INTRODUCTION

Cardiac lipoma is a rare benign primary cardiac tumor and is usually asymptomatic (1). It is usually discovered incidentally but can be related to hemodynamic obstruction depending on its location (2). There have been several reports regarding cardiac lipoma, including its clinical presentation and characteristic findings on computed tomography (CT) (2, 3). However, few cases documented the characteristic CT findings of solitary or multiple cardiac lipomas in the patient with tuberous sclerosis; and to our knowledge, no cases of biventricular lipoma and multifocal fat infiltration of both ventricles, which were detected incidentally in a young woman.

CASE REPORT

A 31-year-old woman, at 37 + 4 weeks of pregnancy, showed T-wave inversion on the precordial leads on a scheduled ECG, which was part of a preoperative evaluation for Cesarean section. She had a history of myomectomy and a Cesarean section two years ago. The physical examination was normal, and there were no skin lesions found at the admission. There also were no cardiac symptoms and the vital signs were within normal range. The initial blood pressure was 120/80 mmHg, and the respiratory rate was 20 breaths per minute. Her body mass index was 24.97 kg/m². There was no elevation of cardiac enzymes. Trans-thoracic echocardiography (TTE) was performed for further evaluation of abnormal ECG findings. On TTE, a hyperechoic soft tissue mass-like lesion was noted on the interventricular septum in the RV (Fig. 1A-C), and another echogenic mass-like lesion was noted adherent to the RV free wall (Fig. 1C). The

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formed using a dual-source CT scanner (Somatom Definition, Siemens Medical Solutions, Forchheim, Germany). A beta-blocker in the form of 50–100 mg of metoprolol was given orally, one hour before the scan, as well as 0.6 mg of nitroglycerin sublingually 1 minute before the examination. Before the helical scan, a non-enhanced ECG-gated CT scan, prospectively triggered at 75% of the R-R interval, was performed. Contrast agent application was controlled by a bolus-tracking technique. To evaluate the mass in the RV, a dual-head power injector (Stellant

Fig. 1. A 31-year-old pregnant woman with spontaneous mass-like lesions in the RV. Transthoracic echocardiogram shows lobulated, hyperechoic mass (arrow) on the RV side of the interventricular septum (parasternal long axis view, A). Another linear mass lesion (arrows) is noted in the RV attached to the apical portion (modified low parasternal view, B), and round mass lesion (arrowhead) is also found on the free wall of the RV without hemodynamic obstruction on the color flow mapping (C, D). Axial pre-enhanced and contrast-enhanced cardiac computed tomography (CT) scans show a homogenous, well-defined, fatty attenuated mass (~70 Hounsfield units), broadly based on the endocardial surface of the interventricular septum of RV (E, G) and other smaller fatty attenuated amorphous lesions are present along the trabeculae and moderator band of RV as well as on the endocardial surface of the interventricular septum of the LV (arrows, F, H). On contrast-enhanced cardiac CT images (G, H), these lesions remained as a fatty attenuation without inner enhancing portion and these fatty attenuated lesions are demarcated well from the interventricular septum and RV free wall without showing myocardial invasion.

Note.—RV = right ventricle, LV = left ventricle, RA = right atrium, LA = left atrium
Right Ventricular Lipomatous Mass and Biventricular Multifocal Fat in a Young Woman

D, Medrad, Indianola, PA, USA) was used to administer a three-phase bolus, at the rate of 4.5 mL/s. First, 70–80 mL of non-ionic contrast media (Iomeron 400, Bracco, Milan, Italy) was administered. Then, 45 mL of a 70%-to-30% blend of contrast media and saline was administered. Finally, 45 mL of saline was given. A pre-enhanced ECG-gated CT scan and contrast-enhanced retrospective ECG-gated CT were performed from 2 cm below the carina to the diaphragm, in a craniocaudal direction, using the following parameters: 1) tube voltages of 120 kV for pre-enhanced ECG-gated CT and contrast-enhanced ECG-gated CT, and 2) tube current-time product of 80 mAs per rotation for pre-enhanced ECG-gated CT and 330 mAs per rotation for contrast-enhanced ECG-gated CT. ECG-based tube current modulation with a Mindose manual was implemented (full-dose window of 30–70% of the cardiac cycle). The calculated effective radiation dose was 9.3 mSv (pre-enhanced and contrast-enhanced ECG-gated CT). On the pre-enhanced cardiac CT, a well-defined, lobulated, homogeneous, and hypoattenuated mass with fatty attenuation (-70 Hounsfield unit) was noted on the RV endocardial surface of the interventricular septum (Fig. 1E). Other smaller fatty attenuated amorphous lesions were present along the trabeculae and moderator band of the RV, as well as on the endocardial surface of the interventricular septum of LV (Fig. 1F). On contrast-enhanced cardiac CT images, these lesions still showed fatty attenuation without an inner-enhancing portion, and these fatty attenuated lesions were well demarcated from the interventricular septum or RV free wall, without showing myocardial invasion (Fig. 1G, H). On cine images using multiphase reconstruction, these fatty lesions were not mobile during the cardiac cycle, and there were no remarkable regional functional abnormalities in the RV. Coronary arteries were normal and there was no evidence of a congenital anomaly in the cardiac structure, nor any evidence of pericardial effusion. The possibility of arrhythmogenic RV dysplasia (ARVD) was also ruled out based on the diagnostic criteria (5). Given these imaging characteristics, the final diagnosis was RV lipoma or lipomatous hypertrophy with multifocal fat infiltration involving both ventricles. The patient was scheduled to have regular follow-up, because there was no evidence of hemodynamic disturbance and the patient did not desire any further surgical intervention. There was no change on cardiac CT findings at the six-month follow-up.

DISCUSSION

A rare case of RV lipoma or lipomatous hypertrophy with multifocal fat involving both ventricles was found incidentally in a pregnant young woman without tuberous sclerosis. Cardiac lipoma is a well-encapsulated neoplasm, comprising of mature adipose tissue, and it accounts for approximately 10% of all benign cardiac tumors (1). It can originate in the myocardium including subendocardium, subepicardium, or intramyocardium and can be seen in the pericardial space or any cardiac chamber at any age without particular sex predilection (4, 6). This tumor is usually solitary, and the commonly reported sites are the right atrium, LV, and the interatrial septum; however, multiple lipomas have been described in patients with tuberous sclerosis (6). Multiple cardiac lipomas in patient without tuberous sclerosis are extremely rare (4). In our case, all of the fatty lesions in both ventricles were located on the endocardial surface of the interventricular septum or were intermingled with trabeculae or moderator band. To the best of our knowledge, this is the first case of RV lipoma or lipomatous hypertrophy and biventricular multifocal fat infiltration detected by cardiac CT, in a patient without tuberous sclerosis.

In general, cardiac lipoma is asymptomatic and may be found incidentally, which is similar to our case, and it requires no surgical or interventional treatment. However, according to previous reports, surgical treatment is required depending on its location, when cardiac lipoma is a causative factor for arrhythmia attributed to intramyocardial location, embolization to distant organs, and compression of the coronary artery or hemodynamic obstruction within the heart (3). Based on our case, we suggest that if there is no surgery or interventional treatment required, it is sufficient to schedule an annual follow-up with TTE.

TTE findings of lipoma are variable according to its location. Intracavity lipoma is usually a homogeneous and hyperechoic mass, similar to that seen in our case. However, in the case of lipoma in the pericardial space, it could be seen as a hypoechoic lesion, and the reason for this is unknown (3). Although lipoma can be differentiated from typical myxoma, it may not be distinguished from other cardiac masses with similar morphologic characteristics on TTE alone. Furthermore, TTE findings of cardiac lipoma may not have high specificity regarding tissue characterization. For this reason, cardiac CT should be used to iden-
The major criteria for ARVD, as outlined by the Task Force, are regional RV akinesia or dyskinesia and dyssynchronous RV contraction, commonly associated with severe global/segmental RV dilatation or global systolic dysfunction. The minor criteria include mild global/segmental dilatation of the RV, regional contraction abnormalities, and global diastolic dysfunction (5).

In summary, we present a rare case of a 31-year-old young woman, who was diagnosed with RV lipoma or lipomatous hypertrophy with multifocal fat involving both ventricles by TTE and cardiac CT. Although fat deposition may be encountered under various conditions, concomitant RV masses with biventricular multifocal fat in a patient without tuberous sclerosis are extremely rare, and cardiac CT is helpful in the final diagnosis.

REFERENCES

1. Roberts WC. Primary and secondary neoplasms of the heart. Am J Cardiol 1997;80:671-682
2. Rajiah P, To AC, Tan CD, Schoenhagen P. Multimodality imaging of an unusual case of right ventricular lipoma. Circulation 2011;124:1897-1898
3. Araoz PA, Mulvagh SL, Tazelaar HD, Julsrud PR, Breen JF. CT and MR imaging of benign primary cardiac neoplasms with echocardiographic correlation. Radiographics 2000;20:1303-1319
4. Sanal HT, Kocaoğlu M, Yildirim D, Ors F. Multiple cardiac lipomas and pericardial lipomatosis: multidetector-row computer tomography findings. Int J Cardiovasc Imaging 2007;23:655-658
5. Marcus FI, McKenna WJ, Sherrill D, Basso C, Bause B, Bluemke DA, et al. Diagnosis of arrhythmogenic right ventricular cardiomyopathy/dysplasia: proposed modification of the task force criteria. Circulation 2010;121:1533-1541
6. Tuna IC, Julsrud PR, Click RL, Tazelaar HD, Bresnahan DR, Danielson GK. Tissue characterization of an unusual right atrial mass by magnetic resonance imaging. Mayo Clin Proc 1991;66:498-501
7. Carpenter HM. Myocardial fat infiltration. Am Heart J 1962;63:491-496
8. Kim SS, Ko SM, Song MG. Linear fat deposition in the middle layer of the left ventricular myocardium: computed tomographic findings. Korean J Radiol 2010;11:571-573
젊은 여성에서 우연히 발견된 우심실의 지방종괴 및 양심실내 다발성 지방침착: 증례 보고

이보람1 · 박재형2 · 안계택2 · 김성수1 · 정진욱2 · 최시완2 · 진선아2 · 이재환2

심장내 지방종은 피막으로 쌓인 성숙한 성인 지방세포의 드문 종양이다. 대부분 증상을 유발하지는 않으나, 위치에 따라 혈류폐색을 야기할 수 있다. 저자들은 젊은 여성에서 우연히 발견된, 우심실에 위치한 지방종괴 및 양심실 내벽에 위치한 다발성 지방침착 1예를 경험하였기에 이를 보고하고자 한다.

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