A 32-year-old man was admitted to the hospital with progressive shortness of breath of 2 weeks' duration. He had received a diagnosis of bronchial asthma nearly 6 months earlier and was being treated with inhaled corticosteroids and bronchodilators.

During his most recent office visits, he had reported worsening dyspnea and wheezing despite aggressive treatment. He had also complained of hoarseness. There was no history of fever, chills, rigors, hemoptysis, or chest pain. He reported that he had lost about 20 lb over the past 4 months. He had never smoked or consumed alcohol and denied any allergies.

PHYSICAL EXAMINATION

The patient was in obvious distress: respiration rate was 28 breaths per minute, and he was using accessory muscles of respiration. He was afebrile. Heart rate was 98 beats per minute, and blood pressure was 110/80 mm Hg.

No clubbing, cyanosis, or hypertrophic osteoarthropathy was noted. Results of the cardiac, abdominal, and neurologic examinations were unremarkable. Auscultation of the chest revealed wheezing, which was more prominent on both hemithoraces.

LABORATORY AND IMAGING RESULTS

White blood cell count was 10,100/µL (polymorphonuclear leukocytes 70%, lymphocytes 20%, monocytes 5%, and
eosinophils 5%); hemoglobin level, 12.9 g/dL; and hematocrit, 34%. Measurement of blood gases on room air showed a pH of 7.44; PCO₂, 42 mm Hg; and PO₂, 65 mm Hg. Chest radiographs revealed a widened mediastinum.

Pulmonary function tests disclosed the following values: forced vital capacity (FVC), 86% of predicted; forced expiratory volume in the first second of expiration (FEV₁), 62% of predicted. FEV₁/FVC was 45, and there was no significant bronchodilator response. The diffusing capacity of lung for carbon monoxide was 72% of predicted. The spirometry flow-volume loop revealed limitations in the expiratory flow curve (Figure 1).

A CT scan of the thorax showed an anterior mediastinal mass surrounding and compressing the trachea (Figure 2). Results of a mediastinoscopic biopsy of the lesion were consistent with a non-Hodgkin lymphoma. 

OUTCOME OF THIS CASE

The patient had an anterior mediastinal mass caused by the lymphoma compressing the trachea, which presented initially as features of bronchial asthma. The patient underwent chemotherapy and radiation therapy, but progressive respiratory failure developed and he died of sepsis 3 weeks after admission.

DISCUSSION

The presence of wheezing and shortness of breath indirectly indicates obstruction to the airflow. A number of lesions that can cause complete or partial airflow obstruction in the large airways are listed in the Table. The clinical manifestations include intermittent wheezing that frequently is associated with episodes of stridor and severe spasms of coughing. Symptoms usually occur with exercise, when the airway diameter is reduced to about 8 mm.

Anterior mediastinal masses can compress the trachea resulting in wheezing. Common lesions in that region include thyroid tumors or goiter, germ cell tumors, lymphomas, and thymus enlargement.

Plain film tomography may reveal the widened mediastinum. CT scanning of the chest provides better diagnostic information and in addition to localizing the tumor may also provide information about associated lymphadenopathy.

The flow-volume loop may at times provide a clue to the diagnosis. The shape of the flow-volume loop, which includes inspiratory and expiratory flow-volume curves, can point to the cause of upper airway obstruction. Intrathoracic upper airway obstructions result in predominantly expiratory flow obstruction and can lead to an expiratory plateau in the flow-volume loop, as was seen in this patient (see Figure 1).

TAKE-HOME MESSAGE

Upper airway obstruction can produce asthma-like symptoms and should be kept in differential diagnosis of patients who present with uncontrolled wheezing. Simple bedside spirometry can provide a clue to the diagnosis.

Table – Causes of central airway obstruction

<table>
<thead>
<tr>
<th>Site</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larynx</td>
<td>Vocal cord palsy, epiglottitis, tumor, polyp, spasm</td>
</tr>
<tr>
<td>Extrinsic trachea</td>
<td>Mediastinal tumor, aortic aneurysm, goiter, hematoma</td>
</tr>
<tr>
<td>Intrinsic trachea</td>
<td>Stricture, tracheomalacia, endobronchial disease (lung cancer, metastasis)</td>
</tr>
</tbody>
</table>