Cardiac Angiosarcoma Diagnosed by Transvenous Endomyocardial Biopsy With the Aid of Transesophageal Echocardiography and Intra-Procedural Consultation

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Summary

We report a case who had confirmed tumor cells in the biopsy specimens by transvenous endomyocardial biopsy with intra-procedural consultation and fast smear cytology. A 57-year-old female was admitted to our hospital because of shortness of breath and left back pain. Transthoracic echocardiography (TTE) and contrast-enhanced computed tomography (CT) scans demonstrated a large mass in the right atrium and multiple liver tumors thought to be due to spread of the disease. Coronary angiography showed the right coronary artery was involved in the mass. In order to confirm the histological diagnosis, we attempted transvenous endomyocardial tumor biopsy under fluoroscopic guidance. However, we failed to obtain adequate tissue material. Due to several risks associated with a surgical procedure such as an open surgical biopsy, transvenous endomyocardial tumor biopsy was again attempted with the aid of transesophageal echocardiography (TEE). Intra-procedural consultation and fast smear cytology enabled us to finish the procedure. Hematoxylin-eosin stained sections demonstrated spindle-shaped cells. Immunohistochemical stains of these cells were positive for anti-factor VIII antigen, CD31, and CD34. These findings indicated a definite diagnosis of angiosarcoma. Since there was no surgical indication for this tumor, the patient underwent chemotherapy with docetaxel and radiotherapy. Three months later, CT scans showed a reduction in the size of the cardiac tumor. (Int Heart J 2010; 51: 367-369)

Key words: Primary cardiac angiosarcoma, Transvenous endomyocardial biopsy, Transesophageal echocardiography, Intra-procedural consultation, Smear cytology

Primary cardiac tumors are extremely rare and difficult to diagnose. A final diagnosis depends on histopathological confirmation. At the time of discovery, up to 75% have systemic metastases and the effect of surgical resection is only temporary, and hence the prognosis is relatively poor. A pathological diagnosis with cardiac biopsy is established in only 50% of patients. The specimen material is usually obtained by open biopsy or surgical resection. There have been reports of transvenous biopsy for cardiac tumors under tranesophageal echocardiography (TEE) guidance, although sometimes specimen material is not successfully obtained.

Case Report

A 57-year-old woman was admitted to our hospital because of shortness of breath and left back pain. She had been healthy previously without recent chest pain or pyrexia, and she denied any exposure to vinyl chloride. On physical examination, her heart rate was 94/minute, blood pressure was 90/54 mmHg, and SpO2 was 98% with a 10 L/minute O2. Jugular vein dilatation and hepatomegaly were detected. Neither heart murmur nor lung rales were detected. The electrocardiogram showed sinus tachycardia (94 beats/minute), low voltage in limb leads, and a QS pattern in V1 and V2 leads. Chest X-rays revealed cardiomegaly and bilateral pleural effusion. Transthoracic echocardiography (TTE) showed reasonable left ventricular systolic function, massive pericardial effusion with right ventricular collapse in early diastolic phase, and a mass in the right atrium. Pericardiocentesis was performed and the resultant bloody pericardial effusion showed no cytological evidence of malignancy (class II). Testing for tuberculosis or other bacterial agents was negative. After pericardiocentesis, her blood pressure elevated immediately. Contrast-enhanced computed tomography (CT) scans demonstrated a large mass in the right atrium; maximum diameter of the lesion was 50 mm. Coronary angiography showed that the right coronary artery was involved in the mass and supplied numerous vessels feeding the tumor (Figure 1). CT scans of the abdomen showed multiple liver tumors thought to be due to the spread of the disease. In order to confirm the histological diagnosis, we then attempted transvenous endomyocardial tumor biopsy under fluoroscopic guidance. However, the specimen obtained was mainly fibrous tissue, thus we failed to obtain adequate tissue material. As the next step, we considered an open surgical bi-
opsy. Since there were several risks associated with a surgical procedure, we chose a less invasive method. In the next week, with the aid of TEE, transvenous endomyocardial biopsy was again attempted. The TEE indicated that the biopsy forceps (biop tome) was positioned on the tumor (Figure 2), and several specimens were obtained. Intra-procedural consultation and fast smear cytology enabled us to finish the procedure. There were no complications during the procedure. The hematoxylin-eosin stained sections demonstrated spindle-shaped tumor cells that formed irregular vascular channels (Figure 3). The tumor showed strong mitotic activity. Immunohistochemical stains of these cells were positive for CD31, CD34 (Figure 4), and anti-factor VIII antigen indicating that the tumor cells were derived from the endothelium. Together, these findings indicated a definitive diagnosis of angiosarcoma. We discussed the fact that there was no surgical indication for this case, because metastases to the other internal organs were found and total excision of the cardiac tumor was anatomically impossible. We therefore selected non-surgical treatments. The patient underwent 4 weekly cycles of chemotherapy with docetaxel at 75 mg/m² per cycle (3 weeks of treatment, 1 week of rest) and standard fractionated radiotherapy at a total dose of 61.2 Gy was given in 34 fractions. Her condition improved with the findings of resolution of the pericardial effusion, reduction in cardiac tumor size, and inhibition of growth of the liver tumors. Three months after these multidisciplinary approaches, a CT scan showed a reduction in the size of the cardiac tumor.

**Discussion**

A clinical diagnosis of cardiac angiosarcoma is difficult because the symptoms of this disease are varied. Clinical symptoms include (a) tumor mass effects that obstruct intracardiac blood flow or interfere with valve function, (b) arrhythmias or pericardial effusion with tamponade, (c) tumor embolism, and (d) systemic or constitutional symptoms. Systemic symptoms only, such as weight loss, fever, night sweats, and

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**Figure 1.** CAG of RCA. CAG revealed tumor stains (white arrowheads) through the RCA and no significant stenosis of the coronary arteries. CAG indicates coronary angiography and RCA, right coronary artery.

**Figure 2.** TEE view and the diagram. A: TTE view. TEE demonstrated a large mass in the right atrium and the bioptome was positioned on the tumor. B: Diagram of TEE view. TEE indicates transesophageal echocardiography; IVC, inferior vena cava; and RA, right atrium.

**Figure 3.** Hematoxylin-eosin staining of the specimen. Hematoxylin-eosin staining showing irregularly shaped vascular channels lined by spindle-shaped endothelial cells of typical angiosarcoma (× 200).

**Figure 4.** Immunohistochemical staining of the specimen. Immunohistochemical staining was positive for CD34, supporting the diagnosis of angiosarcoma.
chills occur in approximately 10% of these patients in the absence of cardiac symptoms. These nonspecific symptoms, the rarity of the disease, and its rapid progression, with tumor metastases to multiple organs, are responsible for the late diagnosis and poor prognosis. Therefore, it is important to make a diagnosis at early stages of the disease. If surgical resection is impossible, only tumor biopsy allows us to obtain diagnostic tissue. Although thoracotomy can also be attempted, endomyocardial biopsy is a safe procedure that can be easily performed to obtain tissue with less morbidity and mortality, particularly in patients at high operative risk. Often tumors are so large at the time of operation that complete resection cannot be performed. Endomyocardial biopsy is therefore the last resort in considering an invasive technique. Formerly, the technique usually was performed under fluoroscopic guidance to obtain biopsy samples. However, using fluoroscopic guidance limits the sites in the myocardium from which samples can be obtained (usually the right ventricular septum). Recently TEE-guided transvenous endomyocardial biopsy has been used to diagnose primary cardiac angiosarcoma. Additionally, in a statement on the role of endomyocardial biopsy in the management of cardiovascular disease from the American Heart Association, the American College of Cardiology, and the European Society of Cardiology, guidance with TEE is advised when possible.

In our patient, transvenous endomyocardial biopsy was less invasive than open biopsy or surgical resection. Using fluoroscopic guidance, we failed to harvest tumor cells. This is believed to be a reason that the tumor did not exist in the right ventricular septum. We discussed the fact that a second biopsy under TEE guidance would be less invasive than open biopsy. Therefore, we selected transvenous endomyocardial biopsy under TEE guidance. TEE provided excellent visualization of both the mass and the biopsy site and was very useful for obtaining diagnostic tissue samples. To determine whether an adequate sample had been obtained from the tumor, we consulted the pathology laboratory during the procedure. Fast smear cytology revealed that the samples consisted of malignant cells.

In the present report, the immediate diagnosis allowed us to undertake active treatments such as chemotherapy and radiation. Surgical resection is not always an effective treatment for cardiac tumors because of the large mass of cardiac tissue involved, furthermore, it sometimes leads finally to exploratory thoracotomy. This makes it highly important to establish a more noninvasive diagnostic tool for cardiac tumors. TEE is useful in determining tumor size, anatomical localization, and valvular abnormalities and has a diagnostic sensitivity of 97% for non-myxomatous cardiac tumors. Definitive diagnosis of cardiac tumors depends on pathological, rather than morphological findings. Transvenous endomyocardial biopsy has several advantages over traditional open incisional biopsy. These include significantly less risk of morbidity and mortality, and ease of learning and performance by most physicians. Furthermore, we confirmed the presence of tumor cells in the specimens obtained by transvenous endomyocardial biopsy, by means of intra-procedural consultation and fast smear cytology. Surgeons often call upon surgical pathologists for intra-operative consultation on diagnosis and assessment of margins of resection, however, there are no reports of cardiologists calling upon pathologists for consultation regarding confirmation of tumor cells in the diagnosis of biopsy specimens. Therefore, not only transvenous endomyocardial biopsy with the aid of TEE, but also intra-procedural consultation, should be taken into consideration when trying to diagnose the histopathology of cardiac tumors.

REFERENCES