Lymphopericardium with Hypoproteinemia, Intestinal Loss of Protein, and Congenital Defects of the Lymphatic System

By F. G. J. Offerijns, M.D., K. J. van der Veen, M.Sc., D. Durrer, M.D., and B. G. Ziedses des Plantes, M.D.

SUMMARY

In the case of the 19-year-old girl reported, lymphopericardium was associated with congenital abnormalities of the lymphatic system and with gastrointestinal loss of protein secondary to intestinal lymphangiectasia. No communication with the thoracic duct was found.

Additional Indexing Words:
Intestinal lymphangiectasia  Chylopericardium  Pericardiocentesis

CHRONIC pericardial effusion without myocardial disease existing for many years is rare. Some of the cases can be attributed to chylous pericardial effusion. In the present case we found lymphopericardium associated with a generalized disorder of the lymphatic system.

Report of Case

A 19-year-old girl was admitted to the hospital because of an enlarged heart. As a baby she had been treated in another hospital because of diarrhea; hypalbuminemia was found, but her disease could not be diagnosed. After symptomatic treatment she was able to leave the hospital when she was 1 year old. She was well till her sixth year, at which time she had a period of...

Table 1
Composition of Pericardial Fluid and Serum at Time of Pericardiocentesis

<table>
<thead>
<tr>
<th></th>
<th>Pericardial fluid</th>
<th>Serum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose (mg %)</td>
<td>80</td>
<td>100 (plasma)</td>
</tr>
<tr>
<td>Total protein (g/L)</td>
<td>35.4</td>
<td>49.8</td>
</tr>
<tr>
<td>Albumin (%)</td>
<td>61.1</td>
<td>50.5</td>
</tr>
<tr>
<td>Globulin α1 (%)</td>
<td>5.6</td>
<td>5.6</td>
</tr>
<tr>
<td>α2 (%)</td>
<td>6.9</td>
<td>13.0</td>
</tr>
<tr>
<td>β (%)</td>
<td>12.5</td>
<td>15.0</td>
</tr>
<tr>
<td>γ (%)</td>
<td>13.9</td>
<td>15.9</td>
</tr>
<tr>
<td>Total lipids (mg %)</td>
<td>218</td>
<td>387</td>
</tr>
<tr>
<td>Free fatty acids (μ Eq/L)</td>
<td>196</td>
<td>160</td>
</tr>
<tr>
<td>Phospholipids (mg %)</td>
<td>2.6</td>
<td>5.1</td>
</tr>
<tr>
<td>Triglycerides (mg %)</td>
<td>11</td>
<td>37</td>
</tr>
<tr>
<td>Total cholesterol (mg %)</td>
<td>110</td>
<td>171</td>
</tr>
<tr>
<td>Cholesterol esters (mg %)</td>
<td>44</td>
<td>40</td>
</tr>
<tr>
<td>D and C Green no. 6</td>
<td>Negative</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Figure 1
Chest roentgenogram showing large pericardial effusion.
LYMPHOPERICARDIUM WITH HYPOPROTEINEMIA

Figure 2

Lymphangiograms interpreted as showing: (A) hypoplastic lymph vessels in both legs; (B) backflow in small dermal lymph vessels; (C) hypoplastic lymph nodes and lateral pathways; (D) patent thoracic and hemithoracic ducts.

fever and joint pains. A diagnosis of rheumatic fever was made. She recovered after tonsillectomy. During her illness it was found that the heart was enlarged and that she had a congenital lymphangioma of the left eye. No murmurs were heard. She developed normally in the following years, but it was often affirmed that the heart remained enlarged in all directions. During her tenth year a small amount of chyle was found in the peritoneal cavity during operation for inguinal hernia. Between her tenth and eighteenth years she occasionally had slight ankle edema.

In August 1965, when she was 18 years old, she experienced a heavy attack of nocturnal dyspnea which was treated with furosemide. Several months later she was admitted to our hospital for observation. We found an intelligent, normally developed girl without cyanosis. She had lymphangioma of the left eye, slight edema of the ankles, and a heart which was enlarged to both sides. No murmurs were heard. Venous pressure was normal. Liver and spleen were not palpable.

Circulation, Volume XXXIX, January 1969
Laboratory Data

The urine was normal, and no albuminuria was present; creatinine clearance was 106 ml/min. Hemoglobin was 13.6 g% and hematocrit 45%. Leukocyte count was 6500/mm³ with normal differentiation. Sedimentation rate was 4 mm after 1 hr. Urea was 18 mg%.

The values for serum sodium, potassium, chloride, serum glutamic-oxalacetic and glutamic-pyruvic transaminases and lactodehydrogenase were normal. The thymol turbidity test was normal.

Basal metabolism was normal; the concentration of protein-bound iodine was 6.0 γ%. Blood-sugar values and the antistreptolysin titer were normal. Total serum protein was low: 41 g/L, with variations during 10 weeks of observation from 41 g/L to maximal 62 g/L. The values for serum albumin varied from 25 to 37 g/L. Percentages of globulins were normal. The albumin pool was decreased (147 g). The half-time survival of ¹³¹I-albumin was normal. The excretion of amino acids and nitrogen in the urine was normal. The value for total serum cholesterol was 145 mg%; for free cholesterol, 20 mg%; for total lipids, 502 mg%, for phospholipids, 3.6 mg%; and for triglycerides, 58 mg%. Free fatty acids were normal: 490 μEq/L. During a fat-balance study the patient lost 10% of the ingested fat in the feces.

By means of polyvinylpyrrolidone-¹³¹I (PVP-¹³¹I) we looked for abnormal loss of protein. The patient lost 5.2% PVP-¹³¹I in the feces (control less than 1%). We concluded that she had intestinal loss of protein with secondary hypoproteinemia.

The heart was studied by means of venous catheterization. Pressures and oxygen concentrations in the right atrium, the right ventricle and the pulmonary artery were normal. There were no signs of contractile pericarditis. A left superior vena cava ended in the coronary sinus. The catheter could not be placed to the external edge of the heart which made the presence of pericardial fluid seem highly probable.

Pericardiocentesis was done after the patient had ingested a lipophilic dye (D and C Green no. 6) on two successive days. About 150 ml of clear yellow fluid was easily obtained from the pericardial cavity (table 1).

The pericardial fluid was sterile on culture. No lipophilic dye was present in the pericardial fluid. Concentrations of total protein, total lipids, and cholesterol were lower in the pericardial fluid than in the serum; we thought it probable, therefore, that the pericardial fluid consisted of lymph and that chylopericardium was excluded.

Lymphangiograms were taken after cannulation of the lymphatic vessels of both feet. The

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Figure 3

Roentgenogram of small bowel showing (A) intestinal mucosal edema and widening of the mucosal folds; (B) detail of A showing typical biconcave mucosal pattern.

No rales were present. The cardiac-thoracic ratio was 17.3: 28.1. There was no calcification in the pericardium (fig. 1).

The electrocardiogram showed low voltage but was otherwise normal.
LYMPHOPERICARDIUM WITH HYPOPROTEINEMIA

Figure 4

Photomicrographs. (A) intestinal mucosa with broad, edematous villi and with much infiltration in the tunica propria; reduced from \( \times 40 \). (B) detail showing infiltration in mucosa and submucosa and with large lymph vessels, reduced from \( \times 200 \). (C) detail of a villus with intercellular edema; reduced from \( \times 500 \).

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following abnormalities were observed: Abnormal fragility of the lymph vessels caused extravasation proximal to the site of injection; the contrast medium passed more rapidly than normal through all lymph vessels; the lymph vessels in the legs were hypoplastic (fig. 2A), and there was dermal backflow (fig. 2B). In the abdomen the contrast medium also followed more lateral pathways (fig. 2C). A thoracic duct and a hemithoracic duct were present and both appeared normal (fig. 2D). No contrast medium was seen in the pericardial cavity.

Roentgenological examination of the gastrointestinal tract showed no abnormalities of the stomach. The entire small intestine showed mucosal edema and widening of the mucosal folds (fig. 3), typical for intestinal lymphangiectasia. \(^8\) Peroral biopsy of the small intestine (Dr. Wiebenga) confirmed this diagnosis (fig. 4).

**Operation**

Because of the attacks of nocturnal dyspnea and for diagnostic purposes operation was undertaken with the aim of making a pleuropericardial window. We did not think it necessary to ligate the thoracic duct because we thought it proven that there was no chylopericardium but a lymphopericardium. At operation (Dr. Meijne) the pericardial sac was found to be about twice normal size. Multiple lymphangiomas were seen on the epicardial surface. The pericardium was slightly edematous but was otherwise grossly and microscopically normal. A pleuropericardial window was made. The postoperative course was uneventful. It is now 18 months after operation and the patient has remained well and had no more attacks of nocturnal dyspnea.

**Comment**

This is the first reported case of lymphopericardium with congenital systemic abnormalities of the lymphatic system associated with gastrointestinal protein loss secondary to intestinal lymphangiectasia. Unlike the patients with protein-losing enteropathy described by Plauth and associates, \(^4\) our patient did not have any signs of constrictive pericarditis. Pomerantz and Waldmann \(^5\) in 1963 described four patients in whom intestinal lymphangiectasia was a manifestation of a more generalized disease of the lymphatic system; none of these patients had lymphopericardium. Nevertheless, we feel that our patient also belongs to the group with generalized lymphatic disease. The cause of the lymphopericardium could not be elucidated. We think, however, that it is proven that the pericardium had no communication with the thoracic duct, as in chylopericardium. \(^6, \, 7\) The lymph in the pericardial sac most probably came from the myocardium. Absence or partial obstruction of the right lymphatic duct might explain the accumulation of lymph in the pericardium.

**Acknowledgment**

The authors wish to thank for their help and advice: M. Frenkel, M.D., J. B. van der Schoot, M.D., C. A. Wagenvoort, M.D., and A. H. Wiebenga, M.D.

**References**

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Circulation. 1969;39:116-120
doi: 10.1161/01.CIR.39.1.116

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

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