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Right Ventricular Metastasis From a Primary Cervical Carcinoma

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A 49-year-old female presented with a 1-month history of cough and low-grade fever. Echocardiography showed a large mass in the right ventricle and percutaneous right ventricular endomyocardial biopsy provided the histologic diagnosis. Despite radiotherapy and chemotherapy, the patient died. At autopsy, the metastatic deposit in the heart was larger than the primary cervical carcinoma. (*Jpn Circ J* 2001; **65:** 761–763)

Key Words: Echocardiography; Isolated right ventricular metastasis; Primary cervical carcinoma

The incidence of cardiac metastases at autopsy ranges from 1.5% to 20.6% (mean 6%) in patients with malignant diseases[1–3] Carcinomas of the lung and breast, malignant melanoma, lymphomas, and leukemias rank among the most common tumors associated with this condition[4,5] Modes of spread to the heart include direct invasion, hematogenous spread, and lymphogenous metastasis. The most common site of cardiac involvement is the pericardium with frequencies ranging from 62% to 81%[6] whereas myocardial or endocardial involvement is rare.

For cervical carcinoma, the most common sites of extrapelvic metastasis are the lung, bone, or the cervical or supraclavicular lymph nodes[7] Cardiac metastasis is very rare with a frequency ranging from 1.6% to 8.0%[8] We report a case of right ventricular (RV) metastasis from a primary cervical carcinoma.

Case Report

A 49-year-old female presented with a 1-month history of cough and low-grade fever. Vital signs at the time of presentation were height of 151 cm, weight of 44 kg, temperature of 37.4°C, heart rate of 120 beats/min, and blood pressure 120/82 mmHg. Jugular venous distension was not evident, nor were superficial lymph nodes palpable. A systolic ejection murmur was noted at the second intercostal space near the left sternal border. An abnormal mass, which was the size of a hen's egg, was palpable in the right lower quadrant just below the umbilicus. No edema was noted. Chest X-ray demonstrated mild cardiac enlargement without pleural effusion or abnormal lung shadows. Electrocardiography (ECG) revealed sinus tachycardia, inverted T waves in leads V_1 to V_4, and low voltage in the limb leads. Laboratory tests revealed thrombocytopenia and elevated lactate dehydrogenase, fibrinogen degradation product (FDP), FDP D-dimer, and small-cleaved cells antigen. These findings were consistent with disseminated intravascular coagulation and so chest and abdominal computed tomography scans were per-

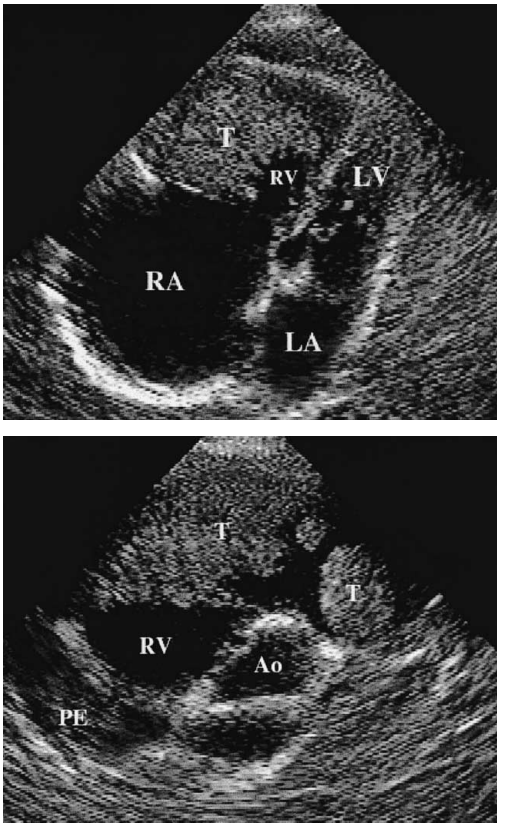

Fig 1. Two-dimensional echocardiograms. (A) Apical 4-chamber view and (B) short axis view demonstrate a large mass in the right ventricle attached by a stalk below the pulmonary valve. RA, right atrium; RV, right ventricle; LA, left atrium; LV, left ventricle; Ao, aorta; PE, pericardial effusion; T, tumor.

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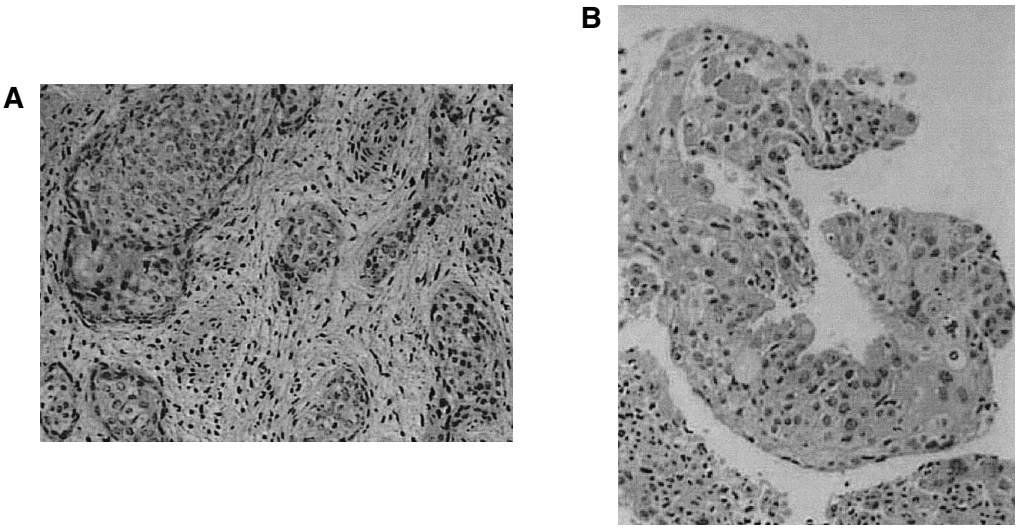

Fig 2. (A) Right ventricular endomyocardial biopsy shows metastatic squamous cell carcinoma. (B) Photomicrograph shows moderately differentiated squamous cell carcinoma consistent with the primary tumor in the uterine cervix.

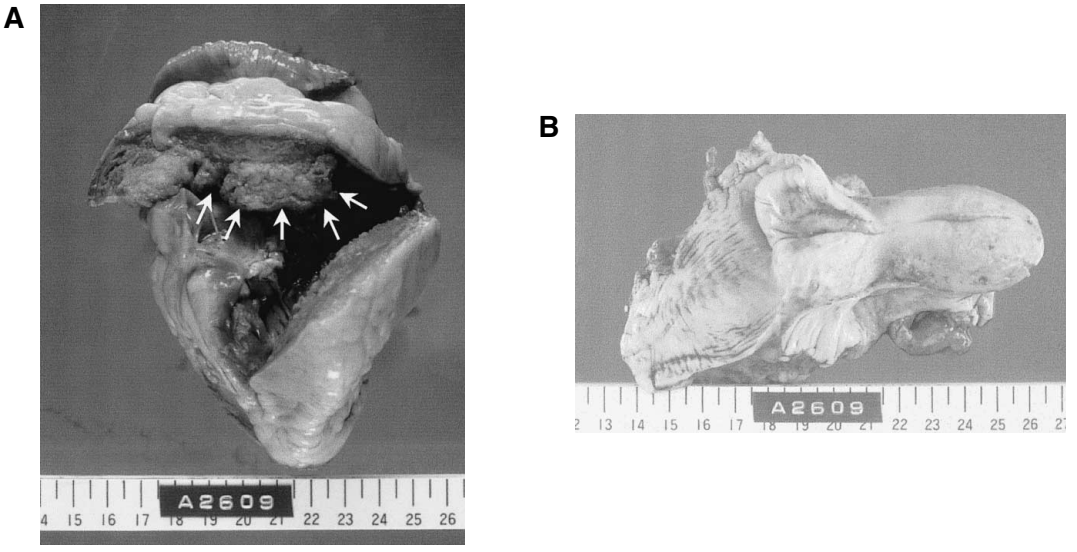

Fig 3. (A) The heart at autopsy shows the right ventricle including the tumor (arrows). (B) The cervix at autopsy does not have a grossly visible tumor.

formed to identify a cause. Enlargement of the celiac lymph nodes, uterine swelling, and pericardial effusion were noted. Her cervix was very hard on internal examination but the gynecologist did not suspect primary carcinoma at first.

Two-dimensional echocardiography revealed a large pedunculated mass in the right ventricle, its stalk attached to the interventricular septum below the pulmonary valve, and moderate pericardial effusion (Fig 1). Angiocardiography showed a small RV cavity and a filling defect in the RV outflow tract. A pedunculated mass in the RV outflow tract was extending into the main pulmonary artery with every beat. Right ventricular pressure was 35/12 mmHg and pulmonary arterial pressure was 23/16 mmHg; the pressure gradient was 12 mmHg. A percutaneus RV endomyocardial biopsy revealed moderately differentiated squamous cell carcinoma (SCC), which was similar to the cervical biopsy result (Fig 2).

These findings suggested that the cardiac mass was a metastasis from a primary cervical carcinoma. Treatment was limited to radiotherapy and chemotherapy as the lesion was unresectable. The patient had temporary palliation of her symptoms, but the tumor did not appear to diminish in size. Dyspnea and fever recurred, and the patient died 68 days after admission. At autopsy, the RV cavity was small and the RV endocardium was extensively involved with a soft white mass (Fig 3A). The mass with thrombus extended into the left pulmonary artery, and the direct cause of death was pulmonary embolism by tumor and thrombus. The uterine cervix, which was the site of the primary tumor, had diffuse transmural edema, but macroscopically visible tumor was not detectable (Fig 3B). The metastasis in the heart was larger than the primary tumor. Microscopically, the tumor cells had invaded the venula and lymph channels of the myocardium, but not the epicardium. The right

atrium, left atrium and left ventricle had not been invaded. The postmortem microscopic findings of the cervix and RV tumor were the same as for the antemortem biopsies. Tumor cells were found only in the myometrium and not in the mucosa. There was no evidence of other metastases than the lungs and abdominal periaortic lymph nodes.

Discussion

This case had 2 remarkable aspects: (1) a RV metastasis, and (2) the cardiac tumor was larger than the primary tumor.

Myocardial or endocardial involvement of cervical carcinoma is rare, with only 2 cases involving the interventricular septum,[9,10] 1 case of the left atrium,[11] 1 in the LV,[12] and 13 cases of RV involvement,[5,9,11–18] 6 of which were an isolated cardiac metastasis without evidence of other metastases. The most likely route of spread for these cervical carcinomas is hematogenously through the cervical venous plexus, into the inferior vena cava and right atrium and ultimately to the RV, where the carcinoma cells attach to the cardiac endothelial surface and begin to proliferate. However, it remains unclear as to why the RV is the most frequent metastastic site within the cardiac chambers.

Common clinical manifestations of metastatic cardiac involvement are dyspnea, arrhythmias, and tachycardia, but as evidenced by the present case, tumors extending into the RV may cause embolism and outflow obstruction. Repeated pulmonary embolism may cause secondary pulmonary hypertension and sudden death. In addition, the increased outflow obstruction and resultant right-sided pressures lead to edema, which is noted clinically. However, many metastatic cardiac lesions are clinically silent and found only at autopsy. Because the proliferation rate of these tumors appears to be slow and the valves and the tissues of the cardiac conduction system are relatively resistant to tumor invasion, cardiac function may be preserved for a long period of time. Only 5 of the 13 reported cases of RV metastasis from cervical carcinoma were antemortem diagnoses. The present case is the first in which the cardiac metastatic tumor was larger than the primary cervical carcinoma. The prognosis for RV metastasis is very poor; all cases, except one, have died. Echocardiography is very useful for detecting intracardiac lesions and should be used to inspect the RV in patients with cervical carcinoma.

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