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DIAGNOSTIC IMAGING IN THE COUGHING CAT

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INTRODUCTION

Coughing in cats may be less common in dogs, but still is an important disease and sometimes a diagnostic challenge. In the cat, the list of possible etiologies of coughing can be divided into the following entities: infectious, allergic, traumatic/toxic, neoplastic and in rare cases, cardiogenic. The cause of cough can be located in the upper as well as in the lower respiratory tract. A thorough workup of the patient history and a good clinical examination are essential to plan the optimal diagnostic imaging procedure.

Cats with cardiac disease often present with dyspnea; however, coughing rarely and only occurs with severe secondary lung disease.

Also in cats the question: “How much radiographic alteration “is still normal?” can be asked. There are only few age related changes in the cat. Mineralization of the bronchial skeleton and the lung parenchyma is often seen in the aging dog but rarely in the cat. A well structured interstitial fishbone appearance of the lungs can be interpreted as mild fibrosis of the lungs in old cats. In cases of obesity, a generalized increase of thoracic opacity (interstitial pattern) can be seen.

In the clinical workup of coughing, radiography is still the modality of first choice. Radiography is efficient, sensitive, widely available, relatively easy to perform and well tolerated, as most often sedation or anesthesia is not necessary. It has to be mentioned that in several countries personnel are not permitted to stay in the radiology suite during exposure. This implies the use of sedatives. Depending on the drug, changes of the cardiovascular structures can be induced and have to be considered reading the films.

Additional modalities such as Ultrasound, Computed Tomography (CT) and/or Magnetic Resonance Tomography (MRT) are usually of second choice for further evaluation of the pathology if needed.

TECHNIQUES IN RADIOGRAPHY

The technical aspects described for dogs can also be applied to the cat. The choice of projections is similar to the ones chosen for dogs. However, the differences between VD- and DV-projections of the feline thorax are not as obvious in cats.

UPPER AIRWAYS AND MEDIASTINAL STRUCTURES

The cardinal sign of laryngeal and pharyngeal diseases is retching. In many cases of inflammatory causes, a definitive radiographic diagnosis is not possible. Space occupying lesions can be depicted and secondary signs of trauma can be recognized. Tracheal tear can be seen in cases of trauma such as high-rise injuries. In cats foreign bodies are rather rare but have to be excluded too.

A granulomatous tracheitis, which produces a marked narrowing of the tracheal lumen, usually causes dyspnea rather than cough in the animals. Tracheal collapse, often seen in dogs, is a rather rare entity in cats.

Oropharyngeal dysphagia and esophageal motility disorders, which are associated with megaesophagus, present relevant risk factors for the development of aspiration pneumonia also in cats.

As mentioned above, cough is not a cardinal sign of cardiac disease in cats. The distribution of the edematous changes differs from dogs and is more generalized, most often affecting the accessory lobe the most. Pleural effusion is common in cases of cardiac decompensation, in particular with left heart failure in the cat.

THE LUNGS

Mineralization of the bronchial walls leads to an increase of radiopacity of them without signs of thickening. In cats this is rarely seen with advancing age. In cats multifocal mineralization of the peribronchial glands can be seen as sign of chronic bronchial or pulmonary disease. Real thickening of the bronchial walls leading to “doughnuts” and “tramlines” is a sign of chronic bronchial inflammation. Thickening of the peribronchial tissues (bronchial cuffing) due to edema or inflammation can mimic bronchial wall thickening but belongs to another list of differentials (bronchopneumonia, cardiogenic edema, lymphangiectasia or allergic reactions).

Also in cats, chronic bronchitis is an exclusion diagnosis with thickened bronchial walls and their increased visibility in the lung periphery being a reliable sign of chronic bronchitis. In cases of acute bronchitis the thoracic study may be inconspicuous or resemble chronic cases. In cats, lower airway disease can lead to a reversible obstruction of the airways with subsequent overdistention/overinflation of the lung. The obstruction is caused by a combination of bronchiolar constriction, bronchial wall edema and hypertrophy of the submucosal glandular tissue. The classic appearance may contain peribronchial cuffing. In some cases only overdistention of the lung field is visible. Also a mixed pattern may be seen. In areas where larger bronchi are obstructed alveolar pattern may be recognized with consolidation and following atelectasis. In cases of extensive mucus production a nodular pattern can be seen. In cats the right middle lung lobe is most prone to collapse in cases of lower airway obstruction. Allergic disease most often presents with a bronchial pattern with or without bronchiectasia. In severe cases alveolar consolidation may be present.

Bacterial infection often follows primary lung disease such as hemorrhage, viral infection or chronic bronchitis with superinfection. In high-rise trauma, where pulmonary contusion is present, this complication has to be considered. In cats two different projections are most often sufficient to visualize all parts of the lung field. The most common radiographic sign is an

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alveolar pattern affecting an entire lobe or just its tips ventrally. The most often affected areas are the cranioventral parts of the lung, cranial lobes and the right middle lobe being overrepresented. An asymmetric distribution is also possible. In cats those superinfections are not as common as in dogs; coughing may be absent. In cats the distribution is similar although just a bronchial pattern may be detected. Pasteurella tends to form abscesses.

Another form is aspiration pneumonia being initiated by the inhalation of larger particles or fluids. Stomach content may lead to chemical irritation and then can lead to edema and bronchial obstructions. A subsequent bacterial infection then leads to lobar pneumonia.

The appearance and the distribution of parasitic pneumonia depend on the type of parasite and the severity or degree of infestation. Very often radiography does not reveal any significant changes. Severe bronchial to alveolar patterns are possible. Neoplasia of the bronchial walls is rare in cats too. The most common tumor type is bronchial wall carcinoma. Also in neoplasia the radiographic appearance may be manifold (solitary nodules, military to alveolar consolidation) although in cats carcinomas have the tendency to develop cavities. Their center may mineralize in the course of the disease.

Recently more emphasis has been given to the distribution and appearance of lesions than to the type of pattern. Lobar disease with increased or decreased volume has been addressed. Multifocal has been opposed to focal distribution. In cases of alveolar opacification ventral distribution has been opposed to caudodorsal and has been shown to stratify pneumonia from non-cardiogenic lung edema in dogs.

ADDITIONAL DIAGNOSTIC IMAGING

See manuscript on diagnostic imaging in the coughing dog.

LITERATURE