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INCIDENCE AND PATHOLOGY OF PARASITIC PNEUMONIA IN IRAQI LOCAL GOATS

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SUMMARY

This study was designed to evaluate the incidence of caprine parasitic pneumonia and to characterize it's pathological (morphologic and histopathologic) features.

Among a total of 800 examined goats, the incidence rate of the disease was 6.3%. Four types of parasitic pneumonia were reported: 1) chronic purulent and muco-purulent bronchopneumonia (52.94%), 2) chronic interstitial pneumonia (19.62%), 3) chronic granulomatous pneumonia (15.68%) and 4) chronic non-suppurative pneumonia (3.92%). Four miscellaneous parasitic lung lesions (7.84%) were also reported.

INTRODUCTION

Pneumonia is considered as one of the most frequent diseases among goats in different parts of the world (1). In Iraq, there is only one report on caprine pneumonic lesions with no attempt to identify the etiology (2), although, extensive studies were carried out in other parts of the world (3, 4, 5, 6). Our routine slaughterhouses visits indicated the importance of the disease in Iraqi goats. The present study was aimed at 1) reporting the incidence of parasitic pneumonia in goats and 2) characterizing the gross and histological features of the disease.

MATERIALS AND METHODS

Fifty one pneumonic lungs were collected through the examination of a total of 800 goats slaughtered at Al-Dawrah and Al-Shaula abattoirs in Baghdad. After identification of the parasites (7), pieces of pneumonic

lesions were fixed in 10% neutral buffered formalin, processed routinely, cut at 5 um thickness and stained with hematoxylin and eosin (H & E). Pneumonic lesions were classified according to the type of the inflammatory exudate.

RESULTS

Among the 800 examined lungs, the incidence rate of the parasitic type pneumonia was 6.3%. Four types of parasitic pneumonia could be characterized pathologically as follows:

1) Chronic purulent and muco-purulent bronchopneumonia, constituting 52.94% (27 cases). It's features were as follows:

Gross Pathology

Lungs had irregular to triangular shaped, slightly elevated areas of consolidation (Fig.1) located on the costal surface of the diaphragmatic lobes and were surrounded by emphysematous areas. Cut sections through the consolidation foci revealed whitish, thread-like nematodes identified as Dictyocaulus filaria or brown coloured parasites identified as Protostrongylus rufescens. Another type of lesion in this category is the presence of multiple, light red, variable-sized and firm subpleural nodules. A number of smaller nodules were present deep in the pulmonary parenchyma and they had hair-like parasites diagnosed as Muellerius capillaris.

Histopathology

There is filling of the alveelar spaces by suppurative exudate, however, neutrophils were mixed with lymphocytes, macrophages and occasionally with eosinophils. In addition to this cellular exudate, mucus and sections of adult parasites, larvae and ova were found (Fig. 2). Also seen are the characteristic first stage larvae of Muellerius capillaris and Protostrongylus rufescens. There is suppurative bronchitis and bronchiolitis characterized by the presence of inflammatory exudate (neutrophils) in their lumena,

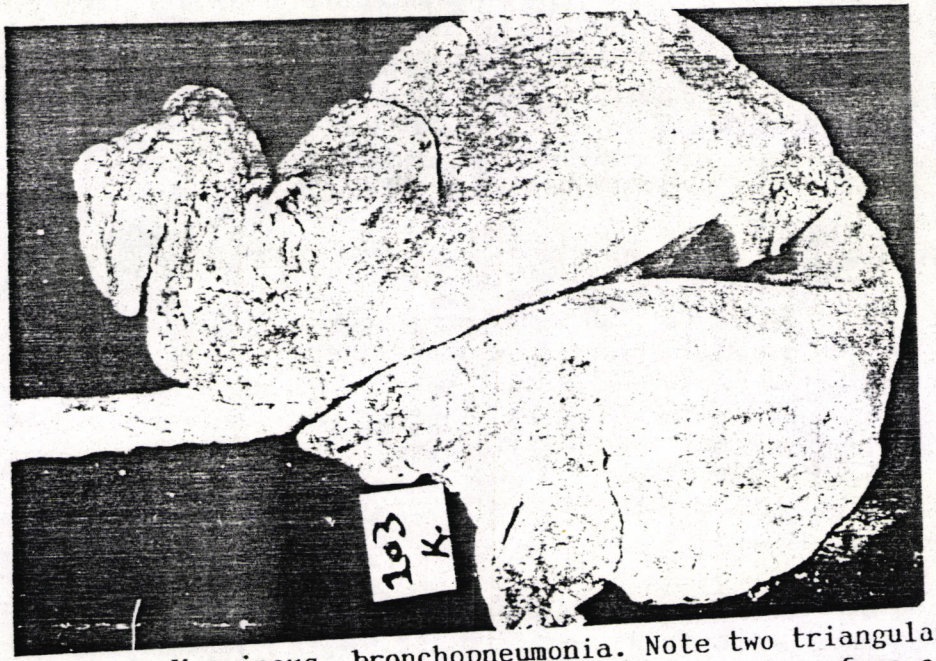

Fig. 1: Verminous bronchopneumonia. Note two triangular areas of consolidation on the dorsal surface of both diaphragmatic lobes near the posterior border.

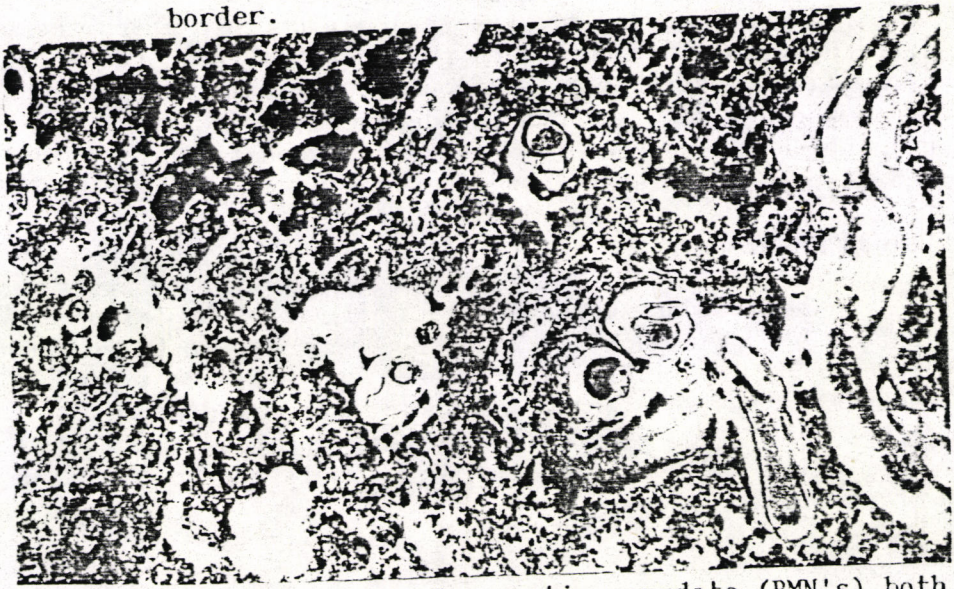

Fig. 2: Histology of 1. Suppurative exudate (PMN's) both in alveoli and the airways mixed with ova, larvae and adult parasites. (H&E) X 100.

sloughing of the epithelium in addition to infiltration of inflammatory cells in walls of the airways. In advanced cases, there were pleural thickening, due to fibroblastic proliferation, and pulmonary fibrosis. Occasional focal granulomatous reaction was also seen.
2) Chronic interstitial pneumonia, constituting 19.62% (10 cases). It's features were as follows:

Gross Pathology

In this type, lungs had small consolidation foci with fleshy consistency, red colour, patchy disribution and were seen on the dorsal portion of the diaphragmatic lobes. In certain cases, lesions were characterized by irregular foci of consolidation in which D. filaria was present in the airways.

Histopathology

The predominant lesion was thickening of the alveolar walls caused by fibroblastic proliforation and infiltration with few lymphocytes and macrophages. Some of the airways had mucus together with cellular exudate (lymphocytes and macrophages mixed with few eosinophils, ova, larvae and adult parasites). In certain cases there were pleural thickening and pulmonary fibrosis resulting from fibroblastic proliferation. Occasional granulomatous response was seen surrounding degenerate parasites.
3) Chronic granulomatous pneumonia, constituting 15.68% (8 cases). It's features were as follows:

Gross Pathology

The lesions were characterized either by triangular areas of consolidation, light red in color or by grayish to red, variable-sized nodules (Fig.3) present subpleurally on the dorsal surface of the diaphragmatic lobes and were surrounded by emphysematous areas. Both D.filaria and M. capillaris were identified in this type of pneumonic lesion.

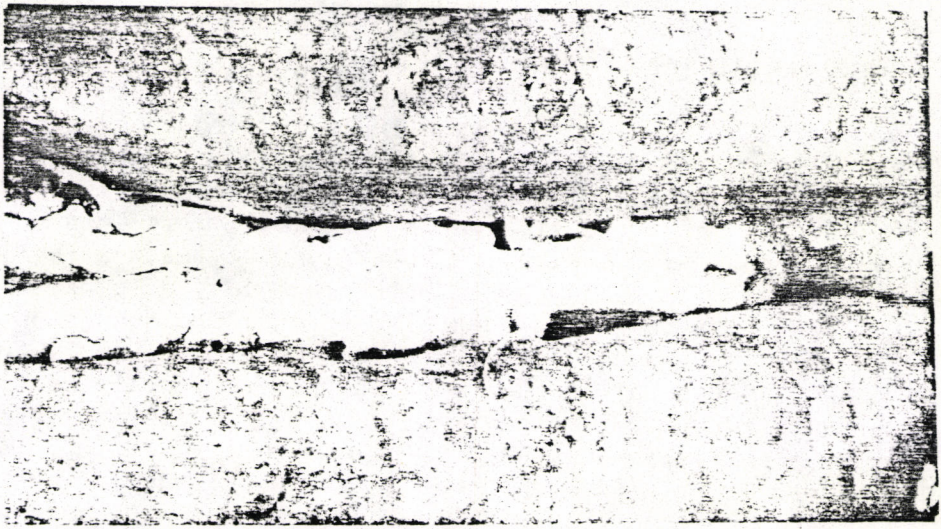

Fig. 3: Chronic granulomatous pneumonia, with multiple nodules present on the dorsal surface of both diaphragmatic lobes near the dorsal border.

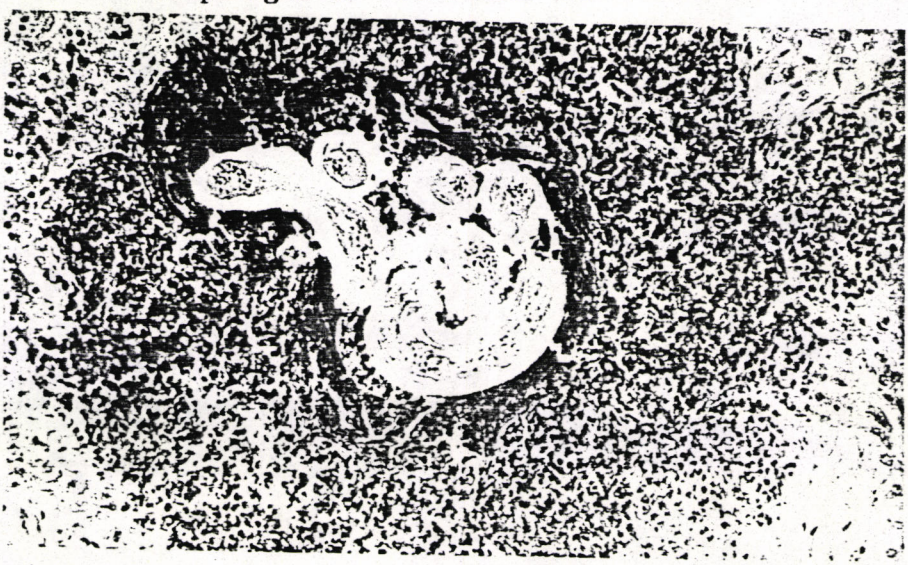

Fig. 4: Chronic granulomatous pneumonia. Note large numbers of necrotic eosinophils surrounded by the degenerate parsaites and on the outside there were giant and epithelioid cells. (H&E) X 250.

Histopathology

The granulomatous reaction was diffuse and has three different forms. The first form consisted of a focal area with central aggregates of necrotic eosinophils, ova, by larvae and adult worms (Fig.4). This center was surrounded by cellular zone (lymphocytes, epithelioids and giant cells) and further outside, a thick fibrous tissue capsule was seen. The second form consisted of a central area of caseous necrosis with calcium deposits and degenerate adult parasite or larval sections, surrounded by chronic inflammatory cells composed of lymphocytes, macrophages, giant cells and fibroblasts. Further outside there was a fibrous tissue capsule. The third form of the granulomatous reaction was composed of aggregates of lymphocytes, macrophages and foreign - body type giant cells (Fig.5). In some cases, there were epithelioid cells surrounding larvae and ova, together with a fibrous tissue encapsulation.

In addition, there are minor lesions of suppurative and interstitial response, perivascular lymphocytic cuffing and peribronchial lymphoid tissue hyperplasia.

4) Chronic non-suppurative pneumonia, constituting 3.92% (2 cases). It's features were as follows:

Gross Pathology

Lesions of this type of pneumonia were either in the form of dark red consolidated foci approximately 2Cm. in diameter, or as multiple, red colored, firm nodules mostly distributed in the posterior part of the ventral surface of the diaphragmatic lobes. These nodules were surrounded by emphysematous areas and some were calcified.

Histopathology

There was filling of the alveolar spaces with cellular exudate, mixed with ova and larvae. The predominant cell type was lymphocyte with variable numbers of macrophages and eosinophils (Fig.6). There is thickening of alveolar walls resulting from it's infiltration by lymphocytes,

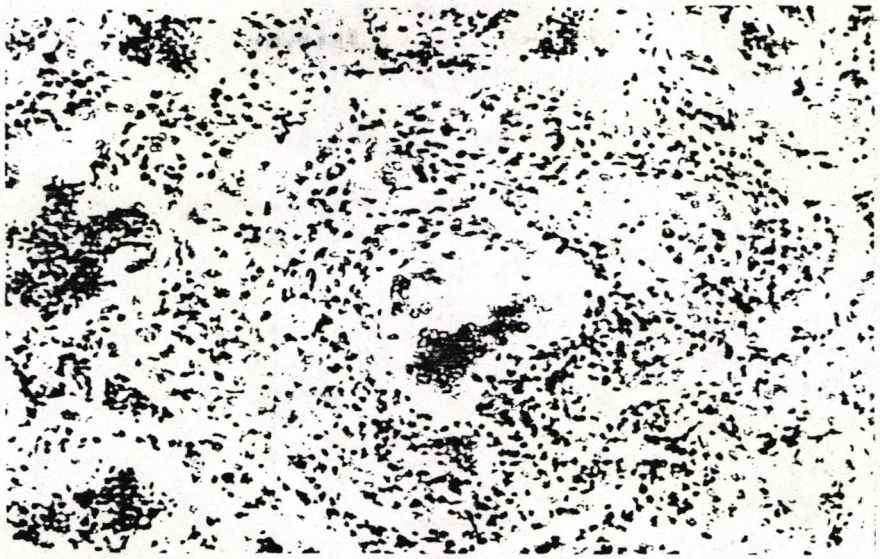

Fig. 5: Chronic granulomatous pneumonia. Note many multinucleated giant cells in the chronic cellular exudate and the suppurative type exudate inside the alveoli. (H&E) X 250.

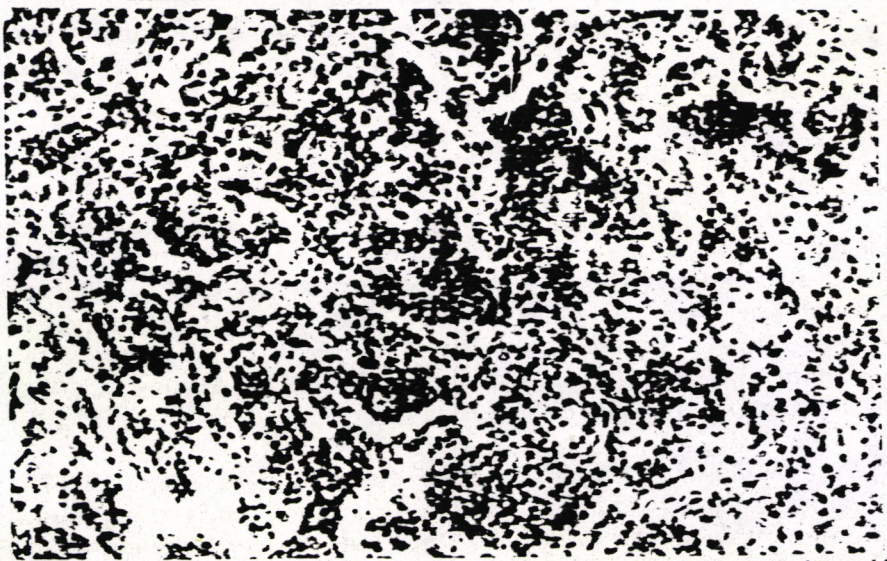

Fig. 6: Chronicnon suppurative pneumonia. Note the cellular exudate consisting mainly of eosinophils. There is fibromuscular hyperplasia. (H&E) X 250.

macrophages and eosinophils. Also seen is fibromuscular hyperplasia. A similar type cellular exudate and parasitic sections were present in the airways. Also seen are peribronchial lymphocytic hyperplasia, pleural thickening and pulmonary fibrosis.

Four miscellaneous parasitic lung lesions were caused by the hydatid cysts (larval stages of Echinococcus granulosus) and the liver fluke (Fasciola gigantica). The first one was a space - occupying lesion and that of the fluke was multifocal consolidation, nodular in shape, brown in color and it's cut section revealed a thick brown inspissated material containing clotted blood and the mature fluke.

DISCUSSION

Among the (800) examined caprine lungs, the incidence rate of verminous pneumonia was 6.3%. The incidence is similar to that reported for goats in india (6) but is different from that previously reported for goats in Iraq (2), where they encountered 15% parasitic pneumonia. The reason why they found a higher rate of verminous pneumonia in that study (2) is that they examined pneumonic lungs (66 lungs) only.

The classification used in this study was based on the type of cellular constituents of the inflammatory exudate. Accordingly, four major types of parasitic were reported with the most common being the chronic purulent and muco-purulent type, comprising 52.94%. The type of exudate was pus alone or mixed with mucus, probably resulting from a combined effect of the irritation of bronchial epithelia by the adult parasite and a secondary bacterial infection (5, 8).

Chronic interstitial pneumonia comprised 19.62%. The lesion was diffuse and not patchy, a finding which has been explained (9) to be due to the absence of immune response against the parasite probably resulting from an infection being a primary one i.e non-sensitized animal.

Chronic granulomatous type pneumonia constituted 15.68%. Grossly this type of pneumonia was nodular and subpleural in location. Li (10) encountered similar location for this lesion and explained it on the bases of sufficient ventilation supplied to this area of the pulmonary parenchyma and probably needed for the parasite. The granulomatous response may have resulted from ova and larvae in addition to degenerate parasites acting as foreign - bodies and hence this type of response. M. capillaris has an important role in the induction of this type of lesion (granuloma) because all developmental stages of the parasite occur in the lung parenchyma.

Also reported are two cases of chronic non-suppurative pneumonia, constituting 3.92%. This type of pneumonic lesion occurred without much degenerative changes, mucus or pus formation. Besides, four miscellaneous parasitic lung lesions were reported due to hydatid cysts (Echinococcus granulosus) and the liver fluke (Fasciola gigantica). It is known that goats can serva as intermediate host for Echinococcus granulosus (8). The presence of lung lesions in association with the liver fluke is considered an incidental finding and probably occurred through migration of the immature parasites (Fasciola gigantica) from the liver to the lungs(11).

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حدوث ومرضية ذات الرئة الطفيلي في الماعز المحلي

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الخلاصة

صممت هذه الدراسة لمعرفة حدوث ذات الرئة الطفيلي وتوصيف الآفات العيانية والمجهرية في الماعز المحلي. شكلت ذات الرئة الطفيلية نسبة (٦ر٣٪).

سجلت اربعة انواع من ذات الرئة الطفيلية هي:-

١- ذات الرئة القيحية والقيحية المخاطية المزمنة (٩٤ر٥٢٪).
٢- ذات الرئة الخلالية المزمنة (٦٢ر١٩٪).
٣- ذات الرئة الورمية الحبيبية المزمنة (٦٨ر١٥٪).
٤- ذات الرئة اللاقيحية المزمنة (٩٢ر٣٪).

سجلت اربعة آفات رئوية طفيلية متفرقة كان سببها الاكياس العدرية وديدان حلزون الكبد.