

Airway collapse

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CASE

A 67-year-old man with severe COPD and chronic respiratory failure on 2 liters of oxygen per minute, hypertension, anxiety, a history of perforated diverticulitis s/p colostomy, and pulmonary nodules s/p bronchoscopy with biopsies consistent with infection has had multiple admissions for COPD exacerbations requiring corticosteroids and antibiotics. Patient was on triple therapy with tiotropium bromide and fluticasone propionate and salmeterol for the past 2 years. His pulmonary function tests included FEV1: 1.5 L (50% predicted), FVC: 3.38 L (82% predicted), FEV1/FVC: 42%, TLC: 6.83 L (103% predicted), RV: 3.21 L (142% predicted), and DLCO: 15.39 ml/min/mmHg (61% predicted). Computed tomography with pulmonary angiography revealed generalized emphysematous changes, a very thick esophageal wall, and tree and bud infiltrates. There was narrowing of the distal trachea and the right and left bronchi with bronchomalacia changes (Figures 1 and 2). The patient underwent dynamic bronchoscopy showing excessive tracheobronchial collapse. He was started on NIV therapy at night and secretion clearing therapy with inhaled saline, a flutter valve, and chest physiotherapy.

DISCUSSION

Tracheobronchomalacia (TBM) and excessive dynamic airway collapse (EDAC) are disorders in which the airway lumen gets compromised, resulting in exaggerated luminal narrowing during expiration.¹ Tracheobronchomalacia is defined as a condition in which the structural integrity of the cartilaginous wall of the trachea is lost; EDAC is characterized by excessive invagination of the posterior wall of the trachea

during exhalation.¹ These disorders are relatively common in patients with obstructive airway disorders and occur in up to 50% of patients with COPD.² Tracheobronchomalacia is associated with chronic airway inflammation, and EDAC is due to dynamic compressive forces during expiration.² In adults, TBM is commonly associated with underlying disorders, which result in sustained airway inflammation, such as COPD and asthma, prolonged intubation, the presence of tracheostomy tubes, inhalation of chemicals, like smoke and combustible fuels, aspiration of irritants, such as gastric acid or food, trauma, tracheal surgeries, malignancies, and congenital anomalies, such as Ehler-Danlos.^{1,2}

Bronchoscopy with airway examination is considered the gold standard to diagnose TBM and EDAC. Diagnosis may be suggested by symptoms but is confirmed by dynamic airway CT and dynamic flexible bronchoscopy. Both tests can determine the percentage of collapsibility.³ Treatment depends on the severity of symptoms, the degree and extent of airway collapse, and the etiology. Medical management should be used before additional therapeutic approaches, such as minimally invasive or open surgical procedures, are

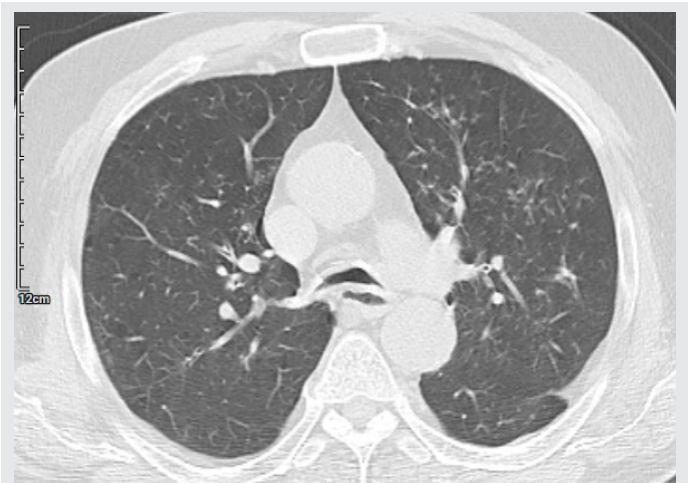


Figure 1. Computed tomography scan reveals significant narrowing of the distal trachea.

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Figure 2. Computed tomography reveals narrowing of both proximal main bronchi.

performed. Clinicians should optimize therapy for the underlying disease if possible, use airway clearance techniques, such as the use of oscillatory devices, external percussion vests, and mucolytics, and consider pulmonary rehabilitation.^{1–3} Non-invasive ventilation can be used to maintain airway patency during sleep, facilitate secretion drainage, and improve expiratory flow. Continuous positive airway pressure provides a pneumatic stent, decreases pulmonary resistance and improves expiratory airflow obstruction.³ It also reduces the elevated inspiratory transpulmonary pressures required to initiate airflow and decreases the work of breathing. If these approaches do not improve

the patient's symptoms, then airway stents or central airway stabilization surgery should be considered.^{2,3}

Keywords: tracheobronchomalacia, dynamic airway collapse

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