

## Images in Allergy

### Excessive Dynamic Airway Collapse Masquerading as Asthma

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Expiratory central airway collapse (ECAC) includes 2 different pathophysiologic entities, excessive dynamic airway collapse (EDAC) and tracheobronchomalacia (TBM). We present a chronic cough case with history of asthma that was diagnosed as EDAC by dynamic bronchoscopy and its improvement with stent trial.

A 71-year-old never-smoker man with past medical history mainly relevant for chronic rhinitis, gastroesophageal reflux, and chronic opioid therapy secondary to chronic back pain presented to clinic for frequent “acute bronchitis” and pneumonia episodes requiring prolonged intravenous antibiotics and systemic corticosteroids. His respiratory symptoms included persistent and productive cough with occasional wheezing. Pulmonary function test results were normal with no obstructive or restrictive pattern, and a normal diffusion capacity. FEV<sub>1</sub> was 2.36 L (83% of predicted), forced vital capacity was 3.21 L (86% of predicted), FEV<sub>1</sub>/forced vital capacity was 73.4 (96% of predicted), maximum vital capacity was 3.73 L (100% of predicted), and

forced expiratory flow at 25% to 75% of forced vital capacity was 1.71 (78% of predicted). Flow-volume loop was normal (Figure 1). No bronchodilator or methacholine challenges were performed. Laboratory workup was relevant for an absolute eosinophil count of 250 cells/ $\mu$ L and total IgE level of 575 kU/L. The patient had no significant improvement with high-dose inhaled corticosteroids/long-acting inhaled beta-agonists, long-acting inhaled anticholinergics, and omalizumab. Additional evaluation was performed in consideration of an alternative diagnosis. Chest computed tomography demonstrated some areas of mucous plugging over lower lobes with minimal bronchiectasis. Dynamic bronchoscopy revealed severe EDAC (>90% collapse) at the mid and distal trachea (Figure 2, A and B), left (Figure 2, D) and right main stem (Figure 2, C) bronchus, and bronchus intermedius. He underwent stent trial with uncovered self-expanding metallic stents (Figure 2, E and F) with subsequent improvement (Figure 2, E and F) of his Modified Medical Research Council dyspnea scale score by 1 point, his St

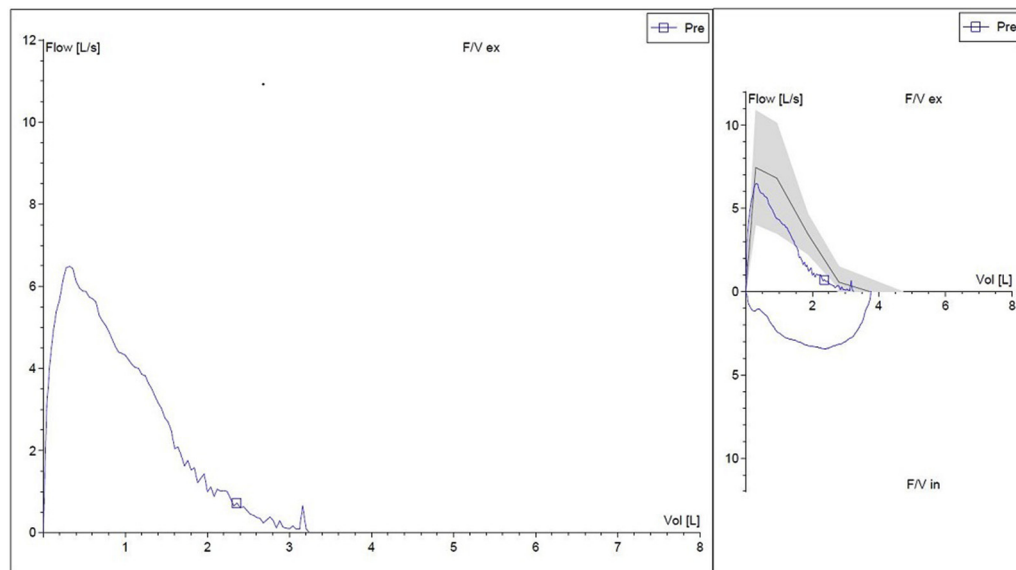


FIGURE 1. Flow-volume loop.

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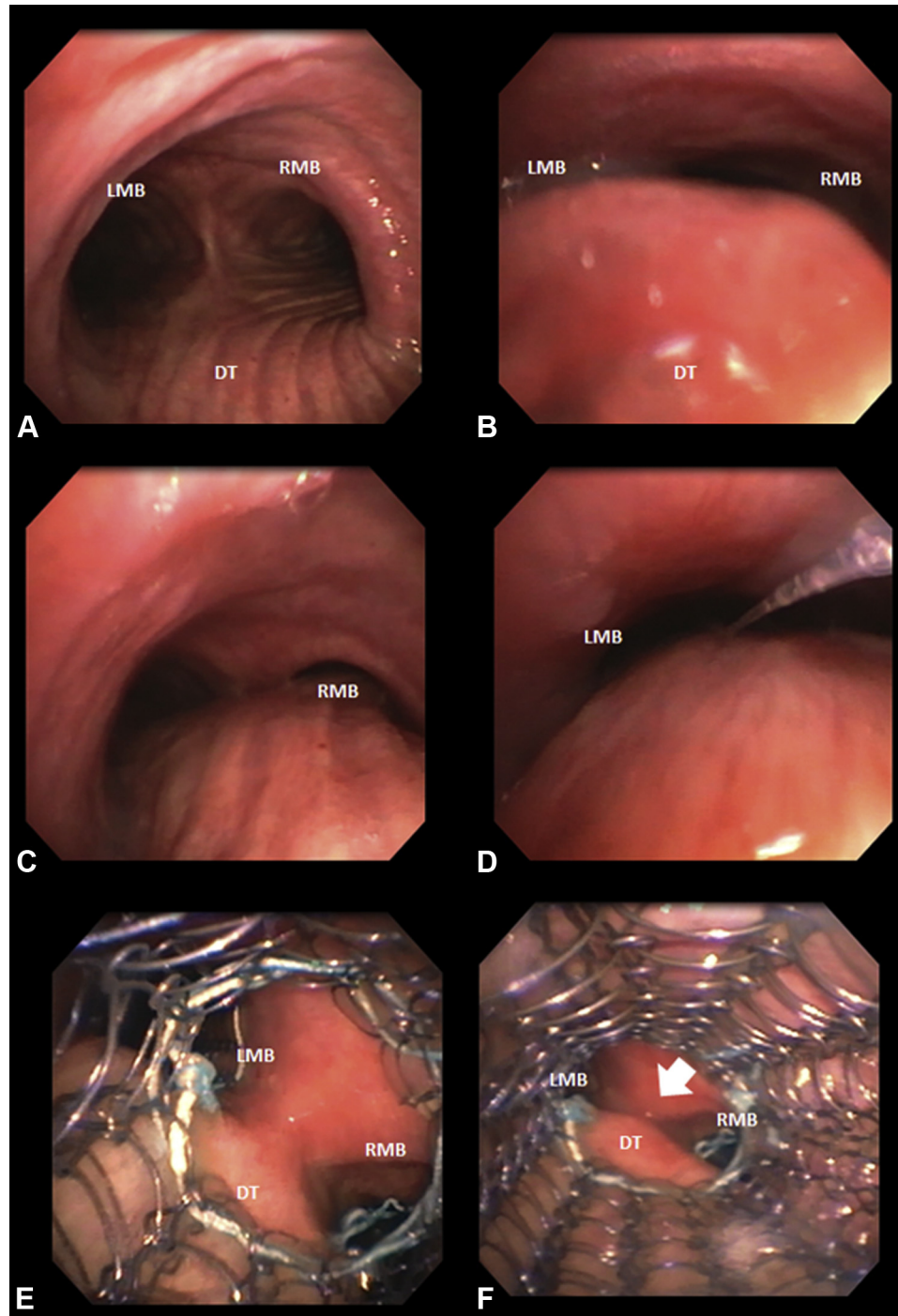


**FIGURE 2.** (A) Distal trachea (DT), left main bronchus (LMB), right main bronchus (RMB) on inspiration. (B) DT, LMB, and RMB, on forced expiration demonstrating severe EDAC. (C) RMB on forced expiration with severe EDAC. (D) LMB on forced expiration with severe EDAC. (E) DT, LMB, and RMB after stent placement on inspiration. (F) DT, LMB, and RMB after stent placement on expiration. Note the significant improvement and minimal posterior wall collapsed pointed by the arrow after the stent placement.

George's Respiratory Questionnaire score by 4 points, and Cough Specific Quality of Life Questionnaire score by more than 10 points. There are plans for tracheobronchoplasty; however, the patient was lost to follow-up.

This case emphasizes that EDAC should be considered in the differential diagnosis in chronic cough evaluations, especially in

patients with physician-diagnosed asthma who are not responding to standard medical therapy. Around 1 in every 3 patients with physician-diagnosed asthma does not have asthma after objective airway limitation testing.<sup>1</sup> Airway clearance physiotherapy is always implemented in patients with significant ECAC. All patients with severe ECAC should be considered for a

stent trial. It is important to highlight that stent trial is not an effective long-term solution for ECAC. Airway stents are removed after 7 to 10 days while new testing is performed to assess objective improvement in testing and symptoms that will justify surgical correction with a tracheobronchoplasty. The differentiation between EDAC and TBM may alter the surgical approach. EDAC refers to an excessive forward displacement of the posterior tracheal wall (membranous portion) due to weakness and atrophy of the longitudinal elastic fibers. The use of this term should only be meant to describe an abnormality in the posterior or membranous portion of the tracheobronchial tree. TBM is a term that should be used to describe an abnormality in the anterior/lateral (cartilaginous) portion of the tracheal wall.

Both terms are independent to the longitudinal extension of the disease and root more in their different pathophysiology.<sup>2</sup> The clinical presentation has a wide spectrum ranging from asymptomatic to severe life-limiting airway symptoms such as dyspnea, cough, and sputum retention. The actual prevalence in the general population is unknown.

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