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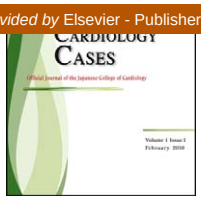

Case Report

The usefulness of chemotherapy for control of ventricular arrhythmias secondary to cardiac metastasis of germ cell tumor

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KEYWORDS
Metastatic cardiac tumor;
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Summary A 14-year-old boy was referred to our hospital because of treatment of germ cell tumor in the anterior mediastinum. Computerized tomographic (CT) scan of the chest and abdomen revealed a large tumor in the anterior mediastinum and multiple metastatic tumors in the lung, liver, kidney, pancreas, and heart. There was a mass in the interventricular septum. A 24-h Holter monitor showed sinus rhythm with 358 premature ventricular complexes (VPC) and 30 ventricular runs including 9 non-sustained ventricular tachycardias per day. The patient was treated with 4 cycles of chemotherapy with good response. Approximately 12 weeks after the start of the chemotherapy, serial CT scan showed regression of the tumors in the anterior mediastinum, lung, and kidney, and disappearance of the tumors in the liver, pancreas, and heart. Repeat Holter monitor showed that VPC and ventricular runs disappeared completely. The chemotherapy for the germ cell tumor was very useful for ventricular arrhythmias secondary to cardiac metastasis of the tumor.

Introduction

Metastatic tumors of the ventricle rarely cause ventricular tachycardia (VT) [1—3]. Such patients usually have very poor prognosis. We report a case of advanced mediastinal germ cell tumor with non-sustained VT secondary to cardiac metastasis which disappeared after chemotherapy to the tumor. This is an extremely uncommon report that the chemotherapy for the tumor was effective in the control of ventricular arrhythmias secondary to cardiac metastasis.

Case report

In June 2009, a 14-year-old boy was referred to our hospital because of treatment of germ cell tumor in the anterior mediastinum. Computerized tomographic (CT) scan of the chest and abdomen in the previous hospital revealed a large tumor in the anterior mediastinum and multiple metastatic tumors in the lung, liver, kidney, pancreas, and heart. There

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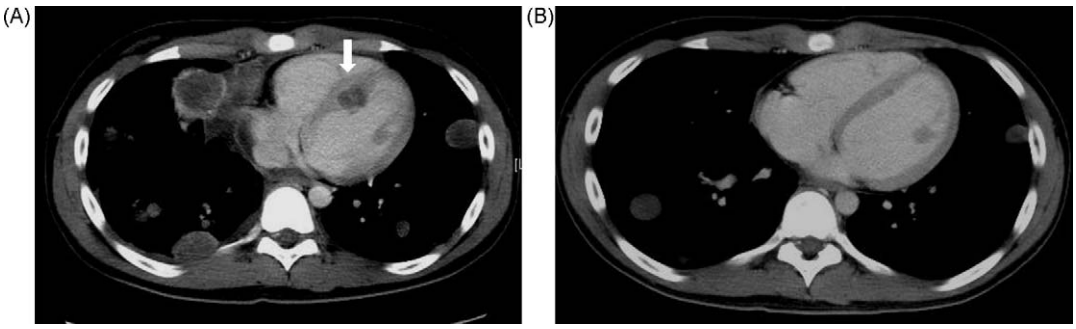

Figure 1 Computerized tomographic scan of the chest. (A) On admission, there was a cardiac metastatic tumor in the interventricular septum (arrow). (B) After the chemotherapy for germ cell tumor in the anterior mediastinum, the cardiac tumor disappeared.

was a mass in the interventricular septum (Fig. 1). The patient was diagnosed with germ cell tumor by needle biopsy of the mediastinal tumor in the hospital. He had no previous history of cardiovascular diseases. One month earlier, he complained of pain in the right shoulder. However, he did not complain of any cardiac symptoms.

On physical examination the patient had a temperature of 36.5 °C with a respiratory rate of 22 breaths/min, blood pressure of 95/72 mmHg, and a pulse rate of 76 bpm with arrhythmia. He had bilateral gynecomastia and moist rale in the bilateral lungs. The patient had a lactate dehydrogenase (LDH) level of 2180 IU/L, an alkaline phosphatase (ALP) level of 498 IU/L, and a β-human chorionic gonadotropin (HCG) level of 2900 ng/ml. The chest radiograph showed a large tumor in the mediastinum and multiple pulmonary tumors. His electrocardiograms had been within normal limits except

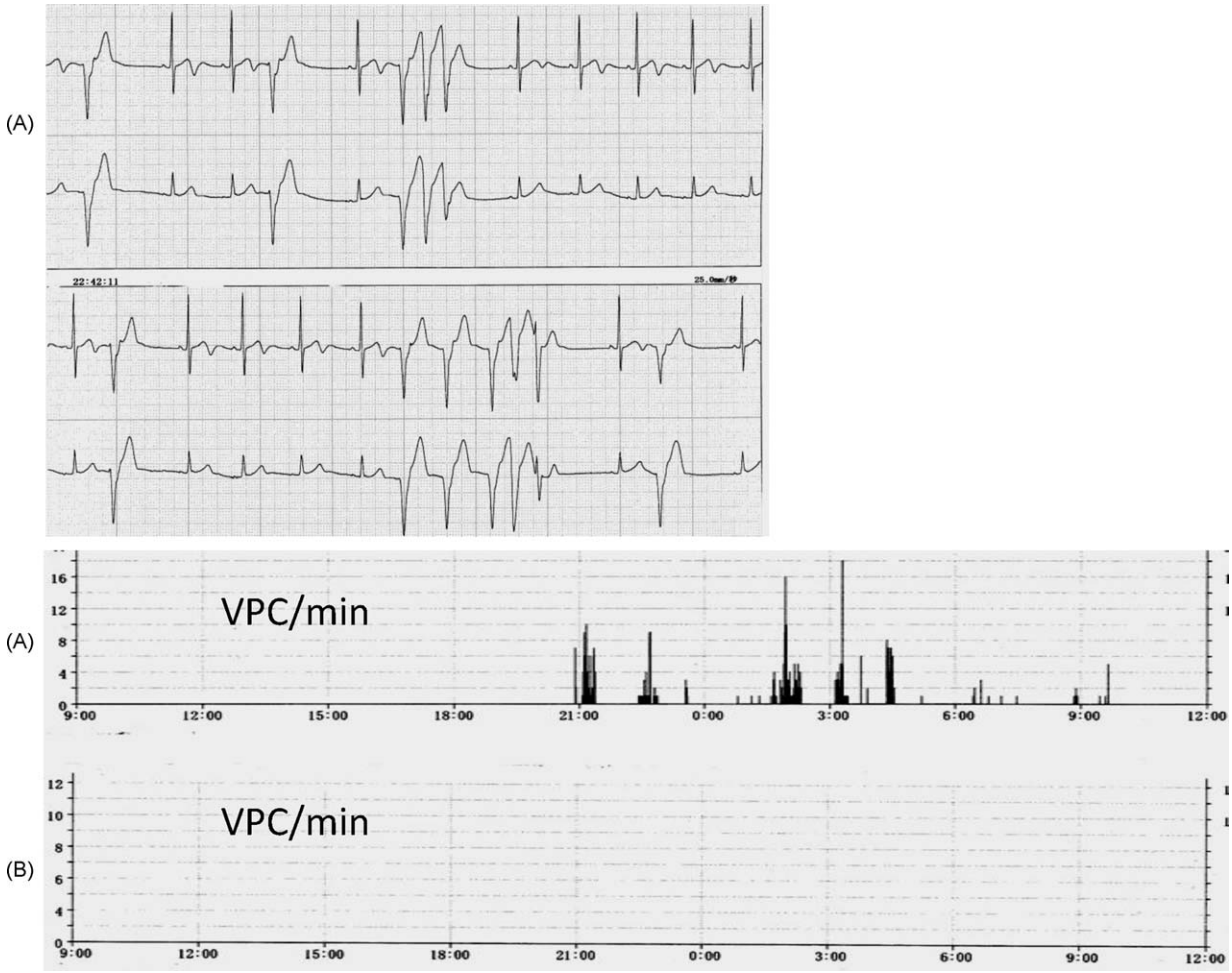

Figure 2 A 24-h Holter monitor. (A) On admission, there were 358 premature ventricular complexes (VPC) including 30 ventricular runs. (B) After the chemotherapy for germ cell tumor in the anterior mediastinum, VPC and ventricular runs disappeared completely.

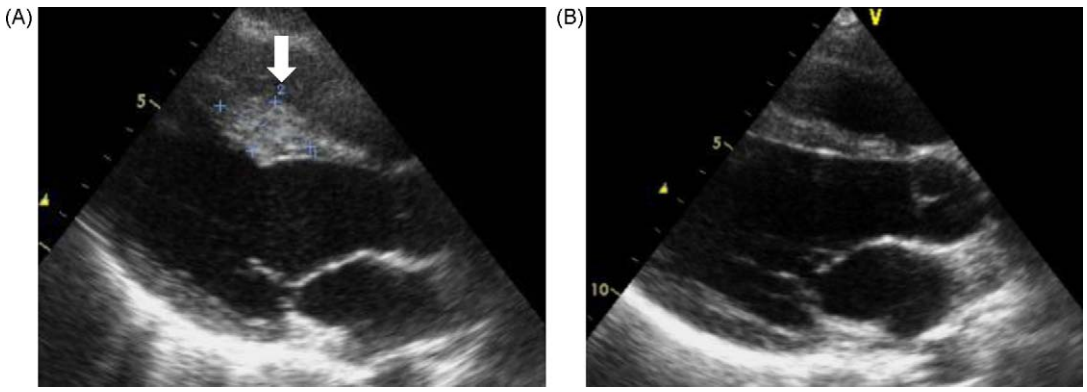

Figure 3 Transthoracic echocardiography. (A) On admission, thickness, granular sparkling appearance, and slightly reduced movement of interventricular septum were recognized (arrow). (B) After the chemotherapy for germ cell tumor in the anterior mediastinum, all abnormalities of interventricular septum disappeared.

for non-specific T wave change. A 24-h Holter monitor showed sinus rhythm with some premature ventricular complexes (VPC). The computer counted 358 VPC. There were 30 ventricular runs including 9 non-sustained VT (Fig. 2). The VPC and runs were usually monophasic. Transthoracic echocardiography (TTE) demonstrated thickness, granular sparkling appearance, and slightly reduced movement of interventricular septum (Fig. 3), global left ventricular systolic function was normal (ejection fraction, 70%). There was no involvement of any other cardiac structure.

The patient was treated with 4 cycles of chemotherapy with cisplatin, etoposide, and bleomycin, and no antiarrhythmic agents. He had a good response to the chemotherapy. Approximately 12 weeks after the start of the 4 cycles of chemotherapy, the patient had an LDH level of 193 IU/L, a ALP level of 371 IU/L, and a β-HCG level of 1.8 ng/ml. Serial CT scan showed regression of the tumors in the anterior mediastinum, lung, and kidney, and disappearance of the tumors in the liver, pancreas, and heart. Serial TEE showed disappearance of thickness, granular sparkling appearance, and reduced movement of interventricular septum, and within normal limits. Repeat Holter monitor showed that VPC and ventricular runs disappeared completely. The computer counted 0 VPC (Fig. 2). He was in good condition and received further chemotherapy.

Discussion

In contrast to primary cardiac tumor, metastatic involvement of the heart is relatively common. As an example, in one of the largest autopsy series of over 7200 patients dying of malignancies, cardiac metastasis was found in 9% [4]. About two thirds of all cardiac metastases involved the pericardium, one third the epicardium or the myocardium, and only 5% the endocardium. The most common clinical manifestation of cardiac metastasis is symptoms due to cardiac tamponade [4—7]. Tumors spreading extensively to the pericardium result in pericardial effusion. However, a focal lesion secondary to the myocardium may usually result in no symptoms [4]. Rare cases involving the myocardium presented arrhythmias, such as atrial fibrillation or flutter, ventricular arrhythmias, and conduction disturbances [1,2,3,8].

Several possible mechanisms of ventricular arrhythmias associated with the myocardium may be considered. First, the site of insertion of the tumor may be the focus of macro-entry. Second, the insertion of the tumor into normal myocardium may alter normal tissue architecture to cause localized dispersion of repolarization, anisotropic conduction, and microre-entry. Third, local compression of myocardial fibers or release of humoral elements may cause an automatic VT [1].

After complete remission of the cardiac metastasis with chemotherapy in our case, VPC and ventricular runs disappeared completely. The chemotherapy for the germ cell tumor was very useful to control ventricular arrhythmias secondary to cardiac metastasis of the tumor.

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