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دراسات عن اصابات الرئة في الجمال  
في محافظة أسيوط

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تم الفحص البكتريولوجي والباثولوجي لاشنين وخمسون وثه من الجمال وقد وجد  
الالتهاب الرئوي في ٧ من الجمال، وقد لوحظ الالتهاب الشعبي الخفيف والاحتقان في  
سبعة من الجمال وقد تم عزل ميكروب الكلبسيلا والسدومونس اروجينزا والبروتيس فولجارس  
والميكروب العنقودي الذهبي والميكروب السبحي الصديدي والكلبسيلا والستروبكتير  
والكوريني بيوجين والميكروب القولوني، البروتيس رتريجي من الحالات وقد وجد  
النيموكتيوز في أربعة حالات أما الاصابات الطفيلية فقد وجدت في خمسة حالات،  
وقد تمخضت هذه الدراسات على أن أسباب الالتهاب الرئوي في الجمال متعددة •

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**A STUDY ON LUNG AFFECTIONS OF CAMELS  
(*Camelus dromedarius*) In Assiut Governorate  
(With One Table and 8 Figures)**

By  
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**SUMMARY**

Fifty two camel's lung were examined bacteriologically and pathologically. Pneumonia was observed in 6 cases. Congestion and mild catarrhal bronchitis were observed in 7 cases. The microorganisms isolated were *Klebsiella*, *Pseudomonas auregenes*, *Proteus vulgaris*, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Citrobacter*, *Corynebacterium pyogenes*, *E.coli* and *Proteus rettergi*. Pneumoconiosis were detected in 4 cases, and parasitic infestation was observed in 5 cases. A variety of microorganisms were isolated from the affected pulmonary tissues. It was concluded that pneumonia in camels was multifactorial.

**INTRODUCTION**

Lung affections, especially pneumonia, is an important disease in farm animals. Several outbreaks of pneumonia have been recorded from various parts of the world (JUBB and KENNEDY, 1985). It is known that pneumonia may be caused by bacteria, virus, parasite and fungi (JONES and HUNT, 1983). Other elements as environmental conditions including climatic changes and husbandary errors play an important role as predisposing factors to bacterial and viral infection (BAXTON and FRASER, 1977).

Several studies on pneumonia in cattle and buffaloes were done (Singh and MALIK, 1968; SAMEL and MALLICK 1983; SELMAN and WISEMAN, 1983, and WEIBLEN, 1983). Analysis of the literature revealed that, there are few reports dealing with the study of pathological and bacteriological affections of the lung from camels (NABIHA *et al.*, 1981). This work was designed, therefore, to study the pathology and bacteriology of affected lungs of slaughtered camels in Assiut Governorate.

**MATERIAL and METHODS**

Samples from different parts of the lung of 52 camels (2-4 years old) slaughtered in Bani-Adi abattoir during winter time were obtained immediately after being slaughtered. Samples for bacteriological examination were sent to the laboratory in plastic bags. The isolation and identification of bacteria were done according to BAILLY and SCOTT (1974) CRUICHSHANK *et al.* (1974), MERCHANT and BACKER, 1976 and by using API 20 E system\*\* Besides, tissue specimens of each case were fixed in 10% neutral buffered formalin solution and were then processed for paraffin embedding. Sections of 5  $\mu$  thickness were obtained, stained with haematoxylin and eosin and examined microscopically.

\* : Animal Health Research Laboratory, Assiut, A.R.E.

\*\* : APT 20E system (Analytical Products, Plainville, New York, U.S.A.)

A.Z. MAHMOUD et al.**RESULTS**

The results of bacteriological examination of 52 lungs as well as the correlation between the isolated microorganisms with the pathological findings are shown in table (1), no microorganisms could be isolated from 17 lung samples. The pathological findings of 23 samples could be classified according to their nature into seven groups.

The first group included four cases in which the lung was congested. Microscopically, areas of active hyperaemia associated with inflammatory oedema were noticed (Fig. 1). The capillaries were distended with blood and the alveoli were filled with pink-stained, homogenous precipitate. Klebsiella organisms were isolated from two of these cases, while either Pseudomonas aerogenes or Proteus vulgaris was isolated from one of each of the other two cases.

The second group included three cases. Grossly, the lung showed focal areas of consolidation. The affected areas were hepatized, reddish in colour, and of lobular distribution. Microscopically, the interalveolar capillaries were dilated and distended with blood. Some of the alveoli were filled with cellular inflammatory exudate consisting of fibrin, erythrocytes, neutrophils, lymphocytes and mononuclear cells while haemorrhage was seen in the lumen of others (Fig. 2). The bronchial system showed accumulation of fibrinous exudate containing mononuclear and polymorphonuclear cells. Staphylococcus aureus, Streptococcus pyogenes or Klebsiella and Citrobacter were isolated, each from one of the three cases.

The third group included two cases. Grossly, the lung from these cases showed multiple focal areas of consolidation with a dark grayish colour and a lobular distribution. Microscopically, the bronchial system was filled with cellular exudate in which the main types of leucocytes were polymorphonuclear and monocyte cell type. The epithelial lining of the bronchi and bronchioles showed desquamative changes. The wall of the bronchi and bronchioles were infiltrated with lymphocytes and mononuclear cells. Peribronchial accumulation of cellular exudate was a prominent feature. The alveoli were distended with cellular exudate (Fig. 3) while few were distended with fibrin or serous fluid. Minute focal areas of necrosis were sometimes seen involving the small bronchioles. Bacterial colonies sometimes could be observed in the necrotic tissues. The interstitial tissue of the lung were thickened by cellular infiltration. Corynebacterium pyogenes was isolated from these two cases.

The fourth group included one case. The lung from this case showed only microscopic lesions in which the predominant reactive cells were large with a rounded central nucleus and a rather abundant cytoplasm (fig. 4). The bronchial system showed moderate changes. The lumen of some of the bronchi and bronchioles contained a little amount of polymorphonuclear and monocytic cells. The bronchial epithelium sometimes showed mild proliferations. E.coli and Proteus rettgeri were isolated from this case.

The fifth group involved three cases where the lung showed mild bronchitis characterized by desquamative changes of the epithelium of the large bronchi. The lumen of these bronchi showed accumulation of mucous cellular debris and few inflammatory cells. Only one case showed old calcified abscess with a mild polymorphonuclear cell reaction in the alveoli. Staphylococcus aureus was isolated from these cases.

The sixth group involved four cases. Grossly the lung from these cases showed minute focal areas of blackish discoloration. Microscopically, dust particles were seen in the tissue as fine granules of dark black colour with a different size and shape. These granules initiated fibroblastic proliferation which appeared in the form of dense nodules. These nodules consisted of fibroblastic cells and some collagen fibrin entrapping the area. The nodules localized either

perivascular, peribronchial, or interalveolar in the interstitial connective tissue. They were also associated with areas of emphysema. Mild desquamative bronchitis was observed in the cases of this group (Fig. 6). Proteus vulgaris and Citrobactor were isolated from this group.

The seventh group involved six cases. The lung from four cases showed echinococcus cysts. Although the cysts did not initiate any inflammatory reaction yet they caused displacement of the tissue around them. Micrococcus species and Citrobactor organisms were isolated from three of them while the fourth case was negative bacteriologically. The lung from one case of this group was infested with Dictyocaulus species. The larvae of this parasite were observed in the bronchi and sometimes in the alveoli (Fig. 7). The parasite produced mild catarrh in some of the bronchi characterized by light desquamation of the bronchial epithelium and accumulation of cellular debris. This was associated with area of emphysema or atelectasis in the related alveoli. In the alveoli the parasite caused displacement of the tissue around it. Proteus vulgaris and micrococcus species were isolated from this case. The arteries of the lung from the last case of this group showed old thrombi. These thrombi were organized by connective tissue and were recanalized (Fig. 8). Some parts of the connective tissue of the organized thrombus showed fibrinoid necrosis. In few instances the organized thrombus was lysed. This case was negative bacteriologically.

Bacterial isolation was recorded from 14 lungs in which histopathological changes could not be detected. Negative bacteriological as well as pathological results were found in the rest of cases (15 lungs).

### DISCUSSION

Pathological studies of 52 camels, lung slaughtered in the abattoir showed that pneumonia occurred in only 6 cases (12%). Four other cases showed mild congestion and oedema. Mild bronchitis was observed in three cases. A variety of microorganisms have been isolated from the inflamed lungs and included Klebsiella, Pseudomonas auregenes, Proteus vulgaris, Staphylococcus aureus, Streptococcus pyogenes, Klebsiella and Citrobactor, Corynebacterium pyogenes, E.coli and Proteus rettergi as well as Staphylococci aureus. Our results in accordance to those of ARORA and KALRA (1973) who isolated Klebsiella and diplococci species from bronchopneumonia in camels. As mentioned by BAILY and SCOTT (1974) Klebsiella and pseudomonas aerogenosa were found in upper and lower respiratory tract are pathogenic microorganisms.

SHIGIDI (1973) isolated and identified microorganisms from nasal swabs, lung and bronchial lymph nodes of apparently healthy camels. These microorganisms included bacilli 26.2%, diphtheroid 15.9% Corynebacterium pyogenes 5.4%, alpha haemolytic Streptococcus 5.1%, E.coli 1% and Enterobactor aerogenes 0.5%.

WOLF et al. (1975) mentioned that E.coli, klebsiella, proteus species, Pseudomonas aerogenosa and coagulase-positive Staphylococci were pathogenic microorganisms frequently encountered in upper respiratory tracts, similar results were also recorded by GHAWI (1978) who isolated Staphylococcus aureus and Klebsiella species from pneumonic camels lung.

From four cases showing pneumoconiosis, Proteus vulgaris and citrobactor were isolated. The nodular lesions observed in these cases were probably induced by excessive inhalation of dust particles and the isolated organism had no role in the production of these lesions but, were introduced into the lung with inhaled dust. Three cases were found to be infested with hydrated cysts, with isolation of micrococcus species and citrobactor. A larval stage of a parasite which was suspected to be a dictyocaulus species was observed in the small bronchi

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and alveolar tissue in one case, the larva was sometimes associated with mild catarrhal bronchitis and atelectosis of the lung tissue.

An interesting case was observed in this study, in which some arteries of the lung were thrombosed, the thrombus was organized and in most instance were recanalized. In our opinion this thrombus might be due to a previous blood parasite (filaria or trypanosoma).

It was clear that the respiratory tract of apparently normal animals acted as a reservoir for many species and types of microorganisms. These microorganisms reached the nasal cavity either through inhalation or during drinking. Stress factors such as changes in the hygienic, environmental and climatic conditions play a role in the onset of pneumonia (BUXTON, and FRASER, 1977). Such factors would lower the resistance of the lung tissue and the existing organism most probable would get the upper hand. This concept was supported in the present study by the fact that a number of bacteria was isolated from 29 cases which showed no pathological lesions.

Pneumoconiosis observed in the present work was found to be associated with the formation of a fibrotic nodule in the lung which would decrease the respiratory area and subsequently would have a deleterious effect on the animal.

**Table (1):** The relation between bacterial flora and Pathological finding of 52 examined lung.

Isolated microorganism	Frequency	Pathological finding
Klebsiella	2	Congestion
Pseudomonas auregenes	1	Congestion
Proteus vulgaris	1	Congestion
Staphylococcus aureus	1	Hepaticization
Streptococcus pyogenes	1	Hepaticization
Klebsiella and Citrobacter	1	Hepaticization
Corynebacterium pyogenes	2	Bacterial pneumonia
E.coli and Proteus rettgeri	1	Atypical pneumonia
Staphylococcus aureus	3	Mild catarrhal bronchitis
Proteus vulgaris and citrobacter	4	Pneumoconiosis
Micrococcus species and citrobacter	3	Hydatid Cyst
Negative	1	Hydatid cyst
Proteus vulgaris and Micrococcus	1	Ditococlys species
Negative	1	Suspected blood parasit
Micrococcus species	5	Negative
Proteus rettgeri	1	Negative
E.coli	1	Negative.
Staphylococcus albus	5	Negative
Citrobacter	2	Negative
Negative	15	Negative

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## LEGEND OF FIGURES

- Fig. (1): Pulmonary oedema. H & E ( X 16x12.5 ).
- Fig. (2): Focal area of pneumonia with mild cellular reaction. H & E ( X 16x12.5 ).
- Fig. (3): Focal area of pneumonia with extensive cellular reaction. H & E ( X 16x12.5 ).
- Fig. (4): Proliferation of alveolar cells. H & E ( X 40x12.5 ).
- Fig. (5): Foci of pneumoconosis. H & E ( X 16x12.5 ).
- Fig. (6): Desquamation of the bronchial epithelium. H & E ( X 16x12.5 ).
- Fig. (7): Dictolus laea in the slvecolav tissues. H & E ( X 40x12.5 ).
- Fig. (8): Orgnized and denulized thrombus. ( X 25x12.5 ).









