Respiratory Distress in a Patient With Multiple Myeloma

D.O., a 35-year-old female with refractory multiple myeloma, was admitted to the hospital with increasing muscle weakness. On day three of hospitalization, she started to experience mild, occasional wheezes and was started on 2.5 mg ipratropium via a handheld nebulizer every six hours as needed. A chest x-ray revealed some segmental atelectasis in D.O.’s left lower lobe.

The following day, D.O. called the nurse into her room and complained of an itching and irritated throat. On examination, the RN observed a continuous nonproductive cough, bilateral rhonchi with occasional wheezes, cold and clammy skin, and agitation; then, the patient complained that she could not breathe. The RN administered 4 L oxygen via nasal cannula and noted an oxygen saturation of 99% on pulse oximetry. The patient’s temperature was 98.8°F, her pulse was 96 and regular, respirations were 22, and her blood pressure was 116/88. A respiratory therapist initiated a breathing treatment with the administration of 0.5 mg ipratropium, and the medical doctor (MD) on call was notified. The MD ordered 1 mg lorazepam via IV push in preparation for intubation. The patient was placed on a semide, lorazepam, and 100% oxygen needed for itchiness. As a result, the patient’s respiratory status stabilized. The consulting pulmonologist suggested that this respiratory distress could be secondary to D.O.’s muscle weakness.

On day seven of hospitalization, D.O. experienced another episode of increasing respiratory distress. The RN notified the MD and the respiratory therapist, who administered two breathing treatments, 30 minutes apart, without relief. Upon the MD’s arrival, D.O.’s oxygen saturation was 96% on 15 L through a nonrebreather mask. Her vital signs were temperature 99°F, pulse 130, respirations 38, and blood pressure 116/88. A respiratory therapist was called, and the respiratory therapist, who administered a breathing treatment with the administration of 0.5 mg ipratropium, noted an oxygen saturation of 97% on decreased 5 L of oxygen. The etiology of this respiratory distress remained uncertain but the possibilities included anxiety or pulmonary emboli. The MD ordered a lung scan, bilateral lower extremity venous Doppler readings, and continuation of the furosemide and ipratropium that had been prescribed on the previous day.

The next day, D.O. once again experienced increasing respiratory distress, which was unrelied by administration of furosemide, lorazepam, and 100% oxygen through a nonrebreather mask. Her vital signs were pulse 140–160, respirations in the 30s and labored, and blood pressure 150/80. Her blood gases were pH 7.36, pCO2 55, pO2 120, HCO3 31.6, and 98% oxygen saturation. A respiratory treatment with ipratropium was administered. The primary MD transferred the patient to the intensive care unit and ordered a computed tomography (CT) of the chest.

The chest CT revealed near obstruction of the trachea about 2 cm below the vocal cords, as well as at the level of the carina, by plasmacytomas. One of the tumors occluded about 90% of the lumen of the trachea. Respiratory support was initiated consisting of bilevel positive airway pressure treatments with the goal of maintaining oxygen saturation greater than or equal to 93%. Dexamethasone was increased from 2 mg to 6 mg IV every eight hours. The patient’s chemotherapeutic agent, 300 mg oral thalidomide daily, was continued. D.O. quickly was placed on a bilevel positive airway pressure mask via rigid bronchoscopy. The patient was kept in the intensive care unit for an additional day for close observation of respiratory status. She remained stable with oxygen saturations more than 90% on room air and had a radiation consult four days post-surgery. Radiation to the tracheal area was planned.

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Clinical Problem Solving

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What should be assessed in patients with multiple myeloma?

S. Lim: Assessments on the original diagnosis of multiple myeloma should include the type of myeloma present: IgG, IgA, IgM, or IgD. The physician also should quantify the amount of immunoglobulin and order a bone marrow biopsy to determine the percent of marrow involvement. Kidney and liver function and electrolyte levels, particularly calcium, should be assessed. Patients with multiple myeloma may be anemic; therefore, a complete blood count also is indicated. Clinically, healthcare providers should determine whether patients have any specific bone pain that may be caused by an underlying lytic bony defect.

The solutions offered to the clinical problems posed in this column are the opinions of the authors and do not represent the opinions or recommendations of the Oncology Nursing Society (ONS), the Oncology Nursing Forum, or the editorial staff.
How does a diagnosis of multiple myeloma differ from that of plasmacytoma?

S. Lim: Multiple myeloma is a malignant proliferation of plasma cells, which normally produce antibodies. These malignant cells typically are distributed throughout the bone marrow. In the late stages of the disease, patients rarely have circulating plasma cells, which is referred to as plasma cell leukemia.

A plasmacytoma is a solid aggregation of the plasma cells. They develop into a mass of cells that form bands rather than residing in the bone marrow or blood. Typically, they are contiguous with bone but may form an extramedullary plasmacytoma not associated with bone.

Are patients with multiple myeloma at increased risk for developing plasmacytomas?

S. Lim: Yes. Having a malignancy of plasma cells, such as D.O.’s multiple myeloma, increases the chance that patients will develop plasmacytomas. D.O. originally was diagnosed with multiple myeloma of the bone marrow, and despite therapy for the bone marrow myeloma, she developed extramedullary plasmacytomas in the skin and oropharynx. Interestingly, patients with plasmacytomas also are at risk for developing systemic multiple myeloma. In this case, D.O.’s respiratory distress became a medical emergency.

What oncologic emergencies that also may precipitate respiratory distress and concomitant anxiety of some form should nurses be concerned about when caring for patients with myeloma?

L. Frausto: Four oncologic emergencies must be considered when managing patients with multiple myeloma. Although these emergencies do not directly affect the respiratory system, shortness of breath, anxiety, and symptoms like those that D.O. experienced can result from associated symptoms (e.g., altered mental status, pain) that may occur with an oncologic emergency.

Hyperviscosity of the blood is one possible associated symptom. Patients with myeloma can secrete a significant amount of immunoglobulins causing decreased blood flow. This may manifest itself as shortness of breath, a headache, and even evidence of ischemia. If hyperviscosity is suspected, serum viscosity can be measured and patients should be treated with aggressive IV fluid hydration and chemotherapy. Plasmapheresis may be considered.

Hypercalcemia, which patients with myeloma develop for various humoral factor reasons, is another possible symptom and can manifest as altered mental status, abdominal pain, or constipation. Therapy involves aggressive IV hydration and diuretic-induced diuresis. With the advent of the bisphosphonates (e.g., pamidronate, zoledronate), this is a relatively easy complication to treat.

The third potential symptom that may occur with an oncologic emergency is spinal cord compression. Patients may develop tumors in the spine causing compression on the spinal cord. Typically, patients complain of pain with or without neurologic symptoms (e.g., weakness or tingling of the lower or

Clinical Highlights: Extramedullary Plasmacytoma

Definition: Extramedullary plasmacytomas (EMPs) are rare primary tumors of plasma cell origin affecting soft tissue. They are composed of sheets of plasma cells of variable maturity that are histologically similar to multiple myeloma. Having a disease of plasma cells, such as multiple myeloma, increases the chance of developing a plasmacytoma.

Incidence: EMPs represent less than 10% of all plasma cell malignancies. About 80% occur in the head and neck region (Kakarlapudi, Lankachandra, & Sanford, 1999); however, they account for less than 1% of all head and neck malignancies (Sulzner, Amdur, & Weider, 1998). The development of an EMP in long-standing multiple myeloma is a rare event. EMPs are reported to have a strong male preponderance, with a male to female ratio of at least 2:1 (Ganjoo & Malpas, 1998). The median age at diagnosis is 59 years, but the condition may develop at any age.

Pathophysiology: These tumors are known to originate in a variety of anatomic sites; however, more than 90% have been reported to develop in the head and neck area (Poole & Marchetta, 1968). Most of the tumors that develop in the head and neck region arise in the upper respiratory passages, including the nasal fossa and the paranasal sinuses (Knowling, Harwood, & Bergsagel, 1983). Multiple cases of EMPs progressing to multiple myeloma have been reported in the literature; however, the converse very rarely is reported (Uppal & Harrison, 2001).

Clinical findings: Clinical presentation varies according to the site and organs involved. Because the most common sites include the head and neck area, patients may present with nasal drainage, epistaxis, nasal obstruction, sore throat, hoarseness, hemoptysis, and dyspnea. The most common presenting symptom is hoarseness with stridor; dysphagia is a late sign. Pain is uncommon unless secondary infection or bone erosion is present (Barat & Sciubba, 1984). Acute airway obstruction requiring intubation is necessary only in extremely rare cases and may represent hemorrhage within a tumor or a secondary bacterial infection (Gormley, Primrose, & Bharucha, 1985).

Differential diagnosis: May include any bacterial or fungal infectious process causing significant respiratory obstruction as a result of lymphadenopathy, pulmonary infection (e.g., viral pneumonia), community-acquired pneumonia, or pneumocystis resulting from chemotherapy and steroid treatment.

Treatment: EMPs are highly radiosensitive. The radiation field should include the regional lymph nodes because they frequently are involved at presentation or are the first site of progression (Bergsagel & Pruzanski, 1996). Surgery can be an effective treatment for small lesions or as a palliative procedure (Uppal & Harrison, 2001).


upper extremities). Diagnosis of this problem includes magnetic resonance imaging of the spine. If the spinal cord is compressed, then radiation therapy or nuclear medicine decompression with the administration of glucocorticosteroids, such as dexamethasone, must be started immediately.

**Fracture of weight-bearing bones** is the fourth possible symptom associated with an oncologic emergency. Patients with multiple myeloma can experience diffuse osteopenia along with lytic lesions. A skeletal survey or plain films of areas where patients complain of localized pain often detects these lesions. If a significant lesion is present, patients may need urgent irradiation or even orthopedic surgical consultation for internal fixation to prevent a crippling fracture.

**What nursing assessment parameters and interventions were of priority in D.O.’s case?**

*L. Frausto:* In D.O.’s case, the nurse was aware of the risk of acute respiratory distress syndrome (ARDS) and carried out a thorough physical assessment to assist in determining the etiologic factors that contributed to the patient’s sudden change in pulmonary status. In patients with cancer, ARDS most often is related to sepsis, aspiration, primary pneumonia, and pulmonary infection; patients with neutropenia are at greatest risk for an infectious cause (Kallenbach, 1998). Symptoms of ARDS include dyspnea, tachypnea, tachycardia, diminished breath sounds, and, as in D.O.’s case, anxiety (Kallenbach).

Immediate nursing interventions focus on respiratory monitoring and the physical examination. These interventions include maintaining a patent airway and astute evaluation of vital signs (increased respirations), integument (pallor and cyanosis), cardiopulmonary status (tachycardia and use of accessory muscles, peripheral edema), mental status (confusion and restlessness), and psychosocial changes (anxiety and fear) (McDermott, 2000). As with D.O., immediate nursing referral to the primary MD and a pulmonologist is a primary intervention if symptoms do not resolve. In addition to ARDS, differential diagnoses could include a change in respiratory status directly related to the malignancy (e.g., metastatic disease to the lung), indirectly related to the cancer (e.g., pneumonia, pulmonary emboli), or as a result of cancer treatment (e.g., chemotherapy-induced pulmonary toxicity) (McDermott). Ongoing nursing assessment, monitoring, and interventions should include respiratory support (e.g., lung sounds, cardiopulmonary evaluation), infection protection (e.g., neutropenic precautions), and anxiety reduction (e.g., deep breathing, relaxation, anxiolytics).

**References**
