Heart Weight of Jamaicans

Autopsy Study of Normal Cases and Cases of Hypertension and Chronic Lung Disease


An enlarged heart is one of the more important signs of heart disease and may be present without clinical symptoms or other physical abnormalities. Both clinical and radiological examination are relatively crude methods of detecting the less severe forms of cardiac enlargement, particularly of the right ventricle. The pathologist is in the best position to assess heart size because he is able to weigh and measure various parts of the heart at autopsy. Most autopsies are not performed on normal persons. The nearest approach to normality may be obtained by considering autopsy material selected from traumatic deaths, but even with these there may be some unknown disease process present. For practical purposes normal cases have to be taken from the general autopsy population. By excluding those cases in which disease processes are known to produce an increase in heart weight, it is possible to acquire data on the normal range of heart weight, but the values obtained have limitations by virtue of selection. In these circumstances it is not surprising that there is considerable variation of opinion about the range of normal heart weight. Generally pathologists rely on "normal" values obtained from European and North American studies, which usually relate body weight and height to heart size.

It has recently been shown that the heart weights of Uganda Africans were less than those in European and North American studies. The smaller heart weight appeared to be directly related to the smaller body size in the African. No normal range of heart weights for Jamaicans who are of African origin has been established. Idiopathic cardiomegaly is a frequent diagnosis in Jamaica, and knowledge of the range of normal heart weight is necessary to define cardiac enlargement more accurately.

In the present study an attempt is made to estimate the normal range of heart weight in Jamaicans and to relate the heart weight to body height and weight, and to age. The investigation included consideration of hypertrophy of individual chambers in systemic hypertension and in chronic lung disease, with an attempt to define normal values for individual chamber weights so that right or left ventricular hypertrophy may be more easily identified.

Methods

A group of 126 Jamaicans of mainly African origin and of both sexes was selected from a group of 162 on whom consecutive autopsies were performed at the Pathology Department of the University of the West Indies between January 1962 and September 1962. Each heart was removed from the body. The coronary arteries were opened and removed from the heart. The heart chambers were then opened and the heart was fixed in formalin. The hearts were then dissected by the method of Reiner, which involves the removal of the epicardial fat followed by separation of the heart into right and left ventricles, interventricular septum, and combined atria. The weight of the whole heart and the weights of its component parts were recorded. The body height in centimeters and the body weight in kilograms were measured and recorded.

Classification of Cases

The series was divided into three groups: cases of hypertension, those with chronic lung disease, and normal cases. Cases of systemic hypertension (systolic blood pressure greater than 150 mm Hg, or diastolic blood pressure greater than 100 mm Hg)
HEART WEIGHT OF JAMAICANS

Hg or both, as recorded in the case notes) and no other disease were termed hypertensive. Cases of bronchiectasis, chronic bronchitis, emphysema, interstitial fibrosis, sarcoidosis, or recurrent pulmonary embolism, without any other form of disease were considered cases of chronic lung disease. Patients dying with an acute or terminal respiratory infection in the absence of chronic lung disease were not included in this group. Cases in which there was no clinical or pathological evidence of hypertension, chronic heart disease of whatever type, anemia, amyloidosis, leukemia, collagen vascular disease, or any condition likely to affect heart weight were classified as normal. The cases excluded from this study because of these criteria are listed in table 1.

Results

Age and sex distribution of the groups is given in figure 1 and values for component heart weights are given in table 2. The values for total heart weight, total myocardial (muscle) mass, and body height and weight are given in table 3. Correlations of total heart weight and total myocardial mass with body height and weight are given in table 4. Correlations of these factors with age were also calculated but have been omitted in view of the small number analyzed.

Discussion

The normal cases studied demonstrated a higher correlation of heart weight with body weight than with body height, particularly for females. This disagrees with a previous finding. Greater body weight implies greater work expenditure, and this is an accepted reason for an increase in heart weight. On the
other hand taller persons are not necessarily heavier, as is reflected in our findings.

The normal hearts examined in this study were lighter than the hearts of Britons or Americans but are similar in weight to the hearts of Uganda Africans. These differences may be ascribable to different body sizes, to which heart weight is related. The difference in body size is probably due to social circumstances, rather than racial factors.

The method of Reiner was devised, in part, to avoid errors introduced by the presence of large amounts of epicardial fat. We feel that the technical difficulty introduced by dissecting off the epicardial fat is so great that this procedure is worthwhile only in cases with large amounts of epicardial fat. Generally the relation between total heart weight and total myocardial mass is so close that the difference introduced by epicardial fat may be neglected, except in very few cases. This is justified by our figures, which show appreciably less epicardial fat than the North American studies.

The figures for the cases of hypertension show that total heart weight, total myocardial mass, particularly left ventricular weight, are significantly higher than these values in the other two groups. This is in agreement with previous partitioning studies. No attempt was made to relate the degree of myocardial weight increase to the severity of hypertension because of the small numbers involved.

The total heart weight in the cases of chronic lung disease was greater than in normals, particularly in females. The increase in weight was partly due to right ventricular hypertrophy but also to increased atrial weight. The reason for this was not clear.

**Summary**

The heart weight and the weights of the component parts have been measured in a group of 126 Jamaicans of African origin on whom autopsy was performed at the Pathology Department of the University of the West Indies. This series comprised 58 normal
HEART WEIGHT OF JAMAICANS

Table 3

Means and Standard Deviations of Total Heart Weight, Total Myocardial Mass, Body Weight, and Height (Not Adjusted for Age)

<table>
<thead>
<tr>
<th></th>
<th>Total heart weight, g</th>
<th>Total myocardial mass, g</th>
<th>Body weight, kg</th>
<th>Body height, cm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean SD</td>
<td>Mean SD</td>
<td>Mean SD</td>
<td>Mean SD</td>
</tr>
<tr>
<td>Males:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>294.5 48.5</td>
<td>243.4 36.0</td>
<td>56.1 10.6</td>
<td>166.1 6.2</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>449.8 102.3</td>
<td>378.2 95.5</td>
<td>65.9 13.3</td>
<td>170.2 6.9</td>
</tr>
<tr>
<td>Cor pulmonale</td>
<td>337.8 68.1</td>
<td>278.9 55.0</td>
<td>52.7 10.7</td>
<td>163.3 11.1</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>258.6 49.5</td>
<td>203.7 37.1</td>
<td>51.2 11.3</td>
<td>160.6 5.4</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>385.3 115.2</td>
<td>330.0 92.9</td>
<td>60.9 16.8</td>
<td>162.7 5.0</td>
</tr>
<tr>
<td>Cor pulmonale</td>
<td>311.2 39.0</td>
<td>247.4 33.1</td>
<td>49.4 12.9</td>
<td>157.2 5.3</td>
</tr>
</tbody>
</table>

Table 4

Correlations of Total Heart Weight and Total Myocardial Mass with Body Weight and Height

<table>
<thead>
<tr>
<th></th>
<th>Weight and total heart weight</th>
<th>Height and total heart weight</th>
<th>Weight and total myocardial mass</th>
<th>Height and total myocardial mass</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight and total heart weight</td>
<td>Height and total heart weight</td>
<td>Weight and total myocardial mass</td>
<td>Height and total myocardial mass</td>
</tr>
<tr>
<td>Males:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>0.47*</td>
<td>0.43*</td>
<td>0.39*</td>
<td>0.30</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>0.35</td>
<td>-0.07</td>
<td>0.32</td>
<td>-0.01</td>
</tr>
<tr>
<td>Cor pulmonale</td>
<td>0.46</td>
<td>0.36</td>
<td>0.26</td>
<td>0.31</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>0.59†</td>
<td>-0.11</td>
<td>0.55†</td>
<td>-0.04</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>0.18</td>
<td>0.31</td>
<td>0.25</td>
<td>0.34</td>
</tr>
<tr>
<td>Cor pulmonale</td>
<td>0.54</td>
<td>-0.10</td>
<td>0.47</td>
<td>-0.07</td>
</tr>
</tbody>
</table>

*p < 0.05.
†p < 0.01.

cases, 46 cases of hypertension, and 22 cases of chronic lung disease.

The mean heart weight for normal males was 294.5 g and for females 258.5 g. These figures are similar to those reported from Uganda but less than those from Britain and North America. The differences in heart weight are probably correlated with difference in body size.

Total heart weight in the hypertensives was greater than in normals because of left ventricular hypertrophy. In chronic lung disease total heart weight was greater than that of normals due to enlargement of the right ventricle and of the combined atria. Right ventricular weight was also increased in cases of hypertension.

Acknowledgment

We wish to thank Drs. M. T. Ashcroft and W. E. Miall for their constructive criticism.

References

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8. Stuart, K. L., and Hayes, J. A.: A cardiac dis-


? Wound of Pericardium: Recovery

Two brothers of noble family lived together in the same house, drawing sustenance from the same source. At a feast—as often happens—a quarrel arose. One stabbed the other to the heart with his table knife. Quantities of blood poured from the wound, his vessels ceased to move, his face was pallid, cold sweat drenched his whole body, the arteries no longer pulsated, and at last every presage of death appeared. To make some effort to save him I ordered that he be fomented with remedies which strengthen the heart, and though he remained in the same state until midnight and his funeral rather than his recovery was considered, yet his spirit gradually began to return to his body. So I continued the treatment with renewed hope until by other and yet other remedies, at last, with God's help, I restored him to his former health. We thus perceived quite plainly that it was not the heart that had been wounded, as we had thought, but the pericardium only that had been slightly pierced.—ANTONIO BENIVIENI. De abditis nonnullis ac mirandis morborum et sanationum causis (First printed in 1507.) (Translated by Charles Singer). Springfield, Illinois, Charles C Thomas, Publisher, 1954, p. 133.
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J. A. HAYES and H. G. LOVELL

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