Case Report

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Ventricular Fibrillation in a Patient with Tachycardia-Induced Cardiomyopathy after Liver Transplantation

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We report a case of atrial fibrillation-related tachycardia induced cardiomyopathy and ventricular fibrillation after liver transplantation in a 41-year-old man with end-stage liver failure. Atrial fibrillation and congestive heart failure occurred postoperatively. Cardiac arrests due to ventricular fibrillation occurred 6 months after the operation with subsequent implantations of an implantable cardioverter-defibrillator. Ventricular arrhythmias did not recur during the 18 months after normalization of heart functions with guideline-directed medical treatments. **(Korean Circ J 2013;43:839-841)**

KEY WORDS: Atrial fibrillation; Ventricular fibrillation; Liver transplantation; Heart failure.

Introduction

Postoperative atrial fibrillation (AF) is associated with morbidity, prolonged hospitalization and increased mortality.[1] AF is not only a well-known risk factor for stroke and systemic embolism, but it also can cause tachycardia-induced cardiomyopathy (TIC), especially for patients with uncontrolled rapid ventricular rates.[2] After liver transplantation, cardiac complications occur in about 12% of cases,[3][4] AF in 3%,[4] new onset dilated cardiomyopathy in 3.4%,[3] and overt congestive heart failures in 3.5%.[4] However, neither TIC caused by AF nor the ventricular fibrillation has been reported after liver transplantations. Herein, we report a case of AF related with TIC and ventricular fibrillation which occurred after the liver transplantation.

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Case

A 41-year-old man with end-stage liver failure due to hepatitis B virus-associated liver cirrhosis underwent orthotopic liver transplantation (OLT). He had underlying diabetes mellitus and did not have a history of exertional angina, dyspnea on exertion, and paroxysmal palpitations. Preoperative 12-lead electrocardiography showed normal sinus rhythms. Preoperative echocardiographic evaluation showed normal biventricular size and function. Paroxysmal AF with rapid ventricular responses developed on the first postoperative day (Fig. 1A; Supplement Fig. 1 in the online-only Data Supplement). Given the stable vital status with no signs of heart failures or myocardial ischemia, the sinus conversion was not attempted. The patient required a prolonged in-hospital recovery period, during which, continuous renal replacement therapy, mechanical ventilation, and tracheostomy were performed. Flecainide and diltiazem were administered to control recurrent AF after normalization of liver and renal function, 5 weeks after OLT. But, such drugs had to be discontinued after development of congestive heart failures with severe ventricular dysfunction (ejection fraction, 30%) (Fig. 1B) 9 weeks after OLT. During the hospital stay, the left ventricular ejection fraction increased to 38% after administration of ramipril, carvedilol, and diuretics. The patient was discharged with these medications on top of immunosuppressive drugs including FK 506 and mycofenolate mofetil 11 weeks after OLT. Acute renal failure occurred 3 months after surgery, but resolved after discontinuation of heart failure medications. Repeated echocardiography showed

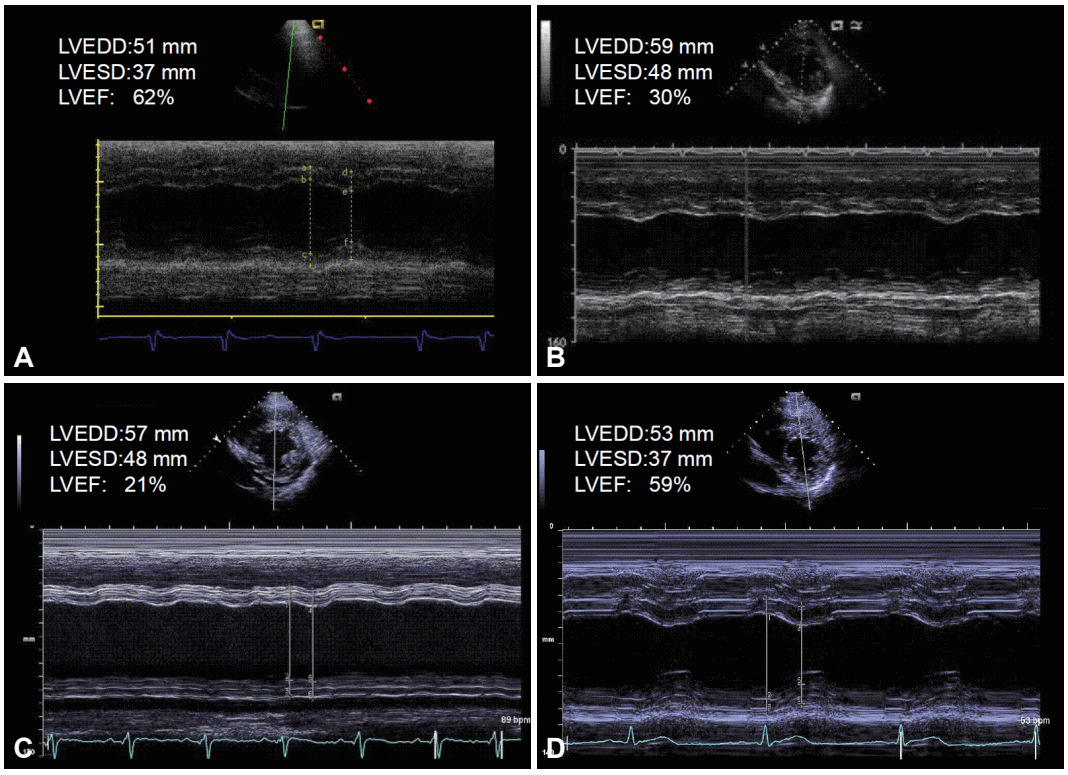

Fig. 1. Serial M-mode echocardiograms of the left ventricle of the patient, taken at the first postoperative day (A) shows atrial fibrillation (heart rate 94 beat per minute), 9 weeks after orthotopic liver transplantation (B) shows atrial fibrillation (heart rate 109 beat per minute), 6 months after liver transplantation (C) with sinus rhythm (heart rate 89 beat per minute), and 8 months (D) after implantation of an implantable cardioverter-defibrillator with sinus rhythm (heart rate 63 beat per minute). LVEDD: left ventricular end-diastolic dimension, LVESD: left ventricular end-systolic dimension, LVEF: left ventricular ejection fraction.

improved left ventricular ejection fraction of 42%.

Six months after OLT, the patient collapsed while he was walking. The patient was transported to the emergency room under cardiopulmonary resuscitation and ventricular fibrillation was noted on electrocardiogram (Supplement Fig. 2A in the online-only Data Supplement). After an immediate defibrillation, AF with rapid ventricular response was noted (Supplement Fig. 2B in the online-only Data Supplement). He recovered without neurologic impairments. Coronary angiography showed no significant stenosis. Echocardiography showed severe left ventricular dysfunction with a left ventricular ejection fraction of 21% (Fig. 1C). A single-chamber implantable cardioverter-defibrillator (ICD) was implanted. Heart failure treatments, including a β-blocker and an oral anticoagulant, were continued. Ventricular tachycardia with palpitation (cycle length of 290 ms, 18 beats for 5.2 seconds) was detected and terminated by antitachycardia pacing 2 months after the ICD implantation (Supplement Fig. 3 in the online-only Data Supplement).

Complete conversion to sinus rhythm was recorded on ICD after 5-months of alternation between AF and sinus rhythm. Echocardiography showed normalized left ventricular systolic function 8 months after the ICD implantation (Fig. 1D). Thereafter, only a β-blocker was administered to prevent tachycardia for 18 months with no recurrences of ventricular arrhythmias.

Discussion

This case highlights the difficulty of managing AF after liver transplantation and the potential risks for fatal outcome in TIC.

Atrial fibrillation may occur during veno-venous bypass during OLT.[5)6)] After the liver transplantation, cardiac complications can occur in 12% of cases.[3)4)] Cardiac causes of immediate deaths after OLT include post-reperfusion syndromes, pulmonary hypertension and cardiomyopathy.[4)]

Differential diagnosis of ventricular dysfunction in this case includes occult coronary artery disease, unsuspected valvular heart disease, uremic or cirrhotic cardiomyopathy, stress or tachycardia-induced cardiomyopathy.[7)] Coronary artery diseases and valvular heart diseases were excluded as appropriate cardiac imaging tests. Normal preoperative ventricular function, development of ventricular dysfunction after surgery, persistence of ventricular dysfunction after normalization of liver and renal function excludes uremic or cirrhotic cardiomyopathy. Stress-induced cardiomyopathy, which could masquerade acute coronary syndromes, may occur after psychological stress, medical illness or surgery. Stress-induced cardio-

myopathy after liver transplantation were reported.[8)9)] Absence of ST-segment change, elevation of cardiac enzymes, typical echocardiographic findings excluded stress-induced cardiomyopathy as a cause of ventricular dysfunction. Tachycardia, especially AF with a rapid ventricular response is a well-known cause of ventricular dysfunction.[10)11)] Progressive deterioration of ventricular function after developments of AF and normalization of ventricular function after restoration of sinus rhythm support AF with rapid ventricular responses as a cause of ventricular dysfunction in this case. Curative treatment of supraventricular or ventricular tachycardia is usually pursued to treat ventricular dysfunction in tachycardia-induced ventricular dysfunction.[2)12)]

There is controversy regarding the optimal management of AF that develops after noncardiac surgeries.[13)] For patients with AF developed postoperatively, the use of amiodarone or dronedarone may be considered after electrical cardioversions to decrease recurrences. In this case, however, neither amiodarone nor dronedarone could be regarded as a safe treatment considering the risk of drug-induced hepatotoxicity after liver transplantations[14)15)] and heart failures. Moreover, although the catheter ablation is a promising treatment modality, especially in AF combined with heart failures,[16)] it cannot be recommended as an initial treatment for postoperative AF, which may have different pathophysiology from that of the AF alone.

Recurrence of ventricular tachycardia 2 months after implantation of an ICD is noteworthy because this recurrence indicates long-term delays in the recovery of ventricular function.[2)] During this extended recovery time, ICD backups can be justified to prevent fatal outcomes.

In conclusion, we report a case of AF related TIC complicating the ventricular fibrillation after liver transplantations. Rate controls with β-blocker and guideline-directed heart failure treatments may prevent such devastating complications.

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Supplementary Materials

The online-only Data Supplement is available with this article at http://dx.doi.org/10.4070/kcj.2013.43.12.839.

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