A 57-year-old woman presented to her primary care physician with a 3-month history of worsening shortness of breath and a nonproductive cough. She was treated with a course of oral antibiotics, an expectorant, and a β-agonist metered-dose inhaler without improvement. She was hospitalized after developing left-sided chest pressure and intermittent wheezing. Her medical history was unremarkable. There was a 30 pack-year smoking history.

Physical examination revealed a temperature of 37.3°C orally and mild dyspnea with a respiratory rate of 28. Other vital signs were stable. There was an absence of breath sounds throughout the left lung field with dullness to percussion. Findings from the remainder of the examination were unremarkable.

An arterial blood gas analysis on room air showed a PaO₂ of 58.5, a pH of 7.50, and a PaCO₂ of 31.0. Results of hematologic, biochemical, and coagulation studies were within normal limits. An electrocardiogram was unremarkable. Chest radiograph (Fig 1) showed an opacified left lung with volume loss and a left mainstem bronchus cut-off sign. Computed tomography (CT) of the chest was performed (Fig 2).

During fiberoptic bronchoscopy, the left mainstem bronchus was found to be occluded by a firm, gray-green mass. Despite suctioning and the use of biopsy forceps, the mass could not be removed. Culture results from bronchial washings for bacteria, fungi, acid-fast bacteria, and Legionella were negative. Biopsy specimens of the mass and cytologic study of brushings and washings revealed squamous metaplasia with necrotic cellular debris. The patient was referred to thoracic surgery.
**Diagnosis: Bronchial cast of the left tracheobronchial tree (plastic bronchitis)**

A rigid bronchoscopy was performed. The bronchial cast could not be completely removed and the left lung could not be expanded. The left lung was believed to be destroyed, and a left pneumonectomy was performed.

Pathologically, a resilient bronchial cast extended into the distal left bronchial tree. When removed, no endobronchial lesion was seen. The lung itself was atelectatic, gray-blue, shrunken, and rubbery. Cystic and cylindrical bronchiectasis involved the entire left lung as seen on the CT (Fig 3). Microscopic sections revealed acute bronchitis and bronchiolitis. The cast itself was composed of mucus and desquamated bronchial epithelia admixed with polymorphonuclear cells and macrophages.

Plastic bronchitis, also known as fibrinous, pseudomembranous, or Hoffman's bronchitis, refers to a condition characterized by the presence of large branching bronchial casts. These casts are expectorated or found at bronchoscopy, autopsy, or surgical resection. Several other conditions are associated with the formation of bronchial casts and must be considered in the differential diagnosis. These include asthma, diphtheria, bronchitis, pneumonia, cystic fibrosis, tuberculosis, allergic bronchopulmonary aspergillosis, bronchocentric granulomatosis, and pulmonary hemorrhage.1-4

Mucoid impaction of the bronchi is probably a related condition, but it has several notable differences from plastic bronchitis.4 In mucoid impaction of the bronchi, the casts have a predilection for the upper lobes and tend to be located in segmental or second-order bronchi. These casts, which are usually 1 to 2 cm in width and 2 to 3 cm in length, have been reported as long as 6.6 cm. Radiographically they appear as smooth, oval, or elliptical masses. If adjacent bronchi are involved, a "cluster of grapes" may be formed. The impacted bronchi frequently make a V shape with the apex of the V toward the hilum. This type of cast formation has most frequently been described in asthmatics and those with allergic bronchopulmonary aspergillosis, but it has also been recognized in patients with chronic bronchitis and cystic fibrosis. In contrast, plastic bronchitis tends to affect the central airways and lower lobes.3 Most cases of plastic bronchitis are not associated with documented asthma and many are idiopathic.5 However, mucoid impaction and plastic bronchitis may have a similar pathogenesis as the composition of the casts seen in these two entities is indistinguishable.6

The clinical presentation of plastic bronchitis might include a history of wheezing, fever, cough, hemoptysis, cyanosis, chest pain, and previous episodes of expectorating cast-like material. Dyspnea can be severe, and death from asphyxiation has been described.7 The characteristic "bruit de drapeau," which is a coarse clicking sound produced by the vibration of a hard cast against the bronchial wall with respiration, is rarely heard.

The radiographic appearance will vary with the site and the extent of the cast formation. Atelectasis, infiltrate, abscess formation, or bronchiectasis can be seen distal to the site of obstruction. If portions of a cast are dislodged or expectorated, the remaining dilated bronchi may produce air bronchograms. In more severe instances, as in this case, a bronchial cut-off sign is seen with atelectasis of a lobe or entire lung, producing shift of the mediastinum.7

Casts vary in consistency from soft and friable to firm and rubbery, they may branch as many as seven times, and they have been mistaken for aspirated chicken meat. Microscopically, they are composed of laminated mucus, fibrin, inflammatory cells, and desquamated bronchial epithelium. Occasionally, eosinophils, Charcot-Leyden crystals, and Kuschmann's spirals are seen. Bronchial walls often show signs of chronic bronchitis.

Treatment for this entity should be individualized. Conditions such as foreign body aspiration in children and bronchogenic carcinoma in adults should be ruled out. Antibiotics for bacterial infection, hydration, chest physiotherapy, and postural drainage can be beneficial. Nebulized or bronchoscopically administered acetylcysteine may decrease the viscosity of secretions, improve mucociliary clearance, and hasten cast dissolution.1

Flexible bronchoscopy may not be effective in the removal of large resilient bronchial casts. They may be too soft to grab with forceps and too thick to suction or lavage.3,6 Rigid bronchoscopy is often required during which the casts are cut with forceps and removed piecemeal with suctioning. Multiple bronchoscopies are sometimes required, the proce-
dure can be quite tedious, and bronchiectasis may still not be prevented.\(^8\) Rarely surgery is necessary for diagnosis or for resection of residual postobstructive bronchiectasis or abscess.\(^1,9\) It should be noted that the formation of bronchial casts can be a recurrent problem for some patients.

REFERENCES

7. Woolley PB. Massive atelectasis due to fibrinous bronchitis. Thorax 1953; 8:301-02