Metastatic Squamous Cell Carcinoma to the Heart*

Unusual Cause of Angina Decubitus and Cardiac Murmur

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A 61-year-old woman was admitted to the hospital with the new onset of angina at rest and an ECG consistent with anterior wall ischemia. She was also noted to have a new cardiac murmur. Eighteen months earlier, she had been treated for squamous cell carcinoma of the base of the tongue. Thirteen months ago, she had local recurrence treated with radiotherapy, but had no evidence of recurrent or metastatic disease at the time of present admission. Echocardiography revealed intracardiac and extracardiac masses; surgical biopsy confirmed metastatic carcinoma to the heart which was responsible for her symptoms and the new murmur. Symptomatic cardiac metastases from squamous cell carcinoma is an unusual situation which, in this case, was easily diagnosed with echocardiography.

In large autopsy series, cardiac metastases have been increasing in incidence with a range of 1.5 percent to 13.9 percent. This trend is attributed to improved local control and prolonged survival of cancer patients. Leukemia, lymphoma, melanoma, and carcinoma of the lung and breast involve the heart most frequently, ranging from 19 percent to 58 percent, but squamous cell carcinoma, especially from the head and neck, rarely affects the heart. In Probert’s review of 779 patients with head and neck carcinoma, only seven patients (0.9 percent) were found to have metastases to the heart. All were found at autopsy and none had symptoms. As a rule, cardiac metastases do not cause symptoms; if so, they usually include congestive heart failure, pericarditis, rhythm disturbances, or sudden death. The following patient was unusual in that her disease was diagnosed antemortem and metastatic squamous cell carcinoma was the probable etiology of both her angina and new cardiac murmur.

**Case Report**

A 61-year-old white woman was admitted with a two-day history of intermittent "squeezing" substernal chest pain. She had several episodes, each lasting approximately five minutes, and the pain was typical for decubitus angina. Her symptoms usually occurred while she was supine, and they had awakened her from sleep. She felt her heart "pounding" during these episodes of pain. She denied shortness of breath, nausea, vomiting, diaphoresis, or prior history of heart disease. Her cardiac risk factors included 40 pack years of cigarette smoking and a two-year history of known hypertension, although prior to two years ago, she had not had medical attention for at least 20 years. Her only medication was Tenerom, 100 mg per day.

She denied any allergies.

Her past medical history was significant for squamous cell carcinoma (T0, N0, M0) at the base of her tongue 18 months prior to admission requiring hemiglossectomy. Five months later, she returned with a fixed left digastic lymph node; excisional biopsy revealed squamous cell carcinoma, and she was treated with radiation therapy (7,000 rads). No evidence of local recurrence had been noted on routine follow-up examinations.

On review of symptoms, she complained of dysphagia since operation and some secondary weight loss. Besides urinary frequency, the remainder of her symptom review was noncontributory.

Physical examination revealed a well nourished woman in no distress. Her blood pressure was 146/76 mm Hg without orthostatic changes. Her heart rate was 72 beats per minute, respirations, 20 per minute, and she was afibrile. Well healed postoperative and post- radiation changes in her neck were present. No adenopathy was noted in the cervical, supraclavicular, axillary, or epitrochlear areas. Pulmonary and breast examination was normal. On cardiac auscultation, a new pulmonary outflow murmur was heard with a midsystolic click. There was no gallop or rub. Her abdomen was soft without ascites, masses, or organomegaly, and there was no cyanosis, clubbing, or edema of her extremities.

Laboratory studies on admission showed mild iron deficiency anemia (hematocrit, 32.2 percent), a slightly elevated calcium and alkaline phosphatase, mild hyperamtenia (131 mg/dL), and her urinalysis demonstrated 20 to 25 WBCs.

The admitting chest x-ray film was read as “heart of prominent size with rounding of the left ventricle,” but no significant lesions were seen. Her ECG demonstrated the new finding of ST depression with T-wave inversions anteriorly, thought to be consistent with the recent onset of myocardial ischemia.

Because of her symptoms, consideration was given to urgent cardiac catheterization for unstable angina, but because of the new murmur, echocardiography was performed first. Two-dimensional echocardiography showed a large anterior mediastinal mass compressing the right ventricular outflow tract and encasing the ascending aorta. A large mobile mass was also present in the right atrium and was tethered to the free right atrial wall (Fig 1). A CAT scan confirmed the findings demonstrated by echocardiography: an extrinsic cardiac mass, located essentially intrapericardially, compressing the pulmonary artery outflow tract and penetrating through the upper right atrium into the superior vena cava. No pulmonary or hilar masses were seen with the CAT scan.

The patient was taken to the operating room for exploration performed via a modified right-sided Chamberlain procedure. The sternum was retracted anteriorly, and the chest opened through the bed of the fourth rib. A tumor mass was found to be invading the entire pericardial sac and was fixed to the superior vena cava, right ventricular outflow tract, and extended between the aorta and pulmonary artery into the transverse sinus. It was inoperable, and it was obvious that any attempt at pericardial decortication would be impossible. Biopsy revealed grade I squamous cell carcinoma.

A postoperative bone scan revealed diffuse bony uptake. She was discharged from the hospital, and outpatient radiation therapy to the mediastinum was begun. She died in her sleep, seven weeks later, before radiation therapy was completed.

**Discussion**

Several mechanisms of cardiac metastases of tumor have been proposed, including direct extension, hematogenous spread via the coronary arteries, retrograde dissemination through lymphatic channels, pulmonary venous invasion with endocardial implantation, and tumor thrombus. It is postulated that the myocardium is usually protected from tumor seeding by the rapid flow of blood through it, its
minimal lymphatic connections, the "kneading" action of cardiac contraction, and some other vague metabolic peculiarities.\textsuperscript{5} It is not known why certain tumors involve the heart more frequently than others.

Head and neck epidermoid carcinomas metastasize to the lung, bone, and liver, but rarely to the heart.\textsuperscript{4,6} Factors correlated with a high incidence of head and neck metastasis are advanced primary tumor and local recurrence above the clavicle. Most metastases occur within 18 months of initial therapy.\textsuperscript{4,6}

Our patient's pain was very suspicious for angina pectoris, but her pain occurred primarily at rest and almost always while she was in the supine position. We believe her tumor compressed her coronary arteries, and this was exaggerated by the recumbent position. Kopelson and Herwig\textsuperscript{7} found extrinsic compression of the coronary arteries to be the most likely cause of coronary artery obstruction resulting from coronary artery metastasis; tumor emboli and intrinsic obstruction of the coronary ostia are much less common causes.

Her ECG was consistent with the diagnosis of coronary artery disease displaying the anterior wall ischemic changes described above. The usual electrocardiographic findings suggestive of metastases are nonspecific; low voltage, premature atrial and ventricular contractions, and diffuse ST-T changes. A wide range of conduction defects have also been noted.\textsuperscript{8,9} Hartman et al\textsuperscript{10} have proposed that prolonged ST segment elevation in the absence of Q waves is a pathognomonic sign of myocardial tumor invasion.

On physical examination, a new systolic murmur and click were heard. Presumably, the murmur was secondary to obstruction of the pulmonary outflow tract; the click was related to delayed opening of the pulmonary valve. These clinical findings led to the key diagnostic test, two-dimensional echocardiography. By detecting intracardiac and extracardiac masses, urgent cardiac catheterization for apparently unstable angina pectoris was prevented. Other case reports have demonstrated the usefulness of echocardiography in the detection of cardiac masses.\textsuperscript{10,11}

Cardiac metastases are rarely diagnosed before death. A strong clinical suspicion is necessary, especially in patients with well-controlled local disease. Echocardiography should be strongly considered in any cancer patient with atypical angina or a new cardiac murmur.

\textbf{References}