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RADIOGRAPHIC ANATOMY OF THE EQUINE LUNG

A thesis presented in partial
fulfilment of the requirements for the degree
of Master of Veterinary Science.

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This research project was instigated in an attempt to provide information on the radiographic anatomy of equine thorax which would enable specific interpretative criteria to be developed in the diagnosis of equine pulmonary conditions. In order to accurately characterise the structures in the thorax a number of existing investigative techniques had to be modified for use in equine subjects.

In the absence of an existing method at the time, a simple method of performing bronchograms on standing conscious horses was developed. The technique involved insufflation of 100 - 200gms of finely powdered Barium Sulphate mixed with 3-7gms of powdered methyl cellulose from an ether vapouriser connected to an intra tracheal tube and supplied with compressed air from a gas cylinder. Good visualisation of bronchial branches down to the seventh and eighth generations were obtained in all but the most dorsal bronchial branches. Elimination of residual contrast agent was rapid and inflammatory response determined by serial histological studies was minimal.

Attempts at pulmonary arterial angiography in the standing horse were abandoned owing to adverse patient reaction in favour of a similar technique in anaesthetised animals, however as a result of difficulties encountered with this technique only a small series of angiograms was performed with mixed results.

Fume fixation of the equine lung was performed utilising the hot formalin vapour technique of Wright et.al.,(1974) resulting in the successful production of several sets of "phantom" lungs on which extensive radiological and gross anatomical studies were performed in an attempt to relate the "in vitro" appearances with those of plain radiographs of the thorax of standing horses.

Careful examination of the resultant radiographs and correlation of differing appearances provided by the contrast techniques demonstrated a number of important diagnostic points. On the plain radiograph a greater number of generations of pulmonary arteries, veins and bronchi can be accurately identified in the horse compared to other species. In addition, despite a similar subgross and superficial radiographic anatomy to man, the horse demonstrates an arterial and venous branching pattern exactly the reverse in appearance. Thus monopodal branching is a feature of the pulmonary arterial system whereas dichotomous smooth branching is the norm for equine pulmonary veins.

Marked between animal variation in the pattern of bronchial branching was also noted however it was not determined if this was a true variation in anatomical branching or the result of widely varying degrees of bronchoconstriction. The latter effect was very marked

in some bronchograms when atropine sulphate was not used prior to barium sulphate insufflation during bronchography. Perhaps the most important result of the correlative study was the ability to accurately identify bronchial and vascular branches over the greater part of the lung fields as a result of prior knowledge of their branching patterns obtained from the contrast studies.

No attempt was made in this study to relate the radioanatomical findings to known clinically apparent pulmonary conditions. Such research was held to be appropriate for a follow up study.

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