A marker of mayhem: macrovolt T-wave alternans preceding polymorphic ventricular tachycardia

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A 70-year-old male with chronic kidney failure caused by Wegener’s granulomatosis was hospitalized for a respiratory tract infection. During his stay, he experienced sudden loss of consciousness. An electrocardiogram was recorded (Figure 1A). There was an extreme lengthening of the QT interval (QTc 750 ms) and a distinct beat-to-beat alternating of the T-wave morphology. This rare phenomenon is known as macrovolt T-wave alternans. During urgent transfer to the intensive care unit, the patient developed polymorphic ventricular tachycardia which was recorded by a portable external defibrillator (Figure 1B). The episode was terminated with a precordial thump and after the intravenous injection of Mg²⁺ sulfate. Two other non-sustained episodes were observed. After substituting Mg²⁺, K⁺, and Ca²⁺, T-wave alternans disappeared within the hour (Figure 1C). The QT prolongation was acquired. It was induced by a combination of sotalol, moxifloxacin, and haloperidol, all known for prolonging the QT interval, together with a low serum Mg²⁺ (1.64 mg/dL), K⁺ (3.7 mmol/L), and ionized Ca²⁺ (1.06 mg/dL). Within 24 h after withdrawal of the drugs, the QTc interval had already drastically shortened (Figure 1D).

This flashlight shows that macrovolt T-wave alternans is a tell-tale of acute arrhythmogenic cardiac distress. It can be easily picked up with the bare eye. This exceptional clinical phenomenon formed the basis of the development of microvolt T-wave alternans as a risk stratifier for sudden arrhythmic cardiac death.