Lateral Displacement of the Head: A Sign of Decreased Right Ventricular Performance*

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Lateral head movements were observed in eight patients with severe right ventricular failure. These motions, easily detectable from a distance, occurred in patients with elevated right atrial “a” waves. These movements appear to be related to a forceful right atrial contraction and reflect a decrease in right ventricular compliance.

Pulsatile head motion (deMusset’s sign) is a well appreciated sign of severe aortic insufficiency.1 In this condition the motions are usually anterior-posterior in direction and are best seen with the patient in the sitting or erect position. We have noted several patients who, in contrast to this anterior-posterior pulsatile head motion, had rhythmic lateral motion of their heads. This phenomenon, which we refer to as “head bobbing,” is best seen with the patient in the supine position, in a completely relaxed or somnolent state.

This report summarizes the findings in eight patients whom we have observed with easily recognized, rhythmic lateral displacement of the head.

**Material and Methods**

Eight patients, six men and two women, demonstrating lateral head movements were observed. In two the phenomenon was documented by motion pictures.2 Their ages ranged from 34 to 50 years, with a mean of 42 years. Three had primary myocardial disease, two had recurrent pulmonary emboli, one had postpartum heart disease complicated by recurrent pulmonary emboli, one had pulmonic stenosis and one had coronary artery disease, left ventricular aneurysm and biventricular failure.

All patients exhibited clinical features of severe right ventricular failure. The jugular veins were prominent with “a” and “v” waves and a rapid “y” descent. A left parasternal precordial impulse was present in all. Atrial and ventricular gallops were audible in all patients and a murmur of tricuspid regurgitation was detected in six. All patients had electrocardiographic and radiographic evidence of right atrial enlargement.

Lateral head motions were documented with a Wayne-Kerr distance meter, with the exploring probe positioned near the temporal region (Fig 1).8 Recordings were made using multi-channel photographic recorders. For timing purposes, head motions were recorded simultaneously with electrocardiogram, phonocardiogram, jugular venous pulse, liver pulsations, intracardiac pressures, and/or apexcardiogram. Right heart catheterization was performed in five patients.

**Description of Findings**

The head motions were characterized by gentle, rhythmic, lateral displacements of the head. These movements are best appreciated with the patient in the supine or semirecumbent position, with the observer standing at the foot of the bed. The motion appeared to be greatest when the patient’s heart rate

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was such that only two movements occurred per heart cycle, one in systole and one in diastole. In this situation the one lateral movement occurred after the "v" wave of the jugular venous pulse, and coincided with the T wave of the electrocardiogram. Another followed the "a" wave of the jugular pulsation and the "p" wave of the electrocardiogram (Fig 2). When the heart rate was slower, extra or resonant lateral movements could be recorded (Fig 3). The lateral head movements did not seem to relate to the arterial pulse or other phenomena originating from the left heart chamber. We arrived at this conclusion after studying the recording made from one patient with bigeminal rhythm due to premature ventricular beats (Fig 3a, b). There was no palpable systolic carotid pulse at the time of the ectopic beats (Fig 3b), yet lateral motion of the head was recorded following the "a" wave of the jugular venous pulse.

In this small series of cases lateral head motion was associated with a right atrial "a" wave and right ventricular end-diastolic pressure of greater than 20 mm Hg (Table 1, Fig 4, 5). With treatment of the congestive failure and regression of the elevated venous pressure, lateral head displacement decreased. Contrarily, maneuvers that temporarily elevated venous pressure could institute or exaggerate these movements.

### Table 1—Cardiac Catheterisation Data of Eight Patients Exhibiting “Head Bobbing”

<table>
<thead>
<tr>
<th>Case, No.</th>
<th>Age/Sex</th>
<th>Clinical Diagnosis</th>
<th>Right Atrial Pressure, mm Hg</th>
<th>Right Ventricular Pressure, mm Hg</th>
<th>Pulmonary Artery Pressure, mm Hg</th>
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<tbody>
<tr>
<td>1</td>
<td>45/M</td>
<td>pulmonary hypertension; recurrent pulmonary emboli</td>
<td>23 24 19 57 23 60 27 38</td>
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<tr>
<td>2</td>
<td>34/M</td>
<td>primary myocardial disease</td>
<td>25 21 22 43 22 40 30 32</td>
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</tr>
<tr>
<td>3</td>
<td>38/M</td>
<td>primary myocardial disease</td>
<td>22 25 23 48 22 50 25 33</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>41/M</td>
<td>coronary artery disease; ventricular aneurysm; biventricular failure</td>
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<tr>
<td>5</td>
<td>45/M</td>
<td>recurrent pulmonary emboli; pulmonary hypertension</td>
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<tr>
<td>6</td>
<td>37/F</td>
<td>pulmonic stenosis</td>
<td>20 18 18 100 21 30 18 24</td>
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<tr>
<td>7</td>
<td>42/F</td>
<td>postpartum myocardial disease; recurrent pulmonary emboli</td>
<td>24 20 21 — — — — — —</td>
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<td></td>
</tr>
<tr>
<td>8</td>
<td>50/M</td>
<td>primary myocardial disease; biventricular failure</td>
<td>23 21 215 56 23 55 19 29</td>
<td></td>
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</tr>
</tbody>
</table>

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Figure 3. (a) Simultaneous recording of phonocardiogram, head movement, jugular venous pulse. Premature ventricular contraction (PVC) has fully compensatory pause and P wave (P) is observed prior to onset of QRS. Jugular venous pulse and head motion inscribe prominent "a" wave. (b) Simultaneous recording of phonocardiogram, carotid pulse, head motion and electrocardiogram. PVC fails to inscribe arterial pulsation. Contrariwise, head motion inscribes prominent "a" wave. For discussion see text.

Discussion

The wide transmission of the systolic venous pulse in patients with severe tricuspid regurgitation is commonly recognized.\(^7\) Rhythmic lateral head motions, as presented in this communication, have

Figure 4. Right atrial pressure tracing (left); right ventricular pressure (center) and recording of electrocardiogram, head pulsation and jugular venous pulse (right). End-diastolic pressure is 22 mm Hg and atrial "a" and ventricular "a" wave measure 28 mm Hg.

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not previously been reported, although they have been noted in patients with tricuspid regurgitation.\(^5\) The presystolic lateral motions seem to result from the widespread distribution of a forceful atrial contraction that is needed to overcome the increased resistance to the failing right ventricle. The exact mechanisms for these displacements, however, have not been elucidated. One possible explanation could relate to the transmission of right atrial pressure pulse, asynchronously to the head as the result of a more direct continuity from the right atrium via the superior vena cava to the right internal jugular vein, than from the right atrium via the superior vena cava and the innominate vein to the left internal jugular vein. This concept, although attractive to us, is not supported by an observation made in one patient in whom temporary interruption of retrograde blood flow in the superior vena cava by inflating a balloon catheter failed to abolish the head motion. A second possible explanation is the transmission of the pulse wave from the right atrium along the wall to the venous system caused by the contiguity of the superior vena cava and the right atrium.

The markedly elevated right ventricular end-diastolic pressures of our patients is probably an indication of right ventricular failure and decreased right ventricular compliance.

In this small series of patients, "head bobbing" was observed when the right atrial "a" wave exceeded 20 mm Hg. The lateral head motions seem to be a reflection of a very prominent atrial "a" wave. Although similar head motions could be expected with tricuspid stenosis, we have failed to demonstrate these movements in a study of three patients with tricuspid stenosis and one with right atrial myxoma. Thus, in the absence of tricuspid stenosis, the prominent "a" wave provides evidence of impairment of right ventricular performance, and altered right ventricular compliance.

This should not be interpreted to indicate that "head bobbing" occurs only in patients with markedly elevated right atrial pressure. Since making the initial observation, other patients have been observed in whom the finding was more subtle, and in whom the venous pressures were not estimated to be as high. The recordings made using the Wayne-Kerr distance meter served to confirm clinical observations made at the bedside. Similar recordings made in a sample of normal subjects exhibited an undisturbed horizontal line, indicating the lack of detectable displacements.

References
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