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CLINICAL IMAGING

Ventricular tachycardia in a patient with double valve replacement and bilateral coronary artery fistulas

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Abstract

A young patient presented with hemodynamic instability due to wide QRS tachycardia occurring about 10 years after double valve replacement. Bilateral coronary artery fistulas draining into the pulmonary artery were documented by invasive coronary angiography as well as by computed tomography imaging. A calcified scar of the posterolateral left ventricle was considered to be the origin of the clinical ventricular tachycardia. Although additional pathological findings are rare in young patients with valvular heart disease, diagnostic imaging of the heart is mandatory prior to cardiac surgery.

Keywords: Coronary artery fistula; Valve replacement; Ventricular tachycardia

1. Introduction

Patients undergoing surgery for valvular heart disease are prone to various complications throughout the short- and long-term follow-up. The occurrence of symptomatic brady- or tachyarrhythmias is not uncommon after valve replacement and requires detailed cardiac workup of the underlying pathology [1].

2. Case report

A 34-year-old man was admitted to the emergency room because of wide QRS complex tachycardia [ventricular tachycardia (VT)] with a right bundle branch block pattern lasting for more than 6 h at a rate of 200 bpm (Fig. 1). Termination of VT was achieved after administration of amiodarone. The patient had a history of prosthetic double valve replacement (both St. Jude Medical mechanical valves) at age 23 that was performed because of severe insufficiencies of the aortic and mitral valve. No coronary angiogram was performed preoperatively because of his young age. The postoperative course was complicated by a maximum rise of the creatine kinase (CK) above 6000 U/l (normal range >80 U/l). An echocardiogram showed a posterolateral wall motion abnormality with a distinct posterobasal hypokinesia.

Cardiac work-up after documentation of monomorphic VT comprised selective coronary angiography and computed tomography (CT) of the heart (Philips Brilliance 64-slice CT scanner). Both imaging modalities excluded the presence of sclerotic coronary artery disease; however, unusual vessel abnormalities were detected. Bilateral coronary fistulas arising from the left (Fig. 2) and the right (Fig. 3) coronary (conus branch) arteries were visualized, which drained both into the common pulmonary artery trunk (Fig. 4). A significant shunt volume was excluded by right heart catheterization using standard techniques. Extensive posterobasal and posterolateral calcifications were visible during fluoroscopy (Figs. 2 and 3; right panel). Transthoracic echocardiography showed no signs of prosthetic valve dysfunction and a moderately reduced left ventricular (LV) pump function with posterobasal akinesis.

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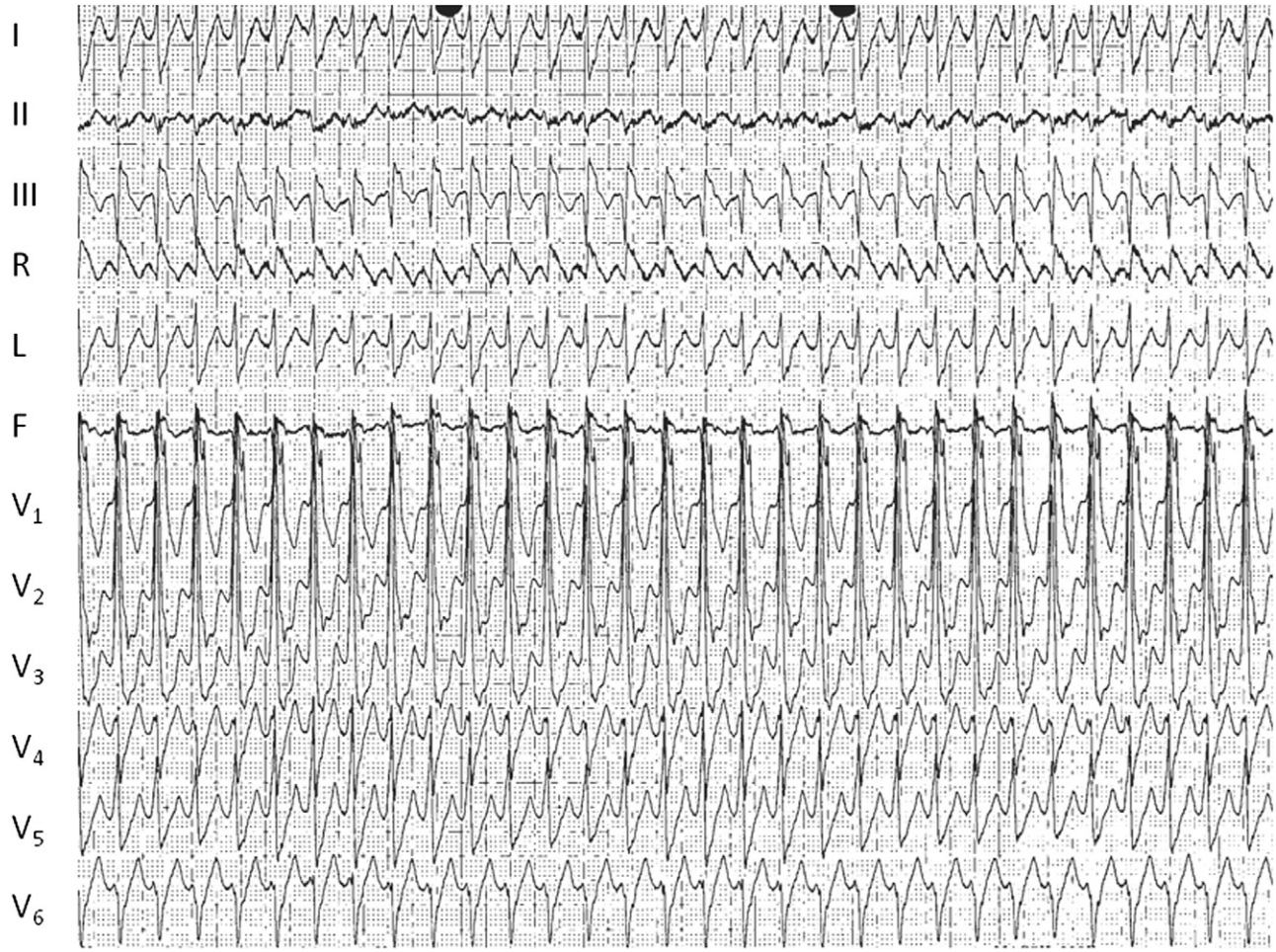

Fig. 1. Clinical wide QRS complex tachycardia (VT) with a right-bundle-branch-block pattern at a rate of 200 bpm.

The transmurality of the posterolateral scar was documented by myocardial scintigraphy (Fig. 5). The electrocardiogram characteristics of the clinical VT were consistent with an origin from the scarred area. However, invasive electrophysiological study was performed and multiple different VT morphologies were inducible with programmed ventricular stimulation. Endocardial ablation of VT was not feasible because of limitations to access the left ventricle with mechanical aortic and mitral valves in place. An epicardial ligation of the fistulas together with a simultaneous epicardial ablation was not considered as first-line therapy due to the multiple different VT morphologies. Thus, the patient received a dual-chamber implantable cardioverter defibrillator for secondary prevention of sudden cardiac death. The epicardial approach, however, might be considered in case of ineffective antitachycardia pacing resulting in multiple painful defibrillator shocks.

3. Discussion

Coronary anomalies are occasional and usually an incidental finding during coronary angiography, with an estimated incidence of 0.6% to 1.5% in patients undergoing examination [2]. Most of the coronary fistulae are congenital and represent a broad spectrum of sizes and anatomical variations, each of them having different clinical implications. Most frequently, they originate from the right coronary artery (RCA) (60%), followed by the left coronary artery (35%) and dual coronary artery fistula (5%) [3]. Coronary artery fistulas have been associated with myocardial ischemia or infarction, congestive heart failure, pulmonary hypertension, infective endocarditis, rupture or thrombosis of the fistula, and sudden cardiac death [4,5].

The present case is unique, as bilateral coronary artery fistulas were found in combination with a large calcified area in the posterobasal LV region of unknown etiology. The myocardial scar was recognized as a primary substrate for the clinical ventricular tachycardia. As the coronary arteries did not show any signs of atherosclerotic disease, the extensive postoperative CK rise remains a matter of discussion. The following mechanisms might have been involved in the myocardial disease process. First, embolization of a thrombus into the RCA may have led to myocardial ischemia. Secondly, local perimyocarditis is commonly observed after open heart surgery leading possibly to ventricular scarring during the postoperative healing phase. Finally, a