Histopathological and Bacteriological Studies on Pneumonic Lung from One Humped Camels Slaughtered in Egypt

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ABSTRACT

Lung infections are major findings in domestic animals. Outbreaks occur in camels, cattle, buffaloes and small ruminants in various countries. Forty lungs of one-humped camels (6 months to 10 years old) slaughtered at different abattoir in Egypt were grossly examined for the presence of pneumonic lesions. Specimens, collected from gross lesions were subjected for histopathological and bacteriological investigations. The main pathological lesions of affected lungs were bronchitis, bronchiolitis, alveolar emphysema, inflammatory and non-inflammatory edema, active hyperemia, interstitial pneumonia, lung granuloma, suppurative pneumonia and haemorrhagic pneumonia. Bacteriological investigation resulted in the recovery of 89 bacterial isolates. This work aimed to isolate the most common bacterial pathogens causing respiratory affections from slaughtered camels. A second goal was to describe the pathological changes in the lungs of affected camels and to correlate these changes with the possible causative agents.

Keywords: *Camelus dromedaries*, pneumonia, bacteria, histopathology

INTRODUCTION

The one-humped (dromedary) camel is widely distributed in the Horn of Africa and North African countries. The dromedary camel is a multipurpose animal used for transportation, the production of milk and meat and its byproducts such as hair and hides are also beneficial. Moreover, very expensive special races shares in animal beauty shows and racing for entertainment. (Leese, 1927; Mares, 1954; Field, 1979). Lung infections, especially pneumonia, are major disease of domestic animals. Outbreaks occur in camels, cattle, buffaloes and small ruminants in various countries (Costa et al., 1998; Selman and Wiseman, 1983). Only few studies are in the available literature on pathological and bacteriological affections of pneumonic lungs in camels. Most of the studies on camels were about parasitic infections (AL- Rawashdeh et al 2000). Rearing systems, stress factors, climatic changes, unhygienic conditions, sudden changes in feed and a low level herd health status are stated as predisposing factors to bacterial and viral pneumonia the objective of this work was to study the etiology (bacterial) as well as histopathological findings of pneumonia in camels in Egypt.

MATERIALS AND METHODS

From March 2013 to December 2013, camels (aging 6 months to 10 yers) slaughtered at governmental abbatoirs in Cairo and Giza were necropsied for lung lesions. Samples were collected from 40 affected lungs portions of the samples were put in sterile plastic bags, kept in an icebox and other parts were put on 10% neutral buffered formalin for histopathological examination. The samples were transported to the laboratory with minimum delay for bacterial examinations. The bacteriological samples, after surface sterilization, a sharp incision was made in the lesion with a sterile blade. A full loop was taken from the lesion and inoculated onto 5% sheep blood agar and MacConkey agar plates (Difco, UK). The inoculated plates were incubated at 37°C for 24-48 hrs. The isolates were identified according to the colonial morphology, pigment production and Gram's staining morphology

as well as biochemical characters. The bacterial isolates were classified by species according to Barrow and Feltham and Bergey's Manual of Systemic Bacteriology. Upon arrival to the laboratory, tissue blocks were processed using standard procedures. Sections, 5 μm thick, were stained with hematoxylin-eosin and examined microscopically (Bancroft and Gamble 2013).

RESULTS

Bacteriological Findings

As shown in Table (1), 89 bacterial isolates (singles and mixed) were recovered from 40 lung spicemens of slaughtered camel. The isolates were identified as 6 E. coli, 12 *Shigella spp*., 10 *Proteus* spp., 14 *Klebsiella pneumoniae*, 22 *Staphylococcus aureus*, 6 *Pseudomonas aeruginosa*, 5 *Pasteurella multocida*, 3 *Manheimia haemolytica*, 2 *Mycoplasma spp*., 3 *Bacillus spp*., 5 *Streptococcus spp*. and 1 *Enterobacter spp*., with percentages of15%, 30%, 25%, 35%, 55%, 15%, 20%, 5%, 7.5%, 12.5%, and 2.5%, respectively.

Table (1): Incidences of different bacterial species in fourty pneumonic lung lesions of slaughtered camels

Bacterial isolate	Numbers of isolates (singles and mixed)	Rate of bacterial isolation (according to total number of samples (40))
E. coli	6	15%
Salmonella species	-	0%
Shigella species	12	30%
Proteus species	10	25%
Enterobacter species	1	2.5%
Staphylococcusaureus	22	55%
Klebsiella pneumoniae	14	35%
Pseudomonas aeruginosa	6	15%
Manheimia haemolytica	3	7.5%
Pasteurella multocida	5	12.5%
Mycoplasma species	2	5%
Bacillus species	3	7.5%
Streptococcus species	5	12.5%

Histopathological Findings

Histopathological examination of tissues prepared from lung lesions of 40 slaughtered camels (figures 1-16) revealed different findings as depicted in Table (2). Microscopical findings revealed bronchitis, bronchiolitis, suppurative pneumonia, haemorrhagic pneumonia, interstitial pneumonia, pulmonary edema, pneumoconiosis and focal pulmonary lesions. Other noticed lesions were active hyperemia, atelectasis and alveolar emphysema either alone or most commonly in the pulmonary tissue surrounding or immediately in the vicinity of the previously mentioned lesions. Interstitial

pneumonia: wasseen in 12.5% of the collected samplescharacterized by thickening of interalveolar septa due to infiltration of large number of small mononuclear cells mainly lymphocytes.

In addition, focal suppurative pneumonia, congestion of alveolar wall and alveolar emphysema in the adjacent pulmonary parenchyma, multifocal lymphocytic granuloma were recorded in two specimens formed mainly from lymphocytic cells with disappearance of lung tissue. One specimen showed pulmonary granuloma accompanied with massive pneumoconiosis with positive reaction with brussian blue stain indicating pneumoconiosis, pulmonary fibrosis resulting from long standing edema within active alveolar hyperemia and atelectasis. Alveolar emphysema was seen in 57.5% of the examined preparations in which the alveolar walls were thin and the alveolar air spaces were abnormally enlarged and dilated. Inter alveolar septa were ruptured and destroyed with communication of adjacent alveoli and acini and alveolar ducts forming giant alveoli and large air-filled areas. In some specimens, red hepatization and pneumoconiosis were evidenced. Away from the lung tissues, histopathological examination revealed chronic catarrhal bronchitis and bronchiolitis characterized by vacuolar degeneration, necrosis of the epithelial lining and hyperplasia of the bronchial epithelium with desquamated epithelial cells inside the lumen. Slight peribronchial infiltration and congestion of blood vessels in the subepithelial lining.

Table (2): Incidence of different histopathological findings in lesions of affected lung from slaughtered one-humped camels

Lesions	No	Percentage
Bronchitis andbronchiolitis	17	42.5%
Alveolar emphysema	23	57.5%
Active hyperemia	6	15%
Pulmonary edema	5	12.5%
Lung granuloma	4	10%
Suppurative pneumonia	2	5%
Parasitic pneumonia	1	2.5%
Interstitial pneumonia	5	12.5%
Serous pneumonia	2	5%
Haemorrhagic pneumonia	3	7.5%
Pneumoconiosis	6	15%

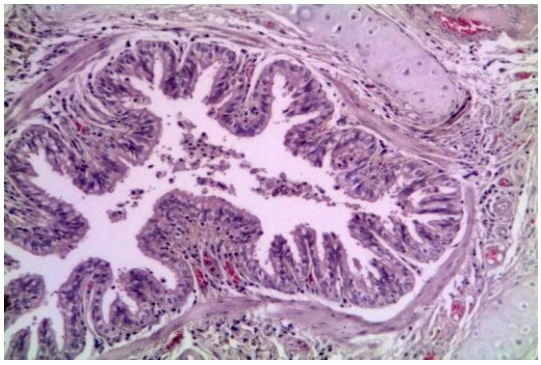

Fig.1: Camel lung tissue showing choronic cattarhal bronchitis 1. proliferation and hyperplasia of epithelial lining 2,desquamated epithelial cells in the lumen of 3, slight peribronchial infilteration of inflammatory cells. H&E(x 10).

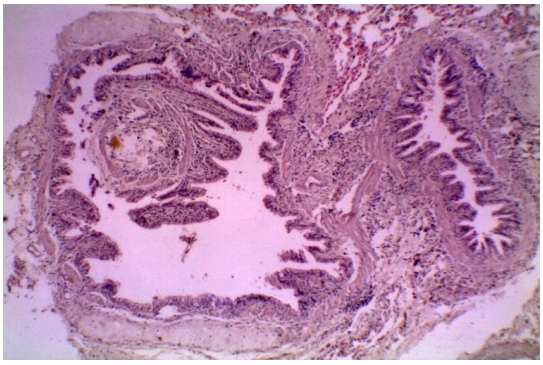

Fig.2. Camel lung tissue showing Chronic bronchitis and bronchiolitis, subepithelial lymphoid follicle hyperplasia in the bronchial mucosa and the hyperplastic part is protruded in the bronchial lumen with slight infilteration of lymphoid cells. H&E (x4).

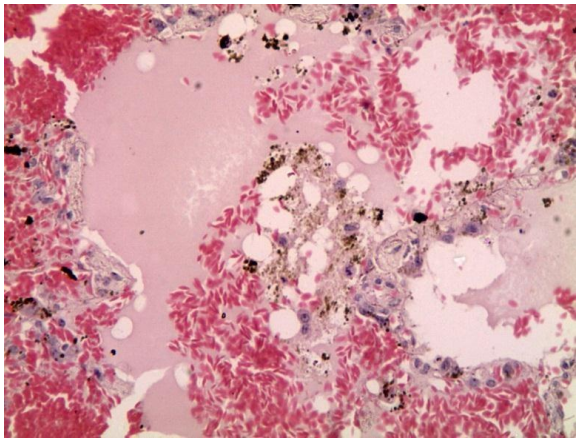

Fig.3. Camel lung tissue showing haemorrhage in alveolar lumen, non inflammatory alveolar edema and pneumconiosis.H&E(x20)

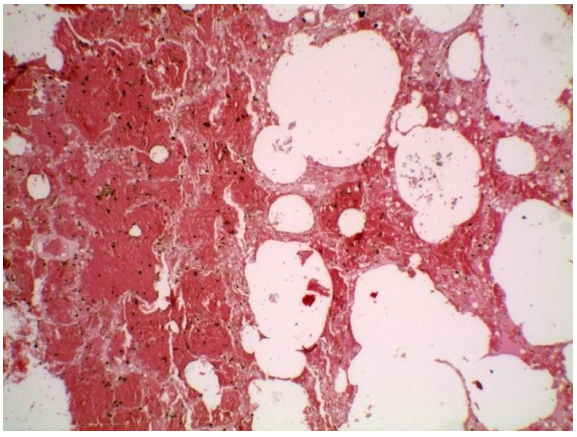

Fig.4 Camel lung tissue showing haemorrhagic pneumonia, red hepatization with pneumoconiosis and alveolar emphysema,in the surrounding pulmonary tissue H&E(x4).

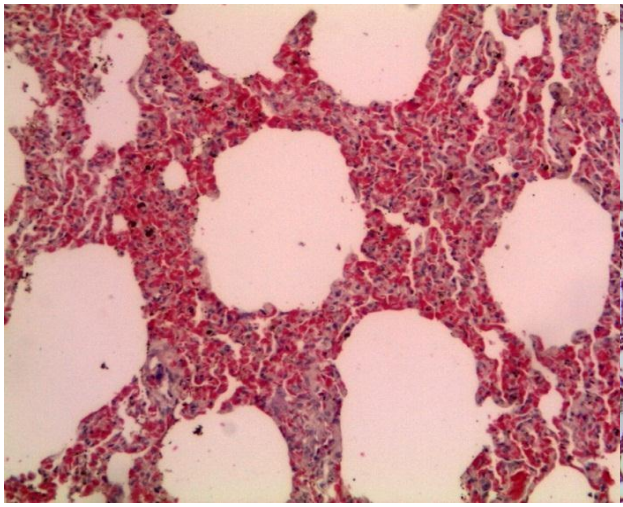

Fig.5. Camel lung tissue: showing chronic interstitial pneumonia with thickening ofalveolar septa and atlectic alveoli H&E(x10)

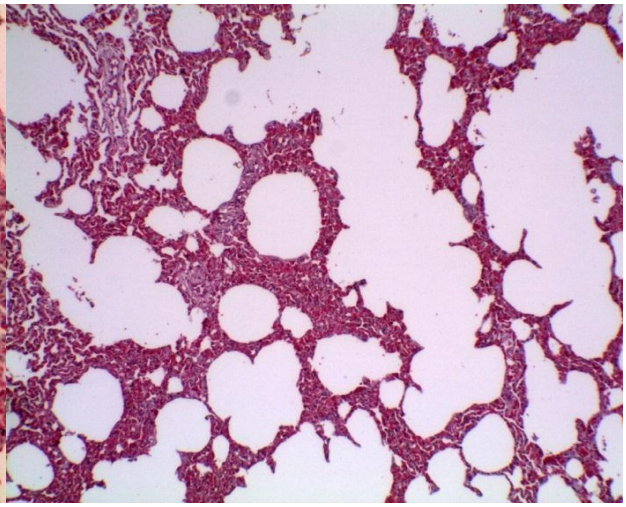

Fig.6. Camel lung tissue revealing chronic interstitial pneumonia with compensatoryalveolar emphysema and appearance of giant alveoli and atelectasis.. H&E (x4)

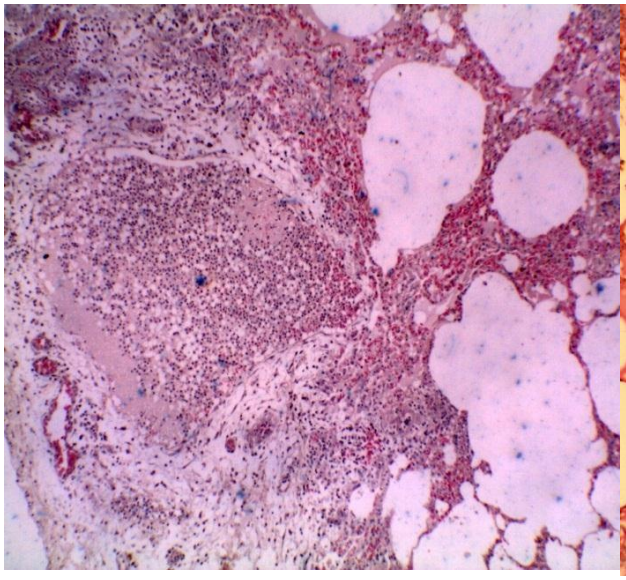

Fig.7. Camel lung tissue showing focal suppurative pneumonia, massive infilteration of inflammatory cells mainlyneutrophils, congestion of alveolar wall capillaries and alveolar emphysema in theadjacent pulmonary parenchyma. H&E(x4)

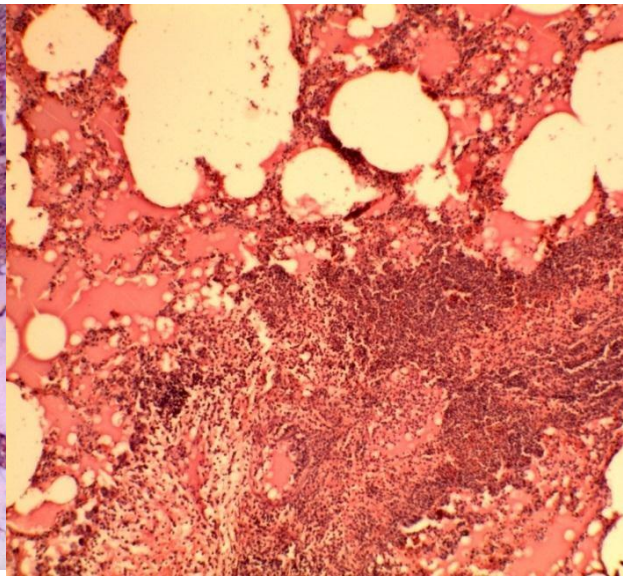

Fig.8. Camel lung tissue showing suppurative pneumonia , proliferation of macrophage, lymphocyte and neutrophils,and alveolar edema.H&E(x4)

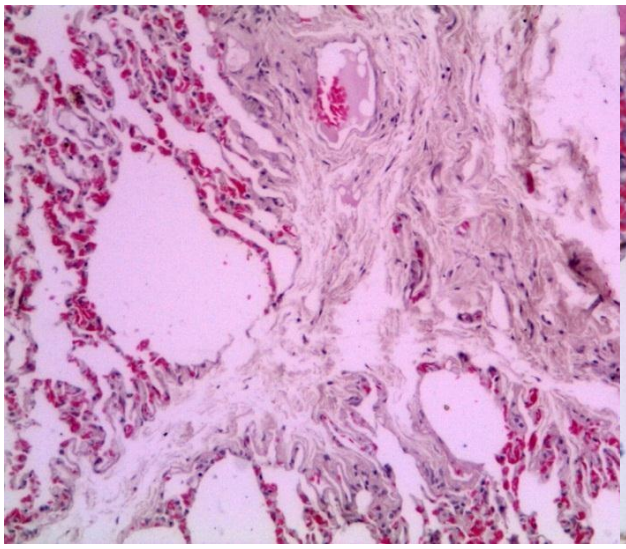

Fig.9. Camel lung tissue showing interlobular fibrosis (pulmonary fibrosis) resulting fromlong standing edema , active alveolar hyperemia and atelectasis..H&E(x10)

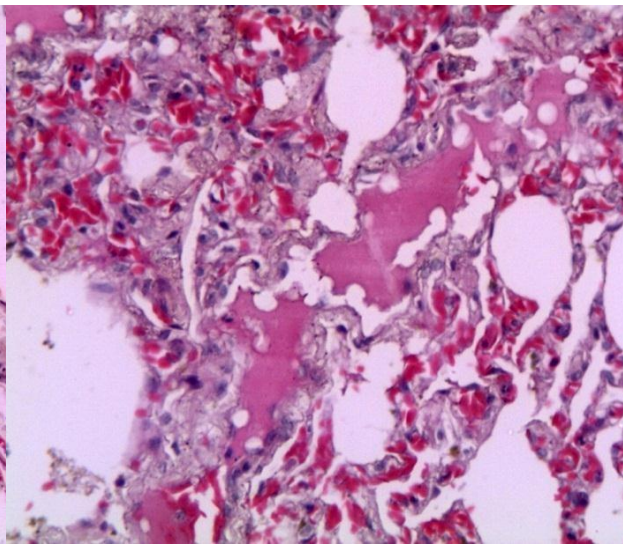

Fig.10. Camel lung tissue showing interlobular haemorrhage, alveolar edema with interalveolar congestion and alveolar emphysema intermittent with atlectasis.H&E(x40)

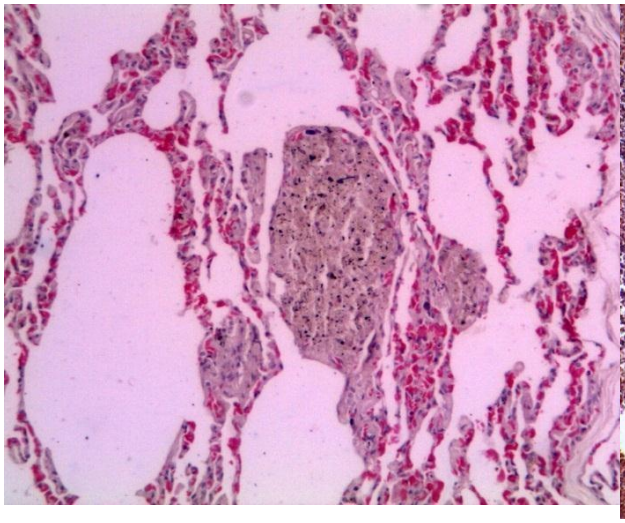

Fig.11. Camel lung tissue showing multiple foreign body granuloma . and congestive atelectasis H&E(x4)

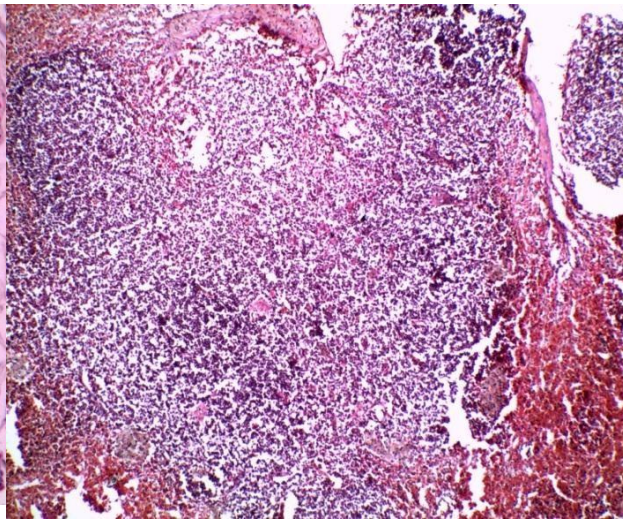

Fig.12. Camel lung tissue showing multifocal histocytic granuloma. .H&E(x20)

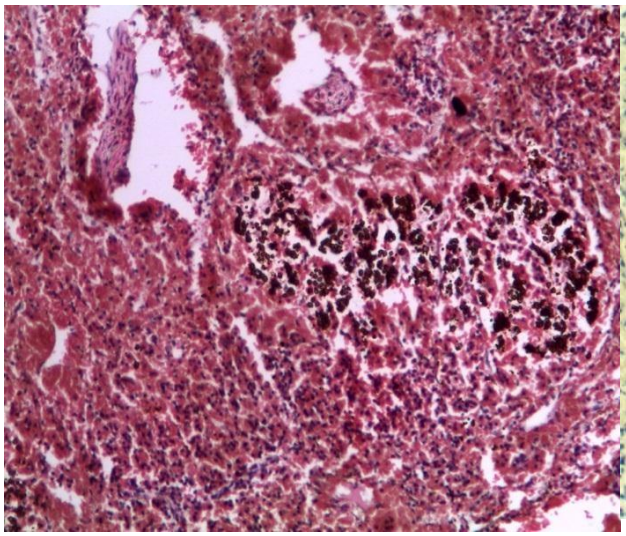

Fig.13. Camel lung tissue showinggranulomatous reaction consist anthracosis with of inflammatory cells mainly macrophages and lymphocytes.H&E(x10)

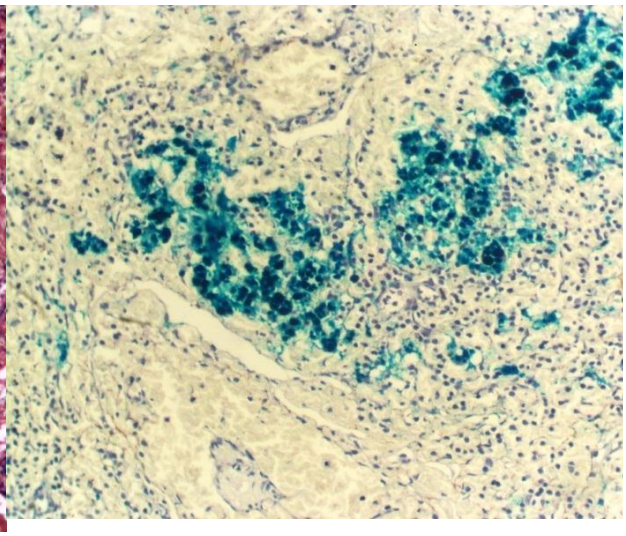

Fig.14. Camel lung tissue: Positive Prussian blue (haemocidrine pigment) in lung of previous case. (x10)

DISCUSSION

In this study, the main bacterial isolates from gross lesions of 40 affected camel lungs were Manheimia haemolytica, klebsiella pneumoniae Staphylococcus aureus, E. coli and Pseudomonas aerugnosa. This finding is almost similar to those reported by Ibrahim et al. (1994), Seddek, (2002) and Al Trazi (2001). This indicates that multiple pathogens can be engaged in the respiratory diseases in camels and this may be referred to different environmental and managemental factors. The same types of isolates were recovered by Al Trazi (2001), El Faki (2003)Bhardwaj et al. (2006) Abdel Hamid et al. (2007) and Bekel, (2008).

On the hand, histopathological examination of H & E stained lung tissue sections from different lesions showed acute and chronic bronchitis and bronchiolitis were observed in the majority of collected samples ,the bronchiole showing hyperplasia of epithelial lining with mild cattarhal

bronchitis. Suppurative pneumonia was evidenced revealing accumulation of large number of macrophages, neutrophils or suppurative exudate filled the alveolar lumen. focal area of liquifactive necrosis with massive infilteration of neutrophils, monocytes and macrophages. In this case the trypanosome spp was detected in lung tissue so it might be the main cause with secondary bacterial infection as Streptococcus pyogenes, pseudomonas, or Staphylococcus aureus.This suggestion is in partial agreement with Abdel Hamid (2007), in only one case appear red hepatization with characterstic pneumoconiosis. The main bacterial isolates Manheimia haemolytica and mycoplasma spp, Lung granuloma: in this study revealed two type of granuloma as foreign body granuloma and multifocal lymphocytic granuloma was formed mainly from lymphocytic cells with disappearance of lung tissue in other case the pulmonary lymphocytic.Interstitial pneumonia was characterized by thickening of inter alveolar septa due to infiltration of a large number of small mononuclear cells mainly lymphocytes. Proliferation of alveolar epithelium led to increased thickening of alveolar septa

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الملخص العربي

"دراسات هستوباثولوجية وبكتريولوجية عن الالتهابات الرئوية في الابل ذات السنام الواحد المذبوحة في مصر"

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الاتهابات الرئويه تعتبر من المشكلات الرئيسيه ف الحيوانات ومنها الابل في العديد من الدول فقد تم فحص ٤٠ رئة من رئات الابل ذات السنام الواحد المذبوحة في مجازر مصر المختلفة تتراوح اعمارها بين ٦ اشهر و ١٠ سنوات وذلك للكشف عن وجود افات رئوية ظاهرة وقد تم اخذ عينات من هذه الافات للفحص الهستوباثولوجي والبكتريولوجي واظهرت النتائج عن وجود هذه الافات في الرئات المصابة وشملت التهاب القصبات الهوائية، التهاب الشعيبات الهوائية، النفاخ السنخي، الوذمة الالتهابية وغير الالتهابية، الاحتقان النشط، الالتهاب الرئوي الخلالي، الأورام الحبيبية الرئوية، الالتهاب الرئوي الصديدي، والالتهاب الرئوي النزفي، كما أسفر العزل البكتيري عن عزل 89 عزلة بكتيرية.

والهدف من هذا العمل عزل أكثر مسببات الأمراض البكتيرية شيوعًا التي تسبب التهابات الجهاز التنفسي في الإبل وكما يهدف أيضًا إلى وصف التغيرات المرضية في رئات الإبل المذبوحة المصابة.

الكلمات الدالة: الإبل، الاتهابات الرئويه ، الهستوباثولوجي ،البكتريولوجي