External tracheal stenting for pediatric airway obstruction: A word of caution

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Central Message

Caution is warranted in PTFE external airway stenting for pediatric tracheobronchomalacia until a system for comparison of its outcomes with those of other treatment modalities has been developed.

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In this issue of the *Journal*, Ando and coauthors¹ have presented their experience with a modification of the polytetrafluoroethylene external airway stent for pediatric patients with tracheobronchomalacia (TBM). Their work adds to an increasing number of surgical procedures reported to address this disease. As the surgical therapy of TBM expands, a framework for the application of these therapies is needed to assess their clinical efficacy and to select the appropriate therapy for each patient. Baxter and Dunbar² defined the clinical condition of tracheomalacia in 1963. They described it as a weakness of the tracheal wall from softening of the supporting cartilage *or* hypotonia of the supporting myoelastic fibers. The description was perhaps prophetic in terms of our current understanding of tracheomalacia. That is, there are both static and dynamic components to tracheomalacia.³ Postmortem studies in patients with tracheomalacia have shown cartilage deformation to be a characteristic feature of tracheomalacia *and* protrusion of the posterior tracheal membrane into the airway lumen. That posterior protrusion has been termed *excessive dynamic airway collapse*.⁴

The technique described by Ando and coauthors¹ addresses both the static and dynamic pathologic components of TBM. The polytetrafluoroethylene external stent is applied to the cartilaginous *and* membranous components of the airway, but as 2 separate stents rather than sutured together. This modification seeks to optimize the growth potential of the airway. Although they found this approach to be effective in improving the airway diameter and reducing its collapsibility, it was associated with significant morbidity and mortality. The actuarial freedom from death or reoperation was 74.8% at 3 years, and the operative mortality reached 30% in patients who had a combination of tracheal and left bronchial stents.

Considering polytetrafluoroethylene external stenting in the context of other reported surgical therapies for TBM, 2 broad categories of surgical procedures are evident: *direct* and *indirect* tracheobronchial repairs. The indirect repairs

do not address the intrinsic pathology of the airway. Instead, they alter anatomic relationships that exacerbate symptoms through extrinsic compression. Aortopexy has been the mainstay of indirect repair. Its primary drawback, however, is that it does not address the dynamic component of the airway pathology. The mortality is as high as 6% in some series.⁵ Direct repairs, such as posterior tracheopexy, address the dynamic component of the airway pathology without dealing with the static component. Still other repairs, such as internal stenting with metal or silicone, are fraught with significant morbidity and significant mortality.⁶ Baird and colleagues³ from Boston Children's Hospital have proposed a grading scale to define the severity of TBM. Their scale may allow uniformity when assessing the extent and severity of disease and may provide a framework for the application of these techniques to each patient's pathology. It may also provide a basis for comparison of outcomes with each of these techniques. Ando and coworkers¹ have made an important contribution to the surgical treatment of TBM, but caution is warranted in the application of this technique until a system for comparison of its outcomes to other treatment modalities has been developed.

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