



Clinical and Pathomorphological profile of Marek's Disease in layer Fowl

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Abstract

The study aims to investigate Marek's disease (MD) incidence rate among the morbidus clinical layer fowl using, clinical examination, necropsy and histopathological profile. Clinically and necropsy examination of birds showed sever nervous signs similar to those of MD without evidence of any pathognomic nervous lesion, while acute diffused lymphomatosis were demonstrated in the visceral organs. Furthermore, histopathological pleomorphic lymphoproliferations detected in the visceral organs were confirmed MD infection with 27.3% incidence rate of the clinical and pathological examined layers. According to these findings further investigation of the disease with final diagnosis of the virulent serotypes in the study area is needed for control polices.

Keywords: Marek's, Oncogenic herpesvirus, Lymphomatosis, Neurolymphopathy.

Introduction

Poultry industry emerges as an important socio-economic practice of global distribution especially in developing countries where conflicts, environmental crises and propagating food security needs are coexisting. Poultry sector suffers from various viral infection of economic concerns despite wide uses of vaccines¹.

Of these an oncogenic Mark's disease (MD); a lymphoproliferative and neuropathic disease of domestic fowl. MD is caused by lymphotropic herpes virus which has three serotypes affect both chicks and adult birds; virulent oncogenic serotype and nonpathogenic serotypes 2 and 3 (vaccine strains)²⁻⁴.

Strains of serotype 1 also classified into pathotype induced lymphomatosis in vaccinated chickens⁵. The virus withstand harsh environment and can be surviving in the hair follicles for long time hence it transmits horizontally by nasal or oral routs and blood but a vertical route of transmission is not reported^{6,7}.

Despite application of multiple MD vaccines an outbreaks in an intensive poultry farms were reported with as 35% incidence rate and 4 virulent strains were isolated from the episodes in Argentina^{8,9}.

Clinically MD characterizes by central and peripheral nervous distress, ocular changes, skin tumors, visceral metastasis and diarrhea¹⁰. While its pathological profile is well characteristic in the classic form of the disease where a pathognomic enlargement of peripheral nerve plexus is mostly evident among chicks rather than adult birds, while skin lesions are considered to be occur in broiler poultts and not in layers¹¹⁻¹³.

Brain tumors was also reported and associated with sever nervous signs¹⁴. Early Lymphoid organs atrophy is occur and result in immunosuppressive complications².

Histopathological picture of MD showed t-cell lymphocytic infiltration in the peripheral nerves, skin, iris and visceral metastasis lymphomas with a characteristic heterogeneous lymphoproliferations varying from pleomorphic lymphoblast, hemocytoblasts and reticulum cells. Moreover uniform small lymphoid cells and reticular or undifferentiated mesenchymal cells were noticed^{14,15}. Intranuclear inclusions bodies of the virus were seen in infected cells⁴.

The current study aims to explore an incidence of MD among morbidus fowl layers in Al Qassim area using clinical, necropsy and histopathological techniques.

Methodology

Fowl: Morbidus field cases of layer chickens from different poultry farms and bird markets were imported either for routine student practical sessions or for consulting diagnostic services at the laboratory of pathology in the department of veterinary medicine during a period from 2014 - 2015.

Clinical examination: Case history, visual and physical clinical examinations of the patient birds were carried out. Apparent clinical signs were noted and mortality rates were calculated according to the case history of the owners.

Necropsy: A total of 150 Morbidus birds were humanely euthanized and necropsied. Any gross pathological changes were noted and fully described. Necropsy procedure of the

infected birds was followed standard operating procedures¹⁶.

Incidence and tentative diagnosis of MD based on the evidence of pathognomic necropsy and histopathological findings which explain the obvious MD clinical symptoms.

Histopathology: For routine paraffin wax histopathology, a portion of 1cm³ of lesions from 41 different visceral organ (13 livers, 11 kidneys, 8 spleen, 8 proventriculous and 1 cardiac muscle) which grossly suggested to have lymphomatosis of MD were selected, incised, fixed in 10% formal saline, processed and stained with H and E as described by Crocker and Hewitson^{17,18}.

Results and Discussion

Clinical examination: According to the case history the mortality rate of the infected flock was determined as 5-10%. Visual and physical examination of the sick birds were exhibiting sever emaciation, ruffled feather, diarrhea, ascites, nervous signs include torticollis, legs and wings paresis or paralysis with complete recumbence and inward curving of toes.

Some birds showing unilateral or bilateral blindness and pupil distortion. Respiratory signs and hair follicle enlargement were not registered among the examined birds.

Macroscopic pathology: Necropsied chickens were showed marked emaciation, ruffled feather with white - greenish diarrhea. Obvious visceral diffuse lymphomatosis tumors were seen in liver, kidney, heart, proventriculos and spleen.

Although there was sever clinical nervous signs, a hyperplastic pathognomic lesion of the peripheral nerve plexus was not observed as well as hair follicle nodulation. Most of the necropsied bird showed a reproductive disorders varying from oovaritis, salpingitis, egg peritonitis and deformative eggs (Figure). Liver fatty change, hepatomegaly, liver bronzy pigmentation and ascites lesion were also noted (Figure-1).

Histopathology: Heamtoxiline and Eosin stained tissue sections of the visceral organs revealed various histopathological changes resembled to the pathological lesions induced by Marek's disease oncogenic virus.

According to histopathological features, the incidence of MD lymphomatosis lesions among the processed samples detected as 82.9% (34 out of 41 samples). Eleven liver section 84.6% (11/13) were harboring multifocal perivascular heterogeneous lymphoproliferative metastasis consist of pleomorphic lymphocytes, reticulocytes, collagenous network, hepatocellular necrosis and intranuclear inclusion bodies (Figure-2).

While, heterogeneous lymphoproliferative with marked lymphoid necrosis and hemorrhages were extremely found in the spleen lesions 100% (8/8) (Figure-3). Moreover, the Embolic lymphomatosis were also found in the renal sections

100 % (11/11) and multifocal to diffuse pleomorphic lymphoproliferations extremely replaced the glomerular, tubular and interstitial parenchyma with acute vascular and necrotic changes (Figure-4).

The same microscopic lesions were found in proventriculous mucosal, glandular, muscularis and subserosa parts 37.5% (3/8) and heart muscle 100% (1/1) invaded by a diffuse pleomorphic lymphoproliferations (Figure-5 and 6).

Discussion: Researches on poultry sector in Al Qassim region were quietly rare hence data concerning diagnosis of poultry diseases is scanty. Despite widespread application of vaccines, complains of poultry farmers with a fatal episodes were arise.

Clinically the examined birds were showing nervous sings, ocular disorder, and visceral lymphomatosis typical to the signs of MD, however, outbreaks of the disease in an intensive poultry farms were previously reported and virulent strains were isolated from the episodes^{8,9}.

Necropsied animals also explored visceral diffused swelling in liver, renal, proventriculous, cardiac muscle and spleen without any evidence of the pathognomic peripheral nerve plexus enlargement, brain changes or hair follicle hyperplasia. These findings were agree with some researchers and disagree with others, whom reported that the classic MD form frequently caused neurolymphopathic lesions in fowls¹¹⁻¹⁴.

Histologic demonstration of metastatic and characteristic perivascular lymphoproliferations varying from pleomorphic lymphoblast, hemocytoblasts and reticulum cells in the visceral organs were evident an acute MD infection in layer fowl flocks and our finding was previously stated by Fujimoto and Musa^{14,15}.

Emerging of different virulent serotypes of MD herpes virus other than rispens vaccine strain may results in new infection of the vaccinated flocks. Other factor of these episodes may refer to pad application of vaccine together with the fact that infected MD cases become carriers, shed the virus in the feces, hair follicles, vomits and blood and then disseminate the infection to the flock where the virus was proved to withstand surviving in the environment for long time⁷.

MD was reported to cause immunosuppression due to early atrophy of the lymphoid organs. Hence reporting of enteritis, oovaritis and salpingitis was approved emerging of opportunistic secondary infections result in such complications².

Conclusion

Demonstrations of the nervous signs with a pleomorphic lymphomatosis in the visceral organs of layer fowls proved MD infection in Al Qassim area. Further investigation of the disease with final diagnosis of the virulent serotypes in the study area is needed for control polices.

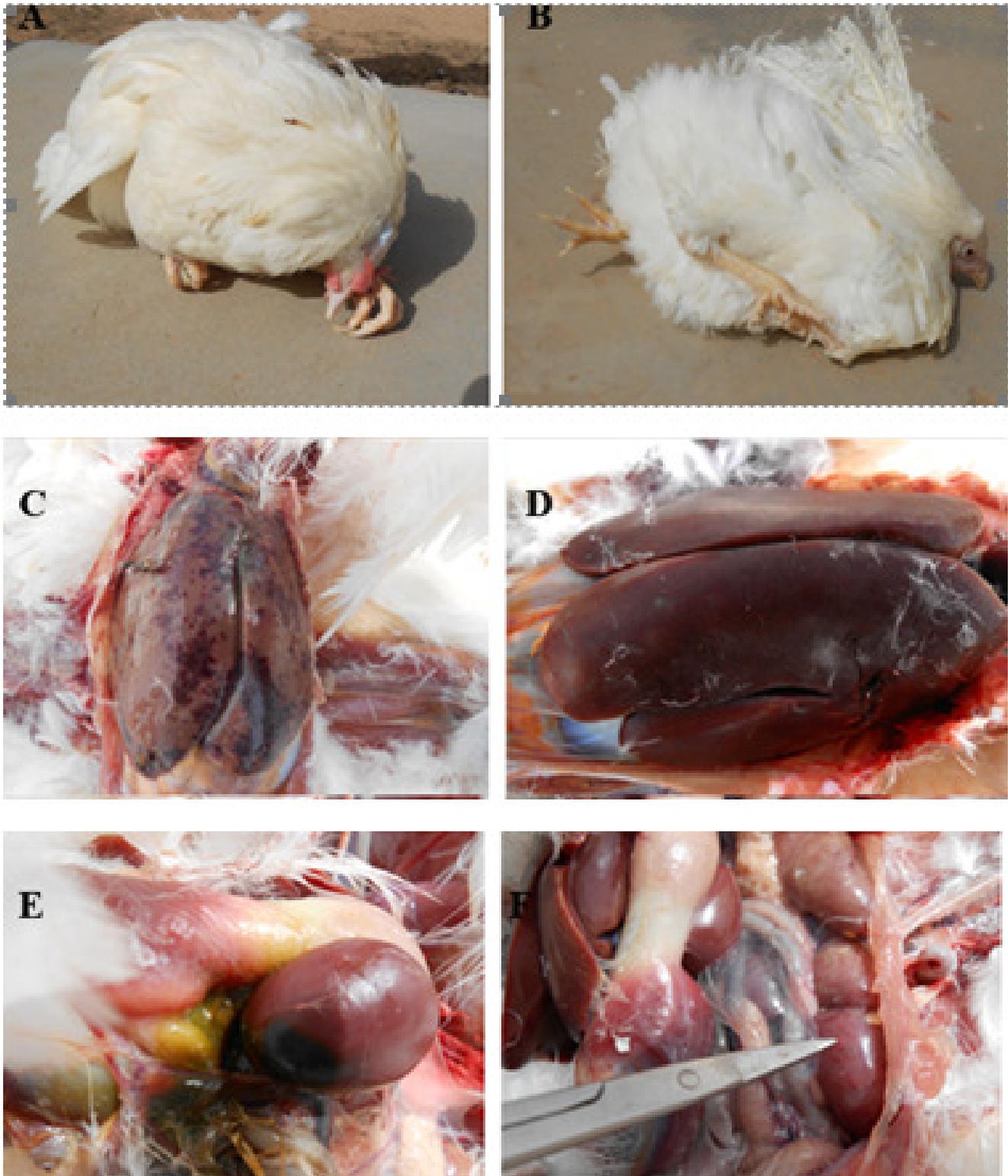


Figure-1

Symptoms and necropsy findings of MD field clinical cases: A and B: Nervous clinical signs; torticollis, inward toes and legs paralysis of MD in layer fowls, C and D: Gross pathological changes: diffuse hepatic swelling with hemorrhages and necrosis, E: Splenomegaly with hemorrhages. F: kidney lobes and proventriculus diffuse swellings

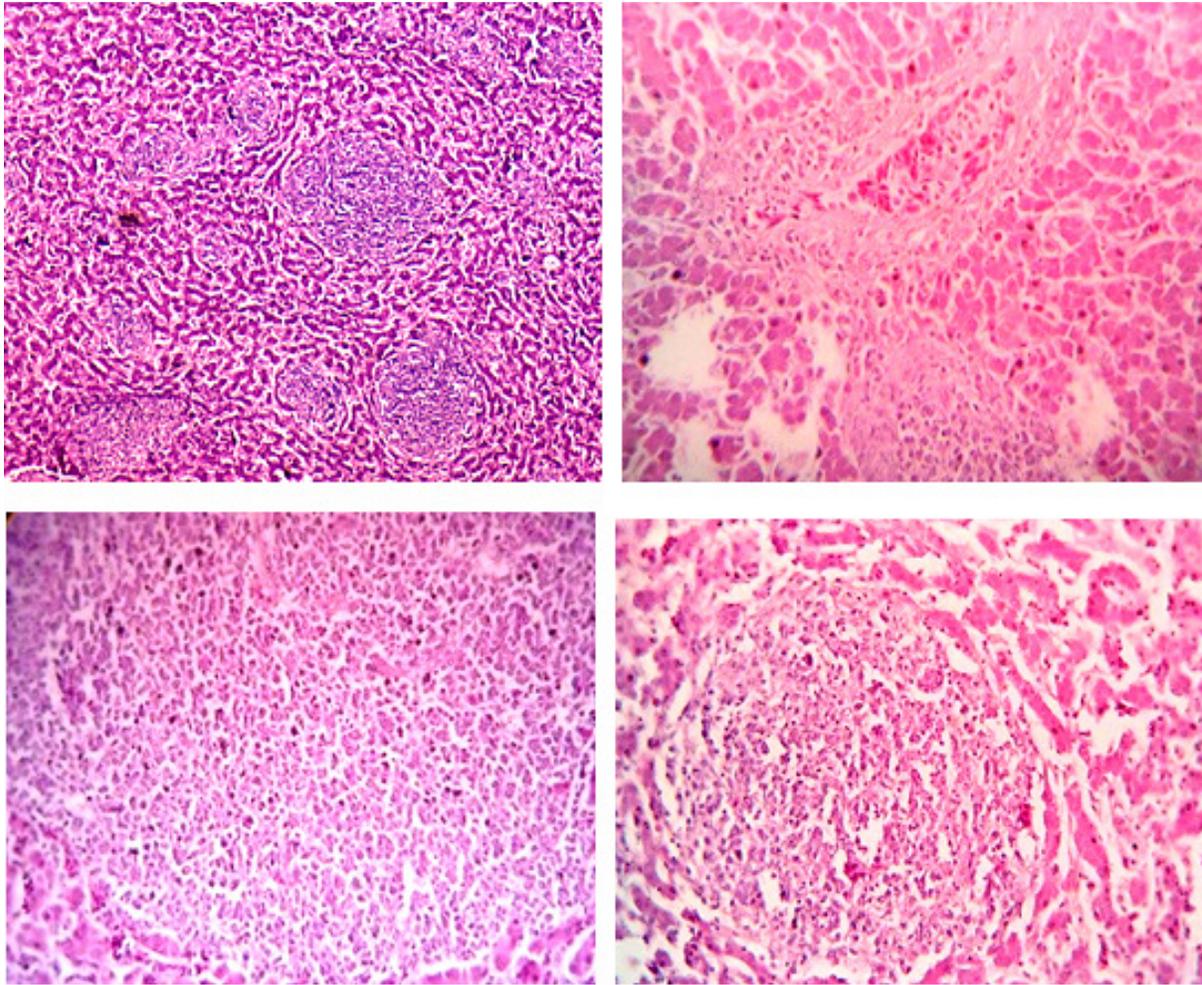


Figure-2

Liver sections showing multifocal perivascular pleomorphic lymphoproliferations (A, B, C), reticulocytes and collagenous depositing (D) and hepatic intranuclear inclusion (B), (H and E 10, 40 X)

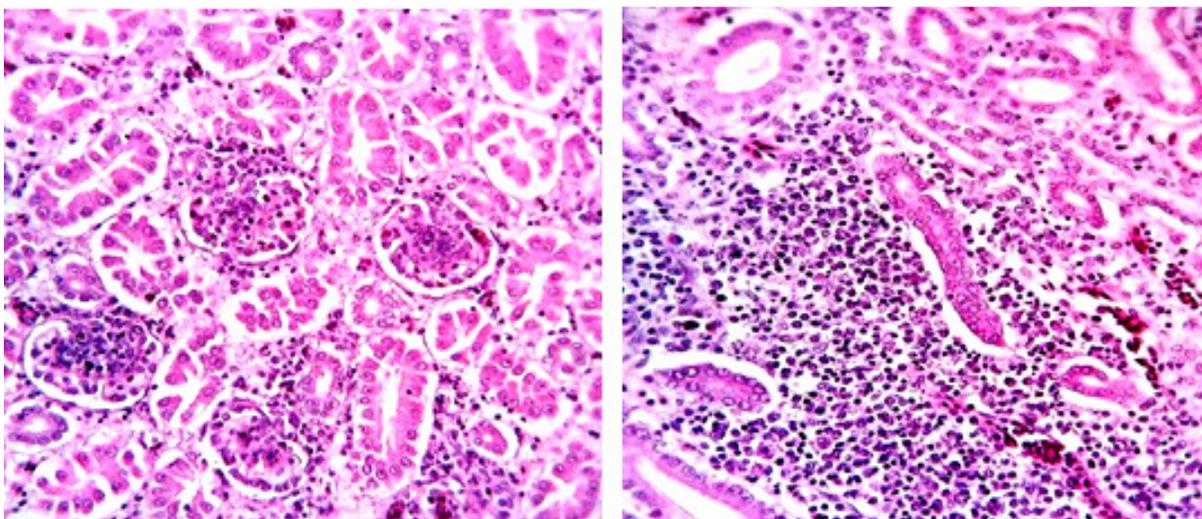


Figure-3

Kidney sections showing embolic glomerular and tubulointerstitial diffused pleomorphic lymphoproliferations (H and E, 40 X)

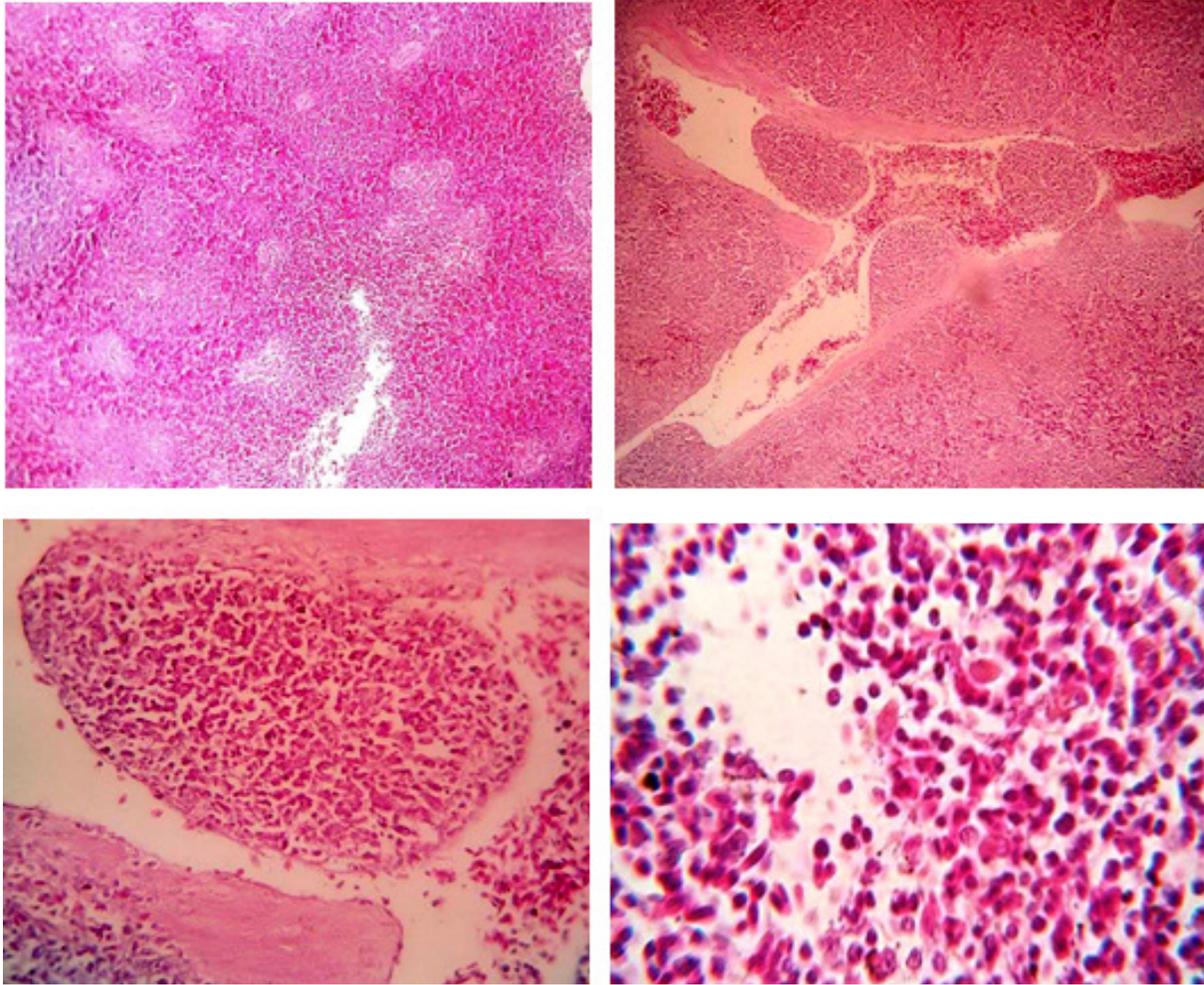


Figure-4

Spleen sections showing multifocal diffused pleomorphic lymphoproliferations (A and B), reticulocytes and collagenous depositing (C and D) and intranuclear inclusion (D), (H and E, 10, 40, 100X)

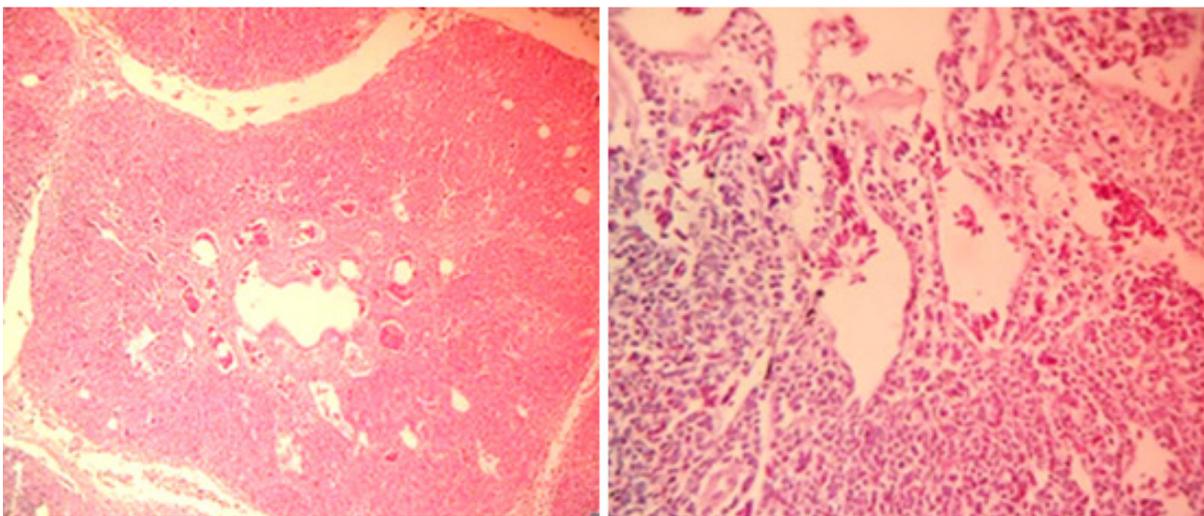


Figure-5

Proventriculous and cardiac muscle sections: A and B: Proventriculitis, multifocal lymphoproliferations, necrosis and congestion (H and E, 10, 40, X)

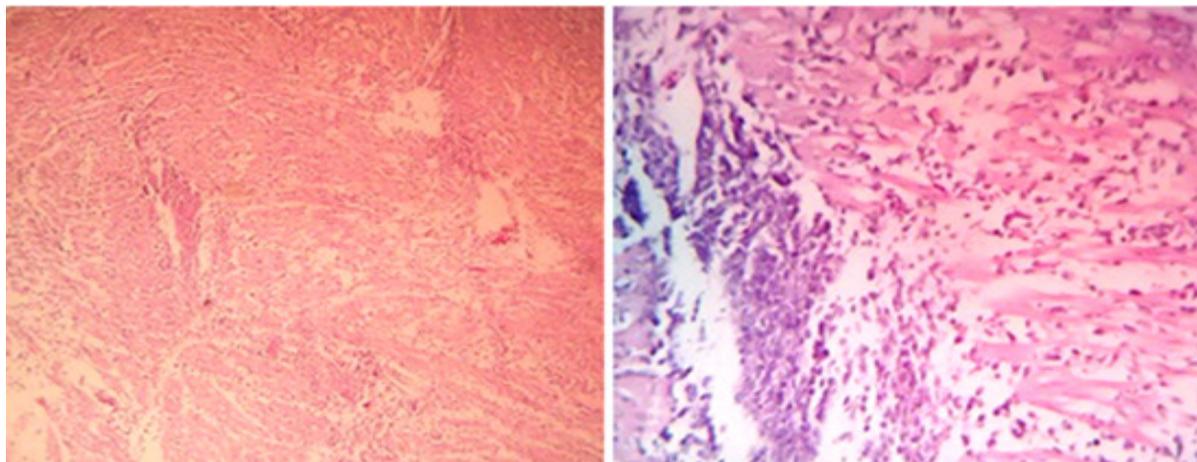


Figure-6

Proventriculosis and cardiac muscle sections: A and B: cardiac myositis, myofibril necrosis and pleomorphic lymphocytic invasion (H and E, 10, 40, X)

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