# Tracheobronchomalacia: Does One Size Fit All?

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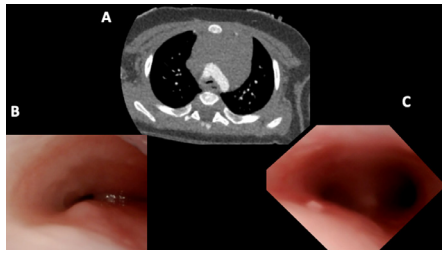
Tracheobronchomalacia (TBM) is a multifactorial and complex disease characterized by weakness of the airway that leads to increased susceptibility of the airway to collapse with changes in pressure.[1] It may be associated with inherent weakness of the airway cartilage or caused by cartilage softening due to prolonged compression from other structures. As such, it may occur alone, or be associated with other anomalies such as airway anomalies, esophageal defects, chromosomal defects, connective tissue disorders, congenital heart defects, and others.[2]

In this issue of the *Seminars*, Shieh et al describe the results of descending aortopexy and posterior tracheopexy for severe tracheomalacia and left mainstem bronchomalacia.[3] They hypothesize that among patients with severe TBM with posterior intrusion and left mainstem compression, performing both a descending aortopexy and posterior tracheopexy in addition to relieving airway compression when present can lead to effective resolution of symptoms. The operative approach was planned by a multidisciplinary team, after obtaining an endoscopic evaluation, and computed tomography imaging. Their study included 32 patients who underwent both descending aortopexy and posterior tracheopexy. In addition, 53% (17 patients) underwent other airway or vascular pexy procedures (left/right mainstem bronchopexy, innominate artery pexy, anterior tracheopexy, and anterior aortopexy). Additional surgical procedures were performed as needed and included vascular rings repair and cardiac repairs. The surgical approach varied between right/left thoracotomy, and median sternotomy. With a median clinical follow-up of only 3 months, the authors reported clinical improvement (including cough, barking cough, noisy breathing, prolonged and recurrent respiratory infections) and improvement in tracheomalacia scores based on standardized bronchoscopic evaluation developed by the authors. The authors should be congratulated for approaching a highly complex clinical problem in a systematic, comprehensive, and multidisciplinary way. They managed to demonstrate that such an approach can lead to improved immediate clinical outcomes.




Patient after vascular ring division with persistent compression and then decompression.

**Central Message**

The management of tracheobronchomalacia should be individualized to each particular patient and led by a multidisciplinary team.

It is clear that what Shieh et al and others call TBM, is a multifactorial entity that combines variable degrees of "true" TBM (cartilage weakness leading to dynamic airway collapse) and airway compression by external structures (such as a vascular ring or a midline descending thoracic aorta). As such, management of these patients has to be individualized in order to address the different components causing the problem in a particular patient (Fig. 1). An added difficulty in the decision process is the fact that TBM (defined as cartilage weakness) may be self-limiting in the majority of patients.[1]

The technique proposed by the authors[3] is welcomed as an important addition to the armamentarium available to treat these patients. The study also reinforces the utility of advanced imaging in the evaluation of these patients. However, we believe that the most important contribution of the study is the creation of a multidisciplinary team to assess patients with TBM and airway compression in a comprehensive way in order to define which particular treatment will be best suited for an individual patient. Ultimate treatment for these patients will likely include a combination of procedures such as pexy procedures, external stabilization, and splinting of the airway with various moldable and 3D-printed biomaterials,[4–6] relief of vascular compression of the airway (eg, division of vascular rings), and use of positive pressure. Some persistently symptomatic patients with complex compression of the airway by the descending aorta may even require more complex operations such as translocation of a midline descending thoracic aorta onto the ascending aorta below the carina.[7]

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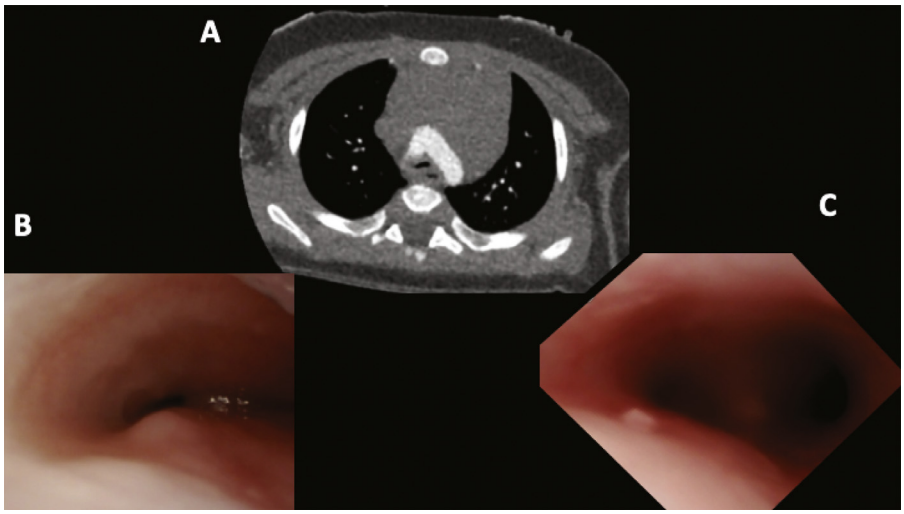


**Figure 1.** (A) Computed tomography of a patient after double-aortic-arch repair via left thoracotomy with residual airway compression resulting from an aortic stump and a posterior lying aorta. (B) Intraoperative bronchoscopy, with severe tracheal compression before subsequent repair. (C) Intraoperative bronchoscopy after aortic stump resection and anterior aortopexy via median sternotomy.

The selection of which one of these different treatments (or combination thereof) will benefit a particular patient is still unclear. Concluding that descending aortopexy and posterior tracheopexy should be used on every patient with TBM and/or airway compression would be a gross underestimation of the complexity of this disease. This technique is likely to be useful on selected patients with true TBM or those predicted to have significant cartilage weakness after relief of vascular compression. The obvious question is how to determine which patients will benefit from this (and other) interventions. The development of the TBM score by the group[3] is definitely a step on the right direction. Short-term studies like this, but most importantly, long-term follow-up of these patients, may be able to provide more answers in the future as to what to do with a particular patient with TBM and/or airway compression. After all, one size does not fit all.

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