Short Communications

Further characterisation of the clinical features of chronic pulmonary disease in West Highland white terriers

B. M. Corcoran, L. G. King, T. Schwarz, G. Hammond, M. Sullivan

A CHRONIC respiratory illness, typified by inspiratory crackles and an increased interstitial pattern on thoracic radiography, has been recognised to be particularly prevalent in West Highland white terriers (WHWTs) (Corcoran and others 1999a, b, Lobetti and others 2001, Webb and Armstrong 2002). It has been suggested that this condition may be analogous to idiopathic pulmonary fibrosis (IPF) in human beings, but there is currently no pathological proof to support this assertion. Nevertheless, this clinical presentation is commonly recognised in veterinary practice and the clinical features of the disease have been previously reported, but only in retrospective studies (Corcoran and others 1999a, b, Lobetti and others 2001, Webb and Armstrong 2002). The purpose of the present study was to use a prospective cross-sectional approach to better define and improve the clinical description of this group of WHWTs. For the purpose of this report the term chronic pulmonary disease (CPD) will be used.

Cases of suspected CPD were recruited at the universities of Glasgow, Edinburgh and Pennsylvania veterinary schools over a three-year period. For inclusion in the study, dogs had to have clinical evidence of chronic progressive respiratory disease, readily detectable crackles on thoracic auscultation and no evidence of significant cardiac disease. The minimum information required included clinical history, physical examination, haematology and biochemistry profiles, and thoracic radiography, high-resolution CT (HRCT), bronchoscopy and bronchoalveolar lavage with cytological analysis, under general anaesthesia. Bronchoscopic evaluation was predominantly used to assess for evidence of chronic bronchitis and dynamic airway collapse (Fig 1).

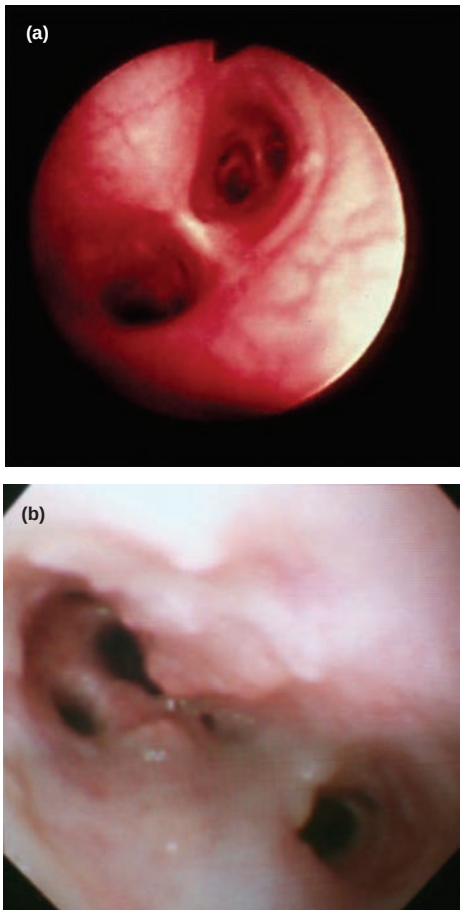

FIG 1: Bronchoscopic images at the level of the carina, illustrating differences in mucosal appearance between (a) a dog with interstitial disease (as determined by radiography and high-resolution CT) and (b) a dog with combined chronic bronchitis and interstitial disease. Both dogs presented with similar clinical signs. The appearance of the mucosa in the interstitial disease case is normal, with partial expiratory collapse of the airways. In contrast, the chronic bronchitis and interstitial disease case shows severe mucosal changes with roughening and blanching of the mucosa, loss of visible mucosal vascularity and excessive secretions. There is also some suggestion of partial expiratory dynamic collapse and bronchiectasis

Twenty-two dogs (12 male [four neutered] and 10 female [all neutered]) were identified (mean age 10.9 years, range 6 to 14 years). Thirteen of the dogs presented with coughing as the primary complaint, seven with dyspnoea and two with exercise intolerance. The duration of clinical signs before recruitment ranged from two to 36 months (mean 9.54 months). Twelve cases demonstrated all three clinical signs at some point, but six of the seven dyspnoeic dogs did not cough. At the time of presentation, all dogs were reported by the owners to be bright and alert, apart from one that was slightly subdued. Cardiovascular parameters were within normal limits, although one dog was reported to have had cyanosis at rest and one dog had a 2/6 left heart base murmur. Respiratory rate ranged from 30 to 100 breaths/minute (mean 47 breaths/minute). Auscultation identified varying degrees of inspiratory crackles and was graded as mild localised in nine dogs, moderate generalised in eight dogs, severe generalised in four dogs and normal in one dog.

Haematology and biochemistry profiles identified few abnormalities of diagnostic importance. Raised serum alkaline phosphatase (SAP) levels were present in 17 dogs and the six dogs with the highest SAP (1004 to 3953 U/l) had all been treated with prednisolone. On bronchoscopy, tracheal collapse was noted in 15 dogs, but was severe in only one case. Six dogs had normal bronchial mucosa, eight had mild mucosal changes, three had moderate changes and five had severe changes consistent with chronic bron-

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B. M. Corcoran, MVB, PhD, MRCVS, **T. Schwarz,** MA, DrMedVet, DVR, DipECVDI, DACVR, MRCVS, **G. Hammond,** MA, VetMB, MVM, DipEVCDI, MRCVS, Hospital for Small Animals, Royal (Dick) School of Veterinary Studies, University of Edinburgh, Easter Bush, Midlothian EH25 9RG **L. G. King,** MVB, DACVECC, DACVIM (SAIM), DECVIM-CA, Department of Clinical Studies, School of Veterinary Medicine, University of Pennsylvania, 3900 Delancey Street, Philadelphia, PA 19104, USA **M. Sullivan,** BVM&S, PhD, DVR, DipECVDI, MRCVS, Small Animal Hospital, Faculty of Veterinary Medicine, University of Glasgow, Bearsden Road, Glasgow G61 1QH

Mr Hammond's present address is Small Animal Hospital, Faculty of Veterinary Medicine, University of Glasgow, Bearsden Road, Glasgow G61 1QH

E-mail for correspondence: brendan.corcoran@ed.ac.uk

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chial pathology. Expiratory dynamic airway collapse was noted in four dogs, involving lobar bronchi only. Bronchoalveolar lavage cellularity was assessed in 21 dogs. Cellularity was low in five dogs, moderate in 15 and high in one, and typically neutrophils and macrophages predominated. Low cellularity was consistent with normal bronchoscopic findings. Moderate cellularity did not have any relationship with the severity of bronchoscopic changes, while the one dog with high cellularity had severe bronchoscopic changes. Radiographic abnormalities were detected in 21 of the 22 dogs. A generalised, diffuse interstitial lung pattern was reported in 14 dogs, and this was the only change in 10 of the dogs. The remaining seven dogs had a predominantly bronchial pattern. A radiographic diagnosis of interstitial disease alone was made in 10 cases, chronic bronchial disease alone in one case, and combined chronic bronchial and interstitial disease in 10 cases; five of the latter group had mild interstitial changes. HRCT changes included ground glass appearance, peribronchovascular interstitial changes, bronchial wall thickening, parenchymal bands, subpleural thickening, and the interface sign, honeycombing and traction bronchiectasis. Representative examples of HRCT changes are shown in Fig 2. Clear bronchial changes were seen in six dogs and a mixture of the listed HRCT changes described above were seen in a further 15. One dog showed no changes; this was the same dog that had normal radiographs. In 10 dogs, the HRCT changes were consistent with interstitial disease (Johnson and others 2005). Nine dogs had changes suggesting the coexistence of chronic bronchial and interstitial disease. In two dogs, only bronchial wall changes were noted.

Using a combination of clinical presentation, bronchoscopic, radiographic and CT data in the cohort of 22 dogs, one was classified as normal, eight had evidence of interstitial lung disease alone, four had evidence of chronic bronchial disease alone, and the remaining nine dogs had evidence of a combination of both (of which six had evidence of mild chronic bronchitis).

The present study used a prospective approach to further clarify the clinical features of WHWTs affected by a chronic pulmonary presentation well recognised in clinical practice. The study demonstrated the heterogeneity of this condition and that it probably includes elements of interstitial and airway pathology. Irrespective of the underlying change, these dogs presented with a variety of clinical signs (cough, dyspnoea, exercise intolerance) but no consistent pattern of clinical signs matching the three possible scenarios (interstitial disease alone, airway disease alone, or a combination of both) was apparent from the imaging techniques used. However, all dogs had a chronic respiratory history with the primary physical finding of inspiratory crackles, except the one normal dog.

The present study has not determined whether the interstitial features of the disease are analogous to human IPF. However, within this heterogeneous group there are dogs with HRCT findings suggestive of exclusive interstitial disease, and many of the HRCT changes are comparable to those reported in human IPF patients (Noth and Martinez 2007). A relatively high incidence of concurrent tracheal collapse was recognised, which must be presumed to contribute in some way to the respiratory presentation. Routine haematology and biochemistry were shown to be of little diagnostic value, but since a proportion of these cases will have bronchial disease, the importance of bronchoscopic examination of the airways in the proper evaluation of these cases is apparent. Cytological analysis was primarily of use in the support of interpretation of changes noted on bronchoscopy, and in dogs with normal bronchial mucosa (and exclusive interstitial changes on HRCT) there were no or minimal cytological changes.

The selection of inclusion criteria for the cohort used in this study was based on clinical presentation and followed those of previous retrospective studies in WHWTs and other terrier breeds (Corcoran and others 1999a). However, unlike other studies, bronchoscopy was undertaken in all cases, and for the first time this was carried out in conjunction with thoracic radiography and HRCT. This gives a completeness of clinical investigation not previously achieved and describes changes that inform clinical practice. However, as access to HRCT is limited, a combination of good-quality thoracic radiography combined with bronchoscopy would appear to give a reasonable chance of diagnosis. The use of HRCT in diagnosis is of great value as it gives increased confidence in the identification of interstitial lung changes, and the data from this and a previous study suggest that findings are consistent in dogs (Johnson and others 2005).

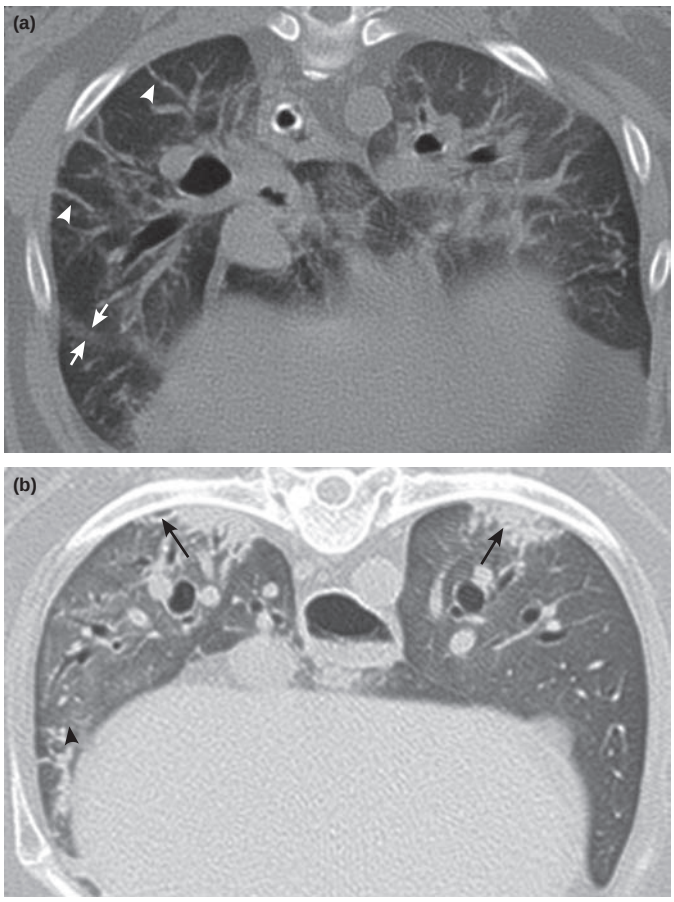

FIG 2: Transverse thoracic high-resolution CT images of two West Highland white terriers (WHWTs) with chronic pulmonary disease, demonstrating interstitial changes. (a) At the level of the accessory lung lobe in an eight-year-old WHWT showing multiple parenchymal bands radiating towards the pleural surfaces (arrowheads) and thickening of the pleura between the right caudal and middle lung lobe (between arrows). (b) At the level of the liver of a 12-year-old WHWT showing generalised increased lung opacity with a ground glass pattern, dorsal subpleural consolidation (arrows), and an enlarged peripheral bronchus adjacent to parenchymal thickening consistent with traction bronchiectasis (arrowhead)

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