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Case report

Spontaneous pneumomediastinum in a patient with bronchiolitis obliterans after bone marrow transplantation

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Summary:

After allogeneic bone marrow transplantation for chronic myelogenous leukemia, spontaneous pneumomediastinum and subcutaneous emphysema developed in a patient with bronchiolitis obliterans. Computed tomography scanning of the chest failed to reveal the cause. There was no evidence of a pulmonary process, pneumothorax, or pharyngeal or upper airway leak. Despite the alarming appearance of the patient, conservative management, including high-flow oxygen, resulted in resolution of the pneumomediastinum and subcutaneous emphysema. The cause of pneumomediastinum and subcutaneous emphysema in bone marrow transplant recipients is discussed.

Keywords: bone marrow transplantation; bronchiolitis obliterans; graft-versus-host disease; pneumomediastinum; subcutaneous emphysema

We report on a patient with chronic GVHD and bronchiolitis obliterans after BMT in whom spontaneous pneumomediastinum and subcutaneous emphysema developed without clear precipitating causes.

Case report

A 42-year-old man was diagnosed with chronic phase CML in May 1995. He received hydroxyurea (average dose 2.5 g/day) for 6 months and then interferon-α (10 million units/day subcutaneously) with suboptimal response.

Subsequently, BMT was performed from his HLA-matched brother. Conditioning included busulfan and cyclophosphamide. Cyclosporine and prednisone were used to prevent GVHD. The patient's post-transplantation course was complicated by acute GVHD of the skin, grade II overall, with good response to high-dose steroids.

Three months after transplantation, a nonproductive cough and shortness of breath developed. Pulmonary function tests showed severe airway obstruction: FEV_1 decreased to 1.61 l from 3.75 l before transplantation. Air trapping was suggested by an increased residual volume of 4.31 l (251% of predicted) and by an increased ratio of residual volume to total lung capacity. DLCO was normal. High-resolution computed tomography chest scans showed no air trapping or mosaic pattern in either lung. The diagnosis of obstructive lung disease secondary to post-transplantation bronchiolitis obliterans was made. The prednisone dose was increased and azathioprine added.

Twenty days later, the patient presented with acute shortness of breath and subcutaneous emphysema (Figure 1),

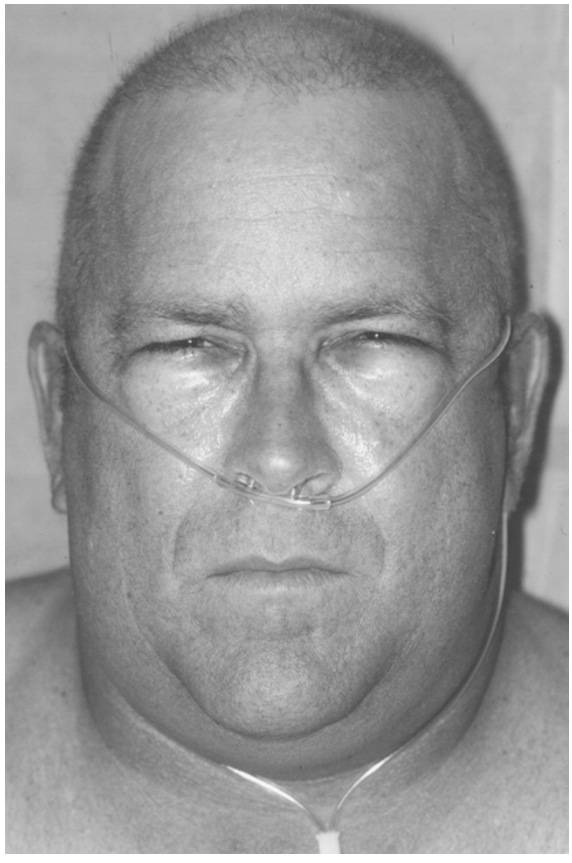

Figure 1 Subcutaneous emphysema extensively affecting the soft tissues of the head and neck.

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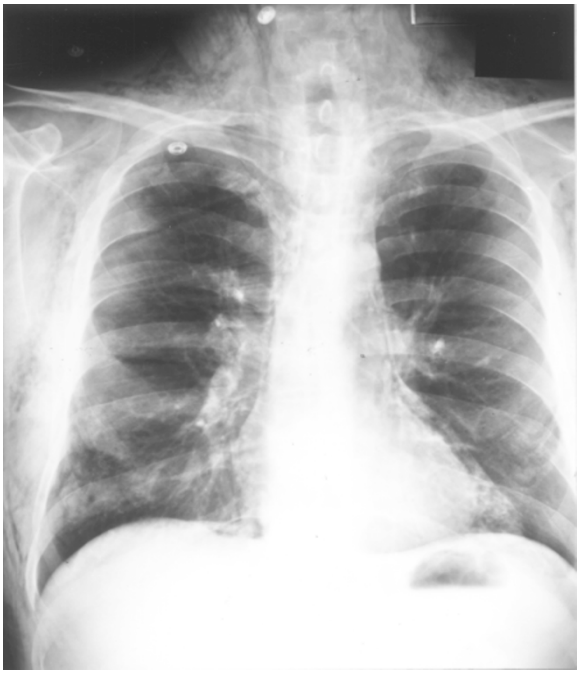

Figure 2 Chest radiograph demonstrates pneumomediastinum and significant subcutaneous emphysema. There is no evidence of pneumothorax.

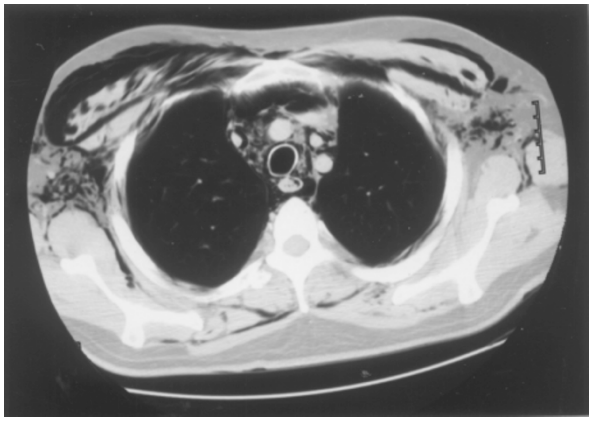

Figure 3 Computed tomography scan of the chest demonstrates a significant amount of air in the subcutaneous tissues and mediastinum.

confirmed on a chest radiograph (Figure 2). Arterial blood gas findings on room air were Po_2, 65 mm Hg; O_2 saturation, 91%; and PCO_2 and pH, normal. A computed tomography scan of the chest (Figure 3) showed significant pneumomediastinum and subcutaneous emphysema affecting the chest wall, neck, and face. There was no pneumothorax, and the lungs were clear. Otorhinolaryngologic examination did not detect any pharyngeal or upper airway leak.

The patient received high-flow oxygen ($FiO_2 > 0.6$) by face tent. Within 5 days, the subcutaneous emphysema resolved and arterial blood gas values normalized. However, at dismissal, the patient required supplemental oxygen for mild hypoxia during ambulation.

Discussion

Progressive obstructive pulmonary disease (occurring in up to 17% of patients without previous evidence of airway limitation) and bronchiolitis obliterans have been reported after allogeneic BMT.[1,2] The cause of obstructive airway disease and bronchiolitis obliterans in transplant recipients is unclear. Postulated causes include viral infection, autoimmunity, and damage to small airways.[2] Bronchiolitis obliterans is higher in BM transplant recipients with GVHD (6%) than in those without (0%).[2] The same applies for obstructive lung disease. GVHD and prolonged methotrexate treatment are risk factors.[3] Clinically, bronchiolitis obliterans and obstructive pulmonary airway disease (defined as $FEV_1/FVC < 70\%$ and $FEV_1 < 80\%$ of predicted value) are usually manifested symptomatically in the first year after transplantation.

Six cases of pneumomediastinum in allogeneic BM transplant recipients have been reported.[4] All patients received TBI for conditioning; five had bilateral pneumonitis with pneumothoraces. The sixth patient was systemically ill with jaundice and diarrhea, and blood cultures demonstrated CMV. Our patient had not received TBI, an indication that lung injury secondary to TBI is not a prerequisite for the development of pneumomediastinum.

Busulfan, part of the conditioning regimen in our patient, has been implicated in pulmonary damage, but not always in a dose-related manner. However, if busulfan caused the patient's pulmonary process, we would have expected restrictive rather than obstructive physiology. Similarly, hydroxyurea and interferon are unlikely to have had causative roles given the normal results of pulmonary function tests at the time of transplantation.

In conclusion, spontaneous pneumomediastinum and subcutaneous emphysema can complicate bronchiolitis obliterans after allogeneic BMT, even in the absence of pneumothorax or respiratory infection.

References

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