A Case of Tumor Embolism of the Coronary Artery, Resulting in Myocardial Infarction and Cardiac Rupture

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SUMMARY

A case of tumor embolism of the coronary artery in a 78-year-old woman was presented. The tumor embolus originating from cancer of the breast resulted in massive large myocardial infarction in the lateral wall of the left ventricle, and she died of cardiac rupture. Metastatic lesions were found in the bilateral lungs, the endocardial and subendocardial layers of the left ventricle, with a growth of tumor thrombus into the left atrium, and also other extracardiac organs.

Additional Indexing Words:
Coronary embolism  Tumor embolism of the coronary artery
Myocardial infarction  Cardiac rupture  Metastatic tumor of the heart

CORONARY embolism is rare as a cause of the coronary occlusion. Majority of them are usually produced by bacterial and rheumatic endocarditis.1),2) Tumor embolism of the coronary arteries has been reported in only 6 cases3)–8) to the best of our knowledge.

CASE REPORT

A 78-year-old woman was admitted to the Yoiku-in Hospital with a chief complaint of a large mass in her left breast in Dec. 1970. Her previous history showed hypertension for recent 2 years which had been treated.

Physical examination on admission revealed a well developed and well nourished woman, and no abnormal findings except the mass in the chest. After radical mastectomy she was discharged on Feb. 24, 1971. On June 4, 1971, she was readmitted to the hospital because a tumor grew up near the surgical scar in the left breast and X-ray films of the chest revealed abnormal shadows in the lung fields. Physical examination revealed that her blood pressure was 184/100 mmHg and the pulse was 86/min and regular. A tumor (2x2 cm) was palpated near the sur-
gical scar of the left chest.

X-ray films of the chest showed 2 round homogenous shadows in the bilateral lung fields and cardio-thoracic ratio was 55%. Electrocardiograms were recorded 3 times during a total course of 1 year, which always showed normal sinus rhythm, no axis deviation, left ventricular hypertrophy, and ischemic ST, T changes in leads I, II, aV_{L}, aV_{F}, V_{4}-V_{6}. The hemoglobin was 8.4 Gm/100 ml, hematocrit 28%, red blood cell 300×10^{4}/mm^{3}, white blood cell 6,400. Urinalysis showed no abnormalities. Occult blood of the stool was negative. Laboratory examinations revealed a total protein of 6.5 Gm/100 ml, A/G ratio 1.2, blood urea nitrogen 18.1 mg/100 ml, serum Na 145, K 3.9, Cl 104, Ca 4.5 mEq/L. S-GOT was 21 international unit, S-GPT 11, alkaline phosphatase 3.0 I.U. Liver function test was within normal limits. Microscopic examination of the sputa did not show any atypical cells.

During her hospital course, the patient experienced the fracture of the femoral neck due to bone metastasis on Aug. 9, 1971, melena on Oct. 1, followed by a down-
hill course. A carcinomatous ulcer was found in the gingiva on Nov. 1. On Nov.
14, 1971, she suddenly complained of back pain with hematemesis, cold sweating
and hypotension. Despite of transfusion, she died on the next day. Clinical diag-
nosis was (1) cancer of the breast with metastasis in the bilateral lungs, the left
femoral neck, the right mandible, the right gingiva and the gastrointestinal tract,
(2) hypertension, and (3) sudden death.

Autopsy findings: The heart weighed 300 Gm with tamponade of 200 ml
and there was no patent foramen ovale. A cardiac rupture was found in the
anterolateral wall of the left ventricle, which also corresponded to the center of
a fresh massive myocardial infarction of 6.0 × 6.5 cm in size (Fig. 1-A). Localized
invasion of cancer cells was found in the endocardial and subendocardial layers
at the base of the anterolateral papillary muscle. From there, tumor thrombus

Fig. 2. Occlusion of the left circumflex coronary artery by an embolus.
The lumen was already narrowed by 75% with atheroma. (Azan, ×13)

Fig. 3. The ruptured canal in the anterolateral ventricular wall. There
were myocardial necrosis, bleeding and round cell infiltration. (H.E., ×13)
Fig. 4-A. Cancer of the breast with epitheloid component with cartilaginous metaplasia. (H.E., ×100)

Fig. 4-B. A section of coronary embolus, showing the similarity of the histological features to the original tumor (H.E., ×100)

Table I. Reported Cases of Tumor

<table>
<thead>
<tr>
<th>No.</th>
<th>Author</th>
<th>Year</th>
<th>Sex</th>
<th>Age</th>
<th>Tumor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thompson(^b)</td>
<td>1930</td>
<td>M</td>
<td>25</td>
<td>teratoma of testis</td>
</tr>
<tr>
<td>2</td>
<td>Darnall(^d)</td>
<td>1937</td>
<td>M</td>
<td>56</td>
<td>cancer of colon</td>
</tr>
<tr>
<td>3</td>
<td>Lisa(^d)</td>
<td>1941</td>
<td>F</td>
<td>?</td>
<td>lung cancer</td>
</tr>
<tr>
<td>4</td>
<td>Cera(^d)</td>
<td>1957</td>
<td>M</td>
<td>60</td>
<td>lung cancer</td>
</tr>
<tr>
<td>5</td>
<td>Mori(^e)</td>
<td>1964</td>
<td>M</td>
<td>57</td>
<td>lung cancer</td>
</tr>
<tr>
<td>6</td>
<td>Haiby(^b)</td>
<td>1965</td>
<td>M</td>
<td>60</td>
<td>lung cancer</td>
</tr>
<tr>
<td>7</td>
<td>Ours</td>
<td>1975</td>
<td>F</td>
<td>78</td>
<td>cancer of breast</td>
</tr>
</tbody>
</table>
grew with the form of a thick cord, through the left ventricular cavity to the left atrium, and was 11 cm in length and 1 to 5 mm in thickness (Fig. 1-B).

Embolic of tumor cells was found along 1.5 cm in the left circumflex coronary artery with 75% atheromatous stenosis (Fig. 2). Ruptured myocardium was induced by a fresh myocardial infarction with hemorrhagic necrosis and round cell infiltration (Fig. 3). Small cardiac metastasis was also found in the posterior wall of the left ventricle.

Metastasis to the other organs was found in the bilateral lungs (multiple, and from miliary to walnut-sized), the left femur, the right mandible, the gastric submucosa, the second lumbar vertebra and the liver.

Histological findings in cancer of the breast was carcinoma with osteo-chondroid metaplasia by Haagensen (Fig. 4-A). Tumor thrombus in the cavity of the left ventricle and embolus in the left circumflex coronary artery were of the same character to the original tumor (Fig. 4-B).

**DISCUSSION**

Occlusion of the coronary arteries by tumor emboli is a quite rare finding. We could find only 7 such cases (Table I). Source of emboli was lung cancer in 4, 5) teratoma of the testis with paradoxical embolism in 1, 3) cancer of the colon with pulmonary metastasis in 1, 4) and cancer of the breast with pulmonary metastasis in this report. Therefore, common denominator of the tumor embolism to the coronary artery could be concluded to the primary or secondary tumor of the lung in these reports. Sites of embolism were multiple small coronary arteries in 3, 4, 5, 7) the anterior descending artery in 2, 6, 8) bilateral coronary arteries in 1, 3) and the left circumflex coronary artery in this case. Direct cause of death was coronary embolism in 6 and cerebral embolism in 1, 3).

The disease processes in this case were suggested as follows; hematogenous metastasis to the lung, and then to the left ventricular endocardium, where cancer cells invaded into the subendocardial layer, and also developed

<table>
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<th>Embolism of the Coronary Artery</th>
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<td>Site of coronary embolism</td>
</tr>
<tr>
<td>bilateral coronary</td>
</tr>
<tr>
<td>multiple branches</td>
</tr>
<tr>
<td>multiple branches</td>
</tr>
<tr>
<td>anterior descending</td>
</tr>
<tr>
<td>multiple branches</td>
</tr>
<tr>
<td>anterior descending</td>
</tr>
<tr>
<td>left circumflex</td>
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a cord-like tumor thrombus up to the left atrium through the mitral valve orifice. A part of tumor thrombus was released and obstructed the left circumflex coronary artery, resulting in myocardial infarction in the anterolateral wall, and a terminal rupture (Fig. 5).

Acknowledgement

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References