

Advancing Health

A CASE STUDY from MedStar Heart & Vascular Institute

The Best Predictor of Mortality in Patients with Heart Failure: **Cardiopulmonary Stress Test**

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Abstract

The cardiopulmonary stress test (CPX) is an under-utilized tool that provides the best estimate of prognosis in patients with heart failure and can identify those at high risk for death. In this case, a 37-year-old patient with heart failure and reduced ejection fraction performed poorly on the CPX, even though he self-reported only mild heart failure symptoms. Eighteen months later, he rapidly progressed to cardiogenic shock, necessitating implantation of a left ventricular assist device (LVAD) as a life-saving measure. He is now active, independent and back to coaching football, while awaiting a heart transplant.

CASE STUDY

Cardiopulmonary Stress Test

Patient Presentation

- 37-year-old male with a history of hypertension, diabetes, obstructive sleep apnea, nonischemic cardiomyopathy and an implantable cardioverter defibrillator.
- He was Class II NYHA heart failure by symptoms, reporting only occasional shortness of breath and fatigue with exertion. He was coaching football and stated that he could walk up the bleachers with his players.
- He had an episode of acute decompensated heart failure, requiring hospitalization for IV diuretics.

Assessment

- An echocardiogram showed a dilated left ventricle with severe LV systolic dysfunction and EF=15%.
- A cardiac MRI confirmed the severe LV systolic dysfunction, but did not show any infiltrative process or myocarditis.
- He underwent a CPX for risk stratification. His peak oxygen consumption at maximal exercise was only 8.4 mL/kg/min, which suggested severe cardiopulmonary limitations.
- According to the International Society of Heart and Lung Transplantation (ISHLT), a peak oxygen consumption of ≤ 12 mL/Kg/min is a Class I (Level of

Evidence B) recommendation for listing for heart transplantation. This should therefore prompt an evaluation for advanced heart failure therapies (heart transplantation and/or LVAD), if not already done.

Diagnosis

- ACCF/AHA Stage D (end-stage) heart failure.

Treatment

- Patient underwent a work-up for advanced heart failure therapies, and was deemed a candidate for heart transplantation.
- Because he was feeling fine, he was maintained on guideline-directed medical therapies. He did not undergo LVAD implantation, as he was able to return to his baseline level of activities, including coaching.
- Eighteen months later, he presented with rapid progression of shortness of breath and weight gain that culminated in cardiogenic shock, which was refractory to inotropes and required insertion of an intra-aortic balloon pump for stabilization.
- He was transitioned to mechanical circulatory support with implantation of an LVAD.



"This test is the best predictor of mortality in patients with heart failure. Identifying high-risk patients early will save lives and help guide therapy. At MedStar Washington Hospital Center, we work with you to provide the best diagnosis and treatment for your patients."

Samer Najjar, MD

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Outcomes

- After he recovered from his surgery, he enrolled in cardiac rehab.
- He has now returned to his daily routine, including coaching sports.
- He awaits a suitable donor heart to undergo heart transplantation.

Conclusion

- Cardiopulmonary stress test remains the best tool for risk stratifying patients with heart failure and reduced ejection fraction.
- This test can help identify patients who are at high risk for mortality and who, according to the ACCF/AHA and ISHLT guidelines, should undergo an evaluation for heart transplantation and/or LVAD.



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If you wish to schedule one of your patients for a cardiopulmonary stress test, please call **202-877-4698** for an appointment. A dictated summary report will be provided to you at the completion of the test.

If you have any additional questions about the utility of this test or which patients should undergo this test, please call Dr. Najjar directly at **202-577-5321** (mobile) or the 24-hour advanced heart failure physician line at **202-297-9307**.

To learn more, please visit
MedStarHeartInstitute.org.