Wolff-Parkinson-White Syndrome as Initial Manifestation of Becker Muscular Dystrophy

Josef Finsterer¹, Claudia Stöllberger², Stefan Quasthoff³

Abstract
Background: Cardiac involvement may precede the onset of muscular manifestations in Becker muscular dystrophy (BMD), but Wolff-Parkinson-White (WPW) syndrome has not been reported as initial cardiac manifestation of BMD.
Case Study: In a 43-year-old, HIV-negative male, WPW syndrome was diagnosed at age 26 years upon a routine surface ECG, carried out for recurrent palpitations since childhood. Since then, WPW syndrome was occasionally found on repeated cardiologic follow-up investigations. From age 27 years, he developed proximal muscle weakness predominantly of the lower limbs, a positive Gower sign, and a waddling gait. Needle electromyograms were repeatedly myogenic, and upon reinvestigation at age 42 years, a deletion of exons 45–47 in the dystrophin gene was detected. Radiofrequency catheter ablation, initially refused by the patient, was scheduled again but no accessory pathways were detected on electrophysiologic investigations.
Conclusion: This case suggests that intermittent WPW syndrome may be a cardiac manifestation of BMD and that cardiac involvement may precede the development of evident skeletal muscle abnormalities.

Key Words: Muscular dystrophy · Dystrophinopathy · Heart · Myocardium · Electrocardiography · Echocardiography · X-linked inheritance

Case Study
Introduction
Cardiac involvement (CI) is a frequent feature of Becker muscular dystrophy (BMD) [1, 2]. CI may manifest as cardiac symptoms or signs, ECG abnormalities, echocardiographic abnormalities, or abnormalities on more elaborate cardiac investigations. Shortening of the PQ interval, with [3] or without a delta wave [4], has only rarely been described in BMD [3, 4]. In both these reports, rhythm abnormalities were seen only after onset of the neurologic manifestations. Here, we report a BMD patient with intermittent PQ shortening with a delta wave (Wolff-Parkinson-White [WPW] syndrome) months before evident neurologic manifestations.

Case Study
The patient is a 43-year-old, HIV-negative, Caucasian male who developed slowly progressive gait disturbance from age 27 years, particularly when going upward or climbing stairs. Neurologic investigations at that time resulted in the diagnosis of a non-
specific neuromuscular disorder. A second neurologic diagnostic work-up at age 42 years revealed proximal weakness of the upper limbs (M4–M5–), diffuse weakness of the lower limbs with proximal predominance (proximal M2–M3, distal M4–M5–), a positive Gower sign, wasting of the spinal muscles and the proximal muscles of the upper and lower limbs, reduced tendon reflexes on the upper limbs and absent tendon reflexes on the lower limbs, pseudohypertrophy of the calves, lumbar hyperlordosis, and waddling gait. Blood chemical investigations revealed repeatedly elevated creatine kinase, hyperuricemia, hyperlipidemia, but otherwise normal blood chemical values. Nerve conduction studies were normal but electromyograms of the right biceps brachii muscle, the right vastus lateralis muscle, and the right iliopsoas muscle were myogenic. Magnetic resonance imaging (MRI) of the upper and lower limb-girdle muscles showed atrophy and fatty degeneration in all of them. Muscle biopsy was inconclusive because of insufficient material but screening for deletions within the promoter region and exons 4, 8, 12, 13, 17, 19, 43–49, and 51–52 of the dystrophin gene by multiplex polymerase chain reaction revealed a deletion of exons 45–47. He has no children and his family history was negative for neuromuscular disease.

Cardiologic investigations at age 43 years revealed that the patient had noted palpitations since childhood, but did not experience other cardiac symptoms, such as syncope, exertional dyspnea, or leg edema. His family history was negative for cardiac abnormalities, particularly palpitations or documented rhythm abnormalities. At age 26 years, an intermittent WPW syndrome was diagnosed upon a routine ECG recording with his specialist for internal medicine (Figure 1) and high blood pressure was detected. The physical examination was normal at that time. At age 28 years, radiofrequency ablation was proposed, but refused by the patient. The ECG at age 43 years showed sinus tachycardia, normal PQ interval, but a delta wave in III. Echocardiography showed thickening of the left ventricular myocardium exclusively. Except for hyperlipidemia, risk factors for atherosclerosis were negative. No coronary angiography had been carried out. Electrophysiological investigations at age 43 years again failed to detect any accessory pathways. Radiofrequency ablation was thus not carried out, and he actually does not require any cardiac medication.

Discussion
CI is an important feature of BMD, considerably influencing management and outcome of these patients. CI in BMD may be diagnosed upon the clinical cardiologic examination, ECG, ambulatory ECG, echocardiography, myocardial scintigraphy, cardiac MRI, magnetic resonance spectroscopy, positron emission tomography, or endomyocardial biopsy [2]. ECG may show impulse generation or impulse conduction abnormalities (Table 1). Echocardiography may reveal hypertrophic cardiomyopathy, dilation of the cardiac cavities with preserved systolic function, dilated cardiomyopathy, or left ventricular hypertrabeculation. Therapy of CI in BMD comprises discontinuation of QT-prolonging drugs, digitalis, diuretics, angiotensin-converting enzyme inhibitors, β-blockers, amiodarone, oral anticoagulation, electrical cardioversion, pacemaker implantation, use of an implantable cardioverter defibrillator, high-frequency catheter ablation, biventricular pacing, or, in case of intractable heart failure, heart transplantation. Supraventricular tachycardia, as in the presented case, may respond to β-blockers or amiodarone [2].

WPW syndrome is characterized by shortening of the PQ interval < 0.12 ms, and the permanent or intermittent occurrence of a delta wave on the surface ECG [5]. WPW syndrome is caused by aberrant conduction via accessory pathways between the atrium and the left ventricle. WPW syndrome may be associated with supraventricular reentry tachycardia, but patients with WPW syndrome have also an increased risk for sudden cardiac death from ventricular tachycardias [5]. In such cases, ventricular tachycardia may be induced by concomitant atrial fibrillation, but not by reentry tachycardia. If incessant, reentry tachycardia may also induce systolic dysfunction or left ventricular dilation, also known