Severe Aortic Regurgitation from Systemic Hypertension*

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Although about 10 percent of patients with systemic hypertension have a basal diastolic blowing murmur indicating aortic regurgitation (AR) (Fig 1),1-7 the degree of aortic regurgitation is usually minimal or mild. The occurrence of severe aortic regurgitation from systemic hypertension unassociated with aortic dissection is rare,8 but herein we describe such a patient who had aortic regurgitation severe enough to require aortic valve replacement.

CASE REPORT

A 64-year-old woman, who died on August 3, 1981, had systemic arterial hypertension noted for the first time at age 36 years (1953). At age 40, she began antihypertensive treatment (reserpine). At age 50 (1967), a grade 2/6 diastolic blowing murmur of aortic regurgitation was noted and the blood pressure was 240/120 mm Hg (Fig 2). During the next seven years, the blood pressure remained elevated despite administration of diuretics, reserpine and alpha-methyldopa. At age 55 years (1973), angina pectoris appeared and thereafter it progressed. On examination at age 56, the intensity of the aortic regurgitation murmur was grade 3/6. The ECG (Fig 3) showed sinus bradycardia and left ventricular hypertrophy, and the chest radiograph (Fig 4), an enlarged cardiac silhouette. On M-mode echocardiogram (Fig 5), the left ventricular free wall and ventricular septum were of similar thickness and the ascending aorta was dilated. The results of the cardiac catheterization are summarized in Table 1. She underwent aortic valve replacement with a tilting-disc prosthesis and had two aortocoronary bypass conduits placed to the left anterior descending coronary system. The aortic valve was three-cusp; each cusp was freely mobile, but mildly thickened by fibrous tissue without calcific deposits, and no commissure was fused.

The blood pressure in the first six weeks postoperatively was reduced compared to the preoperation and late postoperation values (Fig 2). Later she was treated with beta-blocking and vasodilating agents. A murmur of aortic regurgitation was absent postoperatively. At age 62 (1980), angina pectoris and exertional dyspnea reappeared. The blood pressure was 210/100 mm Hg. She took warfarin only intermittently, and in July, 1981 she developed acute pulmonary edema without audible prosthetic aortic valve sounds, and died several days later.

At necropsy, the heart weighed 530 g. The orifice of the aortic-valve prosthesis was severely narrowed by thrombus which made the occluder immobile. A healed transmural left ventricular infarct was present (Fig 6) and the left main, left anterior descending, and right coronary arteries were each narrowed >75 percent in cross-sectional area by atherosclerotic plaques.

**COMMENTS**

The patient described above had systemic hypertension and aortic regurgitation severe enough to warrant aortic-valve replacement without clinical or morphologic explanation for the aortic regurgitation other than systemic hypertension. Recently, we reported four other patients, all men aged 43-59 years (mean 50), with severe systemic hypertension, chronic congestive heart failure, and aortic

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**Figure 1.** Frequency and severity of aortic regurgitation (AR) in patients (pts) with systemic hypertension (SH) based on previously reported data.1-7
Severe Aortic Regurgitation from Systemic Hypertension (Waller, Kishel, Roberts)

regurgitation severe enough to warrant aortic-valve replacement. The hypertension had been present from 1-30 years (mean 13). In each of the four previous patients and in the present patient, the aortic valve was three-cuspid; each cusp was free of calcific deposits and freely mobile.

Until these five patients were encountered, we had not observed severe aortic regurgitation from systemic hypertension alone and are unaware of any reports describing aortic valve replacement for aortic regurgitation in such patients. At least 79 patients with systemic hypertension and aortic regurgitation (by auscultation), however, were reported between 1940 and 1971, but none had aortic valve replacement. Of the 79 patients, the aortic regurgitation was severe in 17 (22 percent) and mild or moderate in 62 (78 percent). Each of the 17 patients with severe aortic regurgitation had fatal congestive heart failure, but another definite, probable or possible cause of the failure other than aortic regurgitation appears to have been present in six. Of the remaining 11 patients, necropsy information was available in seven. The aortic valve and ascending aorta were reported to be normal in all seven. The aortic valve "ring" was dilated in only one (7-12 cm [mean 9]), the left ventricle was dilated in only three patients, but the heart weight

Figure 2. Systolic and diastolic systemic arterial pressures before and after aortic-valve replacement.

Figure 3. Electrocardiogram in patient at age 56 years (eight years before death) showing left ventricular hypertrophy and nonspecific ST segment and T wave changes. The total QRS amplitude is 195 mm.

Figure 4. Posteroanterior chest roentgenogram obtained before aortic valve replacement eight years before death showing an enlarged cardiac silhouette.
was increased in all seven (460-700 g [mean 565 g]).

Certain factors increase the possibility of develop-

<table>
<thead>
<tr>
<th>Table 1—Hemodynamic Data (Pressures in mm Hg)</th>
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<tr>
<td>Left ventricle (LV) ( (s/d) ) &amp; 160/11</td>
</tr>
<tr>
<td>Femoral artery (FA) ( (s/d) ) &amp; 160/60</td>
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<tr>
<td>Pulmonary arterial wedge (mean) &amp; 7</td>
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<tr>
<td>Right ventricle ( (s/d) ) &amp; 20/5</td>
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<tr>
<td>Right atrium (mean) &amp; 3</td>
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<tr>
<td>Cardiac index ( (L/min/M^2) ) &amp; 1.6</td>
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<tr>
<td>AR by aortogram ( (1+4+) ) &amp; 3+</td>
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</table>

Coronary arterial narrowing
\( (% \text{ diameter reduction}) \)
- Left main & 70
- Left anterior descending & 50
- Left circumflex & 50
- Right & 0

\( s/d = \text{peak systole/end diastole} \)

ing aortic regurgitation in patients with systemic hypertension.1-7 1) Magnitude of systemic arterial pressure. The higher the pressure, the greater the chance of aortic regurgitation. 2) Age of patient. Of patients with similar levels of systemic arterial pressure, older patients have a higher frequency of aortic regurgitation than do younger patients. 3) Duration of systemic hypertension. Of patients of similar age and similar pressure, those with systemic hypertension of longer duration have a higher frequency of aortic regurgitation than do those of shorter duration. The mechanism by which severe aortic regurgitation develops in some patients with systemic hypertension is unclear.
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