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Severe left ventricular dysfunction after acute coronary syndrome: Timing for implantable cardiac defibrillator (ICD) and role of the wearable defibrillator (model Life Vest)

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Abstract

An 82-year-old patient was hospitalized for an inferior ST-elevation myocardial infarction (STEMI), with a coronary delay of about 120 minutes. He was treated with effective primary angioplasty and stent implantation of right coronary artery. His echocardiography showed a significant reduction of the global systolic function of the left ventricle, with an Ejection Fraction (EF) of 30%. The patient was discharged with a Life Vest wearable cardioverter-defibrillator for primary prevention. During the 15 days following discharge, several occurrences of non-sustained ventricular tachycardia (NSVT) were reported. Consequently the patient was admitted to the Intensive Cardiac Care Unit (CCU) and after a few hours following admission, another occurrence of sustained ventricular tachycardia, with hemodynamic instability, was effectively treated with external defibrillation. A single-chamber ICD implant procedure was carried out, with no major complications. This case shows the decisive role played by the Life Vest in preventing sudden death, and in suggesting the implantation of a final ICD.

Keywords

wearable cardioverter-defibrillator; sudden cardiac death; ventricular arrhythmias; external defibrillation; life vest

Abbreviations

ICD: Implantable cardiac defibrillator; WCD: Wearable cardioverter-defibrillator; STEMI: ST-elevation myocardial infarction; EF: Ejection fraction; NSVT: Non-sustained ventricular tachycardia; CCU: Intensive cardiac care unit; COPD: chronic obstructive pulmonary disease.

Introduction

An implantable defibrillator (ICD) is the central element in preventing sudden cardiac death. Well known current guidelines recommend ICD implantation for primary and secondary prevention in patients with an established high risk of sudden death [1,2]. However for some patients this high risk is only a temporary issue and often cannot be well estimated within the short period. In clinical practice, the use of a wearable cardioverter-defibrillator (WCD) has been approved (Life Vest model) as a "bridge" in the time range during which the patient is reasonably considered to be at high risk for sudden cardiac death [3,4]. The WCD can be used to determine appropriateness for ICD implantation, specifically a persistent risk for life-threatening arrhythmias or, in case of a reversible cause, to prevent unnecessary ICD implantation [5]. We report a case in which the role of the Life Vest was crucial for a patient at high risk for sudden cardiac death.

Case Presentation

The patient was an 82-year-old man with a history of permanent atrial fibrillation receiving oral anticoagulants (warfarin), with a mild to moderate chronic renal insufficiency and moderate chronic obstructive pulmonary disease (COPD). The patient was admitted to our Intensive Cardiac Care Unit (CCU) for an inferior ST-elevation myocardial infarction (STEMI), with a coronary delay of about 120 minutes. He was immediately treated with effective primary coronary angioplasty and stenting of the right coronary artery (Figure 1). Simultaneously a critical stenosis of the anterior descending branch was found and was treated with coronary angioplasty and drug-eluting stent implantation, on the fifth day following admission. The patient's echocardiography showed a clear reduction of the left ventricular global systolic function, with an ejection fraction (EF) of 30%. Guidelines recommend waiting 40 days, given the patient in optimal medical treatment, before re-evaluating for possible implantation of a Cardioverter Defibrillator system (ICD) for primary prevention from sudden death. However, given that the first 30 days after discharge are those faced with the highest incidence of sudden death and that, in this particular case, because of the coronary delay we believed there would probably never be an adequate recovery of the left ventricular ejection fraction, we discharged the patient with a wearable defibrillator (Life Vest model) for primary prevention.15 days after discharge the patient went to the emergency room for gel leaking from the Life Vest plates: the patient's telemetry data reported several incidents of non-sustained ventricular tachycardia (NSVT) (Figure 2). At this point the patient was admitted to the Intensive Cardiac Care Unit (CCU) with a planned procedure for ICD implantation, this time, meant for secondary prevention. After a few hours from admission, a new episode of sustained ventricular tachycardia (Figure 3), causing hemodynamic instability, was effectively treated with external defibrillation. The definitive single-chamber ICD procedure was performed with no major complications. The patient was thus enrolled for follow-up examination.

Discussion

Acute coronary syndromes (ACS) complicated by severe left ventricular dysfunction are subject to a high risk of sudden arrhythmic death, especially in the first 30 days following the major event [6,7]. Furthermore, the ejection fraction (EF) of the left ventricle is the most important mortality predictor [8,9].

However, the guidelines suggest waiting at least 40 days prior to re-evaluation of left ventricular function, given the patient in optimal medical treatment [11], and before deciding to finally insert an Implantable Cardioverter Defibrillator (ICD) for primary prevention. The introduction of removable wearable defibrillators (Life Vest model) [11-16] protects those patients considered to be at highest risk of sudden death in the first 30 days following major events and avoids the inappropriate insertion of ICD systems at the same time. In the case we report, the use of the Life Vest allowed us to diagnose malignant ventricular arrhythmias, to protect the patient from further potentially fatal arrhythmic episodes and to implant an ICD, with clear indication, currently in secondary prevention.

Figures

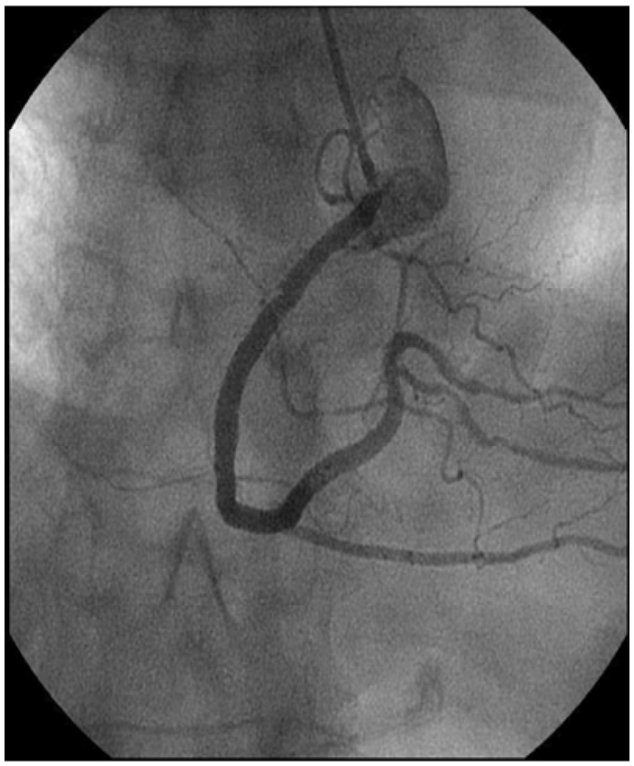

Figure 1: Angiogram of right coronary artery after angioplasty.

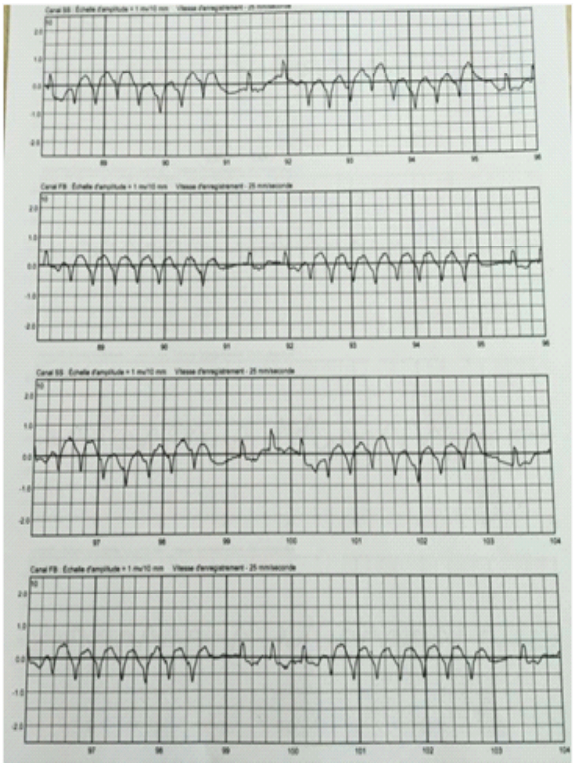

Figure 2: Non-sustained ventricular tachycardia (NSVT)

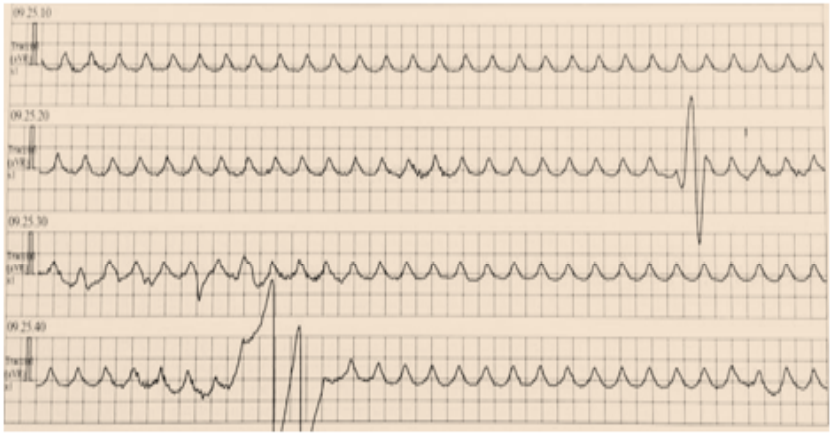

Figure 3: Sustained ventricular tachycardia

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