Bronchiolitis Obliterans Organizing Pneumonia: A Late Complication of Stem Cell Transplantation

Susan L. Moore, RN, MSN, AOCN®

Improvements in antibiotic and antifungal therapy, immunosuppressive medications, and hematopoietic stem cell collection have made survival beyond 100 days common for patients undergoing allogeneic hematopoietic stem cell transplantation (HSCT). Because of longer disease-free survival, allogeneic HSCT recipients may encounter a wider variety of late or chronic complications, including chronic graft-versus-host disease (cGVHD), graft failure or marrow dysfunction, and pulmonary, integumentary, gastrointestinal, and ocular complications.

Pulmonary complications are a significant source of nonrelapse morbidity and mortality in early and late phases of stem cell transplantation. Common pulmonary problems after HSCT include cytomegalovirus (CMV) pneumonia, bacterial pneumonias, and toxicity from drug regimens. A specific pulmonary syndrome that requires early recognition is bronchiolitis obliterans organizing pneumonia (BOOP). "Organizing" refers to unresolved pneumonia in which the alveolar exudate persists and forms fibrous tissue in the alveoli. Patients with BOOP present with common and vague symptoms that can be associated with other pulmonary complications. Undiagnosed, it can progress to respiratory failure. However, initiation of appropriate treatment may result in almost complete recovery over time. This article describes BOOP, a late complication associated with allogeneic stem cell transplantation, and reviews its symptoms, diagnosis, and treatment. The role of community oncology nurses also is discussed.

**Key Words:** bronchiolitis obliterans organizing pneumonia, peripheral blood stem cell transplantation, steroids may represent the rejection of the lungs by transplanted stem cells (Afessa, Litzow, & Tefferi, 2001). Inflammatory cells, such as neutrophils, lymphocytes, and plasma cells, sometimes are seen at the center of intraluminal myxoid polyps (newly formed connective tissue that participates in remodeling and destruction of the interstitium) (Mohr, Bach, Tietjen, & Stover, 2002).

Several known causes of BOOP exist, and the most common is idiopathic (Epler, 2001). Other causes include infection, medications, and stem cell transplantation, which is the second most common cause. Many medications used with stem cell transplantation reportedly interact with radiation used as a conditioning regimen and potentially can increase damage to normal lung tissue. Figure 1 lists risk factors for BOOP related to allogeneic HSCT. Although no direct correlation between BOOP and cGVHD exists, blood chemistries performed on patients with respiratory symptoms show decreased immunoglobulin A and G antibody levels. This suggests that immunosuppression plays an important role in this condition (Buchsel, Leum, & Randolph, 1996).

**Etiology**

BOOP is an inflammatory lung disease that is characterized by the formation of granulation tissue plugs in the alveoli that can extend into the bronchioles. The association with cGVHD suggests that BOOP