Tracheal Collapse in a Dog

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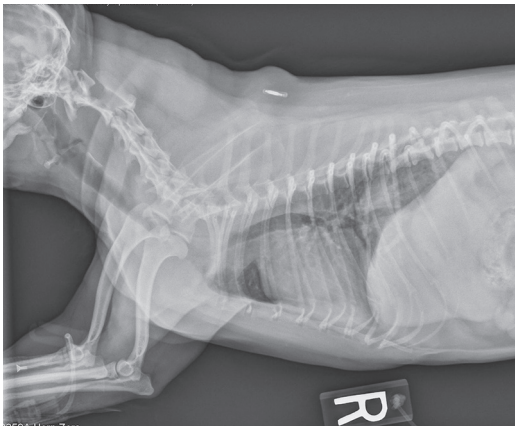
An 8-year-old neutered male Yorkshire terrier is presented for respiratory distress. The patient had been exhibiting a loud, progressive, honking cough for 18 months before presentation. The owners had attempted nebulization and coupage at home without improvement. Physical examination reveals a distressed patient with a respiratory rate of 60 breaths/min, loud upper airway stridor and stertor, and coughing. Temperature is 103.9°F (39.9°C), heart rate is 160 bpm, and mucous membranes are a muddy/cyanotic color. Oxygen is administered, and the patient improves enough for lateral radiography; radiographs reveal a grade III to IV tracheal collapse at the thoracic inlet and a mild interstitial pattern, most prominent in the caudodorsal region of the lungs (***Figure 1***).



▲ **FIGURE 1** Radiograph showing grade III to grade IV tracheal collapse and a mild interstitial pattern

Which of the following drugs would be appropriate for this patient?

Based on the information provided, how would you grade the following drugs and why?

RED = do not use YELLOW = proceed with caution GREEN = safe

Prednisone	RED	YELLOW	GREEN
Meloxicam	RED	YELLOW	GREEN
Doxycycline	RED	YELLOW	GREEN
Cephalexin	RED	YELLOW	GREEN
Hydrocodone	RED	YELLOW	GREEN
Theophylline	RED	YELLOW	GREEN
Butorphanol	RED	YELLOW	GREEN
Codeine	RED	YELLOW	GREEN
Dextromethorphan	RED	YELLOW	GREEN
Acepromazine	RED	YELLOW	GREEN

TURN THE PAGE TO COMPARE YOUR RESULTS

Did you answer?

The following represents the best responses based on drug metabolism, pharmacokinetics, species, diagnostic differentials, clinical and laboratory data, and other pertinent findings.

Prednisone

CORRECT RESPONSE 

Most dogs with tracheal collapse have inflammation and irritation of the tracheal mucosa, which occur with direct contact of opposing mucosal surfaces and can worsen in times of stress or excitement (ie, when respiratory rate, effort, and cough increase). Treating inflammation with glucocorticoids (eg, prednisone) is essential to help control cough, which can exacerbate the disease process. High doses may lead to muscle wasting, panting, and hepatomegaly, all of which may exacerbate clinical signs of tracheal collapse. Although it is ideal to wean prednisone over a period of days to months, some patients may require lifelong steroid therapy if underlying bronchial disease is present. Inhaled steroids (eg, fluticasone) may be an alternate therapy in select patients that can tolerate administration.[1]

Meloxicam

CORRECT RESPONSE 

Most dogs with tracheal collapse receive glucocorticoids on emergency presentation. Concurrent administration of NSAIDs (eg, meloxicam) is contraindicated because of high risk for GI ulceration or perforation. Other categories of sedatives and/or analgesia may be necessary in patients that require pain control; hydrocodone or butorphanol can control pain while also providing cough suppression and sedation.[1,2]

Doxycycline

CORRECT RESPONSE 

Poor mucociliary clearance of commensal organisms can lead to secondary bacterial tracheobronchitis. Patients with tracheal collapse or that have been exposed to groups of dogs (eg, at kennels, parks, daycare, boarding facilities) may have a higher risk for infectious tracheobronchitis (ie, kennel cough [*Bordetella bronchiseptica*]). Although simple tracheal bacterial infections can resolve without treatment in many normal dogs, dogs with tracheal collapse may require short-term use of antibiotics. Other first-line antibiotics may include potentiated sulfonamides or azithromycin; amoxicillin–clavulanic acid has variable distribution into bronchial secretions.[3,4] Antibiotics ideally should be chosen based on culture and susceptibility results.

Cephalexin

CORRECT RESPONSE 

Dogs with tracheal collapse may require intermittent short courses of antibiotics due to poor mucociliary clearance of commensal organisms. However, cephalosporins generally have insufficient coverage for organisms commonly associated with tracheal infection (eg, *B bronchispetica*, *Mycoplasma* spp), and cephalexin does not have sufficient penetration into the airways and bronchial secretions.[3-5] Thus, doxycycline or azithromycin may be more effective for these patients.

Hydrocodone

CORRECT RESPONSE 

Hydrocodone, a narcotic antitussive agent, is a standard therapy for tracheal collapse used to minimize recurrent episodes of coughing. Decreasing coughing can minimize recurrent tracheal inflammation that occurs with repeated mucosa–mucosa contact. Hydrocodone also provides a level of sedation and mild analgesia necessary for many patients.

Theophylline

CORRECT RESPONSE 

Although methylxanthine bronchodilators have no effect on the trachea, bronchodilation may be indicated in patients with evidence of concurrent bronchitis. Small airway dilation may decrease airway pressure in the trachea in sufficient amounts to decrease signs of tracheal collapse. In addition, the phosphodiesterase-mediated anti-inflammatory effects associated with theophylline may be helpful.[2] However, at high doses, theophylline can cause restlessness, tachyarrhythmias, vomiting, and/or seizures. Excess stimulation may increase the patient's tidal volume and exacerbate tracheal collapse. In addition, because theophylline inhibits cytochrome P450, it often has clinically significant drug interactions.

Butorphanol

CORRECT RESPONSE 

Butorphanol is an opioid antitussive agent often used as a first-line therapy in patients with tracheal collapse. It can be administered orally for chronic cough suppression or via injection for sedation in an acute crisis. Opioids have been associated with improvement of dyspnea (or the feeling of "air hunger") in humans[6,7] and can relax the patient, thereby decreasing airway pressure and possibly minimizing tracheal collapse. Careful monitoring is recommended when combining butorphanol with other sedatives.

Codeine

CORRECT RESPONSE 

Codeine is a narcotic antitussive that can be used as an alternative to hydrocodone in dogs that require either additional analgesia or additional cough suppression. Caution should be used when prescribing codeine, as many formulations are mixed with acetaminophen. Use of codeine with hydrocodone is not recommended and can cause excessive sedation.

Dogs with tracheal collapse may require intermittent short courses of antibiotics due to poor mucociliary clearance of commensal organisms.

Dextromethorphan

CORRECT RESPONSE

Although dextromethorphan is considered a non-narcotic cough suppressant,[1,2] it is less effective as compared with hydrocodone or butorphanol. Due in part to the drug's complex pharmacokinetics, it is uncommonly used to treat tracheal collapse; however, it may be considered in patients with poor response to or experiencing intolerable side effects from other antitussives.

Excessive sedation, along with other side effects (eg, hyperexcitability), may occur when dextromethorphan is combined with hydrocodone or codeine. Over-the-counter dextromethorphan may be formulated with other medications (eg, acetaminophen, codeine, pseudoephedrine, doxylamine, diphenhydramine) and thus should be prescribed as a single agent.

Acepromazine

CORRECT RESPONSE

Acepromazine, a phenothiazine tranquilizer, is a potent sedative available for either injection or oral administration. Although it can be used in patients with moderate-to-severe upper airway obstruction, such as tracheal collapse, acepromazine should be avoided in dogs with concurrent cardiac disease, as it can decrease cardiac output and lower blood pressure.

TRACHEAL STENTING

Patients that are severely affected, are refractory to medical management alone, or have life-threatening airway obstruction often benefit from placement of a self-expanding intraluminal tracheal stent (***Figure 2***). Most patients improve substantially, and survival rates are high; however, most patients require continued medical management.

▲ **FIGURE 2** Radiograph of a patient with tracheal collapse treated with a fully deployed intraluminal tracheal stent

See page 57 for references.

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Suggested Reading

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