Respiratory distress syndrome in newborn puppies

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ABSTRACT

A condition causing neonatal mortality in litters of puppies presents all the definitive features of the respiratory distress syndrome as seen in other species such as the horse and man. Histopathology of lung reveals alveolar collapse, distended respiratory bronchioles and in some instances the presence of eosinophilic hyaline membranes. Evidence is presented which indicates that massive phospholipid release from lung tissue is involved in the pathogenesis of the condition. This may be related to extensive damage to great alveolar cells. The exact aetiology of the condition is not known.

INTRODUCTION

The respiratory distress syndrome is an important cause of death in newborn and premature infants (Avery & Said, 1965) and a similar condition has also been described in newborn foals (Mahaffey & Rossdale, 1959; Rossdale, Pattle & Mahaffey, 1967) in lambs (Egberts, 1970) and in a premature calf (Pirie & Selman, 1969).

To our knowledge there are no reports in the literature of the respiratory distress syndrome having occurred in the dog. The purpose of this communication is to record three instances of the condition in litters of newborn puppies, and to draw attention to the respiratory distress syndrome as a cause of acute illness and early death in this species.

CASE HISTORIES

Litter 1

A 2-year-old Chihuahua bitch apparently in good health gave birth to four live puppies. Within 2 days three puppies were dead and the fourth died at 5 days and was submitted for post-mortem examination.
Litter 2
A Pekinese bitch of unknown age gave birth to two apparently normal live pups. Both pups were said to have shown respiratory distress some 6 hr later and died within a further hour. Both were subjected to necropsy.

Litter 3
A bitch of unspecified breed lost four puppies in the early neonatal period. Two of the dead pups were submitted for post-mortem. It is not known if there were any other pups which survived.

Necropsy Findings
In all cases all lobes of the lungs showed extensive or entire collapse, were red-purple and sank readily in water. No abnormalities were detected in the heart or other organs.

![Fig. 1. Fresh-frozen cryostat section of lung from a pup showing the formation of myelin forms. Unstained, mounted in water. × 180.](image)

Examination of fresh-frozen sections by the method previously described by Manktelow, (1967) indicated a severe deficiency of pulmonary surfactant. In addition, the prepared sections from the pup from Litter 1 showed numerous myelin forms in the respiratory bronchioles (Fig. 1).

From all pups examined paraffin sections revealed complete alveolar collapse and distended respiratory bronchioles. In sections from the two pups of Litter 3 there were also numerous eosinophilic hyaline membranes in alveoli and respiratory bronchioles (Fig. 2), which stained positively by the periodic acid–Schiff
DISCUSSION

In the respiratory distress syndrome of infants hyaline membranes are often but not always present and there is always a deficiency of pulmonary surfactant and extensive alveolar collapse. These features have all been noted in the pups above. The presence of myelin forms in the respiratory bronchioles in fresh-frozen aqueous mounted sections of one pup is of particular interest. This phenomenon is indicative of a massive release of phospholipid from lung tissues and is probably related to extensive damage of great alveolar cells, i.e. the cells responsible for the production of pulmonary surfactant. Such myelin forms have also been seen in other conditions associated with pulmonary surfactant deficiency such as paraquat poisoning (Manktelow, 1967), the pneumonia caused by inhalation of kerosene, and in the respiratory distress syndrome of children (Manktelow, unpublished).

The exact pathogenesis of the respiratory distress syndrome is still unknown but Scarpelli (1968) in reviewing possible factors has made mention of perinatal asphyxia as a general aetiological factor. The occurrence of the disease in whole litters of animals as recorded above in the dog tends to suggest that at least in this species the asphyxia or other possible aetiological adversity is likely to be ante partum when the whole litter is subject to a common environment.
The respiratory distress syndrome does not appear to have been previously recognized as a cause of illness and death in neonatal pups but it is possible that it could be quite common.

REFERENCES


Résumé. Les auteurs décrivent un syndrome occasionnant une mortalité néonatale des portées de chiots et qui présente toutes les caractéristiques du syndrome de détresse respiratoire observé dans d'autres espèces animales et chez l'homme. L'examen histopathologique des poumons montra un collapsus alvéolaire, une distension des bronchioles et parfois la présence de membranes hyalines éosinophiles. Certains faits montrent qu'une libération massive de phospholipides à partir du tissu pulmonaire est impliquée dans la pathogénie de cette affection, ce qui serait en rapport avec les lésions des grandes cellules alvéolaires; cependant, on ne sait rien de la pathogénie exacte de l'affection.