Multiple Nodular Opacities on Chest Radiograph After Lung Transplantation

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At the outpatient clinic, a 47-year-old woman was seen for routine follow-up after lung transplantation. The patient had received a right-sided lung transplant for primary pulmonary hypertension 2 years earlier. Her follow-up stated eight episodes of acute rejection, treated with high doses of corticosteroids. After the eighth episode, just over 6 months after transplantation, an open lung biopsy was performed, revealing obliterative bronchiolitis. It was then decided to replace azathioprine by mycophenolate mofetil, whereas treatment with cyclosporine and corticosteroids was continued. Apart from the rejection episodes, *Aspergillus fumigatus* was isolated from the respiratory tract on several occasions.

At the outpatient visit, the patient was well and did not have any complaints. However, a routine chest radiograph now showed multiple ill-defined nodular opacities (Fig 1). The patient was admitted to the hospital, and a CT scan of the chest was performed (Fig 2).

What is the diagnosis?

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**Figure 1.** *Left:* right-sided lung transplantation. Changes in upper field are due to obliterative bronchiolitis. *Right:* several vague round opacities have appeared in both lung fields.
Figure 2. High-resolution CT of the right (left) and left (right) lung, 4 days after the chest radiograph.
Diagnosis: Multiple rib fractures due to osteoporosis

A pulmonary nodule in a lung transplant recipient is often a cause for serious concern. The differential diagnosis consists of posttransplant lymphoproliferative disease, aspergillosis, or pulmonary abscesses mainly caused by Pseudomonas species or Staphylococcus aureus. End et al. reported on the Austrian experience with pulmonary nodules after lung transplantation. Of 64 patients, 8 patients developed one or more nodules. Infections were the most important cause, followed by posttransplant lymphoproliferative disease. Most of these patients (six of eight) were asymptomatic. In the patient described, metastatic disease was also considered. The CT scan, however, showed that the abnormalities were of extrapulmonary location (Fig 3).

Fractures and osteoporosis are common complications of organ transplantation. The etiology of osteoporosis after transplantation is undoubtedly multifactorial. Glucocorticosteroid therapy is a major risk factor, but also cyclosporine has been implicated in the pathogenesis of osteoporosis. The bone mineral density in patients awaiting transplantation is also obviously related to posttransplant osteoporosis, and is negatively influenced by inactivity, smoking, respiratory failure, malnutrition, and postmenopausal state. Many of these risk factors can be identified in patients referred for lung transplantation. The prevalence of osteoporosis after lung transplantation is not exactly known. Chaparro et al. reported on 11 patients with atraumatic fractures, out of 161 lung transplant recipients. In the series of Aris et al., osteoporosis resulted in 12 symptomatic fractures in 45 patients after lung transplantation. Furthermore, 73% of the lung transplant recipients were at risk, being below the fracture threshold as assessed by bone mineral density measurement. Combining the series of Chaparro et al. and Aris et al., the vertebral bodies were most commonly affected by fractures (8 of 23 patients), followed by the ribs (5 of 23 patients). As survival after lung transplantation still continues to improve, one can expect osteoporosis to be a major concern in the future. Preventive strategies and prompt recognition, even of atypical presentations as in our patient, are mandatory to reduce its incidence and serious consequences.

References

Figure 3. High-resolution CT in skeletal window: note rib fracture with callus formation.