**Case
Report**

Intracardiac Metastasis of Esophageal Squamous Cell Carcinoma: Report of a Case

Keiichiro Tayama, MD, Naofumi Enomoto, MD, Michitaka Kohno, MD,
Satoru Tobinaga, MD, Hiroyuki Otsuka, MD, and Ken-ichi Kosuga, MD

We report a case of a 48-year-old man with a history of violent coughing fits and general fatigue underwent urgent surgery for cardiac tamponade, and who was later diagnosed with metastatic intracardiac squamous cell carcinoma of the esophagus. After admittance to Munakata Suikokai General Hospital, Fukuoka, Japan, echocardiography showed extensive pleural and pericardial effusion and a mass, 4 by 2 cm, with a solid echo pattern in the right ventricular cavity. The working diagnosis was primary malignant cardiac tumor of unknown origin with multiple metastases. To prevent sudden death due to obliteration of the outflow tract of the right ventricle, we performed urgent surgery for cardiac tamponade. Histological examination of the resected tumor revealed squamous cell carcinoma. Fiberoptic esophagoscopy showed hypertrophy of the esophageal wall and a submucosal tumor extending throughout the esophagus. Microscopic examination of the esophagus biopsy specimen showed moderately differentiated squamous cell carcinoma, the histology of which was similar to that of the resected tumor and cytology of pericardial effusion. The patient recovered and was able to return home for a few days; however, he was readmitted, and despite maximal supportive therapy, he died one month after the operation.

Key words: intracardiac metastasis, heart metastasis, squamous cell carcinoma, esophageal cancer

Introduction

Although cardiac dissemination of malignant disease is a common finding during an autopsy, it rarely produces clinical symptoms.¹⁾ Cardiac metastases of tumors arising from the esophagus and pericardial effusions caused by metastatic cancer are rare; squamous cell carcinoma causing these events is extremely uncommon.²⁾ We document a surgical case of a metastatic right ventricular

tumor originating from esophageal squamous cell carcinoma.

Case Report

A 48-old male with a history of violent fits of coughing and general fatigue was admitted to Munakata Suikokai General Hospital, Fukuoka, Japan. The patient presented with tachycardia and cold sweating. Echocardiography showed a large amount of pleural and pericardial effusion and a mass, 4 by 2 cm, with a solid echo pattern in the right ventricular cavity (**Fig. 1**). Computed tomography (CT) revealed multiple lymph node swelling (neck, mediastinal, para-aortic, supraclavicular, retroperitoneal, mesenteric) but no tumor-like lesions. Electrocardiography produced normal tracings except for an incomplete right bundle branch block. Serum chemistry and blood counts showed an increase of lactate dehydrogenase (465 IU/L)

Department of Cardiovascular Surgery, Munakata Suikokai General Hospital, Fukutsu, Fukuoka, Japan

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Corresponding author: Keiichiro Tayama, MD. Department of Cardiovascular Surgery, Munakata Suikokai General Hospital, 341-1 Kamisaigo, Fukutsu, Fukuoka 811-3298, Japan
Email: k-tayama@suikokai.or.jp
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Fig. 1 Echocardiography showed solid echo pattern mass in the RV cavity.

(A) short axis. (B) long axis.

A | B

and CRP (3.1 mg/dL). Incidentally, the patient was in a traffic accident 4 months before admission, at which time he underwent a chest roentgenogram, CT scan, and echocardiogram which demonstrated no abnormal findings, except for a small amount of pericardial effusion. We made a working diagnosis of primary malignant cardiac tumor of unknown origin and multiple metastases. At this point, curative resection of the tumor was thought to be impossible, and effectiveness of postoperative chemotherapy was unknown; however, after discussion with the patient and his family, the patient underwent surgery for cardiac tamponade to prevent sudden death due to obliteration of the outflow tract of the right ventricle. On median sternotomy, thickened fibrotic tissue was observed in the substernal space. We aspirated 300 mL of right pleural effusion, which caused the cardiac tamponade. The tumor was identified as a 7 by 6 cm mass that protruded from the epicardium of the right ventricle free wall and extended to the left ventricle beyond the left anterior descending artery; however, it did not adhere to the pericardium (**Fig. 2**). Under cardiopulmonary bypass, we opened the outflow tract of the right ventricle and extirpated part of the tumor which was prominent toward the inside of the right ventricle and obstructing outflow tract. Histological examination of the resected tumor revealed squamous cell carcinoma (**Fig. 3**). After the operation, fiberoptic esophagoscopy showed hypertrophy of the esophageal wall and a submucosal tumor extending throughout the esophagus (**Fig. 4**). Microscopic examination of the esophagus biopsy specimen showed moderately differentiated squamous cell carcinoma, the histology of which was similar to that of the resected tumor and cytology of pericardial effusion. Chemother-

apy and radiation therapy were considered and consulted oncologists and radiologists, however, in this case, because of the rapid clinical deterioration only compassionate care with symptomatic treatment of dyspnea was possible. The patient recovered once and was able to return home for a couple of days, however, despite maximal supportive therapy he succumbed one month after the operation. An autopsy was not performed because we were unable to obtain informed consent from the family.

Discussion

Neoplasms involving the heart or pericardium are far more likely to be secondary (metastatic) than primary. Secondary cardiac tumors are not uncommon and are found at autopsy in 10% to 15% of patients with generalized cancer and 1 to 3% of the general population.³⁾ The two most common primary neoplasms invading the heart are lung and breast because of their high prevalence.¹⁾ Fifty-two percent of metastases is located in the pericardium, 42% in the myocardium, and 6% in the endocardium.⁴⁾ With present-day techniques of echocardiography, computed tomography and magnetic resonance imaging, they can be clinically diagnosed so that lifesaving surgical removal is sometimes possible.⁵⁾ Nevertheless, neoplastic disease of the heart, whether primary or secondary, is usually diagnosed at autopsy. The diagnosis of intracardiac tumors can be difficult because of their rare occurrence and the paucity of symptomatology. Pleural effusions are a rare cause of metastatic squamous cell carcinoma, and pericardial effusions are even less common.⁶⁾ Hoda et al. commented on the rarity and inconspicuous presentation of metastatic squamous-cell cancers

Fig. 2 Intraoperative findings. (A) 7 by 6 cm mass that protruded from the epicardium of the RV free wall and extended to the LV. (B) From the transverse incision of RV, 4 by 2 cm white mass was seen in the RV cavity. (C) Resected tumors. RV, right ventricle; LV, left ventricle

A	B
C

Fig. 3 Histopathological findings of the resected specimens revealed squamous cell carcinoma. (A) HE stain: × 4; (B) HE stain: × 10

A	B
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in effusions and discussed the cytologic criteria in diagnosis, and reviewed 33 reported cases of metastatic squamous-cell carcinoma in pericardial effusion by cytology or histology.²⁾ In their review, only one case out of 33 cases reported metastatic squamous-cell carcinoma with primary esophageal cancer.²⁾ The route of tumor cells to the heart includes embolism through the coronary

arteries, retrograde flow through the cardiac lymphatics, and a direct extension from a mediastinal tumor mass. By reaching the heart through the great veins, tumor emboli may become directly implanted on the endocardium. The mode of spread to the heart is difficult to establish unless there is cancerous growth to contiguous structures in the area. The hematogenous route was the

Fig. 4 Endoscopic findings of the esophagus demonstrated multiple small nodules and hyperplasia of the esophageal wall, and a submucosal tumor extending throughout the esophagus. (A) plane. (B) narrow band image.

most frequent route for the spreading of anaplastic microcellular tumors of the lung, and neoplastic invasion of pulmonary veins seemed to be the most frequent avenue for access to the systematic arterial circulation. Maeda et al. reported a case of myocardial metastasis from squamous cell carcinoma of the esophagus and reviewed reported cases of cardiac metastasis from esophageal cancer. In the review, only 2 patients out of 12 had endocardial metastasis.⁷⁾ In this case, the esophageal squamous-cell carcinoma metastasized via a hematogenous or lymphatic route to the right ventricle, not by a direct invasion. Any excessive accumulation of pericardial fluid and a cardiac tamponade is a medical emergency. Therapy is often directed towards symptom relief and palliation since cardiac dissemination mostly occurs in the setting of widespread metastatic disease. In only a few cases, curative treatment might be possible when the working diagnosis is made. In this case, the diagnosis of metastatic cardiac carcinoma could not be made preoperatively; thus, we only preformed urgent surgery for a cardiac tamponade to prevent obstruction of the outflow of the right ventricle. We were also able to take a sample of the tumor for pathological analysis. About the postoperative strategy, chemotherapy and radiation therapy could have been considered for the multiple metastasis of squamous cell carcinoma; however, after discussions with oncologists, no therapy was indicated. The patient recovered and was able to return home for a few days, though he was readmitted to the hospital. The patient subsequently died, one month after the surgery. In hindsight,

even though there might not be agreement among oncologists on the best treatment for patients such as these, we hope that an optimal treatment will be realized.

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