

BACTERIOLOGICAL AND PATHOLOGICAL STUDIES ON RESPIRATORY INFECTIONS AMONG SLAUGHTERED COWS AND BUFFALOES IN ISMAILIA GOVERNORATE

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Abstract

Bacteriological and pathological examinations were carried out on 500 animals (336 cows and 164 buffaloes) slaughtered in two abattoirs in Ismailia Governorate. From these animals proper samples were collected from lungs and bronchial lymph nodes. The bacteriological examinations revealed the infection of 65 cows (19.34%) and 31 buffaloes (18.90) with *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Corynebacterium bovis*, *E. coli*, *Bacillus* species, *Pseudomonas aeruginosa* and mixed infection. The most predominant organism was *Staph. aureus* with percentage of 8.03% in cows and 7.92% in buffaloes in relation to the total examined cases.

Cattarrhal bronchopneumonia was the characteristic feature of *Staph. aureus* infection. In *Corynebacterium bovis* infection the histopathological changes referred to chronic proliferative stromal pneumonia. In *Pseudomonas aeruginosa* infection, the examined lungs showed giant cell pneumonia. Other bacterial lung infections showed varied degrees of pneumonia. The examined lymph nodes revealed lymphoid depletion and oedema. Pathological lesions were similar in cows and buffaloes.

INTRODUCTION

Respiratory diseases are a major source of economic losses to the cattle and buffaloes and other animal species (Soroor, 1999). The causes of pneumonia are numerous and may be viral, fungal, parasitic, bacterial and or mixed infection. Mokhbatly and Selim (1999) in their studies on 40 cow calves of 6-12 months old belonged to a private farm at El-Sharkia Governorate isolated *Pasteurella multocida* (26.67%), *E. coli* (20%), *Klebsiella* sp. (13.33%), *Streptococcus* spp. (16.67%), *Actinomyces pyogenes* (10%) and mixed infection (13.33%) from nasal swabs taken from diseased animals. Nearly similar pathogens were isolated by El-Sheikh *et al.* (1994) on their studies of respiratory affections in buffalo-calves. These bacterial infections, as stated by Jones *et al.* (1997), caused different pathological changes in affected lungs as haemorrhage,

oedema , leukocytic infiltration , alveolar emphysema and hyperplasia of bronchiolar epithelium.

The present investigation aimed to study the bacterial causes of respiratory affections in cattle and buffaloes in two abattoirs at Ismailia Governorate and to make a relation between these bacterial agents and their detected pathological lesions.

MATERIALS AND METHODS

The present investigation was carried out on 500 animals (336 cows and 164 buffaloes) of 6 months to 6 years old slaughtered in Ismailia and El-Tal-El-Keber abattoirs. Samples from lungs and bronchial lymph nodes were collected in the proper way for bacteriological and pathological examinations.

For bacteriological examination, primary cultures for bacterial isolation were made on nutrient agar, blood agar, MaConckey's agar, Edward's agar, mannitol salt agar media (oxid), which were prepared according to Cruickshank *et al.* (1975). The plates were incubated aerobically at 37 °C for 24-48 hours and surface colonies were examined for cultural characteristics of the various microorganisms and subjected for biochemical identification according to Quinn *et al.* (1994).

The representative samples of lung and bronchial lymph nodes were examined grossly, then, fixed in 10% neutral buffered formalin solution. Paraffin sections of 5 µm thick were prepared, stained with heamatoxylin and eosin according to Bancroft *et al.* (1990) and then, examined microscopically.

RESULTS

Bacteriological Examinations

The bacteriological examinations revealed the infection of 65 out of 336 cows (19.3%) and 31 out of 164 buffaloes (18.9%) with different bacterial infections (Table 1). The most predominant microorganism was *Staphylococcus aureus* with a percentage of 8.03% in cows and 7.92% in buffaloes in relation to the total examined animals. The percentage of other bacteria in both cows and buffaloes were illustrated and identified as *Escherichia coli*, *Corynebacterium bovis*, *Streptococcus pneumoniae*, *Pseudomonas aeruginosa* and *Bacillus* spp.

Table 1. Number and percentage of positive animals for different bacterial isolates.

Organisms	Cows (336)		Buffaloes (164)	
	No.	%	No.	%
Single Infection				
<i>Staph. aureus</i>	27	8.03	13	7.92
<i>Escherichia coli</i>	13	3.86	3	1.82
<i>Corynebacterium bovis</i>	11	3.27	8	4.87
<i>Streptococcus pneumoniae</i>	7	2.08	3	1.82
<i>Pseudomonas aeruginosa</i>	5	1.48	2	1.21
<i>Bacillus spp.</i>	4	1.19	2	1.21
Mixed Infections				
<i>Corynebacterium bovis</i> + <i>Streptococcus pneumoniae</i>	1	0.29	0	0
<i>Staph. aureus</i> + <i>Bacillus spp.</i>	1	0.29	0	0
Total	65	19.34	31	18.90

Pathological Examinations

Macroscopically, most of the examined lungs and bronchial lymph nodes were apparently healthy. In some cases, some parts of lungs appeared either grey red or dark red in colour and firm in texture. In other cases, lungs appeared hypercrepitant and in two cases, the pleura covering these areas was thick and cloudy.

In *Staphylococcus aureus* infection, the pleurae covering the affected lobules were markedly thickened with inflammatory cells intermingled among fibrin network. In the outer zone, aggregations of lymphocytes and neutrophils were seen (Fig. 1). The bronchial lumen was filled with catarrhal exudate, desquamated epithelium and inflammatory cells. The bronchial epithelium showed mucinous degeneration and/or proliferation in the form of leaves like appearance (Fig.2). Some alveoli appeared stuffed with different types of inflammatory cells (Fig. 3).

In *E. coli* infection, the lungs showed areas of red hepatization, and the adjacent areas showed alveoli filled with eosinophilic exudate and haemorrhages (Fig. 4). The interalveolar spaces were oedematous with some alveolar emphysema.

In *Corynebacterium bovis* infection, the pulmonary tissues revealed the presence of proliferative stromal pneumonias (Fig. 5), serofibrinous exudate, injury of the alveolar wall and change in the type I alveolar cells to type II cuboidal epithelium. Lung showed macrophage, plasma cells, lymphocytes and giant cells (Fig. 6).

In *Streptococcus* infection, the pulmonary tissues showed inflammatory exudate and haemorrhages. Bronchial epithelium was dilated with hyperplastic proliferation in some parts.

In *Pseudomonas aeruginosa* infection, the examined sections showed presence of over dilation and rupture of some pulmonary alveoli in focal form (Fig. 7). Lungs showed thickened alveolar wall with giant cell formation (Fig. 8). The bronchial lymph nodes showed depletion of lymphocytes (Fig. 9).

In *Bacillus* spp. infection, the affected lungs showed over dilatation and rupture of some pulmonary alveoli in a diffuse form, with ischemic capillaries, otherwise alveolar wall appeared thin in most of sections examined. Lymphocytic aggregation in peribronchial (Fig. 10), perivascular and in some interalveolar spaces were seen. In mixed *Bacillus* spp. and *Staph. aureus* infections, the picture was more severe and the bronchial lymph nodes showed oedema and lymphoid depletion (Fig. 11).

The examined histopathological lesions were the same in buffaloes and cows.

DISCUSSION

The bacteriological examinations of lungs and bronchial lymph nodes of slaughtered apparently healthy cows and buffaloes revealed the isolation of different pathogenic bacteria with different percentages. Nearly, similar pathogens were isolated by Ali *et al.* (1990), Ismail *et al.* (1993) and Mokhbatly and Selim (1999).

The present investigation revealed that lungs and lymph nodes of the affected animals were exposed to infections by several bacterial pathogens including *Staph. aureus*, *Streptococcus pneumoniae*, *Corynebacteriu bovis*, *E. coli*, *Bacillus* species, *Pseudomonas aeruginosa*. Single infection with only one type of pathogenic bacterial microorganism was detected in all buffalo samples and in 63 out of 65 cow samples. Mixed infection with more than one pathogenic microorganism was detected in 2 cow samples. These results were similar to those obtained by Martin and Aitken (1991). The variation of incidence of *Staph. aureus* in cows and buffaloes was not significant and the results were similar to those recorded by Allan (1978).

The varied microscopical lesions observed in these infections may be attributed to the immune status of the animals as well as to different stages of infections (Carlton and Cavin, 1995). In some recorded infections with different isolated bacteria, the bronchioles of pneumonic areas contained inflammatory cellular exudate with focal hyperplasia of bronchial epithelium. This could be attributed to the chronic irritation of the invading microorganisms (Howard *et al.*, 1997). In pneumonic areas, haemorrhages were found among thickened alveolar septa with slight oedema intermingled with fibrin threads and thrombus formation. These changes were also recorded by Jones *et al.* (1997). The alveolar walls in most examined cases were hyperaemic or congested. In few cases, fibrinous exudate with neutrophilic infiltration was noticed. In other cases, few neutrophils and many large macropahges and giant cells were found. These results agreed with Howard *et al.* (1997). The bronchial lymph nodes showed oedema and lymphoid depletion which was attributed to the action of microorganisms and their toxins (Bashiruddin and Van Dogen, 1999).

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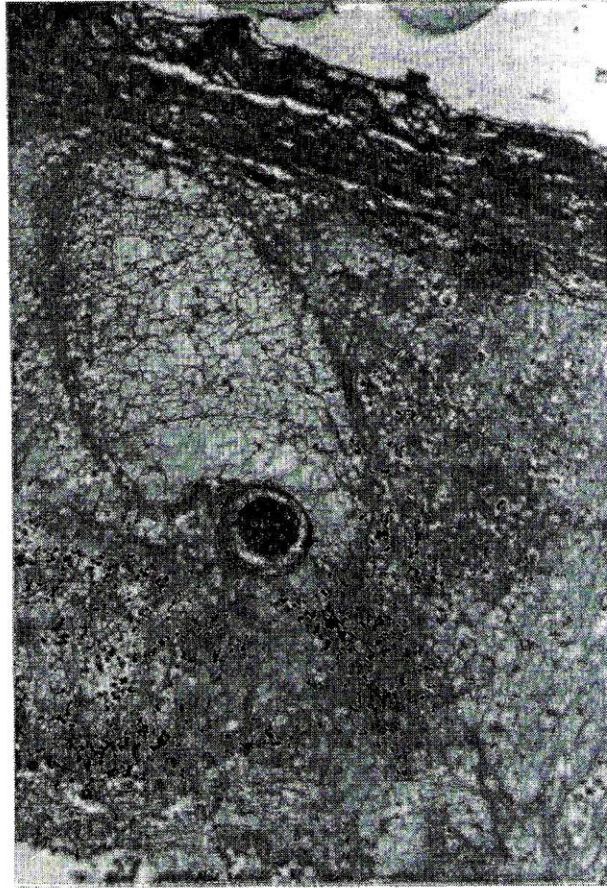


Fig. 1. Lung showing thickened pleura with inflammatory cells, fibrin threads and thrombus formation. (H & E. X 100).



Fig. 2. Lung showing proliferation of bronchial epithelium in the form of leaf like projection (H & E. X 200).

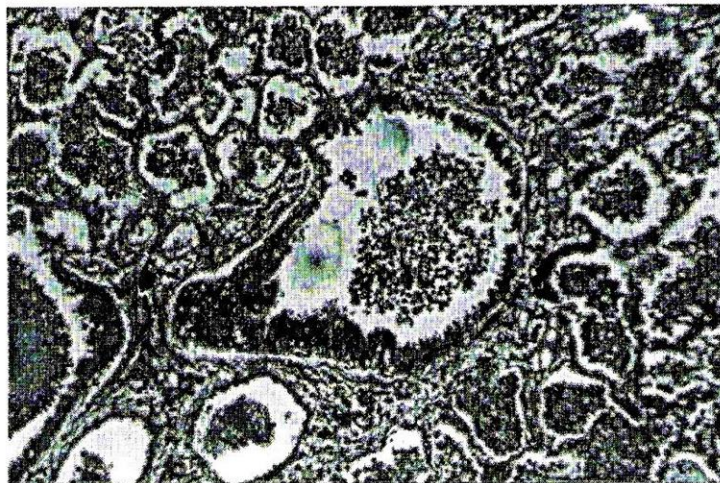


Fig. 3. Lung showing bronchus and alveoli filled with inflammatory cells beside proliferation of epithelium lining the bronchus (H & E. X 200).

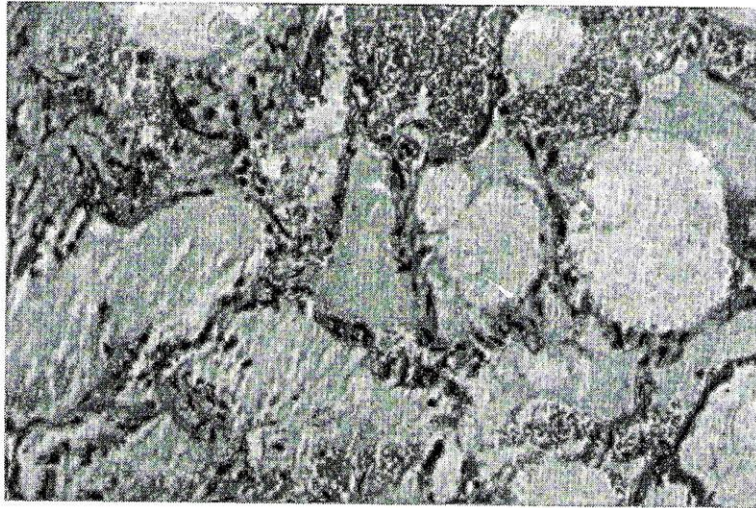


Fig. 4. Lung showed alveoli filled with eosinophilic exudate and haemorrhages (H & E. X 250).

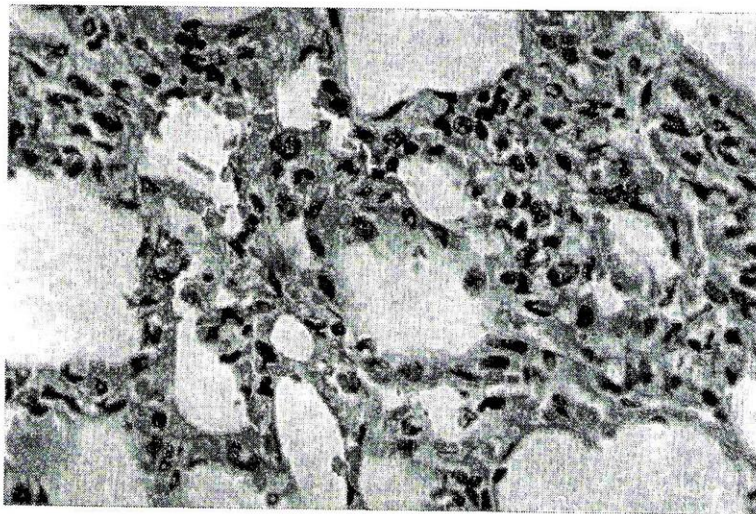


Fig. 5. Lung showing proliferative stromal pneumonia (H. & E. X 400).

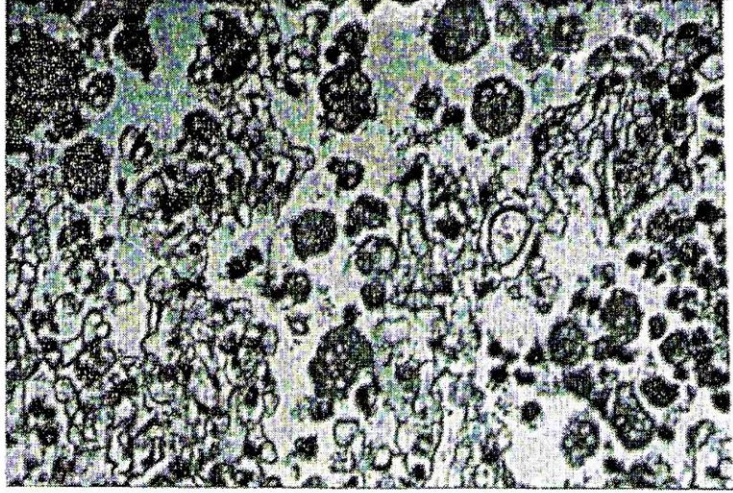


Fig. 6. Lung showing giant cell pneumonia (H. & E. X 650).

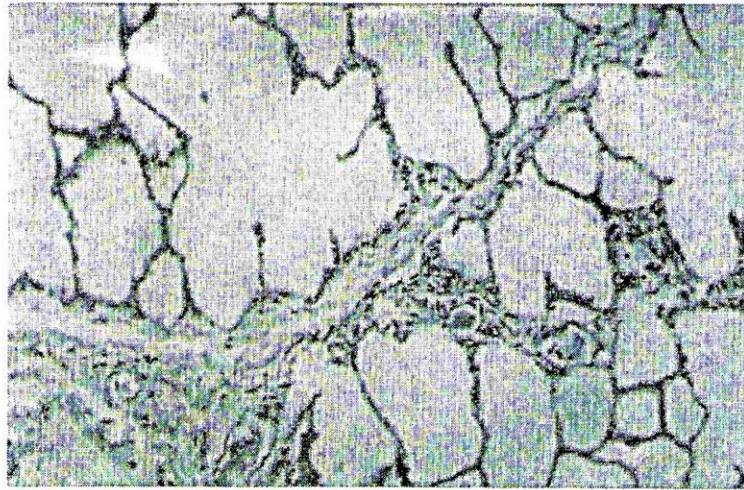


Fig. 7. Lung showing rupture of some pulmonary alveoli and fibrinous threads in be-

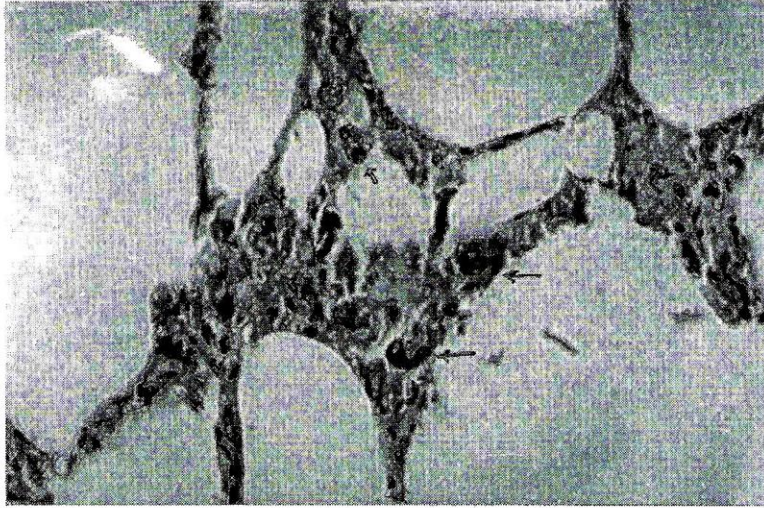


Fig. 8. Lung showing thickened alveolar wall with giant cell formation. (H. & E. X 650).

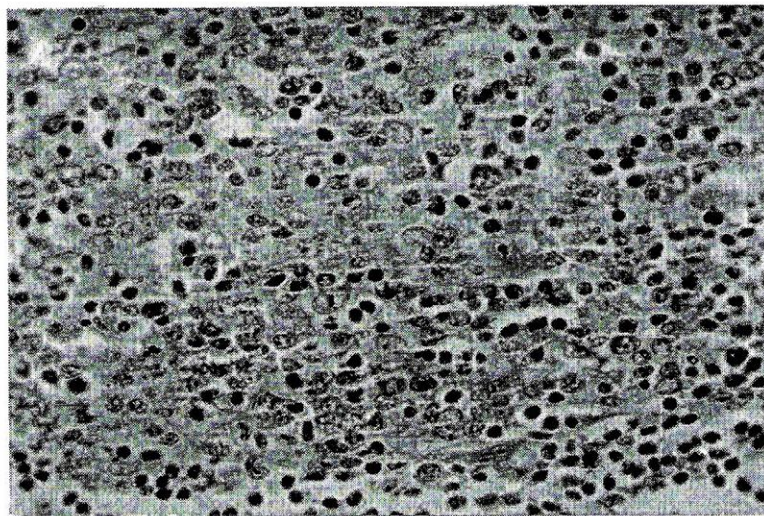


Fig. 9. Lymph node showing depletion of lymphocytes (H. & E. X 400).

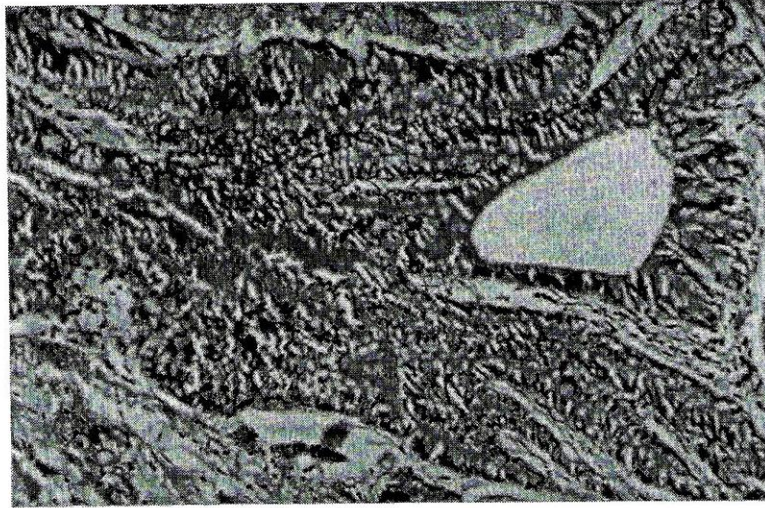


Fig. 10. Lung showing peribronchial lymphocytic aggregation. (H. & E. X 250).

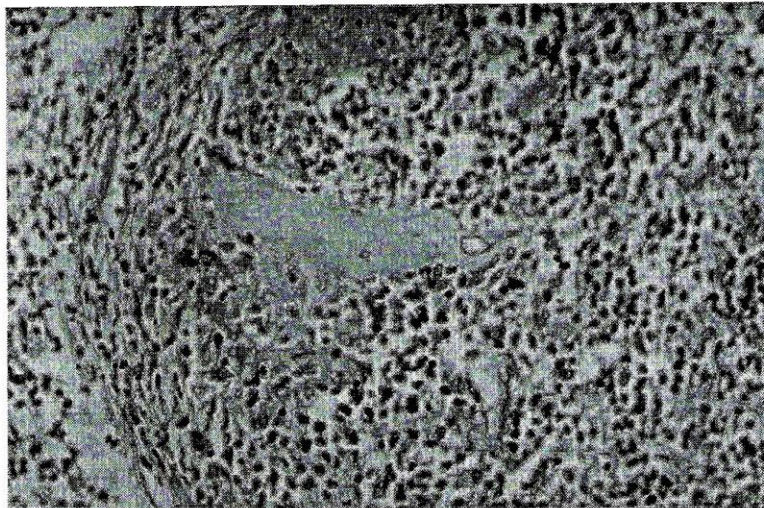


Fig. 11. Lymph node showing oedema in white pulp. (H. & E. X 400).

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دراسات بكتريولوجية وباثولوجية على الإصابات التنفسية فى الأبقار والجاموس المذبوحة فى مجازر محافظة الإسماعيلية

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مصر

اجريت الفحوص البكتريولوجية والباثولوجية على عدد ٥٠٠ حيوان (٢٢٦ بقرة ، ١٦٤ جاموسة) مذبوح بمجزرين بمحافظة الاسماعيلية . تم جمع العينات اللازمة من الرئة والعقد الليمفاوية للقصابة الهوائية من تلك الحيوانات . أوضحت الفحوص البكتريولوجية اصابة ٦٥ بقرة (١٩,١٤٪) وعدد ٣٦ جاموسة (١٨,٩٪) باصابات بكتيرية متنوعة . كانت اعلى نسبة من الاصابة البكتيرية بميكروب المكورة العنقودية البرتقالية والتي وصلت نسبة الاصابة به فى الأبقار إلى ٨,٠٢٪ وفى الجاموس إلى ٧,٩٢٪ .

أدت العدوى بميكروب المكورة العنقودية البرتقالية الى حدوث التهاب رئوى شعبى، وأدت العدوى بالبكتيريا الوتدية بوفس الى حدوث التهاب رئوى حشوى متحور مزمن كما أدت الاصابة بميكروب السيدوموناس الى التهاب رئوى ذى الخلية العملاقة . تميزت العدوى البكتيرية الأخرى بدرجات متفاوتة من الالتهابات الرئوية . أظهرت فحوص العقد الليمفاوية للقصابة الهوائية ظهور أوديميا وإضمحلال فى الخلايا الليمفاوية .