CHRONIC COUGH IN THE DOG
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Chronic bronchial disease constitutes a significant, yet underdiagnosed, cause of both chronic cough, episodic as well as, acute-onset respiratory distress in the adult dog. Untreated, chronic bronchial disease is a debilitating, progressive respiratory syndrome that characteristically results in decreased exercise tolerance, inactivity, paroxysmal respiratory distress, airway collapse, and even death. With proper medical intervention, however, the prognosis for effective long-term management of chronic bronchial disease, even in severe cases, can be good.

DEFINITION
Chronic bronchial disease (CBD) is a general term used to describe a complex, progressive respiratory syndrome characterized by excessive mucous secretion in the bronchial tree and frequent coughing, persisting at least 2 consecutive months. This definition of chronic bronchitis implies that the coughing episodes occur exclusive of other bronchopulmonary disease, e.g., respiratory mycoses, neoplasia, and bacterial infection. In veterinary medicine, however, it is impossible to disregard the impact that secondary infections have on the progression and severity of clinical signs associated with chronic bronchial disease, particularly those associated with acquired bronchial and tracheal collapse.

The underlying pathology of chronic bronchial disease and acquired airway collapse develops over a period of at least several months, and probably several years. It is not until significant airway compromise occurs that the first evidence of respiratory disease, typically coughing, becomes apparent to the owner. What may appear to be an acute-onset problem is, in fact, the result of several months of subtle airway injury. It is critical that clients willing to treat a pet with chronic bronchial disease accept this premise along with the fact that treatment is aimed at control, not cure.

PHYSICAL FINDINGS
Chronic coughing is the hallmark clinical sign in dogs with bronchial disease. However, CBD can induce a severe, acute-onset paroxysmal coughing episodes for which the patient is subsequently presented in respiratory distress. Neither age nor sex seem to be predisposing factors to the development of CBD in companion animals. While the disease is most common in dogs over 5 years of age, young dogs are rarely affected. Among dogs, CBD is considerably more prevalent in small and toy breeds, particularly toy poodles, Pekingese, Yorkshire terriers, Chihuahuas, and Pomeranians. At least one author suggests an hereditary predisposition to CBD in dogs. It is perhaps more appropriate to consider these breeds at risk of developing severe clinical signs of bronchial disease, since CBD clearly occurs in mixed breed and large breed dogs as well as smaller breeds. Compromised tracheal integrity of toy dog breeds, possibly an inherited problem, may further complicate the clinical course of CBD in the older dog. Obesity is a common finding among small and toy dog breeds with CBD and should be regarded as an additional complicating factor in the clinical patient.

Detection of abnormal respiratory sounds during thoracic auscultation is not a reliable indicator of CBD. The ability to elicit coughing by simple manipulation of the cervical trachea is an inconsistent finding in dogs with CBD and an uncommon finding in affected cats. In both dogs and cats with significant bronchoconstriction, a subtle wheezing sound may be heard during expiration. Crackles, when present, can be attributed to the presence of fluid, usually viscous respiratory secretions, in constricted airways.

Dogs with chronic small airway disease are predisposed to bronchial and intrathoracic tracheal collapse. Therefore, during coughing episodes, it is oftentimes possible to auscult airway collapse. Toward the end of expiration, particularly during cough, airway collapse is evident during thoracic auscultation as a loud, discrete thump, referred to as an end-expiratory click or “snap.” The sound is generated as the main bronchi and intrathoracic trachea collapse abruptly. Tracheal collapse can culminate in respiratory distress and syncope in dogs during paroxysmal coughing episodes. It is possible for affected dogs to die subsequent to airway obstruction and respiratory arrest during an acute episode.
Laboratory Findings

Abnormal laboratory results are likely to be reported in animals with chronic bronchial disease, however, laboratory profiles are not diagnostic. Although eosinophilia is reported to occur in as many as 75% of the cats with feline asthma, chronic bronchial disease in dogs can neither be ruled in nor ruled out on the basis of absolute eosinophil count.

DIAGNOSTIC CONFIRMATION

Thoracic Radiography: In the early, nonobstructive stages of CBD, a generalized interstitial lung pattern is usually present, although bronchial changes predominate. Thickening of bronchial walls, indicated by the "doughnut" appearance of end-on bronchi, and "tram lines," the longitudinal shadows associated with thickened bronchi, can be seen. Bronchial calcification alone, commonly seen as a normal age-related change in old dogs, should not be interpreted as bronchitis.

As CBD progresses, there is a tendency for the main bronchi and intrathoracic trachea to collapse during expiration and particularly during the expiratory phase of cough. The prevalence and severity of tracheal collapse appears to be most severe in adult, miniature, and toy dog breeds. Although chondrodysplasia and trachealis muscle dysfunction have been implicated in the pathogenesis of tracheal collapse, the functional diameter of the small airways in dogs with chronic bronchitis is also an important cause of bronchial and tracheal collapse, particularly in older dogs.

Tracheal Aspiration and Culture: Cytology of specimens collected during tracheal aspiration may contain only mucous and normal respiratory epithelium in spite of the severity of the patient's clinical signs. Neutrophils, eosinophils, macrophages, lymphocytes, goblet cells, and even bacteria may be seen. However, in our hands, the diagnostic value of cytologic examination of tracheobronchial washings collected during tracheal aspiration or bronchoalveolar lavage is limited.

Bronchoscopic Exam: In the dog, direct visualization of the trachea and right and left main bronchi using a flexible endoscope is a valuable, although underutilized, diagnostic procedure. Compared to the lower airways of normal dogs, the primary and secondary bronchi appear to have an irregular contour, are mottled white and pink in color, and usually contain accumulations of thick mucous that cling to the bronchial walls and trachea. Oftentimes thin strands of tenacious mucous can be seen traversing the bronchial lumen.

MANAGEMENT OF CBD

The Acute Exacerbation: It is possible for dogs with CBD to present with respiratory distress, cyanosis, and syncope following a severe, acute-onset coughing episode. Affected dogs characteristically have complete bronchial and intrathoracic tracheal collapse. Oxygen administered by face mask should be administered immediately, and an intravenous catheter is placed in any available vein. Sedation with morphine (dogs only--0.5 mg/kg, SQ or IM) or diazepam (dogs @ 5 to 20 mg IV or cats @ 5 mg maximum, IV) is indicated in the conscious, anxious patient. The patient is given a single dose of prednisolone (1-2 mg/kg body weight, IV). It may be safer to actually anesthetize particularly anxious patients with an ultrashort-acting barbiturate, intubate, then administer oxygen through an endotracheal tube. When the patient has been stabilized, thoracic radiographs should be obtained as soon as possible to determine the integrity of the lungs and airways. Even in extreme cases, it has not been necessary to suction mucous from the airways. Restriction to airflow in comatose patients is attributable to airway collapse rather than mucous accumulation.

Management in Dogs. In the stabilized, nonacute dog with documented CBD, even when airway collapse is determined to involve both bronchi and the entire intrathoracic trachea, the client should understand that, although the prognosis is fair to good, the goals of treatment are control and long-term management, not cure.

Vaccination. The earliest and one of the most important measures that can be taken to prevent the consequences of CBD in dogs is to diminish susceptibility to the principle agents of infectious tracheobronchitis, *Bordetella bronchiseptica* and parainfluenza virus. Although the precise role these organisms play in the pathogenesis of chronic bronchitis is not known, they can be significant
complicating factors once clinical signs develop. Parenteral vaccination is recommended, particularly the
miniature and toy breeds known to be at risk of developing CBD. (NOTE: Intranasal vaccines may be
associated with development of clinical signs associated with replication of attenuated bacteria and virus)

**Corticosteroids.** Both dogs and cats with CBD derive significant benefit from the short-term
administration of anti-inflammatory doses of corticosteroids. This is true in patients with acute and
chronic disease. Even when evidence of tracheobronchial collapse and/or pneumonia exists, short-term
corticosteroids (up to 7 days) have an important role in managing the affected patient. Oral prednisolone
is given at doses ranging from 0.2 to 0.5 mg/kg, twice daily in both dogs and cats. Once stable, most
dogs can be effectively managed with a single dose given on alternate days.

**Antimicrobials.** Opportunistic infections of normal respiratory flora can become life-threatening in
dogs with significantly compromised respiratory defense mechanisms, particularly tracheobronchial
collapse and diminished mucociliary transport. The role of *B. bronchiseptica* as a complicating factor in
the pathogenesis of CBD must not be underestimated. When in vitro culture and sensitivity results are
not immediately available, the clinician is justified in prescribing antimicrobial. In fact, antimicrobial
therapy is likely to be the single most important factor in the effective management of CBD in dogs.

As a guideline, enrofloxacin is prescribed for 14 to 21 days (2.5 mg/kg, twice daily) for patients with
CBD. Following treatment with a fluorinated quinoline, it is not uncommon for the patient's clinical signs
to resolve for several weeks or months followed by a gradual redevelopment of cough. In this case, the
treatment regimen with enrofloxacin can be repeated with similar results expected. Enrofloxacin is very
well-distributed to the lungs and, as such, can be used as a first line antimicrobial in managing chronic
bronchitis.

**Bronchodilators.** The methylxanthine bronchodilators, theophylline and aminophylline (theophylline
ethylenediamine), are the preferred products for long-term management in dogs. Even patients with
advanced airway collapse will benefit from bronchodilators.

**Antitussives.** Cough suppressant therapy has limited value as a first-line drug in the management of
CBD. Over-the-counter products (e.g., dextromethorphan) are simply not effective. Narcotic cough
suppressants such as hydrocodone are frequently prescribed for use in dogs. Clearly these agents
should not be used alone in the management of CBD.

**Aerosol Therapy.** The greatest benefits to aerosol therapy are derived in patients with acute onset
signs, an excessive accumulation of bronchial and tracheal secretions, and those with secondary bronchial infections, particularly *B. bronchiseptica*.

**FURTHER READING**

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