Pulmonary Hypertension, Resulting from Tumor Emboli to Pulmonary Arteries*

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A rare cause of pulmonary hypertension is exemplified by a patient who developed symptoms 11 years after carcinoma of the breast was treated. Cardiac catheterization was performed, the autopsy demonstrated mediastinal lymphadenopathy, rib cage tumor nodules, and microscopic carcinomatous emboli to the medium-sized and small pulmonary arteries. This case illustrates that obscure causes of pulmonary hypertension must be thoroughly investigated for metastatic cancer. In addition, the time interval between discovery of the neoplasm and development of pulmonary hypertension can span many years. Stomach carcinoma, choriocarcinoma, and right atrial myxoma have been recorded as causes of metastatic pulmonary artery emboli. Other suggested sources are the kidney and liver. No definite clinical signs, symptoms or x-ray findings are characteristic of this condition.

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normal. The right ventricle varied in thickness from 0.4 to 0.6 cm while the left ventricle ranged from 1.2 to 1.4 cm in thickness. The myocardium was grossly unremarkable. One mediastinal lymph node measuring 1.5 x 1 cm was partly replaced by firm, gritty, whitish-gray colored tissue. The parietal pleura of the posterior left rib cage was studded with numerous, hard, gray-colored nodules, the largest of which measured 0.6 cm in greatest diameter. The liver weighed 1,500 grams and exhibited areas of mottled brown discoloration. The thoracic and abdominal aortas revealed mild to moderate atherosclerosis. The remainder of the postmortem examination was grossly unremarkable.

Microscopic sections of lung stained with hematoxylin and eosin revealed severe congestion and hemorrhagic edema. Many alveoli contained pigment-laden histiocytes. A few medium-sized bronchi were filled with mucus and aspirated gastric material. Innumerable medium-sized and small pulmonary arteries, dilated arterioles, and septal capillaries contained plugs of carcinoma cells (Fig 1). Many of the arterioles and capillaries containing these tumor thrombi were arranged in focal conglomerate nodules and exhibited a hemangiomatoid appearance with mild fibrosis (Fig 2). An occasional nodule was located adjacent to a small pulmonary artery. A section of myocardium revealed the presence of similar tumor plugs within a few intramuscular capillaries (Fig 3). Sections of mediastinal lymph node and a pleural node showed diffuse replacement with metastatic carcinoma compatible with breast origin (Fig 4).

DISCUSSION

Pulmonary hypertension, the result of carcinomatous dissemination, may be produced in several ways:1

1. Carcinomatous lymphangitis with extensive invasion by cancer cells producing compression of alveoli and capillaries without invasion of arteries.

2. Carcinomatous lymphangitis, in which cancer cells from the perivascular lymphatics compress and invade small arterioles resulting in endarteritis and intravascular thrombosis.

3. A pure embolic form in which the pulmonary arterioles are occluded by metastatic emboli and secondary thrombosis.

The pure tumor embolic form is very infrequently recorded in the literature. Mason2 described a case of “subacute cor pulmonale,” the result of breast carcinoma metastatic to the pulmonary arteries. The patient died 19 months later. He also

Figure 1. Dilated pulmonary arteriole containing a cluster of carcinoma cells (hematoxylin and eosin, X 430).

Figure 2. Nodule of pulmonary capillaries containing plugs of carcinoma cells (hematoxylin and eosin, X 430).

Figure 3. Clusters of carcinoma cells within a myocardial capillary (hematoxylin and eosin, X 430).

Figure 4. Mediastinal lymph node containing metastatic carcinoma (hematoxylin and eosin, X 430).
made mention of three cases of stomach carcinoma with similar features. Another case of metastatic pulmonary arteriolar breast cancer was reported in the recent literature, with death nine months later.8

There have been several reports of choriocarcinoma with resultant right heart failure, which at necropsy was found to be secondary to tumor emboli to the pulmonary arteries. Spiegel4 reported a case six years after the primary tumor was found. He was able to find ten similar cases in the literature. A unique case of tumor saddle embolus with multiple embolic infarcts secondary to choriocarcinoma discovered five years previously was reported.8 In many of the cases, normal pregnancies occurred in the interim. Bagshawe and Brooks1 pointed out that these tumor emboli may occur in apparent absence of a pelvic tumor and in the absence of clinical and radiologic changes usually associated with secondary carcinoma in the right lung. However, the condition can be recognized by positive urine gonadotropin levels.

A somewhat different case report was right atrial myxoma with emboli, infarctions, and pulmonary hypertension proved preoperatively by cardiac catheterization and angiography. The myxomatous tissue had actively infiltrated the media causing almost complete pulmonary artery occlusion.8

It is suggested that tumor emboli could result from direct hematogenous spread from the hepatic veins or vena cava, or in our case, carcinoma cells probably travelled via the thoracic duct into the superior vena cava, right heart and finally the pulmonary arteries.

Our case resulted in symptoms 11 years after the discovery of carcinoma of the breast with demise nine months after symptoms of cor pulmonale occurred. No distinct symptom or sign could be found unique to carcinomatous emboli, and no typical radiograph was noted.

It is suggested that in obscure cases of pulmonary hypertension, a thorough search be made for hidden neoplasm. In women, choriocarcinoma should be excluded. Other primary sources to be considered are breast and stomach carcinoma, and cardiac myxoma. The kidney and liver could well be other sources of the primary tumor.

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REFERENCES


RENE LAENNEC'S COMMENTS ON PULSATION OF THE HEART

In a healthy person, of moderate fulness, and whose heart is well proportioned, the pulsation of this organ is only perceived in the cardiac region, that is, in the space comprised between the cartilages of the fifth and seventh ribs, and under the lower end of the sternum. The motions of the left cavities of the heart are chiefly perceptible in the former position, those of the right cavities in the latter. This is so much the case, that, in disease of one side of the heart only, the pulsation in these two situations gives quite different results. When the sternum is short, the pulsations extend to the epigastrium. In very fat subjects, the pulsation of whose hearts is quite imperceptible to the mere touch, the space in which it can be detected by the cylinder is sometimes not more than an inch square. In thin persons, in the narrow-chested, and, also, in children, the pulsation is more extended; being perceptible over the lower third, or even three-fourths, of the sternum, and sometimes even over the whole of this bone; also at the superior part of the left side, as high as the clavicle, and sometimes, though feebly, under the right clavicle.