Aorta-Pulmonary Artery Communication Through the Lungs

Report of a Case

By T. Sterling Claiborne, M.D., and William A. Hopkins, M.D.

A case is reported of anomalous communication between the aorta and pulmonary artery by way of a pulmonary vascular mass. The left-to-right shunt was sufficient to cause typical circulatory dynamics and was demonstrated by cardiac catheterization and angiography. Complete cure was obtained by lobectomy.

This paper presents a case of aortic pulmonary artery communication in the right lung, demonstrated by cardiac catheterization and angiocardiogram. Several types of blood vessel communications in the lungs are reported under various terms: pulmonary arteriovenous fistula, cystic disease of the lungs, anomalous pulmonary arteries, and sequestration of the lung. While some of these are obviously different disorders, others are closely related to each other. The direction and amount of blood flow in such communications are the most important features from the cardiovascular standpoint. When the flow of blood is from the pulmonary artery to pulmonary vein, cyanosis occurs and bleeding from the bronchial tree is frequent. Cough may be experienced but the condition is often asymptomatic and first diagnosed by x-ray. X-ray films may reveal a characteristic rounded area of communication between the enlarged afferent and efferent vessels. A murmur may be heard over the lesion. The heart is usually unaffected. The blood pressure is normal and there is usually no flow from the aorta into the communicating vessels.

When a vessel arising from the aorta becomes a part of the pulmonary arteriovenous fistula, the hemodynamics may be greatly altered. The high systemic pressure blocks the flow of unsaturated pulmonary artery blood and cyanosis may be absent. Such a case was reported by Lawrence and Rumel in 1950. Their patient had cardiac failure. The blood pressure was 140/70. At operation, in addition to a large 3 cm. pulmonary artery branch and 3 cm. pulmonary vein branch, a 0.75 cm. bronchial artery also entered the mass. The authors surmised that the supply of arterial blood directly from the aorta might have blocked cyanosis and questioned the role of this fistula in producing failure. Other cases have been reported of a branch entering from the aorta, but we have found no case with clinical studies and cardiac catheterization showing a free communication from the aorta to the pulmonary artery. Such a free communication would be expected to produce hemodynamic changes similar to patent ductus arteriosus or any peripheral high-pressure low-pressure fistula. In the case reported below the aorta communicated with the pulmonary artery through a pulmonary vascular mass. The clinical and laboratory evidence of increased load on the left ventricle was imposing and cure was accomplished by lobectomy.

Case Report

J. W. was a 14-year-old female student apparently in good health. There was a history of normal delivery without cyanosis and of normal activity without symptoms. She was last examined at age 9 by her pediatrician, who found no abnormalities.

In a routine school examination in September 1955 by Dr. Dewey Nabors a murmur was noted and further study was advised.

On October 4, 1955, she appeared healthy, normally developed, and without cyanosis. The lungs were normal on physical examination but a continuous machinery-like murmur was heard all over the chest, loudest to the right posteriorly. Anteriorly, the murmur was louder to the right than to the left of sternum. The blood pressure was 130/40 in both arms. The pulses in the femoral and dorsalis pedis arteries were forceful and bounding. Fluoro-
Table 1.—Cardiac Catheterization Data

<table>
<thead>
<tr>
<th></th>
<th>Pressure</th>
<th>(O_2) content vol. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior vena cava</td>
<td>13.20</td>
<td></td>
</tr>
<tr>
<td>Right mid atrium</td>
<td>3 mm. Hg</td>
<td>13.38</td>
</tr>
<tr>
<td>Right atrium, high</td>
<td></td>
<td>13.26</td>
</tr>
<tr>
<td>Right ventricle</td>
<td>23/5 mm. Hg</td>
<td>13.00</td>
</tr>
<tr>
<td>Right ventricle</td>
<td></td>
<td>13.16</td>
</tr>
<tr>
<td>Right pulmonary artery</td>
<td>8/0 mm. Hg</td>
<td>16.56</td>
</tr>
<tr>
<td>Left pulmonary artery</td>
<td></td>
<td>14.15</td>
</tr>
</tbody>
</table>

Note the increased oxygen content in the pulmonary arteries, the right being higher than the left.

On December 3, 1955, angiography (fig. 2) demonstrated a large pool of dye in the right lower lung, which seemed to fill from the aorta and flow into the pulmonary artery.

On December 19, 1955, operation performed by Dr. William Hopkins disclosed an artery 1 cm. in diameter arising from the aorta and coursing through the pulmonary ligament into the right lower lobe. A strong thrill suggested a considerable blood flow. The entire surface of the right lower lobe was covered by small but injected blood vessels. The entire lower lobe was removed because it was thought that all the vessels communicated.

Injection of the specimen with contrast medium through the abnormal vessel demonstrated a communication with the pulmonary artery through the lower lobe. This represents an abnormal and unusual aorta-pulmonary artery communication. No evidence of sequestrated lung was present.

The patient recovered promptly without com-

Fig. 1. X-ray showing prominent vessel at right base

Fig. 2. Angiogram. Note the lack of opacification of lower part of right pulmonary artery at 5 sec. (left) and, at 15 sec. (right), the pooling of dye from aorta into base of right lung.
plications; no murmur or thrill was present after the operation. She is in school and active without symptoms. On recent fluoroscopic examination there was no heart enlargement. The blood pressure was 105/70 in February 1956, and 125/80 in May 1956.

SUMMARY
Several cases of pulmonary arteriovenous communications have been reported in recent years with the blood flow from pulmonary artery to pulmonary veins. Such blood vessel masses may contain other vessels arising from the aorta with the hemodynamics of a high-pressure low-pressure shunt. A patient is reported with an aorta-pulmonary artery communication causing wide peripheral pulse pressure and increased load on the left heart. Catheterization and angiocardiographic studies demonstrated the shunt. Surgical cure was obtained by right lower lobectomy.

SUMMARIO IN INTERLINGUA
In recente annos, plure casos de communicaciones arterio-venose pulmonar esseva reportate, con le fluxo sanguine ab le arteria pulmonar verso le venas pulmonar. Tal massas de vasos sanguine pote continer alte vasos, originari ab le aorta, con le hemodynamica de un shunt ab alte pression a basse pression.

Es reportate le caso de un patiente con un communication inter aorta e arteria pulmonar, resultante in un large pression de pulso peripheric e un augmento del carga del corde sinistre. Catheterisation e studios angiocardiographic demonstrava le shunt. Restituzion chirurgic esseva effectuate per medio de lobectomia dextero-inferior.

REFERENCES

Pure rationalism, complete immunity from prejudice, consists in refusing to see that the case before one is absolutely unique. It is always possible to treat the country of one's nativity, the house of one's fathers, the bed in which one's mother died, nay, the mother herself if need be, on a naked equality with all other specimens of so many respective genera.—William James, Principles of Psychology, 1842–1910.
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Circulation. 1956;14:1090-1092
doi: 10.1161/01.CIR.14.6.1090

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