MANAGING SUDDEN CARDIAC DEATH RISK IN NEWLY DIAGNOSED NONISCHEMIC CARDIOMYOPATHY PATIENTS—CASE STUDY

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HISTORY OF PRESENT ILLNESS (HPI) A 40-year-old female presented to the emergency room with complaints of shortness of breath and nonproductive cough. The patient had a history of asthma, diabetes, hypertension, and uterine cancer, which was successfully treated by a hysterectomy in 2011. She was taking metformin and enalapril on a daily basis. She was admitted for further evaluation and scheduled for a consultation with the cardiology department.

SOCIAL HISTORY The patient is single. She reported occasional marijuana use and former tobacco use.

PHYSICAL EXAMINATION/LABS The physical examination did not reveal any clear signs of heart failure. The patient's heart rate was regular with a normal rhythm. There were no signs of peripheral edema. The chest was clear and there were no signs of wheezing or rales. The patient was comfortable, alert, and had no appearance of acute distress.

Relevant labs: sodium 141, potassium 4.0, chloride 101, CO2 26, BUN 10, creatinine 1.1, glucose 179, troponin 0.09, BNP 128

Hematology: white blood count 10.0, hemoglobin 11.7, hematocrit 34.4, platelets 274,000

STUDIES/RESULTS The patient's chest x-ray suggested minimal interstitial airspace disease, which may have represented infiltrates versus edema. Her electrocardiogram (EKG) revealed a normal sinus rhythm with a nonspecific T wave abnormality and a mildly prolonged QT interval at 487 ms. An echocardiogram revealed a severely enlarged left ventricle, an ejection fraction (EF) of 20%, and mild concentric left ventricular hypertrophy. The patient was sent for cardiac catheterization to determine if her cardiomyopathy was of ischemic origin. The results revealed no sign of coronary artery disease. The cardiac catheterization also confirmed mild to moderate systemic hypertension and global hypokinesis.

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IMPRESSIONS/PLAN The patient was diagnosed with nonischemic cardiomyopathy. She was started on ipratropium/albuterol, moxifloxacin, heparin, lisinopril, metformin, and carvedilol.

Her troponin level was elevated upon arrival, but began trending down.

After clinical stabilization, the patient was discharged on day three with the following medications:

- aspirin 81 mg qd
- carvedilol 3.125 mg bid
- furosemide 40 mg qd
- lisinopril 5 mg qd
- spironolactone 12.5 mg qd
- ipratropium/albuterol q4hr
- metformin 750 mg q am

It was determined that the patient's low EF put her at an elevated risk of sudden cardiac death (SCD). The patient was prescribed a wearable cardioverter defibrillator (WCD) (manufactured by ZOLL, Pittsburgh, PA, marketed under the brand name LifeVest®) for four months.

The discharge plan was to optimize medical management and evaluate the patient for EF improvement to determine the need for an implantable cardioverter defibrillator (ICD) for long-term protection from SCD.

CLINICAL UPDATE After four months, the patient was brought in for a follow-up appointment. Her symptoms showed improvement, so she was prescribed to continue wearing the WCD and scheduled to return for a follow-up echocardiogram in one month.

The follow-up echocardiogram revealed her EF improved slightly to 25%. Considering the improvement, the patient's carvedilol dose was increased to 6.25 mg bid and she was prescribed to continue wearing the WCD. The next appointment was set for three months, where her EF would be assessed for further improvement based on the up titration of the beta-blocker dose.

Approximately three weeks later, the patient was home alone when she suddenly lost consciousness. The WCD detected ventricular fibrillation (see Figure 1) and delivered a 150J biphasic treatment shock 34 seconds after detection. The treatment successfully converted her arrhythmia and she awoke moments later. She was immediately taken to the hospital and admitted. Upon arrival, her QTc interval was measured at 473 ms.

Three days later, the patient went on to receive a single chamber ICD for long-term protection from SCD.

She has since returned home and has not been rehospitalized.

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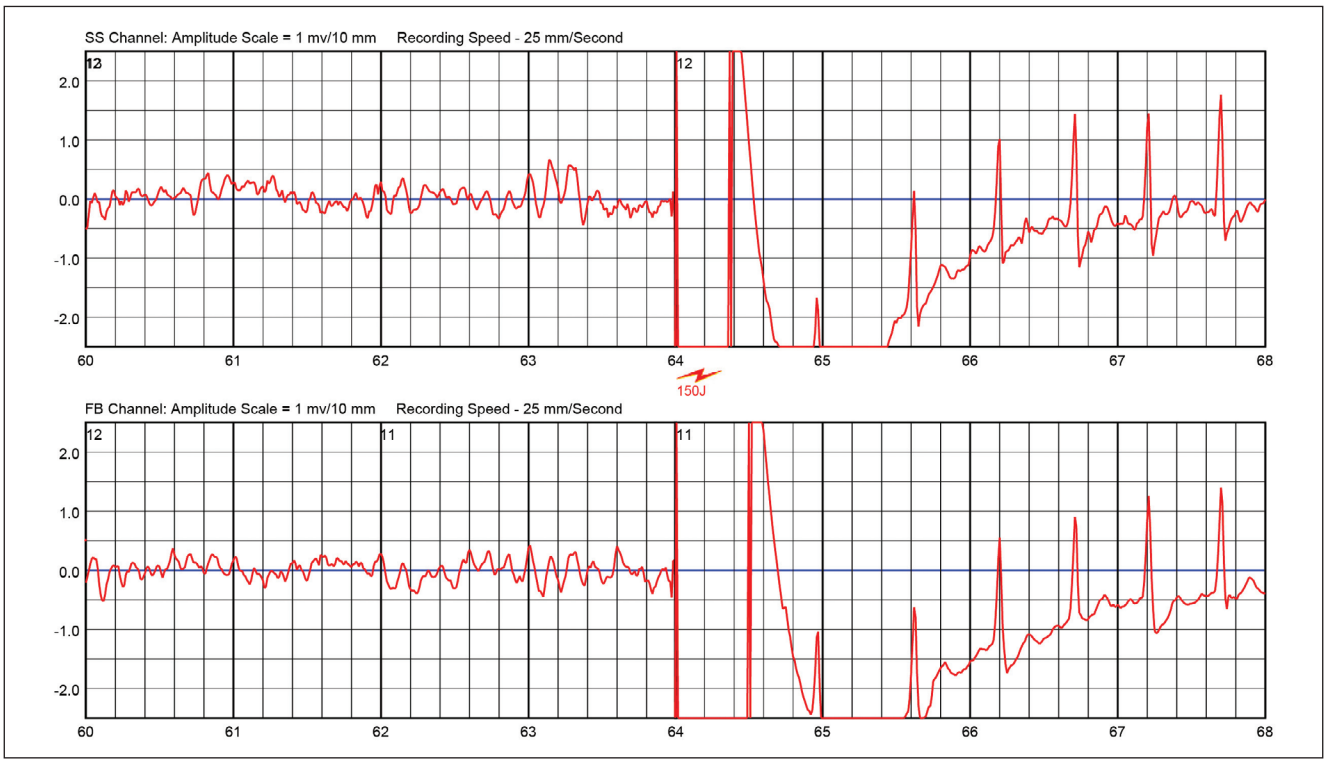

Figure 1: EKG downloaded from WCD. The WCD continuously monitors the patient's EKG using a 4 electrode, 2 lead system—side-to-side (SS, top) and front-to-back (FB, bottom).

DISCUSSION In this case study, a 40-year-old patient with no history of heart failure presented to the emergency room with complaints of shortness of breath and nonproductive cough. While the physical examination did not reveal any clear signs of heart failure, routine tests revealed the diagnosis of nonischemic dilated cardiomyopathy with an EF of 20%.

Optimized doses of beta blockers have been shown to reduce total mortality, including SCD, but often require three or more months of titration to achieve mortality benefits.[1] During the period of medical optimization following a new diagnosis of nonischemic cardiomyopathy, the patient is at an elevated risk of SCD.

While this patient was being medically optimized, she experienced a dangerous episode of ventricular fibrillation. Fortunately, she was protected by the WCD, which successfully converted her arrhythmia. Following this event, the patient went on to receive an ICD.

The WCD plays a critical role in the continuum of care for newly diagnosed nonischemic cardiomyopathy patients. The WCD provides clinicians the opportunity to pursue medical therapy optimization while mitigating the immediate risk of SCD.

REFERENCES

1. MERIT-HF Study Group, Effect of metoprolol CR/XL in chronic heart failure: Metoprolol CR/XL Randomised Intervention Trial in Congestive Heart Failure (MERIT-HF). Lancet 1999; 353: 2001–07.

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