PATHOLOGICAL STUDY OF PNUMONIA IN SHEEP AND GOAT IN ABTTOITR AT DUHOK PROVINCE

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ABSTRACT

This study was aimed to investigate histopathological changes in the lungs of sheep and goat. A total of 4061 lung samples (3667 sheep and 394 in lungs goats), All samples were collected during October 2020 till October 2021. According to macroscopical and histopathological features, different types of pneumonia with percentages rate in both of sheep and goat are recorded, which are including acute suppurative pneumonia, acute suppurative bronchopneumonia, Acute fibrinous pneumonia, acute fibrinous bronchopneumonia, interstitial pneumonia, Broncho-interstatial pneumonia, chronic granulomatous pneumonia, Haemoorgic pneumonia, acute and chronic bronchopneumonia, acute bronchitis and bronchiolitis, chronic bronchitis and bronchiolitis, Broncho-interstitial Pneumonia, verminous pneumonia and Embolic pneumonia. The results showed different macroscopical and histological features according to types of pneumonia and variation between both animals, pneumonia is an important disease in the lungs of small ruminant, and suppurative Pneumonia was the most predominant type while verminous pneumonia was detected only in few cases

Key words: pneumonia, histopathology, small ruminants

دراسة مرضية لذات الرئة في الأغنام والماعز في مجزرة محافظة دهوك

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المستخلص

كان الهدف هذه الدراسة هو معرفة التغيرات النسجية المرضية في رئتي الأغنام والماعزحيث تم جمع 4061 عينة رئوية (3667 عينه من الاغنام و 394 عينه من الماعز) خلال تشرين الاول 2020 حتى تشرين الاول 2021. وفقا للسمات العيانية والنسيجية فقد تم تسجيل أنواع مختلفة من الالتهابات الرئوية وبنسب مختلفه في كل من الأغنام والماعز، والتي شملت الالتهاب الرئوي القيحي الحاد، والالتهاب الرئوي القصبي القيحي الحاد، والالتهاب الرئوي الخلالي، والالتهاب الرئوي الحبيبي المزمن، والالتهاب الرئوي النزفي، الالتهاب الرئوي القصبي الحاد والمزمن ، التهاب الحاد للقصبات الهوائيه القصيبات,الالتهاب الرئوي القصبي الخلالي، الالتهاب الرئوي المتكون بسبب الديدان، والالتهاب الرئوي الانسدادي. ووفقا لنتائج الدراسه الحاليه تبين ان هناك انواع مختلفة من الالتهابات الرئوية وحسب نوع الحيوان ، وان الالتهاب الرئوي هو من الامراض المهمه التي تصيب رئتات المجترات الصغيرة، حيث كان الالتهاب الرئوي القيحي هو الأكثر شيوعا بينما كان الالتهاب الرئوي المتكون بسبب ديدان هو الاقل شيوعا.

كلمات مفتاحية: التغايرات النسيجية، الالتهاب الرئوي، الالتهاب المزمن.

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INTRODUCTION

Among the important diseases that affect sheep and goats, the respiratory diseases are most one, diseases respiratory system of sheep and goats about 5.6 % of the total diseases of the small ruminants (36). Generally the disease are involved either upper respiratory tract that including sinusitis which are caused by the chemical, physical, larvae of parasites, irritation of nasal foreign bodies, gaseous irritation, and enzootic nasal tumors or involved of the lower respiratory tract that contain mainly pneumonia, however, many of multiple etiological agents are required for pneumonia as bacterial, viral, mycoplasma, and fungal and those are recorded as the most common infectious agents (3,11,36, 38). Pneumonia is the most common important disease in Iraq and causes high economical losses in sheep and goats due to many of causes as a reduced weight gain loses of wool production, stock direct losses on the farm, carcasses downgrading at slaughter and high costs of the treatment (2, 31, 18). The Lung is considered one of vital organ of respiratory system of animals which is exposed to different factors which are reach to it through the inhalation from the environment and or from the blood and these factors may be infectious or non-infectious agents and all these lead to pneumonia (18,19). As well as because due their histological particularities and anatomical structure as extensive surface area and the delicate vascular bed in the lungs are well known to expose the lungs for many of infection with varieties of etiological agents (7, 9). It assumes that a uniquely influential position in livestock production of animals and small ruminants can affect remarkable adaptability to diverse environmental conditions and amenable ease of management. They are thus, a reliable important source of income and cash security in the country. Furthermore, they provide wool, meat, skins, and manure that maintain soil fertility. In Iraq, sheep and goats are playing a significant role in the national economy. Is estimated around 9,900,000 Head of sheep and goat in 2014 (1, 2, 14, 18, 37). Therefore, an increase in small ruminant production is needed to maintain self-sufficiency and the production of small ruminant in the country, however, is still constrained by many factors. The major constraints facing sheep and goats production include the diseases especially pneumonia. The current study designed to investigate the pathological features in the sheep and goat lungs slaughtered at Duhok abattoir.

MATERIALS AND METHODS

This research was conducted at Duhok during October 2020 to October 2021, this abattoir is one and biggest abattoir at Kurdistan region of Iraq, it's located in semel region of duhok governorate. The most of animals per day are slaughtered during this abattoir, the sheep and goats regarded one of important animals are slaughtered compared to other animals, and all animals were male, local breeds, and aged was around between 1-2 years, a total of 4061 small ruminants (3667 sheep and 394 goats) were collected in the study. And the samplings were collected twice a day for each week. After the animals are slaughtered only those animals have lung lesions are chosen for sampling During the slaughtered of animals by using of routine necropsy inspection, the lung with lesions are separated, the affected lung lesions were diagnosed by visualization, palpation, and some cut incisions with specific macroscopical criteria are used as color, consistency, texture, adhesion, pattern, number of the lesion and distribution, the nature of exudates, lobe of lung are involved, all of these criteria was photographed and recorded. For histopathological examination, the affected lungs from sheep and goats were collected, and examination was done at histopathology laboratory at College of Veterinary Medicine/ University of Duhok. For histopathological examination, all samples of lungs with a typical lesion were fixed in 10% neutral buffered formalin. Then the samples were dehydrated in accenting concentration of ethanol, and then cleared in xylene, for preparation of paraffin block tissues are embedded in a pure white paraffin wax at melting point 54-56°C. The processed and embedded tissue sections were cut at 4-5 µm with rotary microtome (Leica, Germany). Finally the slides were stained by using hematoxylin and eosin (H &E) stain (4, 19). The stained sections will be examined under field microscope and photographed by using digital computerized camera canon (Leica,

Germany). The results of gross and histopathology will be analyzed and interpreted

RESULTS AND DISCUSSION

The result of this study shows that the total number and percentages of affected lungs in both of sheep and goat was varied, according to morphological and histological feature, the pneumonic lesions are divided to many types (Table 1 and 2). This study indicated that 86.17% of sheep lungs and 13.83% of goats lungs were examined at Duhok was showed with lung lesions, the pneumonia it's regarded as one of the important diseases affected the small ruminants beside the lung is special organ which is exposed to many of diseases in sheep compared to goat, and immune status, this results was degree with many of previous studies. (4, 7).

Table 1. Total number of the examined lungs & percentages of affected lungs

Species	Number of examined lungs		Affected lungs	
	Total number	Total percentage%	Number	Percentage%
Sheep	3667	91.30	218	86.17%
Goat	394	9.70	35	13.83%
Total	4061	100%	253	100%

Table 2. Types of pneumonia &affected pneumonic lesions (N=253)

No	Types of Pneumonia	No. of Lungs affected		Percentage of affected lungs (%)	
		Sheep(218)	Goat(35	Sheep	Goat
1	Acute Suppurative Pneumonia	34	5	14.6%	14.2%
2	Acute Suppurative Bronchopneumonia	26	2	11.9 %	5.7%)
3	Acute Fibrinous Pneumonia	33	6	13.7 %	17.1%
4	Acute Fibrinous Bronchopneumonia	22	3	9.1%	8.5%
5	Acute and Chronic Bronchopneumonia	15	2	4.5%)	5.7%
6	Acute Bronchitis and bronchiolitis	20	1	6.4%	2.8%
7	Chronic Bronchitis and Bronchiolitis	7	2	2.2%	5.7%
8	Broncho-interstitial Pneumonia	23	4	10.5%	11.4%
9	Interstitial pneumonia	7	2	3.2%	5.7%
10	Granulomatous Pneumonia	14	3	4.5%	8.5%
11	Verminous Pneumonia	4	1	1.8%	2.8%
12	Hemorrhagic Pneumonia	7	2	3.2%	5.7%
13	Embolic pneumonia	6	2	2.1%	5.7%
Total		218	35	86.17%	13.83%

Types of Pneumonia:

Acute Suppurative pneumonia: The result showed the highest percentages rate of affected lungs was recorded with this types in both sheep and goat, Macroscopically the affected parts of lungs are consolidated with dark red in color, and presence of grayish-white abscesses in the surface of the lung tissue which is varied in size, when the surfaces is cut there was a scanty grayish-white pus oozes from the affected part was observed (Fig.1A). Microscopically, the acute suppurative revealed presence of severe suppurative exudate which is formed due to liquefaction of necrotic tissues via action of leukocytes, most of alveoli and lung tissues are filled with acute inflammatory cells and few numbers of mononuclear inflammatory, Meanwhile, some areas of abscesses appeared as a focal area of structure less with homogeneous substances infiltrated with neutrophil and surrounded by fibrous connective tissue as a capsule (Fig.1B).

Figure 1A: Acute suppurative pneumonia, macroscopically the affected parts of lungs showed consolidated with dark red in color, and presence of grayish-white abscesses in the surface of the lung

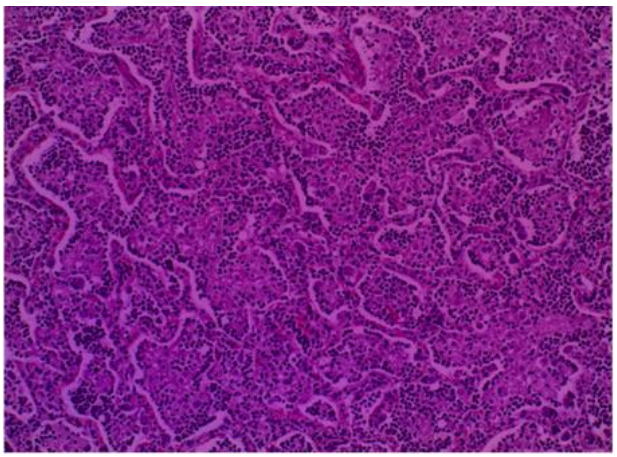

Figure 1B: Acute suppurative pneumonia, sever infiltration of acute inflammatory cells mainly neutrophils which is filled all of alveoli of lung tissues and exudates with sever hemorrhage. 10x H&E

Acute Suppurative Bronchopneumonia: The result shows the percentage rate of pneumonia occurs in sheep was 11.9% while in goat was 5.7%, Macroscopically the involved parts are red too dark in color and consolidated, the abscess are founded inside of lung tissue and in the both bronchi and bronchioles which is mixed with blood and frothy discharge, and lesions were mainly distributed to the cranioventral aspects of the lungs as show in (Fig.2 A), Microscopically, the inflammatory reaction are involved both of the lung tissue and conducting system as bronchi and bronchioles, there was sever inflammatory reaction are presence in lung tissue, epithelial cells lining of both of bronchi and bronchioles, the inflammatory reaction consist of acute inflammatory cells and severe hemorrhage and presence of exudates in the lumen of bronchi and bronchioles and hyperplasia of the bronchial associated lymphoid tissues as shows in (Fig. 2 B).

Figure 2A: Acute suppurative Bronchopneumonia , macroscopically the involved lung are red to light in color and consolidated, the abscess are founded inside of lung tissue in cut section, both bronchi and bronchioles are mixed with blood and frothy discharge

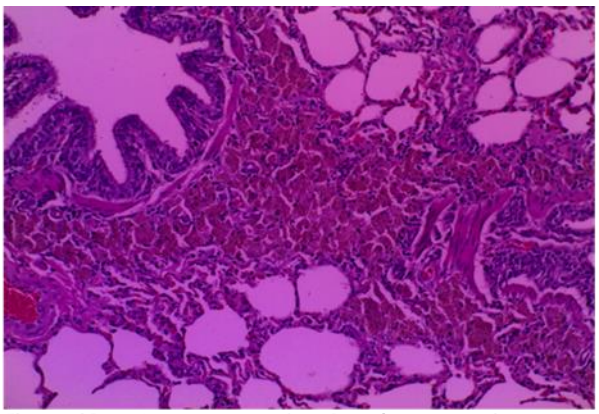

Figure 2B: Acute suppurative Bronchopneumonia , sever inflammatory reaction are presence in lung tissue, epithelial cells lining of both of bronchi, the inflammatory reaction consist exudates and acute inflammatory cells beside sever hemorrhage and presence of exudates in the lumen of bronchi and bronchioles and hyperplasia of the bronchial associated lymphoid tissues10x H&E

Acute Fibrinous Pneumonia: The results shows around of 13.7 % of pneumonia are classified as acute fibrinous pneumonia in sheep while in goat was 17.1%, Macroscopically the lower part of lung tissue are firm, red to gray hepatization and presence of fibrin in the surface of affected part as show in (Fig. 3A). In the cut section of the affected part is difficult to cut because of accumulation of fibrin and consolidation. Microscopically, the pneumonic portions were associated with severe infiltration of inflammatory cells, most of alveoli are filled with inflammatory exudates and fibrin which is appears as sheath of fibrin and staining pink with Eosin, desquamation of bronchial epithelium as well as severs hemorrhage as shows in (Fig.3B).

Figure 3A: Acute Fibrinous pneumonia , macroscopically the affected lung tissue are firm, red to gray hepatization and presence of fibrin in the surface of affected part

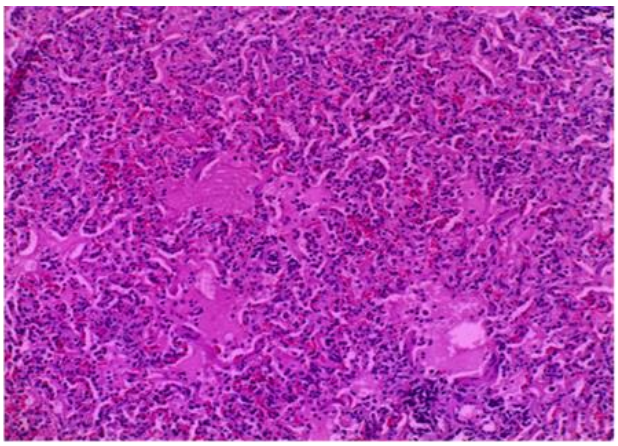

Figure 3B: Acute Fibrinous pneumonia , sever infiltration of inflammatory cells, most of alveoli are filled with inflammatory exudates and fibrin which is appears as sheath of fibrin and staining pink with Eosin, as well as sever hemorrhage10x H&E

Acute Fibrinous Bronchopneumonia:

The result show that 9.1% of affected lung are associated with this type of pneumonia in sheep, while in goat the percentage was 8.5%, in both species grossly, the affected lungs were showed as area of hepatization, consolidated with dark to red in color are found in different parts of lung especially lower regions of lung as shows in (Fig. 4A). Microscopically, the lumen of alveoli and bronchi and bronchioles are filled with fibrinous exudate mixed with infiltration of leukocytic inflammatory cells especially neutrophils, thickening of interlobular septa with infiltration of fbrino cellular exudates comprising predominantly of neutrophils with few number of mononuclear inflammatory cells, hemorrhage and thickening of bronchial walls with severe inflammatory reaction as shows in (Fig.4B).

Figure 4A: Acute Fibrinous bronchopneumonia, Macroscopically, the affected lungs were showed as area of hepatization, consolidated with dark to red in color are found in different part of lung especially lower regions of lung and oozes of blood in cut section.

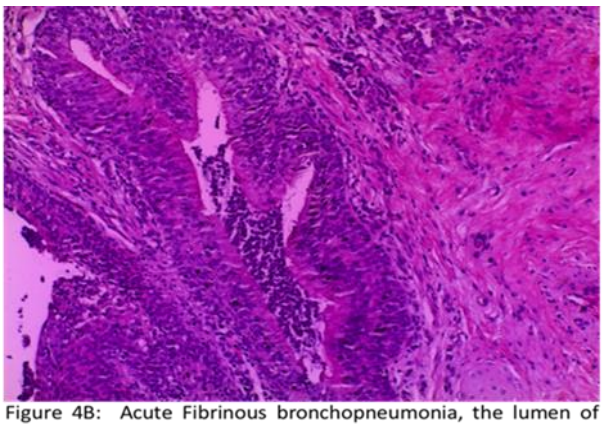

Figure 4B: Acute Fibrinous bronchopneumonia, the lumen of alveoli and bronchioles are filled with fibrinous exudate mixed with infiltration of leukocytic inflammatory cells especially neutrophils, thickening of interlobular septa with infiltration of fbrino cellular exudates comprising predominantly of neutrophils with few mononuclear cells, hemorrhage and thickening of bronchial walls with sever inflammatory reaction 10x H&E

In the current study, the pneumonia and bronchopneumonia in the form of acute suppurative pneumonia, acute fibrinous pneumonia, acute suppurative bronchopneumonia and acute fibrinous bronchopneumonia are recorded as a higher percentage rate of pneumonic lesions of pneumonia encountered. This finding is in agreement with the other previous researches different countries that accounted for these important types of pneumonia in both sheep and goats (10, 25, 27). This result explaining the macroscopical and microscopical lesions of the different types of Pneumonia and bronchopneumonia was the same with the investigation of other studies (11, 21, 27). These finding, found that the lesions could be associated with different disease affected sheep and goat as pneumonic pasteurellosis or contagious caprine pleuropneumonia or diseases lead to formation of fibrin or suppuration (7, 8, 33).

Acute and Chronic Bronchopneumonia: The results show occurrence of chronic bronchopneumonia was 4.5% and 5.7% of the affected lungs in sheep and goat respectively. Grossly the affected parts appears as firm to hard in consistency with gray to pale in color and Its involved the cranial lobe which appears as multifocal abscesses as shows in (Fig.5A). Microscopically, thickening of the bronchi due to accumulation of extensive exudates with infiltration number of mononuclear inflammatory cells in the alveoli and bronchi were observed, as well as the inflammation was interpreted as chronic due to

consolidation, and the most common findings was involved bronchiolar epithelial hyperplasia, peri-bronchiolar or peri-bronchial lymphoid hyperplasia and exudate dominated by neutrophils within the airspaces (Fig. 5B).

Figure 5A :Acute Bronchopneumonia, Grossly the affected parts appears as firm to hard in consistency with gray to pale in color and It is involved the cranial lobe were appears as multifocal abscesses .

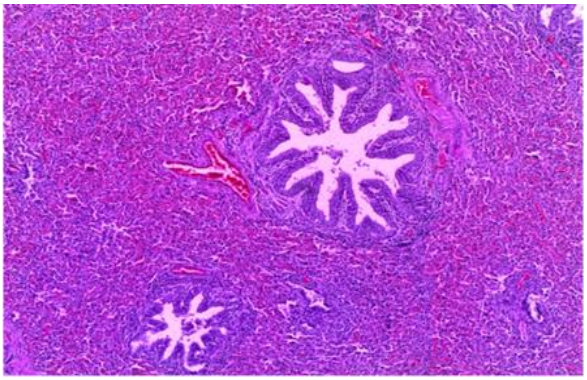

Figure 5B : Acute Bronchopneumonia, thickening of the bronchi due to accumulation of extensive exudates with infiltration of varying degree of polymorphnuclear inflammatory cells in the alveoli and bronchi, sever hemorrhage, bronchiolar epithelial hyperplasia, peribronchiolar or peribronchial lymphoid hyperplasia and exudate dominated by neutrophils within the bronchi and the airspaces. 4x.H&E

Acute Bronchitis and bronchiolitis: The study shows that acute inflammation of airways was detected in 6.4% of sheep and 2.8% of goat, macroscopically there is severe congestion in the mucosa of both bronchi and bronchioles and the lumen was filled with amount of mucous exudate with frothy discharging as show in (Fig.6A). While microscopically, acute bronchitis and bronchiolitis manifested by severe infiltration of inflammatory cells, severe congestion of blood vessels and hyperplasia of bronchial lymphoid tissues (Fig.6B).

Figure 6A:Acute bronchitis, macroscopically there is sever congestion in the mucosa of both bronchi and bronchioles and in cut section the lumen was filled with amount of mucous exudate with frothy discharging

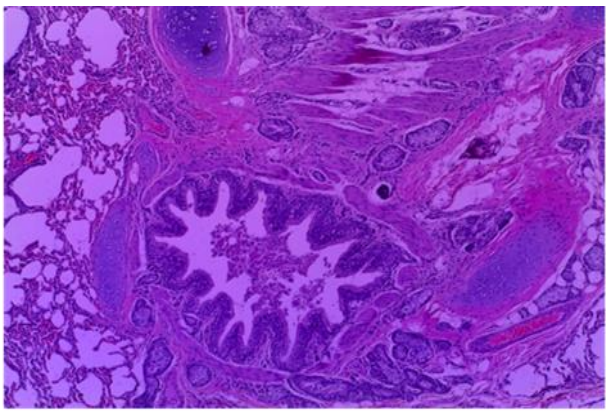

Figure 6B :Acute bronchitis, sever infiltration of inflammatory cells and the lumen filed with inflammatory exudates, sever congestion of blood vessels and hyperplasia of bronchial lymphoid tissues 4x.H&E

Chronic Bronchitis and Bronchiolitis: The chronic inflammation of airways recorded in this study was 2.2% in sheep and 5.7% in goat, Macroscopically the affected part of lung appears as firm, dark to light in color, especially in lower part of lung, in cut section the most of bronchi are filled with frothy discharge with mixed with some of blood as shows in (Fig.7A). Microscopically, thickening the epithelial cells lining of bronchi and bronchioles, with infiltration of mononuclear inflammatory cells, beside desquamation and hyperplasia of epithelium lining both of bronchi and bronchioles with the presence of exudate in their lumen, beside there was peri-bronchial leukocytic cellular infiltrations as shows in (Fig.7B).

Figure 7A: chronic bronchitis , Macroscopically the affected part of lung are appears firm, dark to light in color, especially in lower part of lung, in cut section most of bronchi are filled with frothy discharge with mixed with some blood

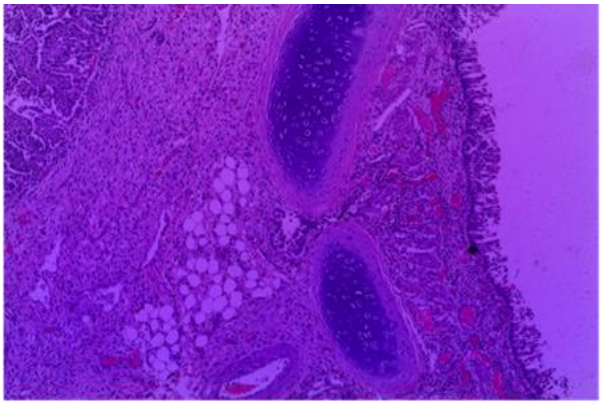

Figure 7B: chronic bronchitis , thickening the epithelia cells lining of bronchi, with infiltration of mononuclear inflammatory cells, beside desquamation and hyperplasia of epithelium lining both of bronchi with the presence of a exudate in their lumen, which occasionally as well as peri-bronchial leukocytic cellular infiltration 4x H&E

Regarding the second types of pneumonia was recorded in this study is involved inflammation of lung and airways as bronchi and bronchioles as well as bronchopneumonia, Bronchitis and bronchiolitis in this study were observed variation in inflammations of airway ducts in both sheep and goat, and these results were in partial agreement with (35), who found also bronchitis and bronchiolitis in different percentages cases in sheep and goats, and this is could be due to the pathogenesis of many of infectious agents which are causes pneumonia either via hematogenous or eirogenous routes, beside many of etiological agents cause pneumonia it will be extends and reach to the airways either via descending and ascending infections (31), furthermore, the study show the chronic bronchopneumonia in current study was in agreement compared to other previous studies, but more than was recorded by Kuma *et al*. The macroscopical and microscopical changes its might be depends to many factors as severity and virulence of etiological agents, furthermore, the changes of infiltration of inflammatory cells inside of bronchi, bronchioles, and alveoli were differed in nature. This could have been due to the pulmonary defense mechanisms against infection, or due to predisposing factors such as stress which is complicated by different types of bacterial fungal and viral infections (22). Beside the chronic bronchopneumonia in small ruminants also is recorded as one of multifactorial diseases causes by different species of viruses as parainfuenza virus type 3 and respiratory syncytial virus as well as mycoplasma species (7,17,32). However, this study did not tested for isolation of viruses or mycoplasma, so we cannot exclude that a concurrent viral infection could be contributed to some of the lung lesions especially histopathological lesions was strongly associated with chronic bronchopneumonia including bronchiolar epithelial hyperplasia, lymphoid proliferation, hyaline scars and presence of exudate in airway.

Broncho-interstitial Pneumonia: Results shows that the macroscopical and microscopical lesions of bronchointerstitial pneumonia were observed in 10.5% and 11.4% of the affected lungs of sheep and goat respectively. The lesions were not observed remarkably but the affected portions were meaty, wet in appearance, un-collapsed, and distributed on both the caudal and anterior lobes as shows in (Fig.8A). Microscopically, lesions were characterized by infiltration of poylmorphonuclear and mononuclear inflammatory cells in the alveolar interstitial tissues, bronchi and bronchioles, distended interlobular space with thickening of alveolar septa and bronchial walls, as well as the lumen was filled with Inflammatory exudates (Fig.8B).

Figure 8 A: the affected portions appears as meaty, wet in un-collapsed, and distributed on both the caudal and anterior lobes of affected parts.

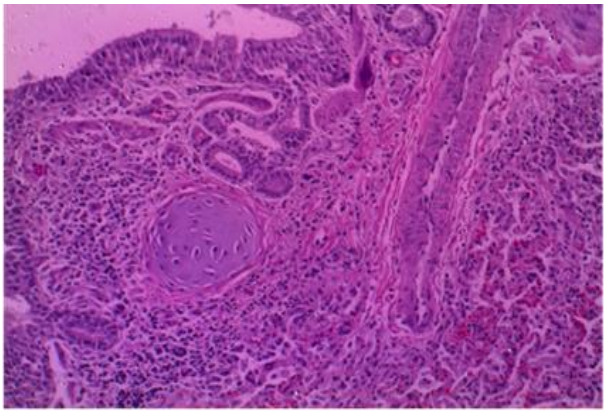

Figure 8B: Broncho-interstiatial pneumonia, infiltration of poylmorphonuclear and mononuclear inflammatory cells in the alveolar interstitial tissues, bronchi, sever hemorrhage, distended interlobular space with thickening alveolar septa and bronchial walls, as well as the lumen are filled with Inflammatory exudates 10 x H&E

Interstitial pneumonia: The results shows that the lungs diagnosed as interstitial pneumonia observed in 3.2% in sheep and 5.7 % in goat were characterized. Macroscopically, characterized by the presence of focal pale-colored patches which are distributed through the surface of lungs, and the affected parts were enlarged, firm or meaty appearance and dry in cut sections, as show in (Fig.9A). Microscopically, the inter-alveolar space are thickened, infiltrated with predominantly polymorphonuclear cells mainly lymphocytes, macrophages and a few of neutrophils with proliferation of fibrous connective tissue and lympho-follicular aggregations, as well as peribronchial and perivascular cuffing, beside the presence of sever hemorrhage and congestion of blood vessels as show in (Fig.9B).

Figure 9A: Interstitial pneumonia , macroscopically, by the presence of focal pale-colored patches which is distributed through the surface of lungs, and the affected parts were enlarged, firm or meaty appearance and dry in cut sections

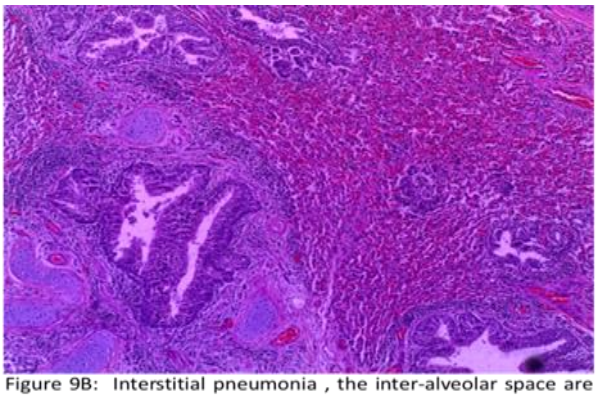

Figure 9B: Interstitial pneumonia , the inter-alveolar space are thickened , and infiltrated with predominantly polymorphonuclear inflammatory cells and a few of neutrophils and proliferation of fibrous connective tissue as well as there is lymphofollicular proliferation as aggregations, peribronchial and perivascular cuffing, beside the sever hemorrhage and congestion of blood vessels.10 x H&E

While about the third types of pneumonia involved in this study was interstitial pneumonia and Bronchial-interstitial Pneumonia which are also recorded from pneumonic lung lesions, this study showed that the gross and histopathological features of the pneumonic lesions in the affected lungs both in sheep and goat were also similar to other previous studies (10, 12). It was appreciated in both species; however, the percentage was considerably higher in sheep compared to goats. could be some of environmental factors are rarely incriminated, as well as the interstitial pneumonia in small ruminants caused by two important viral agents it's called ovine lentivirus in sheep and Caprine arthritis encephalitis virus in goats (7, 30). The most histopathological changes as intralveolar and bronchio-vascular thickening and this is could be due to cellular infiltration of inflammatory cells like lymphocytes, fibroblasts, plasma cells alveolar macrophages and fibrin which is regarded as important features in this type of pneumonia. Beside

metaplasia of epithelial cells lining of alveoli to cuboidal cells and hyperplastic with proliferation of fibrous connective tissue and these changes was similar to those described in earlier publications (31).

Granulomatous Pneumonia: The granulomatous Pneumonia was recorded 4.5% and 8.5% in affected lungs of sheep and goat. Grossly, the affected lungs showed different sizes of nodules scattered throughout the surface of the lung and appeared as pale in color as shows in (Fig. 10A). Microscopically, the nodules is consist of granulomatous reaction represents caseous necrosis or small abscesses in the center and surrounded by different number chronic inflammatory cells and occasionally it's enclosed a zone fibrous connective tissue as a capsule as shows in (Fig.10 B).

Figure 10A: Granulomatous pneumonia , Grossly, the affected lungs showed different size of nodules scattered thought the surface of lung and appears as pale in colored

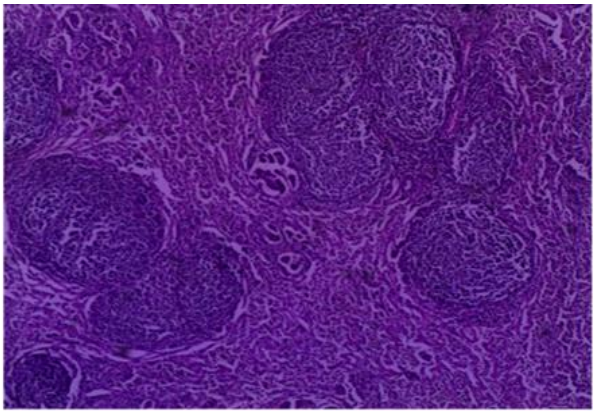

Figure 10B: Granulomatous pneumonia , the granulomatous reactions appears as nodules which s consist of aggregation of chronic inflammatory cells surrounded the area of caseous necrosis or small abscesses in the center occasionally its enclosed a zone fibrous connective tissue as a capsule.10 x H&E

Furthermore, the study is found that the fourth types of pneumonia is granulomatous pneumonia which was recorded around 4.5% in sheep and 8.5% in goat, this results revealed the incidence of granulomatous pneumonia was similar to the previous study by (12, 20, 26, 27), in the goat they found that granulomatous lesion in the lungs collected from goats infected with caseous lymphadenitis, macroscopical is appears as multiple pale colored nodules of different sizes scattered through the surface of lung, while in histological sections is characterized by presence of inflammatory reactions as nodules around the central necrotic area which is surrounded by fibrous connective tissue and this belong to, that granulomatous inflammation can be regarded as an infection granuloma due to the response of pathogens and persistent irritants which is either exogenous or endogenous origin and non-infection granuloma due to delayed cell-mediated immune reactions as allergic conditions (18, 30).

Verminous Pneumonia: The parasitic pneumonia was detected in 1.8% and 2.8% of sheep and goat respectively. The affected lungs were diffuse red, wet, and failed to collapse as shows in (Fig.11A). Microscopically, there is diffuse interstitial pneumonia and bronchiolitis, alveolitis, eosinophilic inflammatory reaction around adult worms, larvae and eggs were also common, presence of different stages of parasite with its eggs occluded in the bronchial lumen and alveoli with sever hemorrhages and inflammatory reactions were surrounded by clear areas of zone of hyperemia as shows in (Fig.11B).

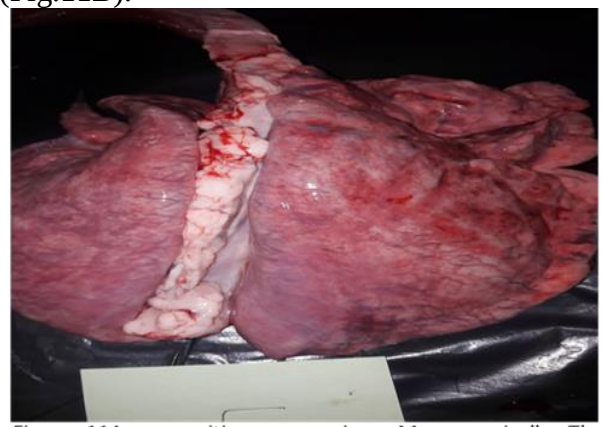

Figure 11A: parasitic pneumonia, , Macroscopically, The affected lungs were diffuse red to pale in color, wet, edematous and failed to collapse . In cut section the lumen of bronchi is congested and filed with frothy discharge .

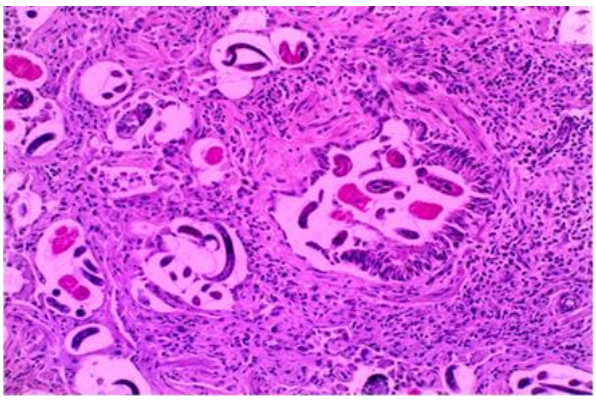

Figure 11B: Alveolar Pnumonia, Diffused interstitial pneumonia and bronchiolitis, alveolitis, eosinophilic inflammatory reaction around adult worms, larvae and eggs were also common, presence of different stages parasite with its eggs occluded in the bronchial lumen and alveoli with sever hemorrhages and surrounded by clear areas of zone of hyperemia. 10 x H&E

The present study shows that the lower incidence of type pneumonia fifth types is called verminous pneumonia or parasitic pneumonia, was recorded around 1.8% in sheep and 2.8% in goat lung and this is consistent with the result of (32). This result is not focused to determine which species of lung worms, but because the most lung worm infections in small ruminants is belong to three species either Dictyocaulus filaria, Muellerius capillaris and Protostrongylus rufescens, while the incidence of our findings is completely disagreed with that founded by (4), who recorded high infection of lung worms in slaughtered sheep was 57.55% and named Dictyocaulus filaria, Muellerius capillaris and Protostrongylus rufescens this might be source of animals which are slaughter in abattoir. Macroscopically there was no obvious gross appearance was noted, while microscopically pneumonic lesions was associated with inflammatory reactions and this due to presence of different stages of worms with its eggs in the lung. Lastly the study observed another type of pneumonia called embolic pneumonia which was around 2.1% in sheep and 5.7% in goat, the low incidence might be due distribution of lesion in lung and causative agents of pneumonia, this result is agreement with result found by (11,13,24,29,34). Pathological finding include presence of multiple nodules in the surface of lung grossly, while histologically characterized by presence of small area of aggregation of inflammatory cells with small abscess in different area lung tissue, this is might be due to transporting of suppurative embolic lesions from other parts of body to the lung via circulatory disturbance (6).

Hemorrhagic pneumonia: The results observe that 3.2% of lungs sheep and 5.7% of affected goat lungs was diagnosed as Hemorrhagic pneumonia and the lesions was involved of lobules, interlobular septa, pleura and peribronchial interstitial tissue. Macroscopically, the affected lung appear red in color, firm in texture as red hepatization and the affected part its clearly separated from normal one by discoloration, in cut section, the blood was oozes from the area as shows in (Fig.12A) Microscopically, the lobular parenchyma showed severe congestion of the interalveolar septa, accumulation of fibrin and severe hemorrhages in the alveoli, edema, congestion and fibrin deposition of pleura and peri-bronchial interstitium. The tissues section was categorized by excessive hemorrhages occupied in all part of lung tissues, beside sever infiltration of inflammatory cells of the bronchi, alveoli and interalveolar septa as shows in (Fig.12 B).

Figure 12A: Hemorrhagic Pneumonia, the affected lung appear red in color, firm in texture as red hepatization and the affected part its clearly separated from normal one by discoloration, in cut section, the blood was oozes from the area.

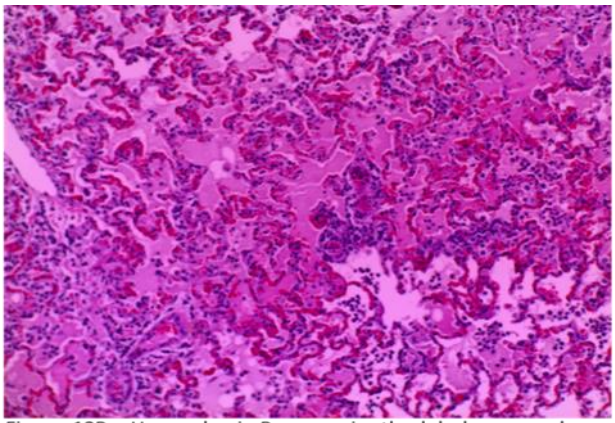

Figure 12B: Hemorrhagic Pneumonia, the lobular parenchyma showed infiltration of inflammatory cells of the interalveolar septa, oedema and accumulation of fibrin and sever hemorrhages in the alveoli,10 x H&E

The six important types of pneumonia was recorded in this study is hemorrhagic pneumonia and the percentages was recorded 3.2% in sheep and 5.7% in goat, this variation is might belong mainly due to etiological agents, many of diseases causes severe destruction of lung tissue either due to severe inflammation as a result of infection or due to sever etiological agents, as *Mannheimia haemolytica* and *Pasteurella spp* (23, 28), the low incidence of this type of pneumonia in our study recorded is because our study is conducted to detection of pneumonic lesions in abattoir not in fields, and generally pneumonia occurs in sheep and goats, and in every country of world due to stress factors such as crowding, dust, water and damp humid weather, high fatigue, hunger, cold, cut off horn or dehorn can increase the disease, therefore, one of these factors is pneumonia which is caused by *Mannheimia haemolytica* and *Pasteurella spp* which are recorded normally as natural flora on the mucous membrane of the respiratory tract of sheep and the goats (5). Our result revealed that the same pathological observations who found by (15) in northern of Diyala of Iraq which is characterized macroscopically as red in color with hard consistency of pneumonic part, while microscopically the histological section showed severe infiltration of inflammatory cells associated with severe hemorrhages and deposition of fibrin which are accumulated in lung tissue and this is mainly due to severe damage of lung tissue due to inflammation.

Embolic pneumonia: The result observed that 2.1% of affected lungs in sheep and 5.7% of affected goat lungs were embolic pneumonia, the affected lungs of both sheep and gross which are characterized macroscopically by presence of multifocal nodules with different sizes and distributed throughout the lung surface. The nodules appear as white foci, small in size (3-6 mm), and surrounded by zone of red area as shows in (Fig.13A). Microscopically, the nodules showed multifocal area of aggregation of inflammatory cells mainly neutrophils around the small area of necrotic tissues and abseccsessation as shows in Fig.13B).

Figure 13 A: Embolic Pneumonia, presence of multifocal nodules with different sizes and distributed throughout the lung surface. The nodules appear as white foci, small in size (3-6 mm), and surrounded by zone of red area.

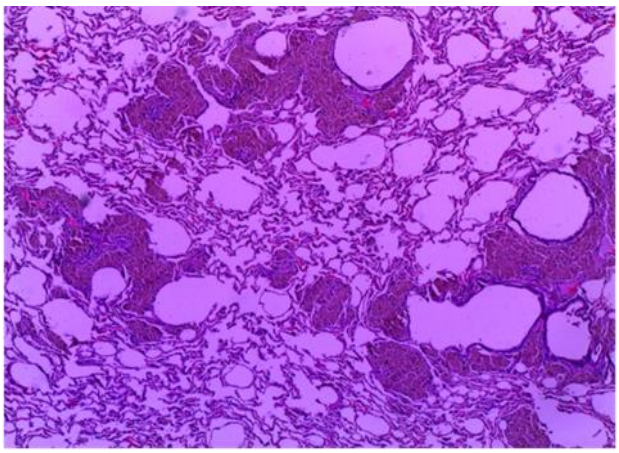

Figure 13B: Embolic Pneumonia,, the nodules showed multifocal area of aggregation of inflammatory cells mainly neutrophils around the small area of necrotic tissues and abseccsessation 4x H&E

This study recorded the seventh type of pneumonia which is called embolic pneumonias, and characterize by presence of multiple, randomly distributed inflammatory foci throughout of some part of lung and this is might be in fact that the most of abscesses that develop in chronic suppurative bronchopneumonia and fibrinous pleuropneumonia or some of bacterial infection and suppuration that is develop in another location, which in sheep and goat is most commonly liver, but other loci may occur, such as traumatic reticulopericarditis in cattle, mastitis, endometritis, arthritis and extension of any infection as emboli to the lung and causes pneumonia especially bacterial infections. (5, 7, 22).

CONCLUSIONS

In general, the current pathological study revealed that the sheep and goats slaughtered at Duhok province were affected with different

forms of pneumonia. The most diseases involved respiratory system is pneumonia was diagnosed as acute while the animals were held alive at the abattoir before animals to slaughter, reducing this period to the minimum could be a significantly reduce the magnitude, the diagnosis of lungs disease potentially helped to survey the different types of pneumonia occurring in different place of the country. Therefore, histopathology should be employed routinely as an ancillary test in the major abattoirs and regional veterinary laboratories to generate additional epidemiological data for better disease control and prevention measures. Further studies focusing on the spatial distribution of the different pneumonic diseases and isolation of the causative agents are also required to formulate of control strategies

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