

“A Coughing Peanut”

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Introduction:

The following case report will talk about an important common disease and how to approach a typical case. Tracheal collapse is a common disease process of toy and miniature breed dogs^{5,8}. It is commonly characterized by a “goose honking” cough that can be elicited on palpation of the trachea^{5,8}. The exact process by which tracheal collapse occurs, is not fully known, but the resulting pathology of the disease process is similar across cases⁵.

This paper will look into the pathophysiology, diagnostics, and treatment of tracheal collapse as well as follow a patient, Peanut, who was seen by the Internal Medicine staff at Mississippi State University, College of Veterinary Medicine.

History and Presentation:

Peanut was a 13-year-9-month-old, male neutered miniature poodle who presented to MSU-CVM Emergency Services on June 22nd, 2020 for increased coughing, lethargy, and decreased appetite. Peanut had a history of chronic bronchitis and tracheal collapse. His owner had visited family in Florida, approximately 1 week prior. During this time, Peanut’s coughing increased dramatically. He was taken to an emergency clinic in Florida. Tests indicated that he had potential heart failure and oxygen responsive respiratory distress. However, Peanut was not hospitalized, and he was sent home with Clavamox. Peanut improved during the rest of his time in Florida, and his owner elected to forgo taking him to his primary care physician once he returned to Mississippi.

Peanut began coughing intensely again after returning to Mississippi. None of his previous medications seemed to improve his current situation. While at home in Mississippi,

Peanut was primarily indoors, only going outside to use the restroom. He had a history of allergies but was not being treated at that time.

Upon presentation, Peanut was bright, alert, and responsive. He weighed 5.5 kg with a body condition score of 5/9. He had a mildly elevated rectal temperature of 103.1 F°. His pulse (96 beats per minute) and respiration rate (28 breathes per minute) were within normal limits. That said, he did have significantly increased respiratory effort with harsh lung sounds, particularly on the right side. No crackles or wheezes were auscultated. His oral mucous membranes were pink with a capillary refill time of 1-2 seconds. He was ~5% dehydrated with a mild skin tent. A grade III/VI, systolic, right-sided murmur was auscultated. He had moderate dental disease on his upper and lower arcades. His abdomen was tense but non-painful on palpation with no masses or organomegaly felt. Femoral pulses were strong and synchronous bilaterally. He had multiple small, well-demarcated, subcutaneous masses. Palpable lymph nodes were smooth and symmetrical. He had suspected medial patellar luxation bilaterally.

Pathophysiology:

Tracheal collapse is a disease that most commonly affects toy and miniature breeds, as well as Pomeranians, Pugs, Yorkshire Terriers, and Chihuahuas⁵. Middle aged dogs are most commonly affected, but the disease is not limited to this age range^{5,8}. It is relatively rare in other breeds and species⁵.

The exact cause of this disease has not been identified^{5,8}. Speculation has been made about some of the potential reasons for this disease, congenital being thought most likely⁵. Regardless of the cause, the pathophysiology of the disease is similar in every case⁵. The trachea is weakened, allowing dorsoventral collapse. This narrowing of the trachea leads to the

pathopneumonic “goose honk” cough that can be heard when external pressure is applied to the trachea^{5,8}.

Common signs of tracheal collapse include exercise intolerance, respiratory distress, and gagging while eating^{1,5,8}. These signs typically wax and wane as tracheal collapse develops over a chronic period of time in most cases¹. Other signs have been reported but are not as common as the ones listed above.

Tracheal collapse is graded on a I-IV scale, with grade I being least amount of lumen and cartilage affected and grade IV having almost zero tracheal lumen and cartilage rings that lay flat on each other⁵. In order to properly grade tracheal collapse, a tracheobronchoscopy must be performed⁵.

Differential Diagnoses:

Tracheal collapse is often apparent on physical exam and with advanced imaging. Common concurrent diseases may include – chronic bronchitis, pneumonia, underlying heart disease, and others¹.

Diagnostic Approach and Treatment:

Peanut’s history of collapsing trachea was suspected as the cause of his clinical signs. Consideration for concurrent diseases (pneumonia, pulmonary hypertension, and heart failure) were investigated. Blood work was performed with no significant findings on the chemistry panel. The complete blood count (CBC) revealed elevations in the white blood cell count and plasma protein concentration. Thoracic radiographs were obtained to investigate possible further causes of Peanut’s respiratory signs. The caudal intrathoracic trachea, carina, and mainstem

bronchi were severely narrowed, and there was a mild unstructured interstitial pulmonary pattern and mild left atrial enlargement.

After reviewing Peanut's thoracic radiographs, he was prescribed hydrocodone, albuterol, dexamethasone-SP, furosemide, Clavamox, enrofloxacin, clopidogrel, sildenafil, and a rescue dose of butorphanol^{5,8}. A D-dimer was within normal reference range. An echocardiogram was performed, and the results confirmed that the mild unstructured interstitial pattern was not due to cardiogenic edema. He also had mild myxomatous mitral valve degeneration with mild left atrial enlargement. A 4Dx Snap test was negative.

Once all the diagnostics had been performed and the severity of Peanut's tracheal collapse was realized (grade IV/IV), the owner elected to have a tracheal stent placed. Peanut was anesthetized and pre-procedural radiographs were taken to determine the appropriate mesh implant to use. Once the size was confirmed, Peanut was moved to the fluoroscopy table. The stent was sterilely inserted into Peanut's trachea and an attempt to place the caudal end 1 cm in front of the carina was made⁷. The majority of the stent deployed without complication, but the cranial end would not release off the stylet. After multiple manipulations, a firm yank was applied to the stylet causing the release of the stent. This also cause the stent to move cranially, where it was deployed directly behind the cricocartilages. It was elected to leave the stent in place and see how Peanut responded post anesthetic recovery.

Peanut had an increased coughing duration and amount after the stent placement. After attempting to decrease his coughing with oxygen and medications for the night, it was decided that Peanut would need to have a new stent placed. The following day, Peanut's first stent was removed, and tracheal measurements were taken once more. The stenting procedure was

attempted a second time. There were no complications with that placement. Peanut recovered from anesthesia without any complications and had only a mild, intermittent cough.

Medical Management:

Tracheal collapse is irreversible, but there are multiple ways to treat the disease depending on severity of signs and symptoms. In cases of mild to moderate tracheal collapse, medical management is pursued first. Typical medical management will include weight loss, antitussives, sedatives, bronchodilators, and +/- antibiotics depending on circumstances⁵. If medical management fails, stent placement or a surgical alternative may be attempted.

Multiple surgical techniques have been attempted in the past with varying success. Chondrotomy and resection-and-anastomosis are not widely used anymore⁵. Extraluminal prosthetic devices have become more of the standard. Surgical correction is not recommended in circumstances of diffuse or intrathoracic collapse⁵. There has been a correlation between morbidity and the extent of the surgical area being incorporated⁵.

Tracheal stent placement is less invasive and, barring any complications, requires less anesthetic time for the patient⁵. The most common complication associated with stent placement is [migration of the stent](#) [chronic coughing, which can usually be managed with cough suppressants, although some coughing usually remains.](#) ~~This occurred during the deployment of Peanut's first stent.~~

Case Outcome:

Peanut would return a couple of weeks later because of multiple violent episodes of coughing. The owner believed that a lowered dose of hydrocodone was the cause for this increase in coughing. Radiographs were repeated and his stent had not shifted, and he had no

other significant changes since his stent placement. Peanut's hydrocodone dose was increased and he was sent home.

Peanut's most recent recheck on February 4th, 2021, confirmed that he is still doing well at home. His stent placement is still ideal and his myxomatous mitral valve disease and pulmonary hypertension appeared static.

References:

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