BACKGROUND

A 51-year-old African-American female patient presented to the health center’s emergency department with severe dyspnea on exertion and progressive edema of the lower extremities. She reported that her breathlessness and coughing episodes had become particularly severe in the preceding 3 weeks and was now at the point where she could not stand or walk for more than 1 minute to 2 minutes without becoming fatigued.

HISTORY

She is a 40 pack-year smoker (ie, about 1 and 1/2 packs per day since her mid-20s) and currently still smokes cigarettes. She is not taking any medications and has no family history of asthma, allergy, or cardiovascular disease. She claims to have never been treated by a doctor.

PHYSICAL EXAMINATION

Woman with moderately above normal body mass index who is in obvious respiratory distress. Decreased breath sounds and obvious cyanotic skin. 2+ lower extremity edema to thigh. She had neck vein distention and a positive heparojugular reflex.

Respiratory rate: 30 per minute
Heart rate: 115 bpm
SaO2: 78%
Arterial blood gases:
PaO2: 41 mm Hg
PaCO2: 66 mm Hg
pH: 7.28
HCT: 48%
Prealbumin: low normal

Repeat arterial blood gases:
PaO2: 113 mm Hg
PaCO2: 92 mm Hg
pH: 7.28

FURTHER EVALUATIONS

Echocardiogram revealed severe right ventricular hypokinesis and a right ventricular systolic pressure of 55 mm Hg. Catheterization of the right side of the heart showed a pressure of 70/30 (48) mm Hg and a cardiac output of 4 L/minutes with no O2 step-up. The forced expiratory volume in 1 second (FEV1) was 0.38 L (16%); the residual volume was 5.97 L (373%); and the ratio of residual volume to total lung capacity was 84%. Diffusion capacity was 7.8 mL/mm Hg/min (41%). The ventilation/perfusion matched abnormality in both lower lobes, and there was 7% quantitative perfusion to the bases, demonstrating oligemia to the lower lobes.

MANAGEMENT

The patient was deemed to be in acute respiratory distress and to have severe smoking-related chronic
obstructive pulmonary disease (COPD). She was gas trapped and hyperinflated without significant diffuse emphysema. After immediate admission to the intensive care unit, she was started on bronchodilators, systemic steroids, inhaled steroids, antibiotics, and noninvasive positive pressure ventilation (NPPV). After 3 weeks of inpatient hospitalization she was discharged to her home with chronic nocturnal NPPV and supplemental oxygen. She was also referred within the health system for immediate outpatient rehabilitation, smoking cessation, and weight monitoring. A flutter valve device was provided for management of coughing exacerbations.

Due to the severity of lung function deterioration (eg, FEV₁ well below 25%) and the inability of medical therapy to relieve symptoms, this patient was listed for lung transplantation. She had no significant change in her condition in 3 years and underwent double-lung transplantation. Performance as measured by lung function (Figure) and by physical function and her quality of life have improved. As shown on the pretransplantation and post-transplantation spirometry results, she had a 350% increase in spirometric volume; she also had a reduction in dyspnea and a marked improvement in quality of life.

**Discussion**

Lung transplantation is a life-extending extreme measure for patients with the most severe cases of COPD. It is unknown whether this complex and risky procedure could have been avoided or at least delayed with earlier intervention in this individual patient. Smoking cessation is the 1 intervention proven to alter the long-term decline of lung function in smokers. In conjunction with an aggressive smoking-cessation program, earlier introduction of medical therapy might have delayed and possibly averted the need for transplantation in this patient. The complete absence of medical evaluation, counseling, or therapy for this lifelong smoker is, unfortunately, common. In this worst-case scenario, interventions such as steroids, oxygen, and NPPV allowed the patient to be more comfortable while waiting for the appropriate lung procedure. Reviewing this case of a patient with end-stage COPD should remind clinicians of the reasons for instituting early and aggressive smoking-cessation efforts and the need to develop newer medical therapies and surgical techniques that may prevent or at least delay the need for the most radical COPD solution. The demand for such symptom-based interim therapies will increase in coming years as United States health systems are forced to deal with that large population of patients with COPD who have already progressed to the more advanced stages of the disease.

**Figure. Spirometry Before and After Lung Transplantation**

![Figure. Spirometry Before and After Lung Transplantation](image-url)