SCIENCE PHOTONS Publishers

Case Report ISSN 3070-5681

Innovative Insights in Case Reports and Reviews

A Successful Life-Saving LifeVest Defibrillation in a Patient with Systolic Heart Failure: A Case Report

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Received Date: 05 May 2026;
Accepted Date: 23 Jun 2026;
Published Date: 09 Jul 2026.

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Citation: Akbar S, Tran P, Goldstein LB. A Successful Life-Saving LifeVest Defibrillation in a Patient with Systolic Heart Failure: A Case Report. Innov Insights Case Rep Rev. 2026; 2(3): 1-4.

ABSTRACT

Pneumonia is a common clinical problem treated by numerous specialists. However, when a patient cannot breathe properly while lying flat, other etiologies must be explored. When a patient is then found to have systolic heart failure with an ejection fraction of less than 15%, significant concern is raised when discharging the patient after they become hemodynamically stable. A likely fatal culprit that a patient could face would be an arrhythmia. To prevent death due to fatal arrhythmias in the setting of heart failure, patients are trialed on a wearable defibrillator, the LifeVest, to determine whether they will need an implantable cardioverter-defibrillator (ICD). We present the case of a patient who was diagnosed with systolic heart failure when his complications arising from pneumonia did not correlate with his symptoms. During his trial of the LifeVest, his life was saved by defibrillation. He was then successfully brought to the hospital for placement of a permanent implantable cardioverter-defibrillator (ICD).

Keywords: *Systolic Heart Failure; Wearable Defibrillators; LifeVest; Implantable Cardioverter-Defibrillator; Heart Disease; Atrial Fibrillation.*

Introduction

Pneumonia and heart failure frequently overlap in hospitalized patients, and worse outcomes among pneumonia patients with heart failure appear to be driven largely by acute heart failure exacerbations [1]. Heart failure is a clinical syndrome characterized by symptoms such as dyspnea, orthopnea, fatigue, and exercise intolerance due to impaired ventricular filling, impaired ventricular ejection, or both [2]. Heart failure with reduced ejection fraction (HFrEF) is defined by a left ventricular ejection fraction (LVEF) of 40% or less and is associated with progressive left ventricular remodeling, neurohormonal activation, and an increased risk of hospitalization and mortality [2,3]. Initial evaluation begins with a careful history and physical examination, but diagnostic confirmation commonly relies on elevated natriuretic peptides and objective evidence of cardiac dysfunction on echocardiography [3]. Current guideline-directed management of HFrEF emphasizes the rapid initiation and optimization of evidence-based medical therapy, including renin-angiotensin system inhibition or angiotensin receptor-neprilysin inhibition, beta-blockers, mineralocorticoid receptor antagonists, and sodium-glucose cotransporter-2 inhibitors [3,4].

Patients with HFrEF remain at increased risk for ventricular arrhythmias and sudden cardiac death, particularly when the ejection fraction is severely reduced. For selected patients with ischemic or nonischemic cardiomyopathy and persistently reduced LVEF despite guideline-directed medical therapy, implantable cardioverter-defibrillator (ICD) placement is recommended for the prevention of sudden cardiac death [3,4]. However, ICD implantation may be deferred in newly diagnosed cardiomyopathy or early after revascularization because left ventricular systolic function may improve with medical optimization and treatment of reversible ischemia [4,5]. During this vulnerable waiting period, a wearable cardioverter-defibrillator (WCD), commonly known as a LifeVest, may be used as a temporary bridging strategy in patients considered to be at elevated short-term risk of malignant ventricular arrhythmias [5,6].

The clinical utility of WCD therapy remains an area of ongoing debate. Registry data suggest that WCDs can successfully detect and terminate ventricular tachyarrhythmias in selected high-risk patients [6]. However, randomized trial data have shown mixed results, with the VEST trial failing to demonstrate a statistically significant reduction in arrhythmic death after myocardial infarction, although all-cause mortality was lower in the WCD group [7]. More recent reviews emphasize that WCD benefit is likely greatest when patients are carefully selected, appropriately educated, and highly compliant with device wear time [8].

This case report presents a patient with newly diagnosed severe systolic heart failure who was discharged with a LifeVest and subsequently experienced a successful, life-saving defibrillation for a malignant ventricular arrhythmia.

Case Presentation

The patient was a 61-year-old male who initially presented to the emergency room reporting that it felt like he was drowning. He had been on antibiotics and steroids prescribed by his primary care physician for suspected pneumonia. All of his vital signs were within normal ranges. His only reported symptom was severe dyspnea when lying flat. Otherwise, he did not have any pain, palpitations, dizziness, syncope, or presyncope. An EKG showed no acute ischemia, nor were there any elevations in troponin levels. A CTA of the chest with and without contrast was then performed (Figure 1). Normal opacification of the pulmonary arteries was found. The caliber of the aorta was normal, with no evidence of dissection. Marked coronary calcifications were present. No pleural or pericardial fluid was present. Mild dependent atelectasis was present. The impression was a normal CT angiogram of the chest with no evidence of pulmonary embolism. There was evidence of coronary artery disease.

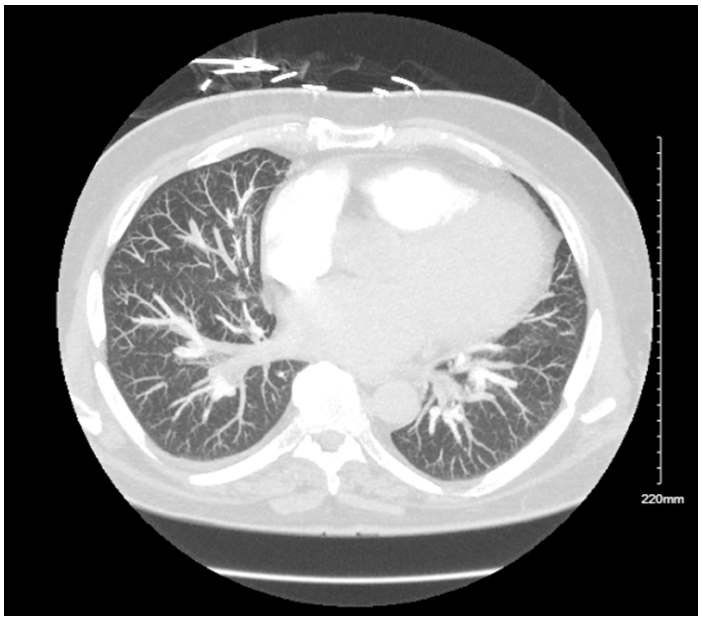

Figure 1: *The above figure depicts the patient's chest CTA.*

The patient then began to exhibit atrial fibrillation with rapid ventricular response on a repeat EKG. The patient was then admitted to the hospital and started on an intravenous amiodarone drip. The patient had an elevated BNP level of 659, suggesting acute congestive heart failure. He denied any family history of coronary artery disease, myocardial infarction, or a history of smoking.

A transthoracic echocardiogram was then ordered by the inpatient cardiologist (Figure 2). The left ventricular cavity size and wall thickness were normal. The estimated ejection fraction was 5–10% by the biplane method of disks. The right and left atria were dilated. There was mild regurgitation of the mitral, aortic, tricuspid, and pulmonic valves. The inferior vena cava and ascending aorta were dilated. On a follow-up transesophageal echocardiogram, a cardiac mass was also found, which looked more like a blood clot than a myxoma (Figure 3). Given that the patient had a CHA_2DS_2-VASc score of at least 2, he was also continued on a heparin drip.

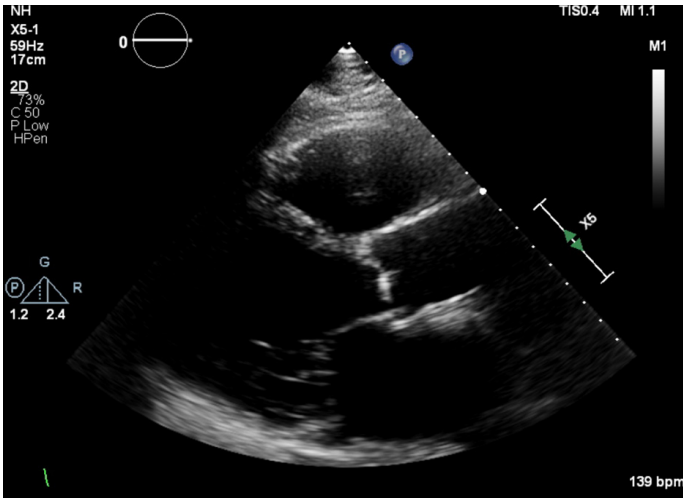

Figure 2: *The above figure depicts the patient's transthoracic echocardiogram.*

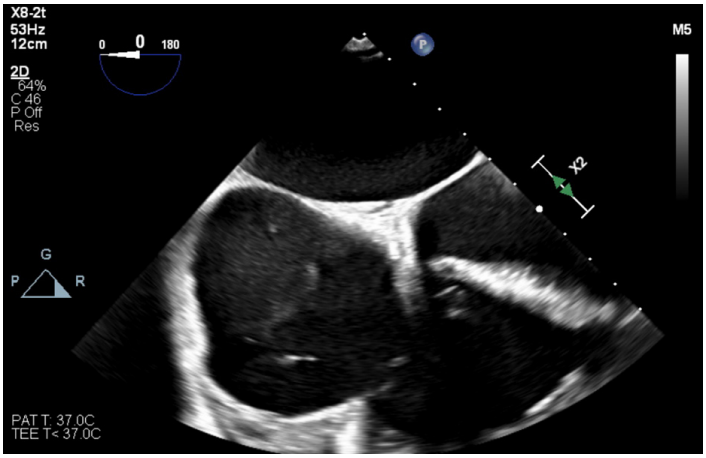

Figure 3: *The above figure depicts the atrial mass found on the transesophageal echocardiogram performed on the patient.*

The patient then underwent a cardiac catheterization (Figure 4). There was a 75% mid-vessel occlusion of the left anterior descending artery. There was also an 80% proximal vessel occlusion of the ramus intermedius. There was also an 85% occlusion of the left circumflex artery. Three cardiac stents were placed, and the recommendation was dual antiplatelet therapy with aspirin and prasugrel. A follow-up echocardiogram confirmed the dissolution of the blood clot and showed an ejection fraction that had improved to 14%. The patient was then diagnosed with paroxysmal atrial fibrillation with acute systolic heart failure. The patient was then discharged with a LifeVest and given appropriate return precautions.

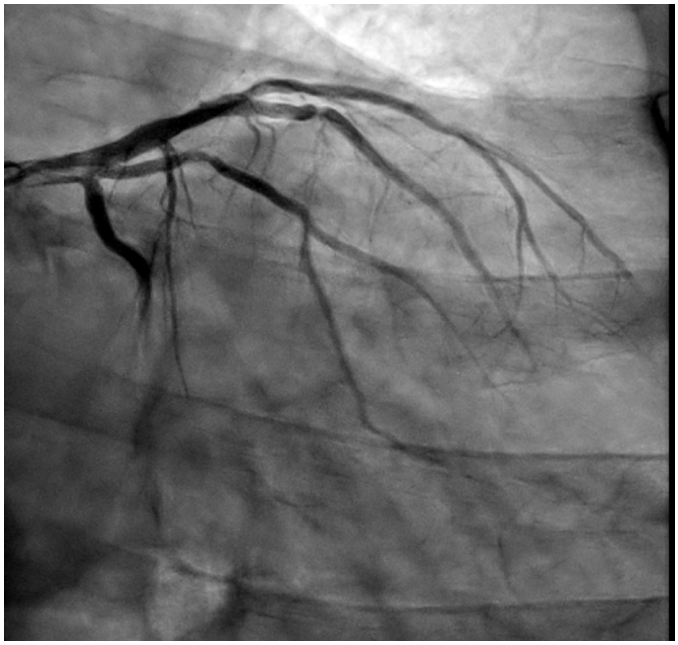

Figure 4: *The above figure depicts the coronary angiogram performed on the patient.*

Three days after the patient's discharge, he was talking to his wife when, all of a sudden, he lost consciousness. He regained consciousness quickly but could not recall what had happened. His LifeVest had responded to an arrhythmia and administered a shock. He was then taken to the emergency room by EMS for evaluation following the LifeVest shock. The patient was then admitted to the hospital, and an inpatient cardiologist interpreted his event strip as torsades. He then received a consultation from an electrophysiologist who could not find any reversible causes of the event that the patient had encountered. The patient then had an implantable cardioverter-defibrillator (ICD) placed to prevent further recurrences. Following a successful ICD placement, the patient was discharged from the hospital (Figure 5). He had no outstanding complaints at his outpatient hospital follow-up appointment.

Discussion

To start, the patient initially presented with orthopnea and was being treated for pneumonia. He did not have any of the other cardiovascular symptoms, such as dizziness, palpitations, syncope, or presyncope, prior to his significant heart failure diagnosis. The initial indication that the patient had heart failure was an elevated BNP. Had the echocardiogram not been performed, the patient would not have been diagnosed with heart failure and would have remained at high risk for potentially life-threatening complications. Also, if the atrial clot had not been diagnosed and treated, the patient would have been at substantial risk for a life-altering stroke. If the left heart catheterization had also been delayed, the patient would have remained at increased risk for myocardial infarction and other serious cardiovascular complications, and the need for the three stents would have only been a post-mortem finding. The cardiologist displayed great insight by providing the patient with a LifeVest wearable defibrillator upon discharge, despite an improvement in ejection fraction. The patient remained at high risk for a life-threatening ventricular arrhythmia, as demonstrated by the torsades event recorded on the event monitor. The patient's compliance with the wearable defibrillator also likely saved his life. The defibrillator had a clear benefit in this case and further indicated the pressing need for this patient to have a permanent implantable cardioverter-defibrillator (ICD) placed. The patient was also fortunate to have the permanent ICD placed without complications, as right ventricular perforation is a recognized complication of the procedure.

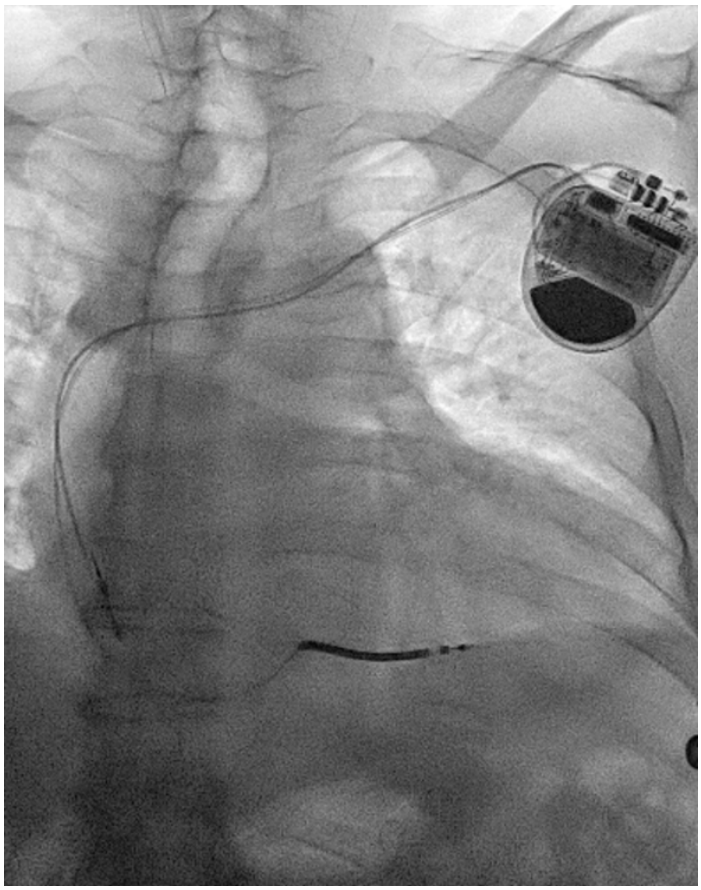

Figure 5: *The above figure depicts the successful ICD implantation performed on the patient after his return to the hospital.*

This case also reflects broader real-world experience with WCD therapy. Contemporary registries indicate that patients tolerate the LifeVest well, with average daily wear times exceeding 22 hours and adherence remaining high even beyond three months of use [9,10]. Device effectiveness appears closely tied to patient compliance, as higher wear time correlates with a greater likelihood of appropriate arrhythmia detection and successful termination, while non-compliant patients derive little protective benefit [11]. Large observational cohorts, including the German nationwide SCD-PROTECT study, have further shown that patients with newly diagnosed cardiomyopathy remain at meaningful risk for sudden cardiac arrest during the WCD bridging period, reinforcing the rationale for wearable protection while left ventricular function is reassessed [12]. In parallel, current expert consensus for HFrEF management emphasizes the prompt initiation and up-titration of all four pillars of guideline-directed medical therapy, since achieving target dosing can take several months, and functional recovery during this window may ultimately change a patient's candidacy for a permanent defibrillator [13]. Taken together, this reinforces that WCD use in this patient was concordant with current practice patterns for bridging newly diagnosed patients with a severely reduced ejection fraction pending medical optimization and definitive ICD decision-making.

Conclusion

Pneumonia is a common clinical presentation. It is important for physicians to always consider differential diagnoses that may also explain a patient's symptoms, especially when the patient may have significant risk factors for heart failure and/or coronary artery disease. The BNP level in this case served a pivotal role in drastically altering the patient's course of treatment and diagnosis. Had the patient not been given the wearable defibrillator device, he would have remained at high risk for a life-threatening ventricular arrhythmia. It is important for every doctor managing patients with systolic heart failure to be conscientious of the guidelines and the potential benefits of wearable defibrillators such as the LifeVest. Further research is needed into other options for temporary defibrillators for patients with systolic heart failure to ensure that the decision to ultimately place a permanent implantable cardioverter-defibrillator (ICD) is well supported by quantifiable evidence.

Statement of Informed Consent

Informed consent was obtained from the patient described in this case report.

Conflicts of Interest

The authors declare no conflict of interest and received no specific funding for this work.

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