CASE PRESENTATION:
Advanced Age and Lung Transplantation: It’s About More Than a Number

By Matthew Morrell, MD

Advanced age and lung transplant candidacy has been a controversial topic, with some studies suggesting poor outcomes in elderly recipients. We present a case of an elderly patient who successfully underwent lung transplantation and discuss additional parameters that should be considered in elderly patients with end-stage lung disease.

A 72-year-old former police officer was given the diagnosis of idiopathic pulmonary fibrosis (IPF) after a computed tomography scan of the chest documented reticular opacities and honeycombing in a subpleural distribution, and open-lung biopsy documented histologic findings of usual interstitial pneumonia. He had become oxygen-dependent and limited in his activities of daily living. After failing all therapeutic options, he was referred to a local lung transplant center, but was turned down as a candidate due to the fact that he was over 65 years of age. He was then referred to UPMC for re-evaluation and was eventually deemed a suitable candidate for lung transplantation by the selection committee. At the time of listing, he had severe restrictive pulmonary disease, with a forced vital capacity of 1.04 L (24 percent of predicted value) and forced expiratory volume in one second of 0.88 liters (31 percent of predicted value). He required six liters of supplemental oxygen at rest, with desaturation to 80 percent after walking 600 feet on a six-minute walk test. Cardiac catheterization documented mild pulmonary hypertension with a trans-pulmonary gradient of 15 mm Hg and patent vein grafts from a previous coronary artery bypass procedure. His chest x-ray is shown in Figure 1.

Despite these deficits, he was robust and able to ambulate independently. In early 2013, at the age of 74, he underwent a left single-lung transplant without cardiopulmonary bypass. Recovery from his surgery was uneventful, with extubation on postoperative day one and discharge from the hospital on postoperative day 15 without supplemental oxygen. At present, 18 months after lung transplantation, he maintains an independent and active lifestyle without any respiratory complaints. Recent pulmonary function tests show a forced vital capacity of 2.00 L (46 percent of predicted value) and forced expiratory volume in one second of 1.65 liters (58 percent of predicted value).

For the past three decades, lung transplantation has been a viable option for patients suffering from a variety of end-stage lung diseases. Recipient age has historically been a controversial topic in regard to candidate selection for lung transplantation. A recent report by the International Society of Heart and Lung Transplantation (ISHLT) documents that elderly lung transplant recipients have a shorter overall survival compared to younger recipients (1). As a result, age greater than 65 years has been considered to be a relative contraindication for lung transplantation. Nevertheless, approximately 10 percent of lung transplants performed worldwide are for recipients greater than 65 years of age, with 3 percent of recipients being 75 years of age or older. The basis for the observed association between older age and shorter survival time has been attributed to an age-related increase in comorbidities.

Figure 1: Chest x-ray at the time of referral to UPMC

Figure 2: Chest x-ray after single left lung transplantation

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Frailty, or age-related susceptibility to stressors, is a biological syndrome characterized by decreased reserve across multiple physiologic systems. Fried et al. formally defined frailty as the presence of three or more of the following: unintentional weight loss, self-reported exhaustion, weakness, slow walking speed, and low physical activity (2). Sarcopenia, or loss of muscle mass, immune senescence, and a heightened inflammatory response define the physiologic changes of frailty. The low-grade chronic pro-inflammatory state associated with frailty, termed “inflammaging,” is a result of increase serum levels of proinflammatory cytokines and activation of both the innate and adaptive immune system. These increased circulating levels of proinflammatory mediators, such as IL-6, have been identified in frail patients and have been associated with disability, decreased muscle strength, and complications of lung transplantation including both acute and chronic rejection (3-5).

The frailty syndrome has been investigated as a preoperative risk stratification tool, and has also independently predicted the risk of death in both community-dwelling and hospitalized elderly adults. To date, the concept of frailty and its associated proinflammatory state have not yet been directly associated with chronic lung diseases and lung transplantation, but may underlie the increase risk of death in select lung transplant recipients. Our experience with lung transplant recipients over 65 years of age at UPMC has been positive, with outcomes similar to those of recipients less than 65 years of age. Our current practice is to consider lung transplantation to select elderly patients over the age of 65 who are robust and fit the general criteria of recipients less than 65 years of age. Overall, increased age alone should not be an absolute contraindication for consideration for lung transplantation, and further studies are needed to evaluate the association of clinical outcomes of frail patients with end-stage lung disease.

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