Postmortum and Histopathologic Changes of Expermintal Salmonellosis in Dogs

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Summary

This study was carried out to study the postmortem and histopathologic changes in dogs experimentally infected with Samonella *typhimurium*.

Ten (10)puppies were included in this study which divided into two groups . The first group inoculated orally with 10 ml of sterile trypticase soya broth (control group) while the second group were inoculated orally with 10 ml of trypticase soya broth which containing (4.8×10^9) CFU /ml) of *Salmonella typhimurium* (infected group). Postmortum and histopathologic examination were done after the death of animals of second group . The result revealed that the gross and microscopic lesions of *Salmonella typhimurium* infection in dogs were found in the gastrointestinal lesions in liver ,spleen and lungs.

التغيرات المرضية العيانية والنسجية لخمج السالمونيلا في الكلاب

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الخلاصة :

اجريت هذة الدراسة لمعرفة التغيرات المرضية العيانية والنسجية للكلاب المخمجة تجريبيا بجراثيم سالمونيلا تايفيميوريم.

استخدمت في هذه الدراسة عشرة جراء وقد قسمت الى مجموعتين حيث جرعت حيوانات المجموعة الاولى 10 مل من مرق trypticase soya الخالي من الجراثيم واعتبرت كمجموعة سيطرة في حين جرعت المجموعة الثانية 10 مل من المرق اعلاه بحيث يحتوي على 4.8×10^9 جرثومة سالمونيلا \ مل .

اجري التشريح المرضي والفحص النسجي بعد هلاك حيوانات المجموعة الثانية واظهرت الدراسة بان التغيرات المرضية والنسجية للخمج التجريبي بالسالمونيلا تايفيميوريم في الكلاب موجودة في القناة الهضمية وخاصة اللفائفي كما سجلت التغيرات النسجية في كل من الكبد والطحال والرئة .

Introduction

Salmonellosis: An infectious disease of man and animals caused by many species belong the genus salmonella (Hoskin *et al*., 1959; Stephan, 1975 and Murdoch, 1979)

Salmonellosis is a worldwide problem and considered to be one of the most important zoonotic diseases in developing countries (Radostits *et al* ., 2000). It is an economically important disease in farm animals caused by a number of different species of *Salmonella* (Williams, 1980). Clinical salmonellosis is uncommon in adult dogs although a variety of serotypes may be carried by normal animals, while it is commonest in young animals and in those subjected to stress conditions (Borland; 1975; Gillespie *et al.*,1981 and Kallow and Hasso, 2001).The clinical signs can vary from asymptomatic carrier to septicemia (Hoskin *et al.*, 1959 and Stephan ,1975)

The disease has public health importance because Salmonellosis is one of the commonest diseases in man and its principal reservoirs are domestic animals (Rubin and Weinstein, 1987).

The disease is worldwide in distribution and the incidence of disease is different from country to country ;but in general the incidence of disease is about (1-30%)(Kaufman; 1966).

In Iraq Al.Obaidi and Kallow (1995) reported that the incidence of salmonellosis in dogs was (20%); while Bayram (1995) found the incidence was (7%) and *S.give* was the most common serotype. Kallow and Hasso (2001) found that , *Salmonella spp* isolated from 17 out of 150 (11.3 %) rectal swabs taken from diarrheic and non diarrheic pet dogs and *S.typhimurium* was the most common serotype.

Materials and methods :

Ten (10) puppies from a local breed aged between (2-4) months and weighted between (3-4.5) kg were used in this study. All animals were prepared to experiment by treatment with Ciprofloxacin (20mg/kg B.W daily for six days) ;Ivermectin (0.2 mg/kg B.W) S/C one dose and Niclosamid (50 mg/kg B.W) The animals included in this study were divided into two groups (5 animals of each).

A- First group (Control group):

The animals of this group were inoculated orally with 10 ml of sterile trypticase soya broth.

B- Second group(Infected group):

The animals of this group were inoculated orally with 10 ml of trypticase soya broth which contain (4.8×10^9) CFU of *S.typhimurium* per ml (Bayram, 1995) as infected group.

Postmortem examination was conducted after the death of the experimentally infected (second group) according to Thompson (1978). The results of P.M were recorded and

specimens for histopathologic examination were collected from (stomach, intestine mesenteric lymph nods, liver, lungs, spleen, kidney and the heart). All specimens were preserved in 10% formalin immediately after performing postmortem examination and stored at 4C° until preparation of sectioning according to Luna (1968).

Results

Postmortem Findings

Severe congestion and haemorrhage in most parts of the gastro intestinal tract were seen. There were also severe congestion and petechial haemorrhages in the mesenteric blood vessels , mucosal and serosal surfaces of small intestine and desquamation of intestinal mucosa (Figure 1). There were severe congestion and petechial haemorrhages in the colon and rectum. There were no clear gross lesions on the other organs.

Histopathologic examination

A) Intestine

The microscopic section revealed necrosis, erosion and desquamation of the epithelial lining of crypt of liebourkhan ; some of them remain lining with the basement membrane only (Figure 2). Also inflammatory cells mainly neutrophils infiltration in the lamina properia of the villi and the lumen of liebourkhan crypts, beside congestion of the blood vessels (Figure 3) ; The lesions were also characterized by hyperplasia and hypertrophy of goblet cells with over secretion of mucin in the lumen of intestine , together with the inflammatory cell infiltration mainly neutrophils and lymphocytes in the lamina propeia , as well as atrophy of the villi which characterized by fusion together at their tips and tack rounded shape (Figure 4).

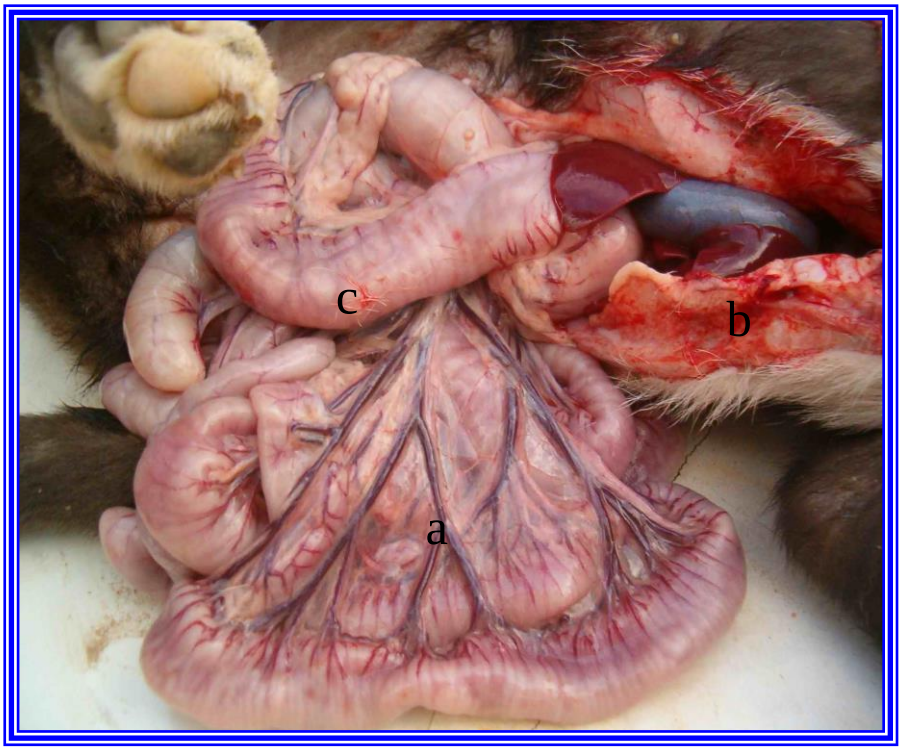

Fig (1): Gross picture of intestine showing congestion of mesenteric blood vessels (a) and haemorrhage on the mucosal (b)and serosal surfaces (c).

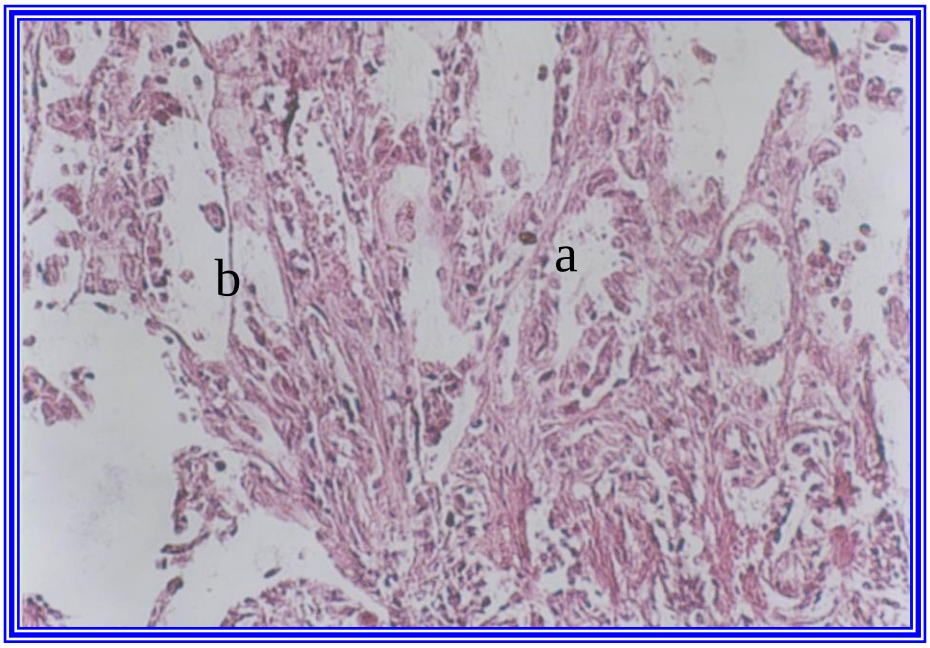

Fig (2): Histologic section of intestine showing necrosis, erosion and desquamation of epithelial lining of Liebourkhan crypt (a), some of them remain lining with basement membrane only(b) 200X(H&E stain).

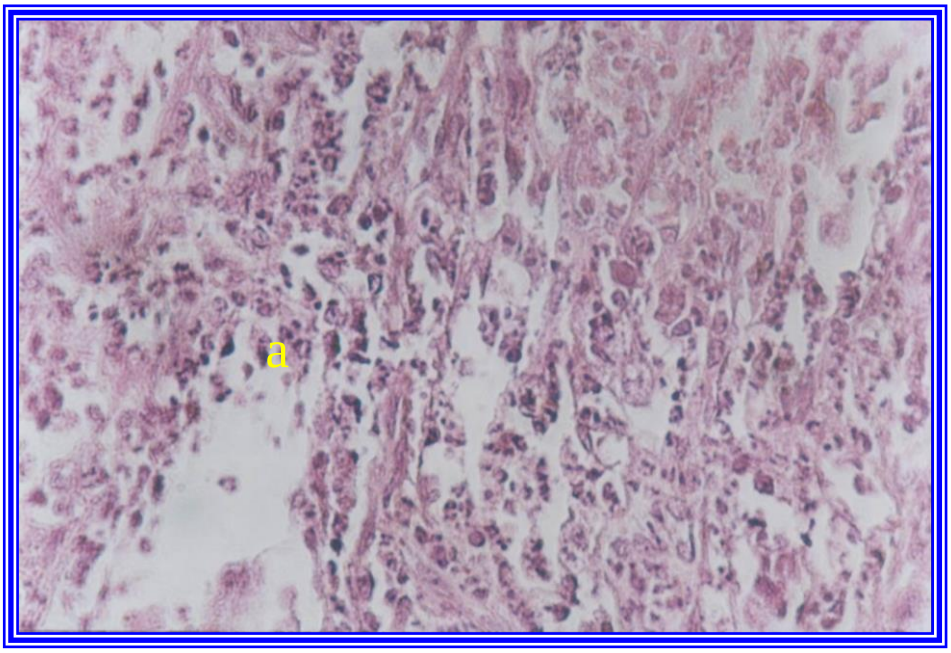

Fig (3): Histologic section of intestine showed infiltration of inflammatory cells mainly neutrophils in lamina properia of the villi and lumen of Liebourkhan crypt (a) 400X. (H&E stain).

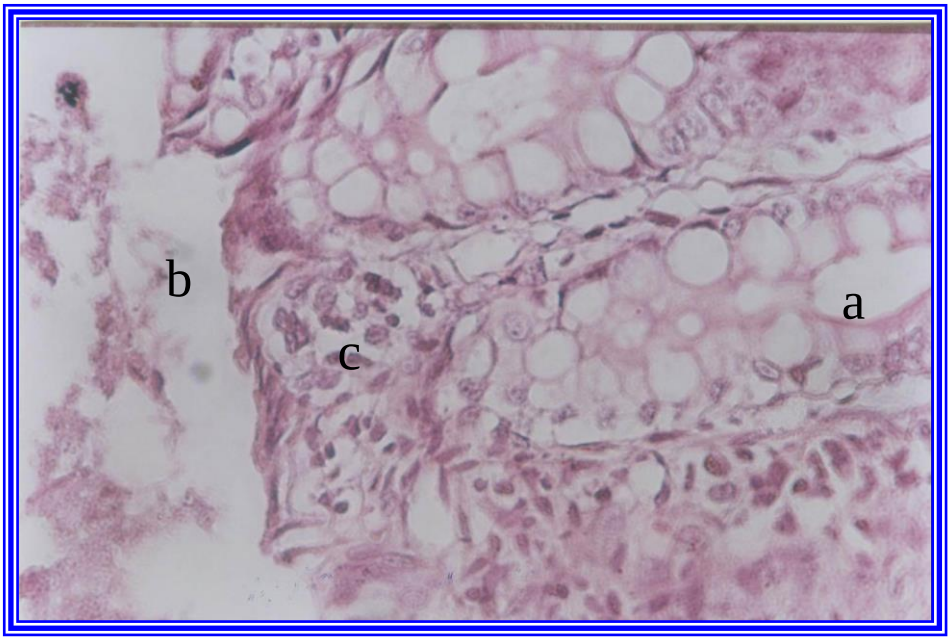

Fig (4): Histologic sections of intestine showed hyperplasia and hypertrophy of goblet cells (a) with over secretion of mucin in the intestinal lumen (b) , as well as atrophy of villi which fusion together at their tips and tack rounded shape(c) 400X. (H&E stain).

B) Liver

The histopathologic examination showed atrophy of hepatic core and dilatation of sinusoids with disorders of architecture of hepatic core and congestion of sinusoids and central vein which contain inflammatory cells mainly neutrophils (Figure 5). In another section there was hyperplasia of epithelial lining of the bile ducts which extend into the lumen as a papillary projections together with pleomorphic and mononuclear cells infiltration in sub epithelial area (Figures : 6 and 7)

C) Spleen

The microscopic section showed depletion of the white pulp due to necrosis and atrophy of the lymphocytic cells together with hypertrophy of muscular layer of the central artery ; as well as ; hyperplasia of endothelial cells. There is also congestion of red pulp with inflammatory cells infiltration mainly neutrophils (Figure : 8).

D) Lung

The histopathologic section revealed that ; the alveoli filled with proteneous materials and increase the thickness of inter alveolar septa due to congestion of interaliveolar capillaries and inflammatory cells infiltration (Figure : 9). There was also aggregation of inflammatory cells mainly neutrophils around the blood vessels and in the lung parenchyma; as well as; emphysema and collapse of the alveolar walls (Figure 10).

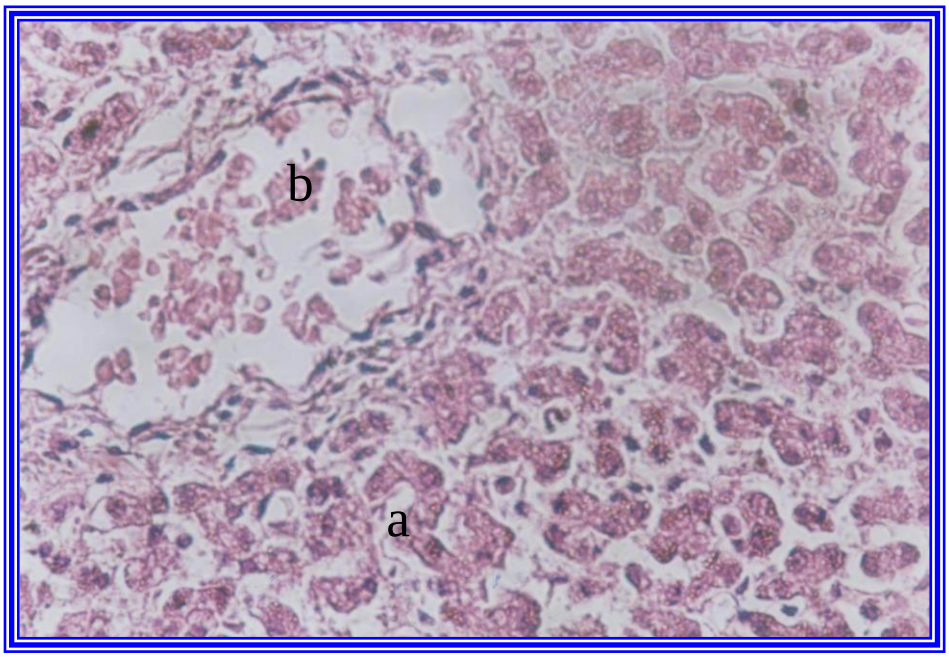

Fig (5): Histologic section of liver showed dilatation, atrophy and congestion of sinusoids (a) and congestion of central vein which contain inflammatory cells mainly neutrophils (b) 400X. . (H&E stain).

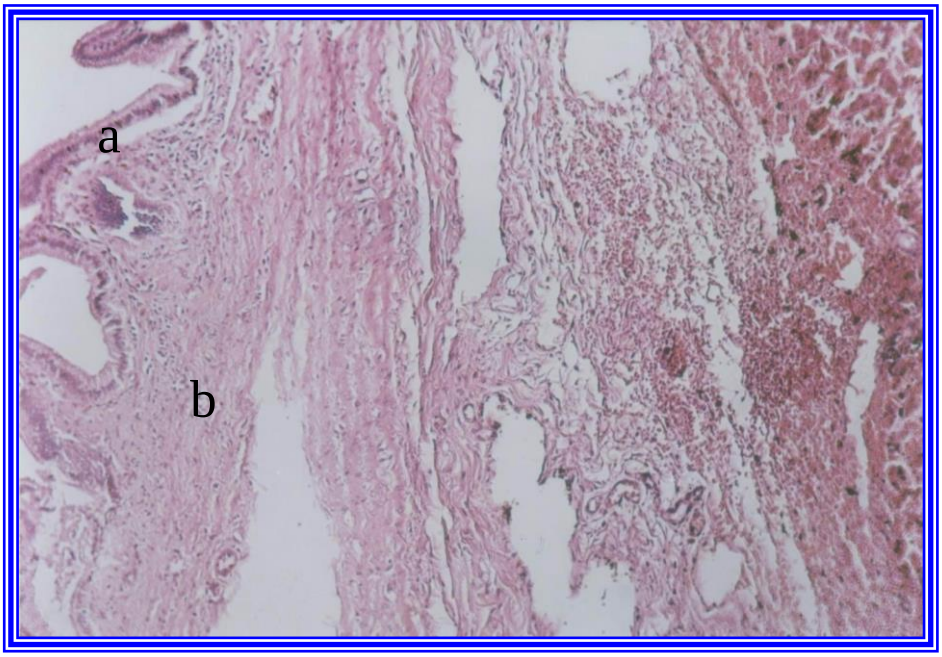

Fig (6): Histologic section of liver showed hyperplasia of epithelial lining of the bile duct which extends into lumen as papillary projection (a) with the inflammatory cells infiltration in sub epithelial area (b) 100x . (H&E stain).

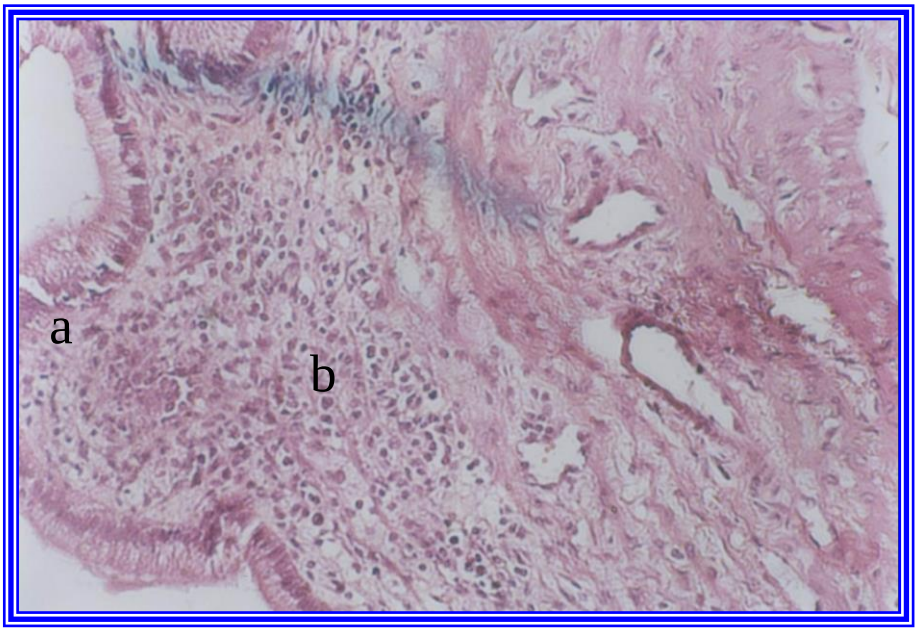

Fig (7): Histologic section of liver showed hyperplasia of epithelial lining of the bile duct which extends into lumen as papillary projection (a) with inflammatory cell infiltration in sub epithelial area (b) 200X. (H&E stain).

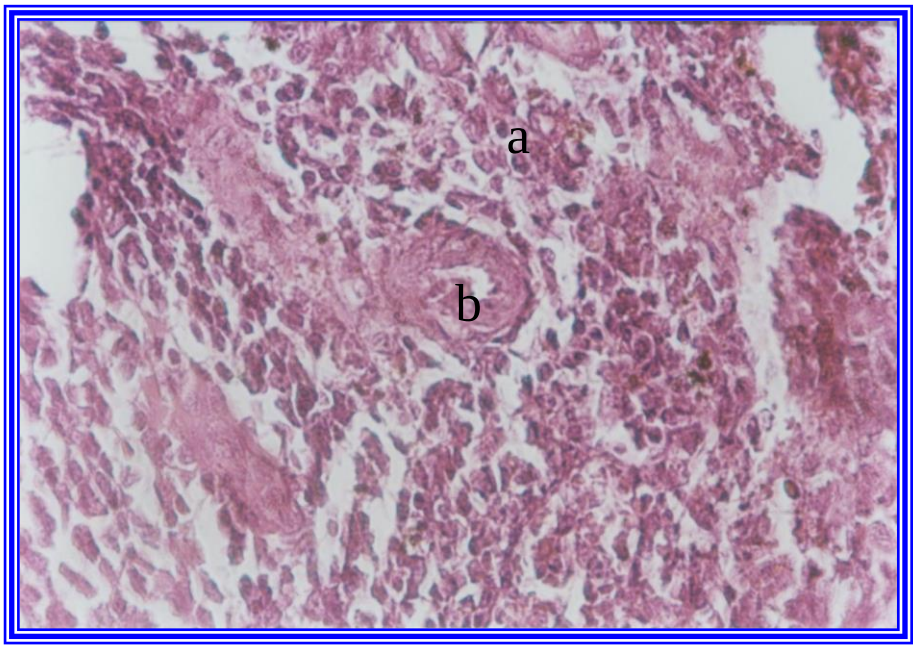

Fig (8): Histpathologic section of spleen showed depletion of the white pulp (a) and hyperplasia of intema of the central artery (b) 400X. (H&E stain).

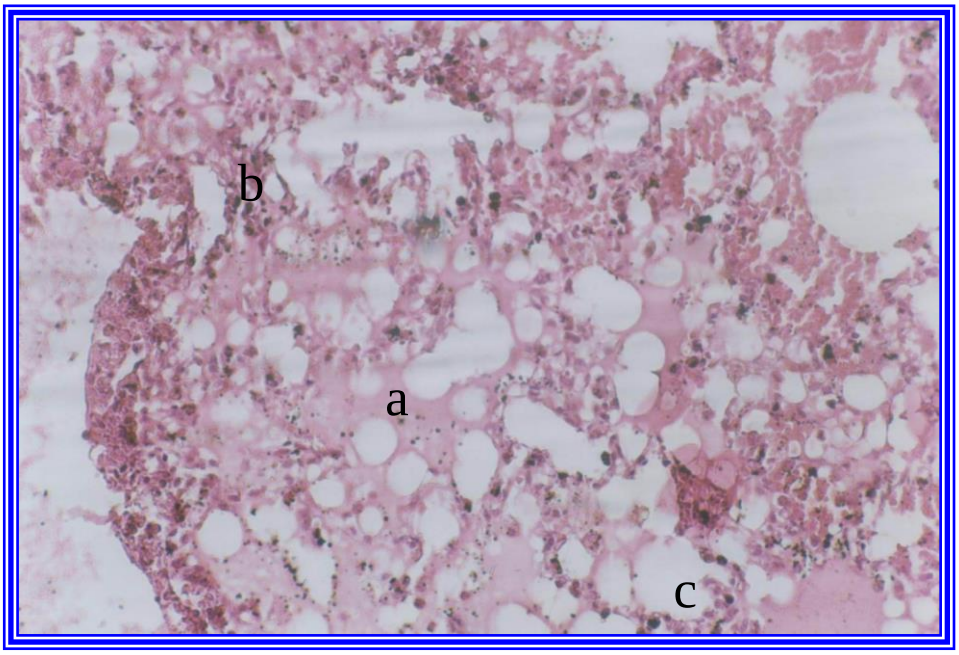

Fig (9): Histopathologic section of lung showed alveoli filled with proteineous materials (a) with increases the thickness of interalveolar septa (b) and emphysema (c)200X (H&E stain).

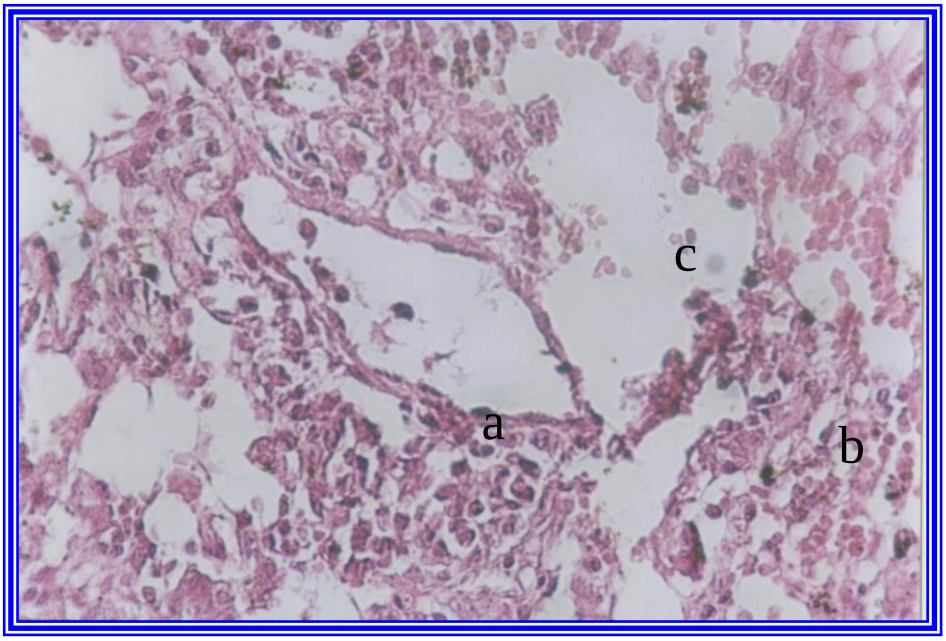

Fig (10): Histopathologic section of lung showed aggregate of inflammatory cells mainly neutrophils around the blood vessels (a) and in the lung parenchyma (b) , as well as , emphysema and collapse of the alveolar walls (c)400X (H&E stain).

Discussion

The post mortem examination revealed that there was sever congestion and hemorrhage in the gastrointestinal tract specially the distal part of small intestine (ileum). This result was in agreement with Tanaka *et al.,* (1976). This is because the peristaltic movement of the intestine is slow in this part that lead to accumulation of bacteria and invasion the intestinal mucosa leading to severe lesion here (Nation, 1984).

The histopathologic examination revealed that the inflammatory reaction in the intestine was characterized by heavy cellular infiltration in the lamina properia and lumen of Liebourkhan crypts and congestion of blood vessels. These changes were due to the effect of salmonella endotoxins on blood vessels and increase permeability (Najraja *et al*, 1997). In the liver, the histopathologic lesions were found in the liver parenchyma and gall bladder due to the localization of bacteria their (Gudmundsdottir *et al.,* 2005). The hyperplasia of bile duct may be related to the injury caused by tumor necrosis factor (TNF) secreted from macrophages that followed by repair of the damaged hepatocytes that surround the bile duct (Cunningham, 2002 and Plumlee, 2004). The presences of histopathologic lesions in the spleen indicate the localization of bacteria as well as effect of endotoxin on the spleen (Cunningham, 2002). The congestion of the red pulp is related to the activation of extra medullary erythropoiesis by endotoxin (Rubin and Farber,1990). Also the presence of histopathologic lesions in the lungs indicates the effect of endotoxin on the pulmonary tissue (Najraja *et al*, 1997 and Radostitis *et al*., 2000).

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