Operative Techniques in Thoracic and Cardiovascular Surgery

Tracheal Surgery: Posterior Splinting Tracheoplasty for Tracheomalacia

Cameron D. Wright, MD[*,†]

Adult acquired tracheomalacia is an uncommon disorder that is more frequently diagnosed by CT imaging than by presenting associated symptoms. Common symptoms include dyspnea, constant coughing, inability to raise secretions and recurrent respiratory infections. The basic evaluation includes an inspiratory-expiratory chest CT (Dynamic CT), an awake functional bronchoscopy and pulmonary function studies. Patients with significant associated symptoms and severe collapse on CT and bronchoscopy are offered an operation. Tracheoplasty (or more commonly tracheobronchoplasty) is performed via a high right thorocotomy. The posterior airway is exposed after the azygous vein is ligated. The posterior wall of the trachea is reefed to a sheet of acellular dermis (or polypropylene mesh) with a series of 4 mattress sutures of 4-0 sutures from the thoracic inlet to the bottom of the trachea to re-shape the trachea and restore the normal D shape. Similar techniques are performed if the main bronchi are involved. Patients report generally good results with relief of their symptoms. Functional capacity is improved while pulmonary function tests usually are not.

Operative Techniques in Thoracic and Cardiovascular Surgery 20:31-45

KEYWORDS Tracheomalacia, Tracheoplasty, Tracheal Surgery

Introduction

Tracheomalacia (or more commonly tracheobronchomalacia) in adults is uncommon and is often an incidental finding on a chest computed tomographic (CT) done for another reason with mild to moderate airway collapse seen on an expiratory study. These patients just need reassurance. Severe airway collapse is rare and usually associated with symptoms such as dyspnea, incessant coughing, inability (or difficulty) raising secretions, and repeated chest infections.[1] These patients are often miserable, and it often takes them a long time to be diagnosed and referred, as many clinicians are not familiar with this uncommon disease. If patients are smokers and have associated chronic obstructive pulmonary disease, it can be very troublesome and difficult to sort out which disease is most important and whether to offer an operation. I tend to shy away from those with significant chronic obstructive pulmonary disease unless I am quite convinced that the tracheomalacia is very dominant. The evaluation process starts with a high-quality dynamic chest CT with inspiratory and expiratory views to determine the degree of tracheomalacia and whether it extends to the major bronchi (Figs. 1 and 2). If severe malacia is found, then an awake functional bronchoscopy is done to verify this and further assess the airway. All airways collapse with a strong cough, and that finding is not diagnostic of tracheomalacia. If the airway collapses during quiet breathing with exhalation, then more severe malacia is confirmed (Figs. 3 and 4). Sometimes coughing is incited by the opposition of the anterior and posterior walls of the airway. There are 2 anatomical forms of tracheomalacia, the classic soft or weak anterior tracheal cartilages (cartilaginous malacia) with a redundant posterior membranous wall (Fig. 1) (often with tracheobronchomegaly or Mounier-Kuhn syndrome) and excessive forward displacement of the membranous wall (membranous malacia) (Fig. 2). Pulmonary function tests are performed to document any other lung pathology and help assess the risk for thoracotomy. There is no specific finding on pulmonary function studies that is diagnostic of tracheomalacia. Some have advocated a trial of a silicone Y stent in an attempt to document whether symptoms and quality of life are improved with airway stenting as a diagnostic strategy to decide if tracheoplasty would be beneficial.[2] I have not found this particularly helpful, as several patients have not been able to tolerate a stent even for 1 day because of coughing and airway irritation. In general, I recommend an operation if severe symptoms match the imaging and bronchoscopic findings of severe expiratory collapse of the airway (Figs. 5-10).

*Division of Thoracic Surgery, Massachusetts General Hospital, Boston, MA.
†Harvard Medical School, Boston, MA.
Address reprint requests to Cameron D. Wright, MD, Division of Thoracic Surgery, Massachusetts General Hospital, Blake 1570, MGH, 55 Fruit St., Boston, MA 2114.

1522-2942/$-see front matter
http://dx.doi.org/10.1053/j.optechstcvs.2015.02.002

A

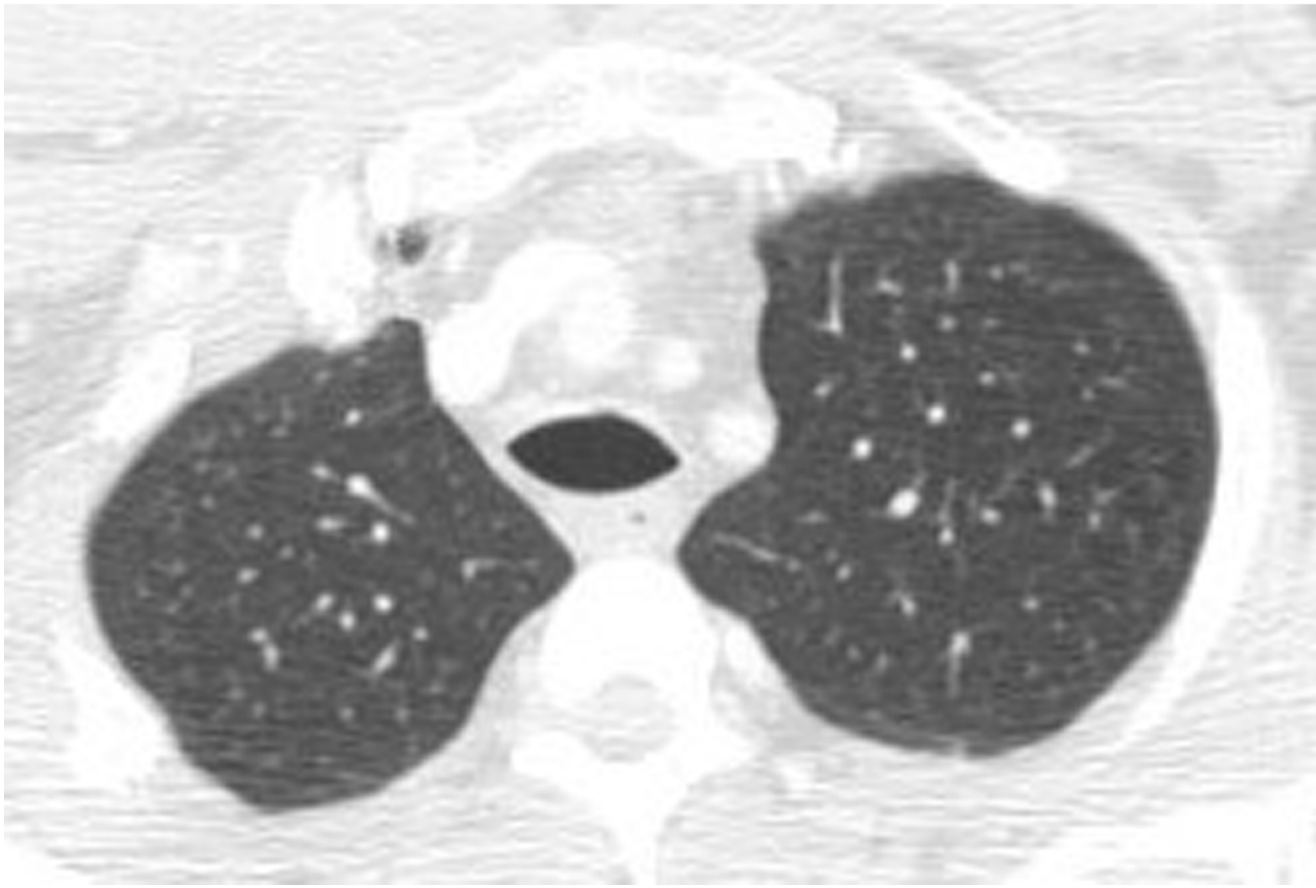

Figure 1 (A) Inspiratory CT scan from a patient with classic tracheomalacia with a soft widened anterior tracheal wall with a very wide posterior membranous wall.