Ventricular Septal Aneurysms

A Report of Two Cases

By JOSEF EDELSTEIN, M.D., AND BERNARD L. CHARMS, M.D.

ANEURYSMS of the ventricular septum have been described in the membranous and muscular portions. In 1960 Taussig1 reviewed the literature and found 80 cases reported of membranous septal aneurysm. In 1957 Steinberg2 made the first diagnosis ante mortem from an angiocardioographic study. During the past few years there have been several reports of this entity8-6 with only a few diagnosed during life7.8 and probably less than five successfully repaired.9-12 On the other hand, all cases reported in the muscular portion of the septum have followed myocardial infarction.13-14

Anatomy

The pars membranacea is the last portion of the septum formed in the fetus, is located between the left and right ventricles in front of the tricuspid valve, and between the left ventricle and the right atrium, behind the tricuspid valve.15 It lies in close proximity to the aortic and atrioventricular valves and is considered to be the weakest part of the ventricular septum. The aneurysms of the membranous portion usually measure 1 to 2 cm. in all diameters and their walls are composed of fibrous tissue forming thick trabeculae when seen from the left ventricle. They can project into different portions of the right ventricle or right atrium.16

Etiology

Postulated origins of the aneurysms include endocarditis, congenital malformations, and a combination of these factors with the high pressure of the left ventricle.17 Mall18 in 1912 thought that the congenital origin was most likely due to an abnormal horizontal orientation of the septum exposing the membranous portion directly to the high left ventricular pressure.

The increased number of reports describing spontaneous closure of ventricular septal defects19-21 encourages the possibility that this area represents a weaker portion of the septum and thus may be subject to aneurysm formation. It is interesting to note that although the most acceptable theory is the congenital one, no cases have been described in fetal or newborn hearts which favors the theory of exposure to high ventricular pressure.

Clinical Course and Associated Lesions

Aneurysms can be of no significance or may produce serious hemodynamic changes, depending on infection, rupture, or the obstruction they produce. The most common associated lesions are aortic insufficiency,22 membranous subaortic stenosis,23 coarctation of the aorta,11, 24 complete AV block25 or other arrhythmias,26 mongolism,17 and AV canal.27 Frequent complications are subacute bacterial endocarditis, thromboembolism, left-to-right shunt and obstruction of the right ventricular outflow tract.9, 12 The two main entities to be considered in the differential diagnosis are aneurysm of the sinus of Valsalva or ventricular septal defects with an adherent leaflet of the tricuspid valve, forming a pocket.7

Case Reports

Case 1

D. C., a 9-year-old white boy, was essentially asymptomatic. He was one of twins and had been well except for an episode of lung infection and cyanosis at age 6 months. Two years prior to admission an inguinal herniorrhaphy was done without complication.

On physical examination blood pressure in the right arm was 160/100 mm. Hg and 180/110 mm. Hg in the left. Both femoral pulses were absent. The heart was not enlarged and no thrills were palpable. A grade-IV/VI ejection systolic murmur, starting with the first sound and ending

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with the second, was best heard at the fourth left intercostal space. A grade-III/V murmur was present at the second right intercostal space. The second sound was normally split with a loud first component. A continuous murmur was heard over the left paravertebral area. The electrocardiogram was normal. Chest x-ray revealed minimal enlargement of the left ventricle with a prominent ascending aorta.

Cardiac catheterization was performed and no evidence of a left-to-right shunt was observed. Pressures were within normal limits (table 1). Cineangiographic studies from the left ventricle in the left anterior oblique projection showed an area of the membranous portion of the ventricular septum bulging into the right ventricle during systole. A faint amount of dye could be seen leaking through the aneurysm (fig. 1). An injection from the root of the aorta demonstrated a coarctation. Surgical correction was successfully accomplished. No repair of the ventricular septal aneurysm seemed indicated at this time.

Case 2

D. F., an 8-year-old Negro boy, had been observed because of a murmur and a questionable history of rheumatic fever. He was entirely asymptomatic.

On physical examination a diamond-shaped murmur, grade IV/V, starting with the first sound and continuing throughout systole, was best heard at the fourth intercostal space and left sternal border. The second sound was normally split. The electrocardiogram showed an incomplete right bundle-branch-block pattern but was considered normal. Chest x-ray was negative.

Cardiac catheterization failed to reveal any left-to-right shunt, and pressures were within normal limits (table 2). A selective cineangiogram from the left ventricle showed an area in the midportion of the septum bulging to the right with each systole. A faint amount of dye traversed the septum to the right ventricle (fig. 2). No surgical attempt was considered indicated at this time.

Table 1

<table>
<thead>
<tr>
<th>Location</th>
<th>Pressure, mm. Hg</th>
<th>O2 saturation, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVC</td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>RA</td>
<td>30/0(10)</td>
<td>81</td>
</tr>
<tr>
<td>RV</td>
<td>30/12(17)</td>
<td>82</td>
</tr>
<tr>
<td>PA</td>
<td>5-14(10)</td>
<td></td>
</tr>
<tr>
<td>LV</td>
<td>145/10(75)</td>
<td>98</td>
</tr>
</tbody>
</table>

Discussion

It is well known that angiography is the only method of diagnosing ventricular septal aneurysm during life. In case 1 the aneurysm was located high in the septum, immediately below the aortic valve, with an associated coarctation of the aorta. In case 2 the aneurysm was in the center of the septum corresponding anatomically with the muscular portion. The latter situation has not been reported except following myocardial infarction.

The appearance of the observed defects together with the presence of small left-to-right shunts suggests the likelihood that these aneurysms occurred in association with spontaneous closure of interventricular septal defects.

Surgical repair in both patients has not been deemed necessary because of the minimal hemodynamic abnormality. The clinical course will determine the need for future repair.

Summary

Two cases of ventricular septal aneurysm are reported, one in the membranous septum and one in the muscular portion. The diagnosis was made by selective left ventricular angiography. It is suggested that these cases represent spontaneous closure of a ventricular septal defect with weakness and aneurysmal

*Figure 1*

Selective cineangiogram from the left ventricle in a left anterior oblique projection showing a fairly large ventricular septal aneurysm located in the membranous portion with a faint amount of dye leaking through into the right ventricle. A, aneurysm; L.V., left ventricle; S, left-to-right shunt; M.V., mitral valve.
VENTRICULAR SEPTAL ANEURYSMS

Table 2
Data from Cardiac Catheterization—Case 2

<table>
<thead>
<tr>
<th>Location</th>
<th>Pressure, mm. Hg</th>
<th>O2 saturation, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVC</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>SVC</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>RA</td>
<td>0-5(3)</td>
<td>73</td>
</tr>
<tr>
<td>RV</td>
<td>25/3(10)</td>
<td>78</td>
</tr>
<tr>
<td>PA</td>
<td>25/8(12)</td>
<td>79</td>
</tr>
<tr>
<td>P. cap</td>
<td>5-10(8)</td>
<td></td>
</tr>
<tr>
<td>LV</td>
<td>95/5(40)</td>
<td></td>
</tr>
<tr>
<td>Aorta</td>
<td>95/60(75)</td>
<td>97.5</td>
</tr>
</tbody>
</table>

Figure 2
Selective cineangiogram from the left ventricle in a left anterior oblique projection shows an aneurysm of the muscular septum with a faint amount of dye going across into the right ventricle. A, aneurysm; L.V., left ventricle; S, left-to-right shunt; M.V., mitral valve.

formation due to the high left ventricular pressure. Both are asymptomatic and hemodynamically within normal limits. Surgical repair of the aneurysms is not considered necessary.

Acknowledgment
We wish to express our gratitude to Miss Judy Wood, R.N., and Mrs. Gwen Chaney, B.S., for their technical assistance.

References


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**Exercitatio anatomica de motu cordis et sanquinis in animalibus**

We come now to the book, Exercitatio anatomica de motu cordis et sanquinis in animalibus, Guilielmi Harvei, Angli, Francofurti, sumptibus Guilielmi FITZERI, anno M.DC.XXXVIII. This great work stands by itself. In the medical sciences there is nothing else in the same class. Its seventeen brief chapters, in seventy-two pages, are an inexhaustible source of enlightenment, stimulus and pleasure, with its revelation of clear premises, cogent and skillful experiment, precise deduction, and incontrovertible conclusions. Its achievement was more than a discovery: it was a revolution.—WILLIAM F. HAMILTON, M.D. and DICKINSON W. RICHARDS, M.D. *Circulation of the Blood*. Edited by Alfred P. Fishman, M.D., and Dickinson W. Richards, M.D. New York, Oxford University Press, 1964, p. 74.
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Circulation. 1965;32:981-984
doi: 10.1161/01.CIR.32.6.981
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
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