging from 20 to 110 mm Hg. The mean age of patients with hypertrophic cardiomyopathy was 85 ± 7 years (range, 75 to 100) compared to 82 ± 8 years (range, 62 to 100) in patients without hypertrophic cardiomyopathy (difference not significant).

Figure 1. Continuous-wave Doppler recording with transducer at apex of left ventricle. Increased left ventricular outflow tract velocity (5.2 m/s) and late systolic peaking of flow velocity with "ski-slope" appearance are diagnostic of dynamic left ventricular outflow tract obstruction.
MAC was present in 13 of 17 patients (76 percent) with hypertrophic cardiomyopathy and in 176 of 362 patients (49 percent) without hypertrophic cardiomyopathy (p<0.025).

Figure 1 illustrates hypertrophic cardiomyopathy in a patient with a gradient of 110 mm Hg across the left ventricular outflow tract.

**DISCUSSION**

Kronzon and Glassman demonstrated MAC in 12 of 18 patients (67 percent) older than 55 years with hypertrophic cardiomyopathy and in four of 25 patients (14 percent) younger than 55 years with hypertrophic cardiomyopathy (p<0.01). Nair et al found MAC in 12 of 42 patients (29 percent) with hypertrophic cardiomyopathy. Their patients with hypertrophic cardiomyopathy and MAC were older than their patients with hypertrophic cardiomyopathy and no MAC. Motamed and Roberts observed MAC in 30 of 100 autopsy patients (30 percent) older than 40 years with hypertrophic cardiomyopathy and in none of 100 patients (0 percent) younger than 40 years with hypertrophic cardiomyopathy. Fulkerson et al demonstrated that hypertrophic cardiomyopathy was present in five of 80 patients (6 percent) with MAC, mean age 73 years (range, 41 to 90).

We found that the prevalence of hypertrophic cardiomyopathy in our unselected elderly patients (mean age 82±8 years) was 4 percent. The mean age of our patients with hypertrophic cardiomyopathy was 85±7 years. The prevalence of IHSS in our unselected elderly patients was 2 percent. MAC was also present in 76 percent of our elderly patients with hypertrophic cardiomyopathy compared with 49 percent of our elderly patients without hypertrophic cardiomyopathy (p<0.025).

**REFERENCES**

1. Roberts WC, Perloff JK. Mitral valvular disease: a clinicopathological survey of the conditions causing the mitral valve to function abnormally. Ann Intern Med 1972; 77:593-75

2. Roberts WC. The senile cardiac calcification syndrome. Am J Cardiol 1986; 58:572-74


7. Aronow WS, Kronzon I. Correlation of prevalence and severity of mitral regurgitation and mitral stenosis determined by Doppler echocardiography with physical signs of mitral regurgitation and mitral stenosis in 100 patients aged 62 to 100 years with mitral anular calcium. Am J Cardiol 1987; 60:1189-90


**Miliary Tuberculosis due to Intravesical Bacillus Calmette-Guerin Therapy**

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While receiving treatment for bladder carcinoma with intravesical BCG, a 78-year-old man developed a clinical illness and roentgenographic manifestation of miliary tuberculosis. The transbronchial lung biopsy demonstrated granulomas with giant cells. Treatment with antituberculosis therapy resulted in complete resolution of the illness. The pathogenesis of this complication was considered to be due to pulmonary infection by BCG from the bladder source and differs from previously reported cases of interstitial pulmonary infiltrates which more likely represent a hypersensitivity reaction to BCG. (Chest 1988; 94:1296-98)

Recent studies have demonstrated a significant advantage of intravesical bacillus Calmette-Guerin (BCG) over chemotherapeutic agents such as thiotepa, for the treatment of superficial bladder carcinoma. Serious complications of intravesical BCG are few and pulmonary side effects rare. In a multicenter series of 1,276 patients reported by Lamm et al., 12 patients (0.9 percent) demonstrated pneumonitis or hepatitis, and none showed the classic radiographic appearance of miliary tuberculosis or granulomatous histologic changes.

The purposes of this report are to describe for the first time a patient who developed a clinical illness and radiographic findings typical of "miliary" pulmonary disease after intravesical BCG which was confirmed by the finding of well formed granulomas on transbronchial lung biopsy, and second, to discuss the controversial pathogenesis and treatment of this pulmonary complication.

**CASE REPORT**

A 78-year-old white man with recurrent hematuria was found on cytologic examination of the urine to have carcinoma of the bladder in September, 1982. The patient was admitted to the New York Hospital and underwent cystoscopy which revealed a 1 cm area of papillary tumor on the left anterior wall of the bladder. This was resected transurethrally and was reported as papillary urothelial carcinoma, grade 1, stage A (T1, Nx, MO). Three months later, the cytology again revealed carcinoma in the voided urine. The patient then received six weekly instillations of intravesical BCG, a Pasteur strain, 120 mg each. At the end of the fifth weekly instillation, urine cytology reverted to normal. Two weeks after completing the course of intravesical BCG therapy, he underwent cystoscopic examination and random biopsies of the bladder, all of which revealed chronic cystitis with scattered granulomas compatible with BCG therapy. There was no evidence of carcinoma. He was continued on monthly intravesical instillation of BCG. After the fourth month, he began to note low grade fever and a nonproductive cough. Urinalysis at that time revealed 10 to 12 WBCs with negative culture results for bacteria and mycobacteria. Urine cytology remained negative for

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1296

Miliary TB due to BCG Therapy (Gupta, Lavengood, Smith)