

Interventional Radiology Management of Tracheal and Bronchial Collapse

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KEYWORDS

- Tracheal collapse • Chondromalacia • Honking • Extraluminal prosthetic rings
- Tracheal stent • Fluoroscopy

KEY POINTS

- Tracheal and bronchial collapse are common causes of coughing and upper airway obstructions in small-breed dogs.
- Fluoroscopy provides dynamic noninvasive assessment of airway diameter changes during normal respiration and coughing to help confirm the diagnosis without general anesthesia.
- When medical management fails to control a patient's clinical signs and alleviate upper airway obstruction, tracheal stenting provides a minimally invasive rapid treatment to restore airway patency.
- Tracheal stent placement under fluoroscopy provides real-time dynamic feedback about stent positioning in the airway and degree of opening so that it can be reconstrained and repositioned if needed.

INTRODUCTION

Tracheal collapse is a common, frustrating disease process in small-breed dogs that results from progressive degeneration of the airway cartilages secondary to chondromalacia.^{1–6} Collapse of the airway cartilages and repeated luminal contact results in chronic inflammation, which precipitates further coughing, leading to worsened inflammation, and perpetuation of a vicious cycle of cough and inflammation. The persistent tracheal inflammation also causes loss of the columnated ciliary epithelial component of the mucociliary escalator, leading to squamous metaplasia. Loss of ciliary function also causes coughing to become the major mechanism of tracheo-bronchial clearance, adding to the vicious cycle of coughing and inflammation.^{1–4,6} Bronchomalacia is a similar change to the cartilages of the bronchi and bronchioles. It can occur as an isolated syndrome or in conjunction with tracheal collapse and can affect dogs of all sizes.^{7–10}

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Signalment, history, and physical examination findings can support a tentative diagnosis of tracheobronchial collapse, but localization of the disease along the trachea and lower airways requires targeted client questions and diagnostic imaging. Once the extent and severity of disease are understood, medical management should be implemented in all cases except those so severely affected that discharge without intervention is not possible. Tracheal stenting has become a popular, noninvasive method for treating tracheal collapse in dogs. Initial experience with tracheal stenting was met with significant complications, leading to it being branded a salvage procedure. Design enhancements, progress in sizing protocols, and improved patient selection criteria have increased the success of their use.

HISTORY, CLINICAL SIGNS, AND PHYSICAL EXAMINATION FINDINGS

A thorough history and physical examination are essential in all dogs presented for tracheal collapse evaluation, because many dogs have compromise of multiple locations in the upper airway, including the nasopharynx, larynx, trachea, and bronchi. In addition to a complete medical history, pointed questions directed to disease localization and severity are important to determine airway obstruction from lower airway and pulmonary parenchymal disease (**Box 1**).

Visual assessment of the patient breathing at rest, during respiratory noise and/or coughing, is needed to evaluate for the nature of the cough, prolongation of inspiratory or expiratory phase of respiration, increased respiratory effort, abdominal push on expiration, and herniation of the cranial lung lobes out of the thoracic inlet on expiration or during coughing episodes. Auditory assessment from a distance should assess for the nature of abnormal respiratory noises (honking, high pitched, wheezing moist, stertor, or stridor). The larynx, trachea, and entire thorax should be carefully auscultated with simultaneous observation of respiratory phase for air movement, fluid sounds in the large airways, wheezes, and crackles. The presence of an inducible cough on tracheal palpation is not pathognomonic for tracheal collapse because aggressive palpation can induce patients with normal tracheas to cough.

Box 1

Questions to help differentiate airway obstruction from lower airway and pulmonary parenchymal disease

1. Duration and progression of clinical signs
2. Past treatments administered and response to therapy
3. Nature of respiratory noise (honking, dry hacking cough, soft cough, moist/productive cough, expiratory wheezing, terminal retch, gagging)
4. How frequent are events and how long do they last
5. Does the pet appear to have respiratory difficulty or distress during or after an event
6. What are the triggers for a coughing or respiratory event
7. Is the pet able to sleep through the night without coughing
8. Does the pet snore or have signs of airway obstruction when sleeping
9. Is there a seasonal component to the respiratory events
10. What is the home environment like (is there smoking, air conditioning, air fresheners, and the like)

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