The Ballooning Posterior Leaflet Syndrome: Minnesota Multiphasic Personality Inventory Profiles in Symptomatic and Asymptomatic Groups

Stephen D. Shappell, M.D., F.C.C.P., ** William Orr, Ph.D., † and C. G. Gunn, M.D.†

Due to the complex of vague symptoms in some patients with a ballooning posterior leaflet (BPL), a standardized personality inventory test (MMPI) was given to 14 patients exhibiting a midsystolic click and/or late systolic murmur and a positive echocardiogram for a BPL. Seven of the eight symptom-free patients had normal MMPIs. Of the six symptomatic patients, five had abnormal scores for hysteria and hypochondriasis, four abnormal scores for depression, psychopathic deviate and schizophrenia, and three abnormal scores for psychasthenia. Of these six patients, two have been resuscitated from a near-fatal arrhythmia and two have frequent premature ventricular contractions (PVCs). Since those patients with life-threatening arrhythmias showed at least four abnormal MMPI scales, it is postulated that an abnormal MMPI in a person with the BPL syndrome portends a greater risk for a potentially fatal arrhythmia. The presence of normal MMPIs in four symptomatic patients with aortic stenosis suggests that life-threatening symptoms per se do not account for the abnormalities found in patients with the BPL syndrome.

In the process of evaluating an increasing number of people presenting with a midsystolic click and/or late systolic murmur, it became apparent that two distinct groups could be identified: Group 1 consists of patients who were referred for some other reason, are totally asymptomatic, have a midsystolic click and/or a late systolic murmur on auscultation, and exhibit a typical ballooning posterior leaflet on echocardiography not due to any demonstrable organic heart disease. This group appears to be quite common. A second group of patients, presenting not only with the midsystolic click and/or late systolic murmur and a positive echocardiogram for ballooning posterior leaflet but also with overt symptomatology, are considered to have the ballooning posterior leaflet syndrome.

The inordinate emotional lability and many vague symptoms (chest pain, fatigue, palpitations) in patients with the complete syndrome was impressive. Indeed, symptoms of "neuropsychiatric origin" appeared to play a role in many of those patients described by Hancock¹ and Jeresaty.² In addition, the observation that emotional lability contributed to the sudden death of two patients with the ballooning posterior leaflet syndrome³,⁴ raised the question as to whether objective assessment of personality features might help to identify patients with the full syndrome particularly at risk for sudden death. A standardized personality test, the Minnesota Multiphasic Personality Inventory (MMPI), was, therefore, given to both groups of patients in an effort to more objectively assess the presence of gross psychopathology.

 METHODS AND PROCEDURES

Fourteen patients, 2 men and 12 women, seen over a six-month period and exhibiting a midsystolic click and/or late systolic murmur, were studied. In all cases, the click and murmur moved in the manner expected for the ballooning posterior leaflet.⁵ A clearly positive echocardiogram for ballooning of the posterior mitral leaflet was used to confirm the diagnosis in all cases.⁶ An MMPI was administered to all patients. The MMPI is a standardized questionnaire consisting of 566 statements to which a subject answers "true" or "false." These responses are combined to yield scores on four validity scales and ten clinical scales: hypochondriasis, depression, hysteria, psychopathic deviate, masculinity-femininity, paranoia, psychasthenia, schizophrenia, hypomania and social inversion. An MMPI score of 70 or higher was considered abnormal.

Four patients with symptomatic valvular aortic stenosis, observed over an eight-month period, were also evaluated with MMPIs in an effort to assess whether the presence of life-threatening symptoms per se would cause abnormal MMPI scores.

RESULTS

The validity scales revealed no abnormalities. Seven of the eight symptom-free patients had entirely normal MMPIs. The eighth, discovered because she was the niece of a woman who died from the ballooning posterior leaflet syndrome, showed an abnormal test score for hypomania. Of the six symptomatic patients with the full ballooning posterior leaflet syndrome (Table 1), five had abnormal scores for hysteria and hypochondriasis, four showed abnormal scores for depression, psychopathic deviate and schizophrenia, three had abnormal scores...
Table 1—Clinical Data on the Six Patients with Full Ballooning Posterior Leaflet Syndrome and an Abnormal MMPI

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Sex</th>
<th>Age (Yr)</th>
<th>Auscultation Findings</th>
<th>Symptoms</th>
<th>Resting ECG</th>
<th>Echo</th>
<th>MMPI (Elevated Scales)</th>
<th>Validity Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>20</td>
<td>MSC with amyl nitrite</td>
<td>nervousness, palpitations</td>
<td>IRBBB**</td>
<td>pos.</td>
<td>depression, psychopathic deviate; masculinity-femininity; paranoia; psychasthenia, schizophrenia; hypomania; social inversion</td>
<td>50 3 14 6</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>24</td>
<td>MSC: LSM</td>
<td>nervousness, palpitations, chest pain, syncope (VF)**</td>
<td>QT (0.45) seconds</td>
<td>pos.</td>
<td>hypochondriasis; hysteria; psychopathic deviate; schizophrenia; psychasthenia</td>
<td>50 4 13 11</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>43</td>
<td>MSC</td>
<td>palpitations, chest pain</td>
<td>NL</td>
<td>pos.</td>
<td>hypochondriasis; depression; hysteria</td>
<td>50 11 8 21</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>39</td>
<td>MSC: LSM</td>
<td>palpitations, chest pain, faintness, PVCs</td>
<td>NL</td>
<td>pos.</td>
<td>hypochondriasis; depression; hysteria</td>
<td>50 5 3 16</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>26</td>
<td>MSC: LSM</td>
<td>palpitations, chest pain, PVCs</td>
<td>NL</td>
<td>pos.</td>
<td>hypochondriasis; depression; hysteria</td>
<td>50 2 12 9</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>48</td>
<td>MSC: LSM</td>
<td>palpitations, chest pain, syncope, recurrent VT****</td>
<td>NL</td>
<td>pos.</td>
<td>hypochondriasis; hysteria; psychopathic deviate; schizophrenia</td>
<td>50 1 7 7</td>
</tr>
</tbody>
</table>

*Number of unanswered questions; **Incomplete right bundle branch block; ***Mid-systolic click; LSM—Late systolic murmur; ****Ventricular fibrillation; *****Ventricular tachycardia

for psychasthenia, two had abnormal scores for social inversion, and one showed abnormal scores for paranoia, hypomania and masculinity-femininity. Two of these six patients have been resuscitated from a near-fatal arrhythmia (patients 2 and 6), and two have demonstrated frequent PVCs during electrocardiographic monitoring procedures (patients 4 and 5). The two patients with life-threatening arrhythmias (ventricular fibrillation and ventricular tachycardia) were abnormal in at least four categories of the MMPI, while the other patients showed abnormal elevations on at least three of the scales.

Of the four patients with valvular aortic stenosis, all presented with angina pectoris, two with exertional shortness of breath, and one with occasional dizziness. All four exhibited normal MMPIs with normal validity scales (Table 2).

**DISCUSSION**

Numerous studies have been made relating a variety of psychosocial factors to coronary heart disease. Wolf has described anecdotal situations

Table 2—Clinical Data on the Four Patients with Valvular Aortic Stenosis and a Normal MMPI

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Sex</th>
<th>Age (Yr)</th>
<th>Symptoms</th>
<th>Resting ECG</th>
<th>Aortic Valve Area, (Cm²)</th>
<th>MMPI</th>
<th>Validity Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>M</td>
<td>53</td>
<td>angina pectoris; exertional dyspnea; occasional dizziness</td>
<td>LVH with 2º ST-T changes</td>
<td>0.50</td>
<td>no elevated scales</td>
<td>20 6 3 3</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>64</td>
<td>angina pectoris; exertional dyspnea</td>
<td>LVH with 2º ST-T changes</td>
<td>0.62</td>
<td>no elevated scales</td>
<td>50 4 3 21</td>
</tr>
<tr>
<td>9</td>
<td>M</td>
<td>41</td>
<td>angina pectoris; fatigue; exertional dyspnea</td>
<td>LVH with 2º ST-T changes</td>
<td>0.72</td>
<td>no elevated scales</td>
<td>50 5 11 8</td>
</tr>
<tr>
<td>10</td>
<td>M</td>
<td>43</td>
<td>angina pectoris</td>
<td>LVH with 2º ST-T changes</td>
<td>1.00*</td>
<td>no elevated scales</td>
<td>50 3 3 15</td>
</tr>
</tbody>
</table>

*Estimated from echoangiogram; patient has declined catheterization.

2. Wolf has described anecdotal situations

CHEST, 66: 6, DECEMBER, 1974

Ballooning Posterior Leaflet Syndrome 691
in which emotional stresses have precipitated either life-threatening cardiac arrhythmias or sudden death, and Jenkins has devised a questionnaire which discriminates between type A and type B coronary prone behavior patterns. In addition, considerable work has been done with standard personality assessment devices, particularly the MMPI in an attempt to relate various personality traits and patterns to coronary heart disease.

The present preliminary investigation describes MMPI scores in patients with the ballooning posterior leaflet syndrome (BPLS). Since some of these patients are at risk for sudden death, it might be hypothesized that some have personality traits which signal a greater risk of sudden death.

With the data presented, it is not possible to determine whether the personality factors precede or follow the symptoms. The presence of an abnormal MMPI in our one asymptomatic stigmatized relative followed prospectively may help to answer this question. Sequential MMPIs on other asymptomatic relatives may also help to clarify the problem. The group with aortic stenosis, three of whom subsequently underwent successful aortic valve replacement, suggests that the abnormal MMPIs in the BPLS group are not merely a function of life-threatening symptoms per se. Indeed, the patients with aortic stenosis were aware of the gravity of their illness and the upcoming open heart surgery.

In one clearly documented sudden death in a patient with the ballooning posterior leaflet syndrome, ventricular fibrillation was the mechanism present. Two of the patients in the present study have demonstrated life-threatening ventricular arrhythmias, one ventricular fibrillation and one ventricular tachycardia. With the emphasis in the literature on ventricular arrhythmias as a cause of sudden death, whether at rest, emotionally, or exercise-induced, it appears that central neural influences may play a prominent role in this setting.

Of particular interest, then, is how abnormal personality features as determined by an MMPI can relate to sudden cardiac death. The relationship between brain mechanisms and cardiac arrhythmias has been well documented in the laboratory and at the bedside. It is clear that any atrial or ventricular arrhythmias which may be seen clinically can be produced in "normal" experimental animals by discrete stimulation in a variety of CNS foci. The investigation of Hockman points to the role of sympathetic mechanisms, while that of Gunn and Porter, on the other hand, stresses the role of the vagus in the central induction of cardiac atrial and ventricular arrhythmias. Meinhardt and Wolf have shown ventricular tachyarrhythmias to occur in emotional settings and have documented their recurrence in stress interviews. It is suggested that the MMPI, in patients with the BPLS, may serve as a marker in identifying patients particularly prone to psychophysiological sudden death. The challenge remains, however, of preventing sudden death in a select group of patients and studying its pathophysiology more closely.

REFERENCES


692 SHAPPELL, ORR, GUNN

CHEST, 66: 6, DECEMBER, 1974