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The pulmonary Parenchymal Lesions and Incidences of Infectious Bronchitis and *Mycoplasma gallispticum* Infection in Broilers

Karam H. Al-Mallah[1] and Mohammed I. Ahmed[2]

[1,2]*Department of Pathology and poultry diseases,College of VeterinaryMedicine,University of Mosul, Iraq.*

THE MAIN target of this study was to reveal the relationship between incidences of each of CRD and IB disease in broilers, clinically showing signs of severe respiratory disorders from production fields at Nineveh province, as well as highlighting the relations between those two infections and the occurrence of lesions in lower respiratory tract. For serving the purpose, 198 broiler bird was isolated after confirmed showing severe respiratory disorders from 25 production field in Nineveh province for the period from 1/11/2021 to 1/2/2022. The clinical observations were recorded, blood serum tested by ELISA to confirm infection with *Mycoplasma gallisepticum* and IB virus antigens, recording the gross pathological notes and for harvesting samples of the lower respiratory system which preserved, then 99 samples of them were randomly selected for histopathological examination that studied lesions in pulmonary parenchyma. The results demonstrate a high variation in incidence rate of the infection between the CRD by *Mycoplasma gallisepticum* reaching 81.3%, were the incidence rate of infection with IB was 1.5 %, the incidence rate of the mixed infection was 1.5% as well. Gross examination also supported the clinical signs by revealing pathological changes with the inflammatory nature at all the examined birds including pulmonary congestion, fibrin deposition, adhesions between pulmonary lobs and air sacs and cheesy deposition in bronchi and airs sacs. There was hyperemia and pulmonary edema at ratios 91.91% and 84.84% respectively, pleuropneumonia and pleural fibrosis and thickening at ratios 32.32% and 19.19% at pulmonary-pleural junction area. These lesions were variated in their severity between samples The correlation test results showed a significant link between infection with Mycoplasmosis and hyperemia, pulmonary emphysema at ($P \leq 0.01$) also there was a significant correlation between Mycoplasma infection and each of perivascular hemorrhage, cellular inflammatory infiltrations, caseous necrosis and pulmonary fibrosis at ($P \leq 0.05$) as well as there was a significant correlation link ($P \leq 0.01$) between IB and pleural fibrosis. The study concluded that both of these two infections were related to incidence of lesions but they more synchronized and correlated to the infection of *Mycoplasma gallisepticum* while very limited pathological relevance were linked with IB, may be due to the success of the applied vaccination programs to control it in fields.

Keywords: Pulmonary parenchyma , Infectious bronchitis , Mycoplasma.

Introduction

Chronic respiratory disease

Chronic respiratory disease is a disease of chickens, characterized by the presence of respiratory symptoms (sneezing, coughing, rales, a change in sound, and the nasal secretions [1]. It causes a group of microorganisms called the collection of Pleuropneumonia Group, the most prominent of which are: *Mycoplasma gallisepticum* and *Escherichia coli*. This disease does not often occur alone, as it may be associated with several diseases, including Newcastle disease, infectious bronchitis, chronic fowl cholera and other bacterial diseases. Therefore, this disease may occur as a mixture of other diseases and often causes high mortality rates in broiler chickens and economic losses. Significant due to low weight gain, isolation of infected birds

*Corresponding author: Karam H. Al-Mallah, E-mail: Karamyahya74@uomosul.edu.iq . Tel.: 009647701699181
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and their culling, especially when an outbreak of air sac infection, as well as in laying hens, leads to a sharp decrease in egg production up to 30-40%[1]. The precise diagnosis of *Mycoplasma gallisepticum* depend on the serological detection with isolation and identification of the organism and the modern molecular techniques [2].

Infectious bronchitis

Infectious bronchitis is a worldwide disease of the broiler chickens, it is common and of commercial importance alike, it causes mortalities, growth retardation, and high rates of spoilage of broiler birds, as all these reasons lead to economic repercussions in the poultry industry. Moreover, a decrease in the production of Eggs, internal and external egg quality and hatchability in laying hens and Breeder mothers. Secondary pathogens can make the treatment of this condition more difficult, which leads to higher rates of infection and death, as the infection reduces the weight gain of infected incubating chickens as well as the quality of eggs and infected laying hens' outputs, which leads to economic effects [3,4].

Through this study it was shown that Lung histopathology revealed moderate to severe interstitial artery and blood capillary congestion, as well as varied degrees of haemorrhages and interstitial oedema. With medial cystic dilatations, pulmonary arterioles seemed thickened. Perivascular leukocytic infiltration was frequently detected, consisting of heterophils mixed with mononuclear cells. Occasionally, plexiform lesions were seen. Although the par bronchi, air spaces, and air capillaries were normal in some instances, broncho-interstitial pneumonia and hemorrhagic bronchopneumonia were often seen. Bronchointerstitial pneumonia was distinguished by interstitial thickness, heterophilic infiltration mixed with mononuclear cells, and the presence of inflammatory exudates in the parabronchi. Haemorrhagic bronchopneumonia was related with the presence of necrotic material in the lumen of parabronchi, mesobronchi, and metabronchi, as well as haemorrhagic inflammatory exudates including heterophils and mononuclear cells, creation of fibrous connective tissue in the interstitum, and solidifying of the air space wall due to muscle trabiculae hypertrophy. Osseous metaplasia was observed on rare occasions. [5]. In the lungs, the MG mean genome copy counts in the unvaccinated group that got only MG were around 12-fold lower than in the unvaccinated group that received both MG and IBV. The immunizations demonstrated two distinct impacts on the replication of MG in the lungs. While 6/85 vaccinated birds exhibited a substantial decrease in MG mean genome copies, MG and IBV replication levels in the lungs had dropped significantly [6]. The lungs were hyperemic and edematous, with triangular and diamond-shaped lesions occasionally detected, indicating hematogenous spread of the infecting agent to these zones [7]. Microscopic lesions in IBV-M41-infected embryos have been investigated. By the sixth day of PI, there was congestion with perivascular cuffing and partial necrosis of the liver. Lungs were pneumonic, with bronchial sac congestion, cellular infiltration, and serous exudate. Interstitial nephritis with edoema and distension of the proximal convoluted tubules as well as the presence of casts was seen in the kidney. Glomeruli did not change. The CAM and amniotic membrane were both edematous. There were no inclusion bodies discovered [8]. Chronic interstitial pneumonia with loss of bronchiolar epithelium was discovered in the lungs. Pneumonia was distinguished by significant congestion and fibrin buildup in the lung parenchyma [9]. The viral genome load in the trachea and lung was measured using the complementary DNA (cDNA) originating from RNA extracted from IBV-infected chickens by analysis with real-time quantitative polymerase chain reaction [10].

Material and Methods

Survey

Twenty five production fields of broilers were visited for selecting birds with severe respiratory distress, those fields located at different regions of Nineveh province including (Rbiaa, Hamdanya, Bashiqa, Gogjali, Bartella, Telqaif, Quiara, Sherqate, Humaidate and Telaafer) for the period extended from 1/11/2021 to 1/2/2022. The ethical approval license numbered UM.VET.2021.077 .

Selected broilers

A total of 198 broilers were selected from the visited fields, who clearly showed a severe clinical signs of respiratory distress, the clinical signs also recorded, the birds transported to the laboratory for sampling.

The blood and tissue samples

The blood collected directly from the heart to a clean plastic tubes, left to coagulate, centrifuged at (2000) RPM for 5 minutes to separate serum which is collected and kept in deep freeze. Birds were euthanized by cervical dislocation, The necropsy finding were recorded and the lower respiratory system was harvested and preserved in 10% neutral buffered formalin.

Serological conformation for pathogens

Both of *Mycoplasmosis* and IB antigens were detected through estimation of antibody levels in

serum by using of indirect ELISA technique. ELISA kit from Biocheck (manufacturing facility in the UK and our commercial head office in the Netherlands). Were used, the conjugated antibody reacted to the antigen in the plate who doesn't trapped by serum antibodies, the absorbance was assessed at 650 nm wave length and calibrated to antibody titer. [11] the vaccine index (VI) was calculated for each field. [11] The titer of the samples from the same field were compared to the field (VI) and the values above it considered as infected, the infected – non infected characteristic were turned to the digital values (1, 0) for the two pathogens to be used for statistical analysis [12].

Histopathological exploration

Ninety nine samples of the lower respiratory tract tissue were elected randomly and processed for microscopical examination through trimming, dehydration, clearing, embedding with paraffin, sectioning and staining with hematoxylin and eosin [13]. The microscopical examination for each sample focused on the bronchi, bronchioles and peribronchiolar areas. The monitored pathological changes were recorded and their severity was expressed digitally to 4 grades as (0,1,2,3) to determine the lesion score for each sample [14,15].

Statistical Analysis

The relation between each pathogen infection status and the occurrence of each noticed lesion with severity was estimated by using Spearman's correlation test for ordinal data / SPSS /Version 19. [12].

Results

Clinical signs

The clinical signs included sternal or lateral recumbency, nasal discharge, extended neck with gasping, lacrimation, moist rals sound with breathing, sneezing and difficult breathing, losing intraction with environment and diarrhea at few birds Figure (1).

Necropsy Findings

The lungs showed mild to severe congestion with regions of hepatization, shrinkage in some lobs, foci of pulmonary emphysema, most of bronchi are inflamed containing either frothy catarrhal exudate or caseated purulent exudate may obstruct lumen, fibrinous exudate noticed in many samples covering the surface of lungs, air sacs and liver surface in the form of pseudo membranes, air sacs contained caseation and hydropericardium had been noticed in few samples. Figure (2).

Serological identification

ELISA test results for all studied samples cleared infection with infectious bronchitis virus in only 3 birds from total of 198 birds at incidence rate 1.5% from total samples while infection with *Mycoplasma gallisepticum* was confirmed in 161 birds with incidence rate 81.3% of samples, the dual infections appeared at 1.5% of total samples. Table (1).

Histopathological examination

The histopathological examination of the pulmonary tissue showed pathological changes that variated in severity between sections, the most frequently seen lesions were hyperemia at 91.91% of samples, perivascular edema at 84.84%, diffused edema at 46.46% and perivascular hemorrhage at 94.94% as incidence rate in examined samples. Figures (3, 4, 5, 6). Inflammatory cells infiltrations also noticed at perivascular areas in 94.94% of the sections. Figure (7), atypical proliferative pneumonia has been recognized at 2.2% and pulmonary emphysema at 39.39%. Figures (8, 9), pulmonary fibrosis at 33.33%. Figure (10), Caseous necrosis with granulomatous reaction clearly diagnosed at 36.36% of the total examined sections. Figure (11). Table (2).

The spearman's correlation test revealed a significant link between *Mycoplasma gallisepticum* infection and each of hyperemia, perivascular edema, diffused edema and pulmonary emphysema at ($p \leq 0.01$). Also there was significant link between *Mycoplasma gallisepticum* infection and each of perivascular hemorrhage, inflammatory cells infiltrations, pulmonary fibrosis and caseous necrosis with granuloma at ($p \leq 0.05$). The correlation test didn't show any significant link between infectious bronchitis virus infection and pulmonary parenchymal lesions Table (3).

Image 1. Broiler with sternal recumbency with difficult breathing and gasping.

Image 2. Broiler with face swelling, lacrimation and nasal discharge.

Fig. 1. Broilers showing Signs of respiratory distress.

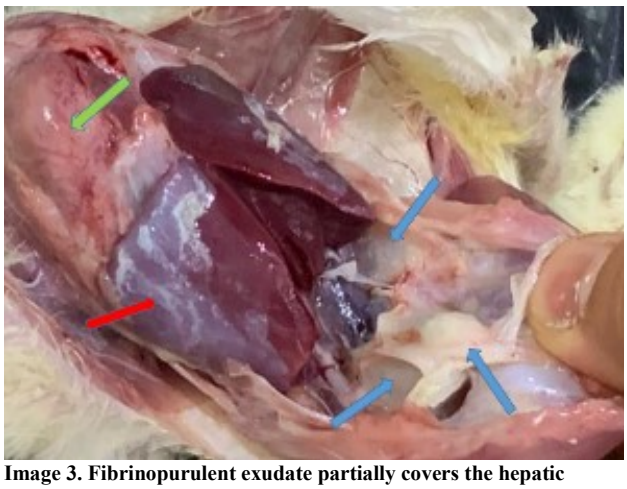

Image 3. Fibrinopurulent exudate partially covers the hepatic surface (Red arrow) and fills air sacs (Blue arrow) with purulent fibrosis and adhesions between abdominal viscera (Green arrow).

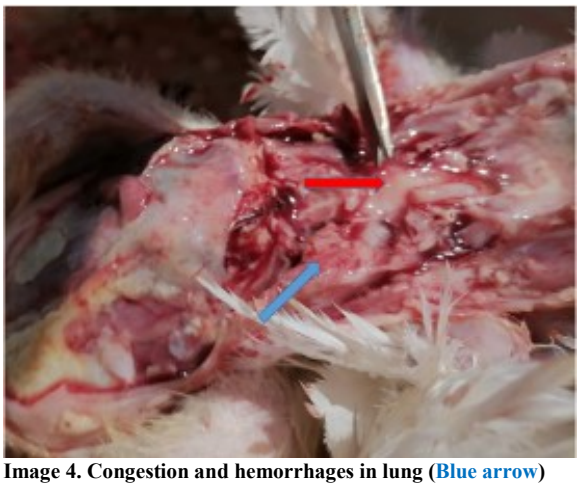

Image 4. Congestion and hemorrhages in lung (Blue arrow) and accumulation of purulent exudate in air sacs (Red arrow).

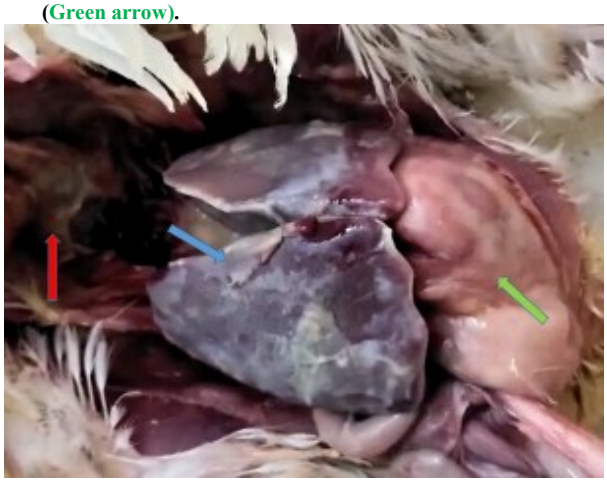

Image 5. pseudomembranous fibrinopurulent exudate at the liver surface (Blue arrow) precipitate in air sacs (Red arrow) and between intestinal coils (Green arrow).

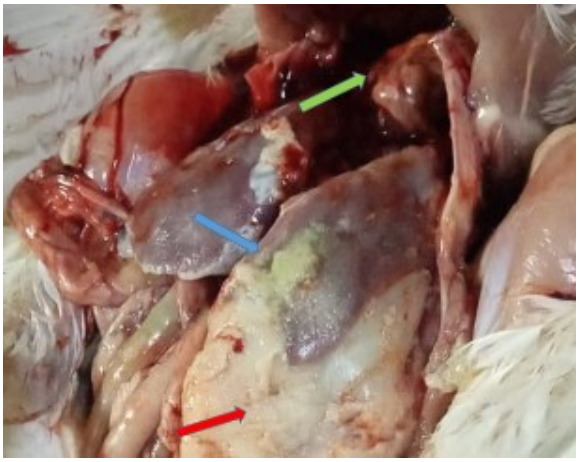

Image 6. Caseous necrosis in liver (Blue arrow), sub capsular accumulation of fibrinous exudate (Red arrow), polymerized masses of fibrin in pericardial sac (Green arrow).

Fig. 2. Necropsy finding of broilers showed respiratory illness.

TABLE 1. Incidence rates of infectious bronchitis virus and *Mycoplasma gallisepticum* in broilers showed signs of respiratory distress from different fields of Nineveh province.

Field No	No of isolated birds	IBV positive%	MG positive%	Mixed infection%
1	4	8%	75%	8%
2	3	0%	35%	0%
3	5	20%	100%	20%
4	7	0%	100%	0%
5	5	0%	60%	0%
6	4	0%	100%	0%
7	8	0%	100%	0%
8	5	0%	100%	0%
9	26	0%	100%	0%
10	15	13.3%	100%	13.3%
11	17	0%	100%	0%
12	8	0%	62.5%	0%
13	2	0%	50%	0%
14	5	0%	100%	0%
15	10	0%	90%	0%
16	5	0%	100%	0%
17	4	0%	100%	0%
18	4	0%	100%	0%
19	5	0%	100%	0%
20	13	0%	30.7%	0%
21	10	0%	100%	0%
22	4	0%	75%	0%
23	10	0%	70%	0%
24	4	0%	75%	0%
25	3	0%	66.6%	0%
	Total number of samples (Broilers)	**Total incidence of IBV**	**Total incidence of MG**	**Total Mixed infection**
	198	1.5%	81.3%	1.5%

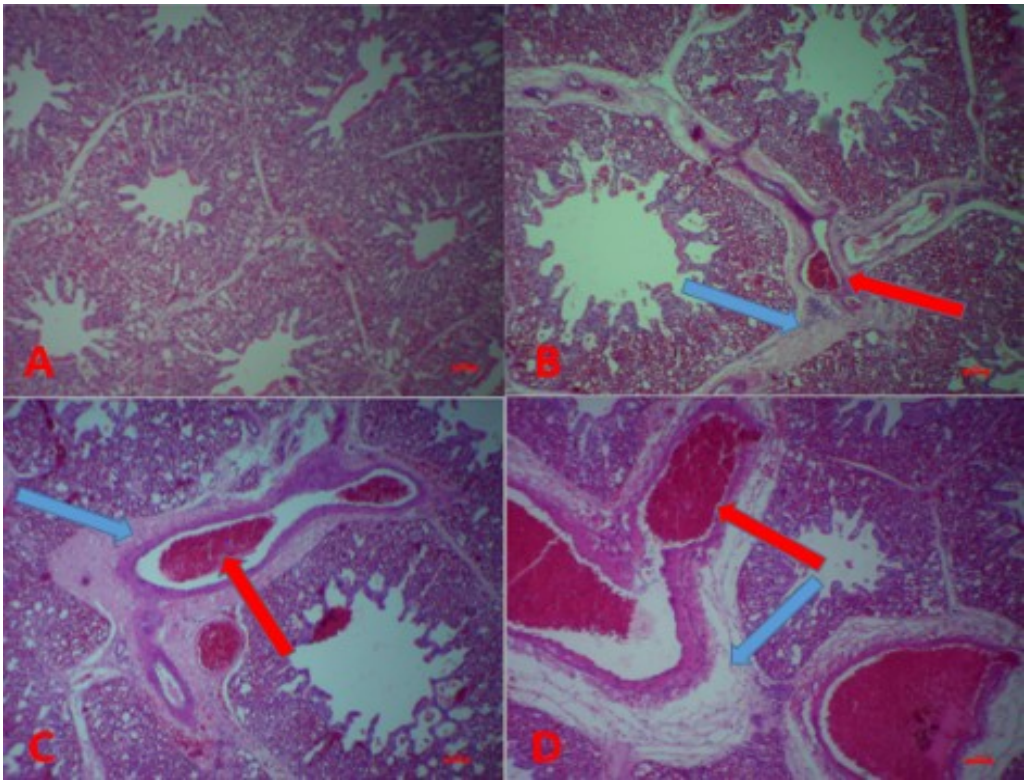

Fig. 3. Screens vascular hyperemia of the pulmonary parenchyma (Red arrows) and perivascular edema (Blue arrows). Hyperemia as lesion was graded as (A=0), (B=1), (C=2), (D=3).Magnification 40X. Scale bar=50 µm. Staining H&E.

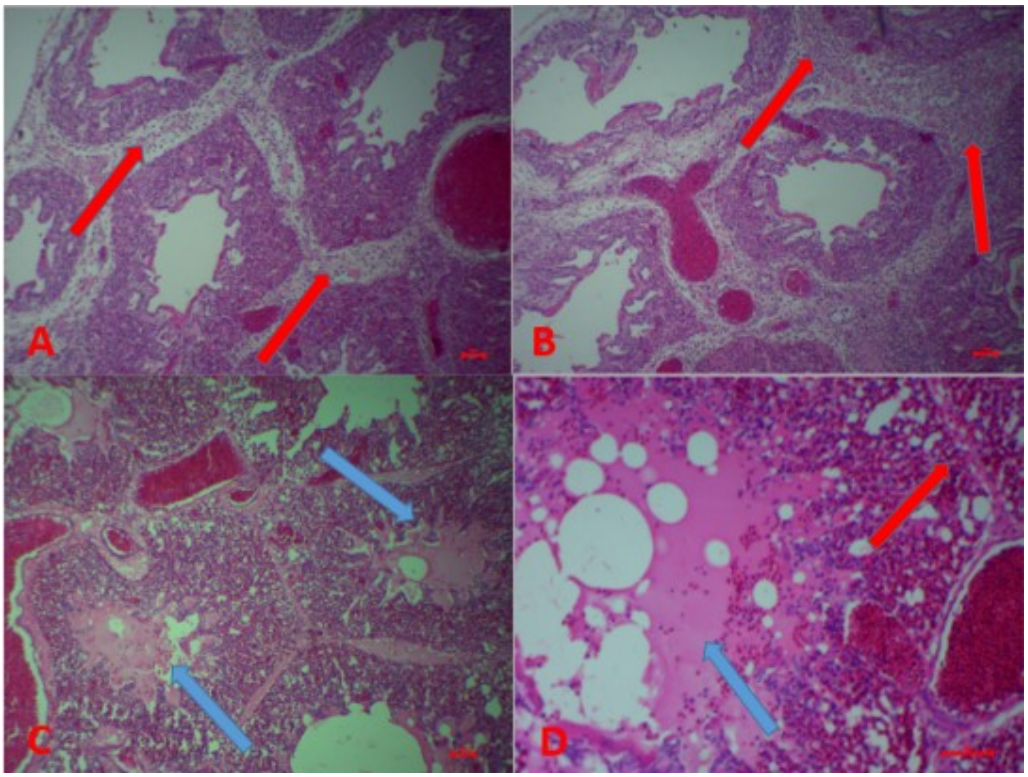

Fig. 4. Showing interstitial edema in interlobular septa (Red arrows) and mid lobular edema (Blue arrows). the lesion was graded as (A=1), (B=2), (C=3) Magnification 40X, (D=3) Magnification 100X.Scale bar=50 µm. Staining H&E.

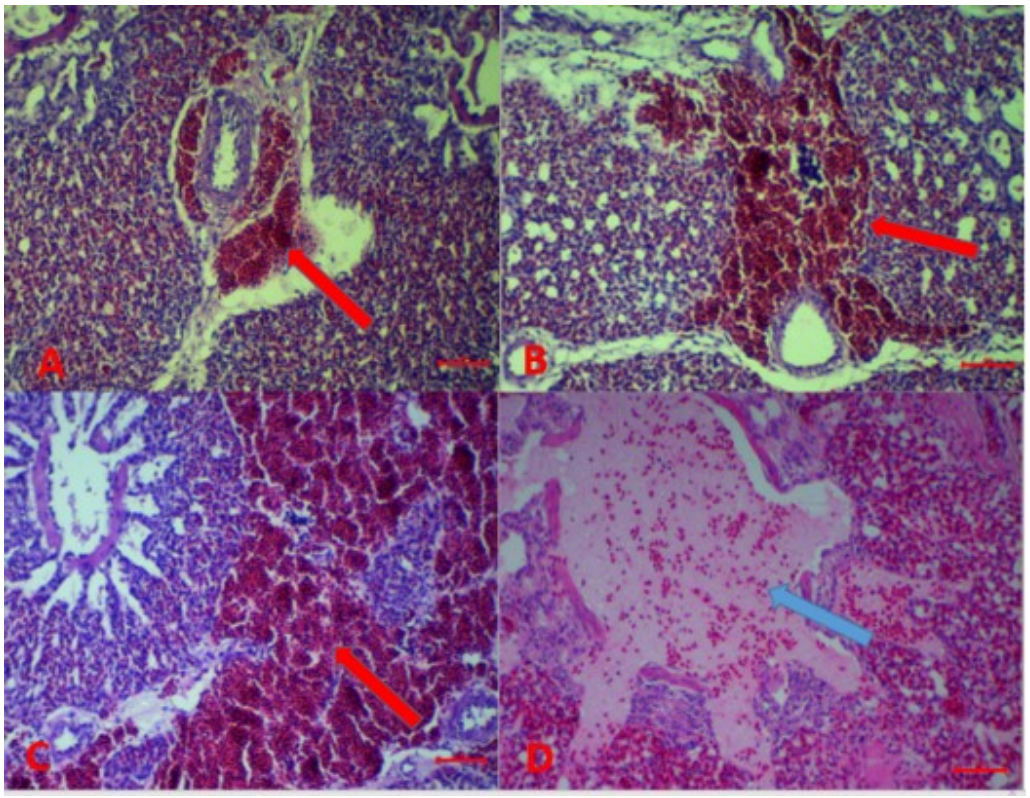

Fig. 5. Perivascular pulmonary hemorrhage of broilers lung (Red arrows). The lesion graded as (A=1), (B=2), (C=3), the (Blue arrows) points hemorrhage with severe pulmonary edema (D). Magnification 100X, Scale bar=50 µm. Staining H&E.

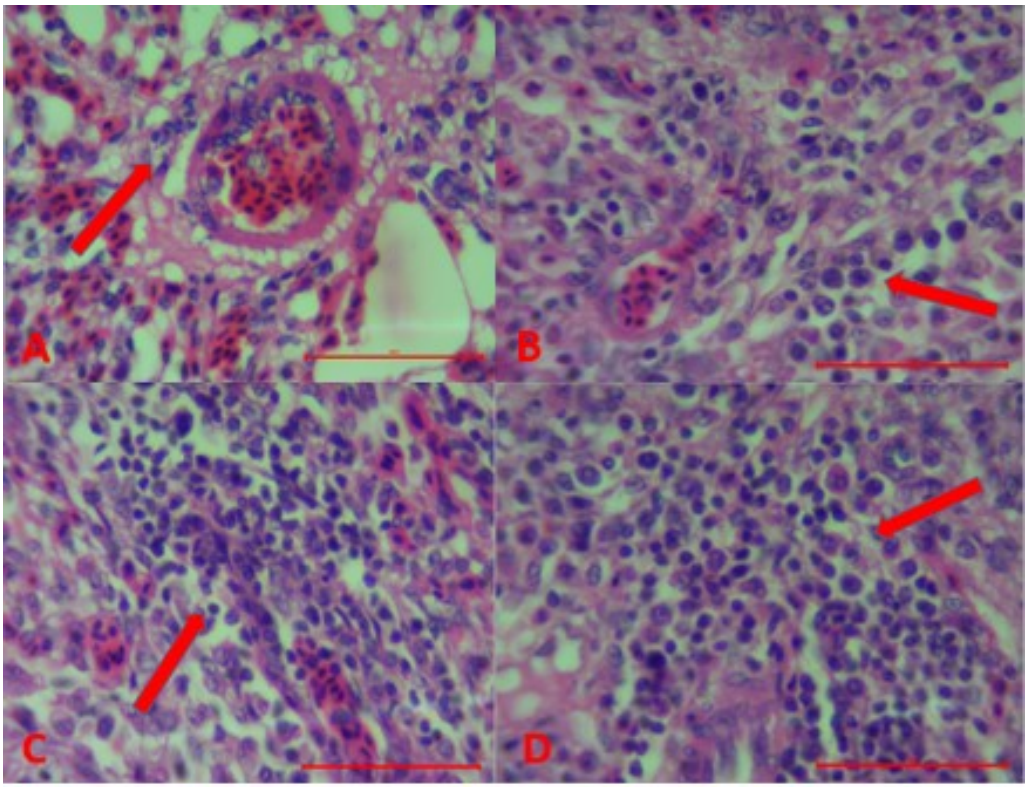

Fig. 6. Perivascular inflammatory cellular infiltrations (Red arrows). The lesion graded as (A=1), (B=2), (C=3), (D=3). Magnification 400X, Scale bar=50 µm. Staining H&E.

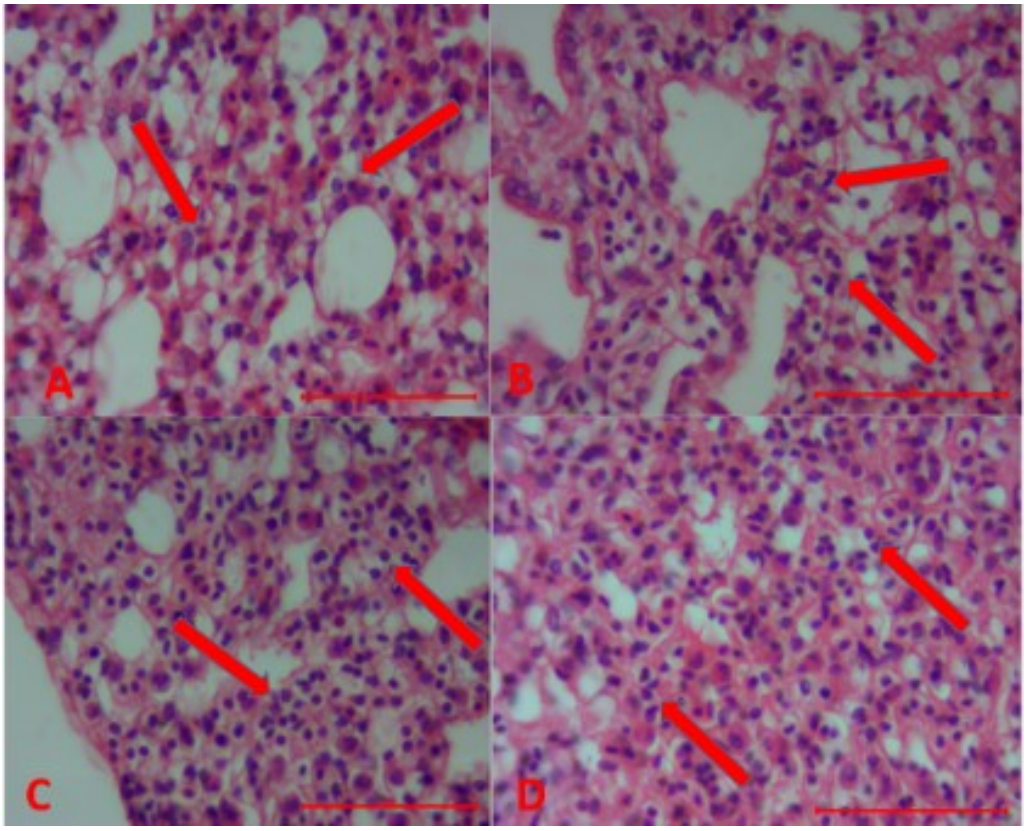

Fig. 7. Demonstrate interstitial pneumonia in broilers manifested by infiltration of lymphocyte and plasma cells at perivascular and perialveoler areas (Red arrows). The lesion graded as (A=1), (B=2), (C=3), (D=3). Magnification 400X, Scale bar=50 µm. Staining H&E.

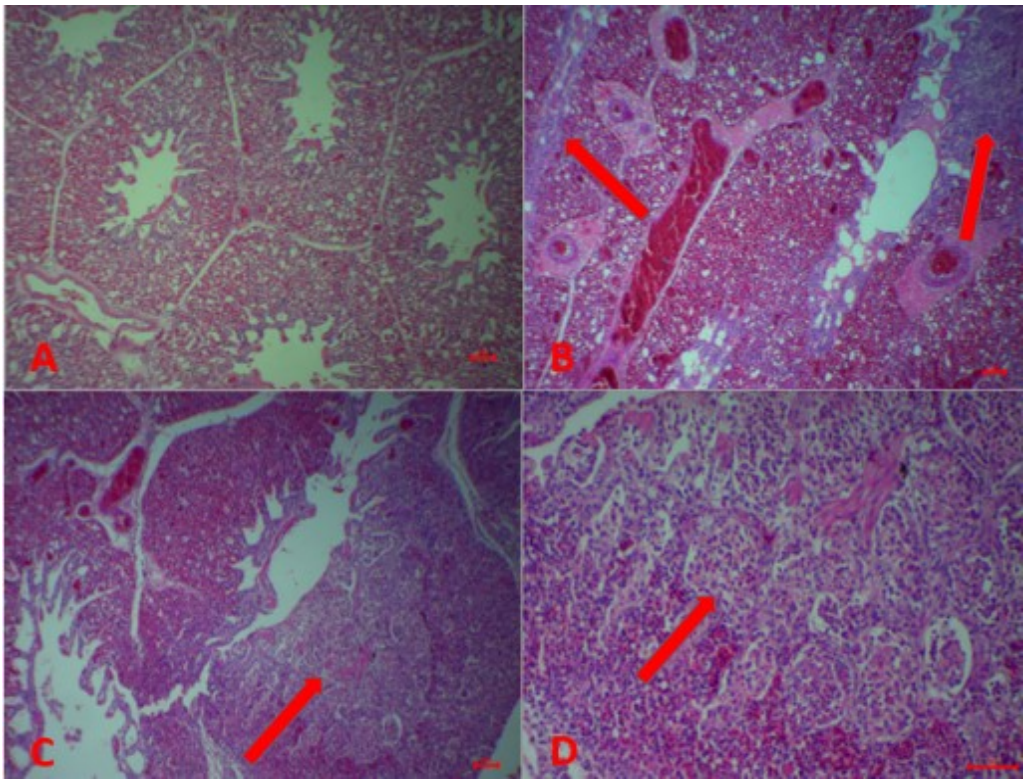

Fig. 8. Showing proliferative pneumonia manifested by parabronchial and air capillary epithelial hyperplasia in the pulmonary lobules (Red arrows) with inflammatory cells infiltrations. Image (A) normal pulmonary tissue. Images (B), (C) and (D), Screened the lesion. Magnification 40X and 100X. Scale bar=50 µm. Staining H&E.

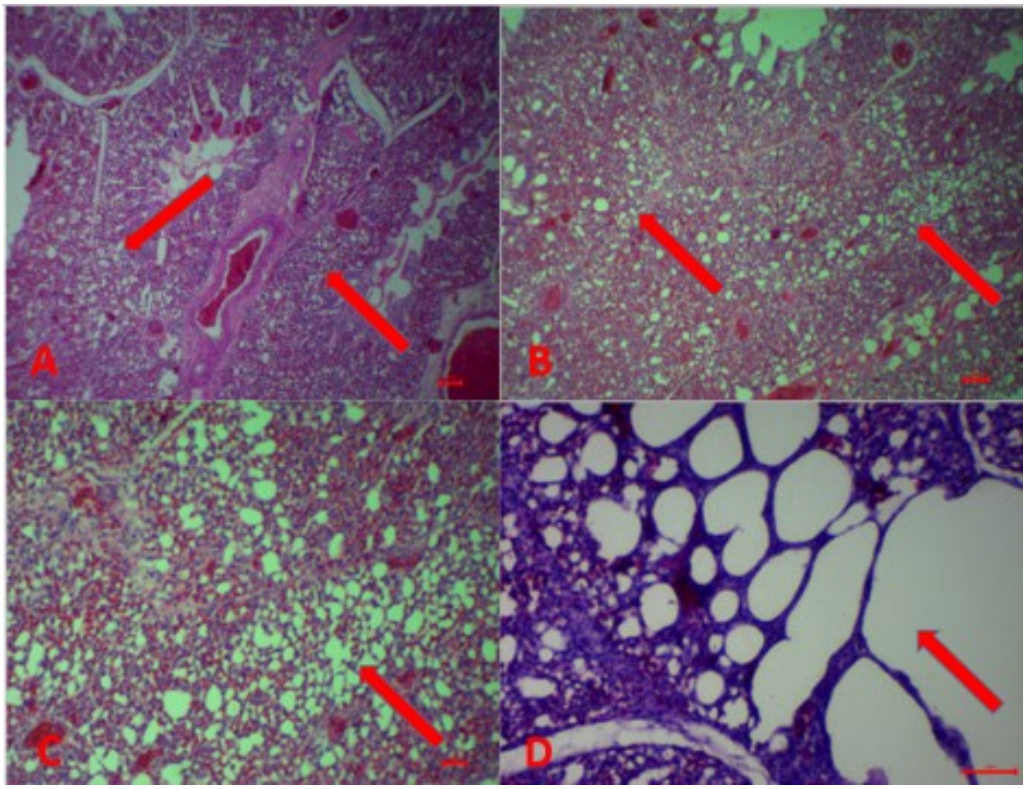

Fig. 9. Pulmonary emphysema manifested by dilation and rupture of air capillaries walls in pulmonary lobules (Red arrows). The lesion graded (A=1), (B=2), (C=3), (D=3). Magnification 40X and 100X. Scale bar=50 µm. Staining H&E.

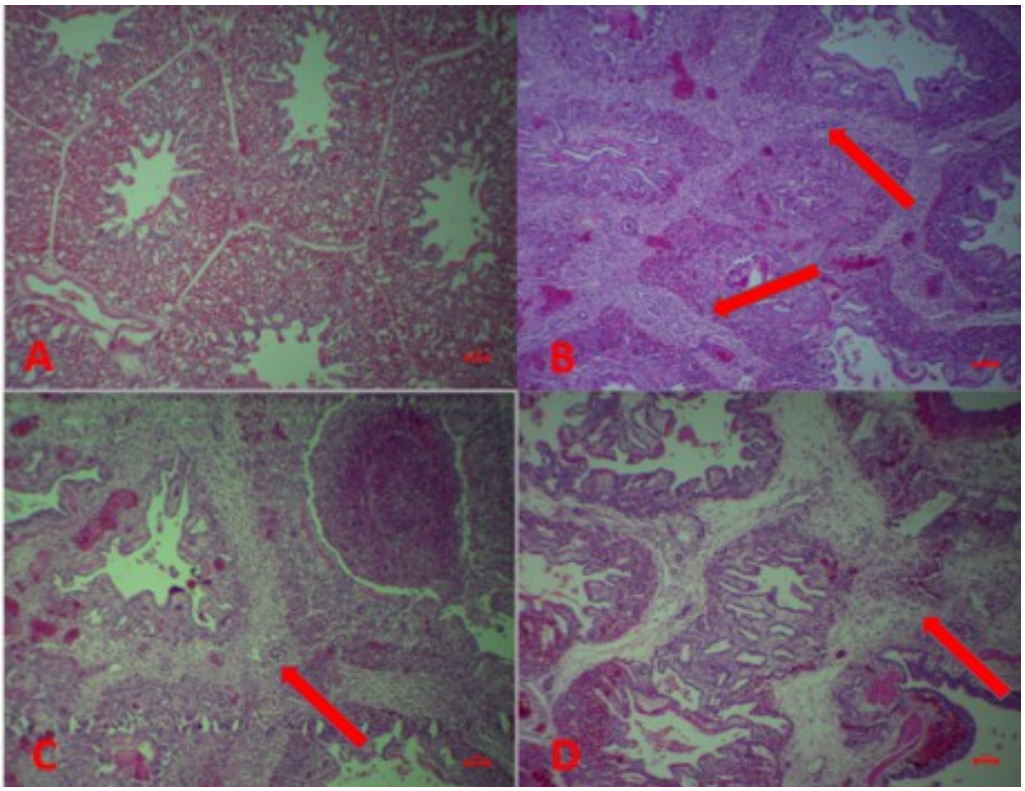

Fig. 10. Pulmonary fibrosis in broiler identified by thickening of intralobular septa by proliferating fibrous tissue (Red arrows). The lesion graded (A=1), (B=2), (C=3), (D=3). Magnification 40X. Scale bar=50 µm. Staining H&E.

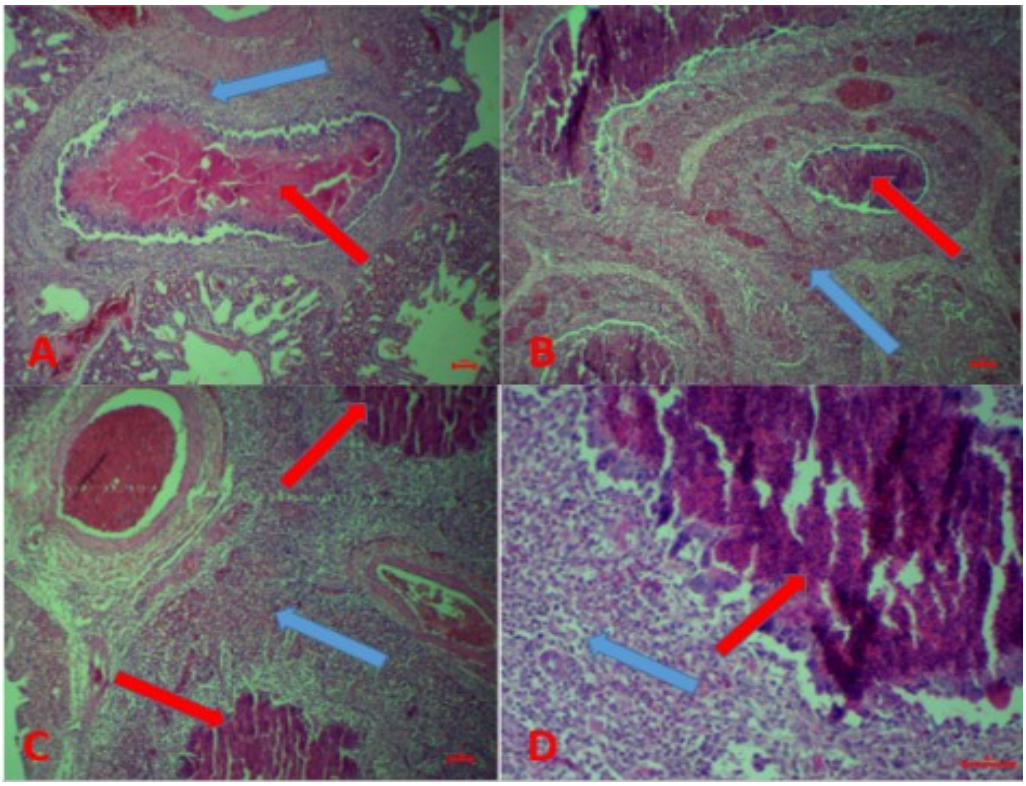

Fig. 11. Caseous necrosis in pulmonary parenchyma of broiler (Red arrows), surrounded by granulomatous reaction containing proliferating fibroblast, collagen fibers, lymphocytes, plasma cells, macrophages and giant cells (Blue arrows). Screened as (A), (B), (C), (D). Magnification 40X and 100X. Scale bar=50 µm. Staining H&E.

TABLE 2. The recorded histological lesions with their Incidences at Pulmonary parenchyma in broilers.

No	Lesion	Number of affected samples	Incidence rate%
1	Hyperemia	91	91.91
2	Perivascular edema	84	84.84
3	Diffused Massive edema	46	46.46
4	Perivascular hemorrhage	41	41.41
5	Perivascular inflammatory cells infiltrations	94	94.94
6	Proliferative pneumonia	2	2.2
7	Pulmonary emphysema	39	39.39
8	Pulmonary fibrosis	33	33.33
9	Caseous necrosis with granuloma	36	36.36
Total number of the histologically examined samples=99 sample.			

TABLE 3. Spearman's correlation coefficient values evaluating link between *Mycoplasma gallisepticum* and IBV infections and the severity of histological lesions in pulmonary parenchyma of broilers.

Lesion / Infection		Hyperemia	Perivascular edema	Diffused edema	Perivascular hemorrhage	Inflammatory cells infiltrations	Proliferative pneumonia
MG	R	0.527	0.578	0.364	0.254	0.236	0.850
	Sig	0.000 **	0.000 **	0.000 **	0.011 *	0.16 *	0.567
IBV	R	0.183	0.157	0.048	-0.061	0.189	-0.025
	Sig	0.070	0.120	0.635	0.550	0.062	0.803

Lesion / Infection		Pulmonary emphysima	Pulmonary fibrosis	Caseous necrosis
MG	R	0.295	0.230	0.239
	Sig	0.003 **	0.022 *	0.017 *
IBV	R	0.052	0.129	0.083
	Sig	0.609	0.204	0.415

R=Correlation coefficient, Sig=*(significant at p≤0.05) **(significant at p≤0.01)

Discussion

Histopathological lesions in the lungs of broiler birds showing respiratory signs demonstrated circulatory disturbances represented by perivascular edema at a high rate that is almost present in all preserved samples, as well as diffused edema and perivascular hemorrhage, and these changes mainly accompany the inflammatory process and are largely recorded in infections of pulmonary parenchyma, since hyperemia is the expansion of the blood vessels bringing more amount of blood as a response to the secretion of inflammatory mediators such as histamine and α-TNF [16], the Inflammation is required here as protective mechanism aiming mitigating, isolating, and removing the cause of infection and repairing the tissue damage caused by injurious agent. the inflammatory changes can be expected according to the presence of infection with *Mycoplasma gallisepticum* and less frequently IBV or the mixed infection in our results. [17] described a significant respiratory signs, airsacculitis, and peritonitis associated with the positive serological conformation to mycoplasma infection and developing to be more intense in multiplication with avian influenza. The results of the present study closely agreed with the results of [18] who recorded presence of *Mycoplasma gallisepticum* infection in 46% of the studied broiler fields in Pakistan and recorded similar gross and histopathologic changes including catarrhal and caseous exudates in bronchi, congestion, consolidation and hepatization of the lungs, cheesy exudates in air sacs, also stated degeneration, necrosis and hyperplasia of the bronchiolar epithelium, submucosal infiltration of leukocytes, hemorrhage and they also noticed the pulmonary emphysema.

The slight congestion which is the expansion of the blood vessel and its filled with blood. it appear as a response to the secretion of inflammatory mediators such as interleukin-6, Bradykinin, Which agree with what the researcher said [19] The lungs of the chickens, which were affected showed significant edema and congestion, and most of the air spaces were filled with protein substances. These pulmonary lesions were of sufficient intensity to cause the death of the broilers, which developed edema, this will be followed by red hepatization. It is a condition of the lungs turning into a liver-like state, which makes the lung oozing and not able to be filled with air. may occur due to the alveoli in the lung being filled with red blood cells, neutrophils, and fibrin. Supportive to and may occur due to congestion of the lung's developing vessels and inflammatory cellular infiltrates, which was observed by histological examination in this study about blood vessels. This was stated by [20], who showed redness as a stage of pneumonia development, which begins with and the color of the lung becomes dark red as a result of

changes in the lung tissue. It is a second stage after congestion, where we see the affected parts of the lung are different and lead This indicates the presence of emphysema in the pulmonary tissue, especially when air enters the respiratory tract and leaks into the interstitial tissues, which occurs due to the lack of surface areas for gas exchange. The red blood cells that have begun to disintegrate, the appearance of the lungs is red, but once the blood is decomposed they take on a gray color and he agreed with what we mentioned [21], which revealed acute bilateral congestion in the lungs, located especially in the middle to lower parts of the lungs, approximately Which revealed acute bilateral congestion in the lungs located especially in the middle to lower parts of the lungs, as well as in the nodules spread in the lungs.

The stage of consolidation and shrinkage of the pulmonary lobes and fibrosis in the septa between the lobes in chronic inflammation in the lungs, followed by an accumulation of fibrous tissue and thickening of the alveoli, especially in the case of mycoplasma infection, the presence of caseous necrosis reflects the action of atypical pyogenic microorganism that undertake the necrosis of tissue, other than *Mycoplasma gallisepticum,* like *Staphylococci*, *Strepetococci*, *Corynebacterium* and *Mycobacterium* spp [22]. It has been concluded that the incidence of lesions was more synchronized and correlated to the infection of *Mycoplasma gallisepticum* while very limited pathological relevance were linked with infectious bronchitis virus, may be due to the success of the applied vaccination programs to control it in fields.

Acknowledgment

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Authors contributions

The first author suggested the outlines, performed the histopathological examination, the second author collected the samples and examined them by Elisa method, both authors shared the writing work.

Conflicts of interest

we declare that no conflict of interest related to the article.

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أفات المتن الرئوي وحدوثية الإصابة بالتهاب الشعب المعدي والمايكوبلازما الانتانية القيحية في فروج اللحم

كرم هاشم يحيى الملاح [1] و محمد ابراهيم احمد ابراهيم [2]

[1، 2] فرع الامراض وامراض الدواجن - كلية الطب البيطري - جامعة الموصل - العراق.

هدفت الدراسة الى معرفة الارتباط بين حدوثية كل من المرض التنفسي المزمن و مرض التهاب الشعب الهوائية في طيور فروج اللحم المظهر لعلامات القصور التنفسي الشديد في حقول التربية من مناطق مختلفة في محافظة نينوى وكذلك لمعرفة الارتباط بين كل من الاصابتين وحدوث الآفات المرضية في الجهاز التنفسي السفلي. لهذا الغرض تم عزل 198 فروج لحم شخص سريرياً باظهاره العلامات التنفسية الشديدة من 25 حقلاً من محافظة نينوى للفترة من 2021/11/1 الى 2022/2/1. سجلت العلامات السريرية وتم سحب الدم منها وعزل مصل الدم لأجراء اختبار الأنزيم المناعي الممتز لكل من مستضد المايكوبلازما الانتانية الدجاجية و مستضد فايروس التهاب الشعب الهوائية المعدي ، و تمت التضحية بالطيور في المختبر واجري لها التشريح المرضي وتسجيل التغيرات المرضية العيانية ثم جمعت عينات الجهاز التنفسي السفلي وحفظت و أنتخب منها 99 عينة عشوائياً لأجراء الفحص المرضي النسيجي والذي تضمن تسجيل التغيرات المرضية النسيجية في المتن الرئوي و درجت الأفة حسب شدتها الى ثلاث درجات (طفيفة ومتوسطة الشدة وشديدة) كما تم تثبيت صفة الإصابة من عدمها في مصول نفس العينات المفحوصة نسيجياً و أجري التحليل الإحصائي باستخدام اختبار سبيرمان للارتباط الرتبي بمستوى معنوية تحت (0.01) و (0.05) لمعرفة الارتباط بين صفة الإصابة وظهور الأفة وشدتها. أظهرت النتائج وجود تباين كبير في نسبة الإصابة، فقد وصلت نسبة الإصابة بالمرض التنفسي المزمن الذي تسببه المايكوبلازما الدجاجية الانتانية الى 81.3% في حين لم تتجاوز نسبة الإصابة بمرض التهاب الشعب الهوائية 1.5%.و كانت نسبة الإصابة المشتركة بالمرضين المدروسين 1.5% فقط في فروج اللحم المظهر لعلامات القصور التنفسي الشديد و ثبتت نتائج التشريح المرضي العياني وجود الآفات المرضية ذات الطبيعة الالتهابية في جميع طيور فروج اللحم المظهر للعلامات السريرية تمثلت ابرزها بالاحتقان الرئوي و ترسب طبقات من الليفين والالتصاقات بين الفصوص الرئوية والاكياس الهوائية واحتواء القصبات والاكياس الهوائية على نضحة متجبنة. لقد بينت الدراسة وجود الآفات المرضية النسيجية المتنوعة و كان ابرزها التهاب القصيبات التنخري وانسدادها بالنضحة الالتهابية بالنسب 76.76% و72.72% على التوالي في منطقة القصيبات الهوائية ومحيطها و فرط الدم والوذمة الرئوية بالنسب 91.91% و84.84% على التوالي في منطقة الاوعية الدموية ومحيطها في المتن الرئوي والتهاب الرئة والجنبة وتثخن الجنبة الرئوية بالنسب 32.32% و19.19% في منطقة التماس الرئوي الجنبي وكانت هذه الآفات متباينة الشدة بين العينات المختلفة.

أظهرت نتائج اختبار الارتباط وجود علاقة ارتباط معنوية بين الاصابة بالمايكوبلازما الدجاجية الانتانية وكل من التوسف الظهاري للقصيبات الهوائية وفرط الدم والوذمة الرئوية والنفاخ الرئوي بمستوى معنوية ($P\leq0.01$). ولوحظت علاقة ارتباط معنوية بين الاصابة بالمايكوبلازما و كل من النزف حول الوعاء الدموي والارتشاحات الخلوية الالتهابية والنخر التجبني وتليف المتن الرئوي بمستوى معنوية (0.05) كما سجلت علاقة ارتباط معنوية بين التهاب الشعب الهوائية وتليف الجنبة الرئوية بمستوى معنوية (0.01). لقد تم استنتاج ان الإصابات التنفسية المدروسة في الدراسة الحالية كانت فيها افات مرضية متنوعة وكانت أكثر مزامنة وارتباطاً بالإصابة بجرثومة المايكوبلازما الدجاجية الانتانية ولم يكن للإصابة بفايروس التهاب الشعب الهوائية دور ملحوظ في نشوئها ربما بسبب نجاح نظام التلقيح ضده في خفض الاصابات الحقلية به.

الكلمات الدالة: المتن الرئوي ، التهاب الشعب الهوائية ، المايكوبلازما.