ECG diagnosis of native heart ventricular tachycardia in a heterotopic heart transplant recipient

M Vanderheyden, J de Sutter, M Goethals

Abstract

A case is reported of haemodynamic collapse in a 51 year old male heterotopic heart transplant recipient caused by native heart ventricular tachycardia. An accurate diagnosis was made by selective right and left sided electrocardiography. Synchronised electrical cardioversion of the native heart (200 J) resulted in restoration of sinus rhythm with prompt relief of symptoms and amelioration of the clinical situation.

(Keywords: transplantation; ventricular tachycardia)

A 51 year old man underwent heterotopic heart transplantation because of end stage ischaemic heart disease and fixed pulmonary hypertension. Two days after transplantation he was admitted to the intensive care unit because of sudden haemodynamic collapse. His clinical course had been uneventful, but he presented with cardiogenic shock characterised by hypotension (blood pressure 55/46 mm Hg), severe respiratory distress, and a rapid irregular heart rate of approximately 150 beats/min.

The 12 lead ECG (fig 1) showed a broad QRS complex tachycardia with a left bundle branch block morphology at a rate of 245 beats/min. According to the standard ECG criteria\(^1\) he was diagnosed with ventricular tachycardia; however, the exact nature of the tachycardia remained obscure as narrow QRS complexes were interposed between the broad ones in the peripheral limb leads. Although these narrow beats during ventricular tachycardia could result from capture or echo beats, they most probably reflected normal activation of the non-affected heart. We wondered from which heart—donor or host—the arrhythmia originated. In contrast to the left precordial leads (V2–6), the precordial V1 lead showed sinus tachycardia; therefore an ECG in the dextrocardia position was taken by positioning the precordial leads rightwards on the chest. This right sided ECG showed ventricular tachycardia in V1R whereas precordial leads V2R–6R showed sinus rhythm (fig 1). As the donor heart is positioned rightward to the

Cardiovascular Center,
OLV Ziekenhuis,
Moorselbaan 164, B9300 Aalst, Belgium
M Vanderheyden
J de Sutter
M Goethals

Correspondence to:
Dr M Vanderheyden,
Cardiovascular Center,
Imeldastraat 1, 2820 Bonheiden, Belgium.
email: Marc.Vanderheyden@skynet.be

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Figure 1 (Top) Standard 12 lead ECG. Precordial leads V2–6 show a broad QRS complex tachycardia compatible with native heart ventricular tachycardia whereas the precordial lead V1 shows sinus tachycardia of the donor heart. (Bottom) Right sided ECG. When all precordial leads are swapped from the left to the right, ventricular tachycardia is noted in V1R whereas leads V2R–6R show sinus tachycardia originating in the donor heart.
native heart, the small complexes on the ECGs most probably reflected normal activation of the donor heart, whereas the broad QRS complexes represented native heart ventricular tachycardia. Synchronised electrical cardioversion of the native heart (200 J) with one defibrillator paddle under the left clavicle and the other on the left mid-axillary line at the level of the 10th rib resulted in restoration of sinus rhythm with prompt relief of symptoms and amelioration of the clinical situation.

Discussion

Heterotopic heart transplantation has become a useful option for patients with end stage heart disease and severe fixed pulmonary hypertension. These patients are denied orthotopic heart transplantation as the thin walled right ventricle of the donor heart will not be able to sustain the sudden increase in right ventricular afterload imposed by the high pressures in the pulmonary circulation of the recipient. Therefore they are critically dependent on right ventricular function and loss of the native right ventricular contribution will result in rapid right ventricular failure and systemic hypoperfusion. Owing to the maintenance of haemodynamics by the heterotopic allograft, they are better tolerated and they do not carry the same risk of sudden cardiac death.

The implantation of the donor heart to the right of the native heart allows selective ECG recordings of donor and host heart by examining the precordial ECG leads from the right and left chest, respectively. Therefore, whenever heterotopic transplant recipients develop severe arrhythmias, a right sided ECG should be taken for the exact localisation of the arrhythmia.