Pathological Evaluation of Canine Hepatic Cirrhosis and Necro-inflammatory Activity

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Abstract

Background: Hepatic fibrosis is a common pathological result of chronic liver diseases, which is a dynamic process of liver decomposition mediated by cellular mediators in response to injury.

Objective: The present study aims to evaluate the histopathological features of dog-liver fibrosis and / or cirrhosis.

Materials and Methods: 40 liver samples were collected; 12 liver fibrosis suspected animals were performed the histopathology to determine the main features of canine liver fibrosis.

Results: The histopathology revealed chronic hepatitis with liver islands separated by strips of fibroblasts and collagen, moderate numbers of macrophages, lymphocytes and plasma cells. Also in fibrosis between chronic hepatitis/cirrhosis had a wide range of severity and inflammation was observed primarily around fibrous tissue or was surrounded by fibrous tissue but extended to the liver parenchyma. The histochemical study revealed to a deposition of collagen fibers in the portal, subscapular and interlobular regions.

Conclusion: The histopathology revealed a range of lesions vary from mild hepatic degenerative changes to severe fibrotic features associated with canine hepatic fibrosis and early cirrhosis.

Key words: *Pathological, Hepatic, Fibrosis, Canine.*

Introduction

Cirrhosis/ liver fibrosis is a common pathological result of chronic liver disease, cirrhosis is a dynamic process of liver decomposition mediated by many cellular mediators in response to an inflammatory process [1]. The infected animals with liver chronic diseases can cause a harm affection in either health status and economic as a results to the inflammatory changes related to this disease [2].

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Hepatic star cells (HSCs) are a major component of cirrhosis, in the fibrous liver, HSCs quiet across different to reproductive, migratory and perxing myofibroblasts, show transcription properties and pro-fibrous secretions so-called cell activation and the secretion of ECM molecules that accumulate and form the deterrent tissues in space from the diss that leads to inflammation[3]. Liver diseases, especially chronic hepatitis and copper-related hepatitis, are common in dogs, with varying amounts of fibrosis, necrotizing, and inflammation among individual patients [4].

Fibrosis is an integral part of chronic liver disease, hepatitis caused by various detogenal sedation raises fibrous tissue deposition in parenchyma, which replaces normal functional liver cells, reshapes blood vessels in the system, waives liver functions[5]. Cirrhosis is characterized by the gradual accumulation of

extracellular matrix components (ECM) in the liver with persistent inflammation, the collagen profile of the liver changes, with increased relative amounts of first and third collagen types accompanied by modification and binding of ECM components [6]. Histologically cirrhosis is well estimated on the sections of the hematosis-eosin or with histochemical spots (titular mason or red sirius), which show collagen deposition with varying degrees of architectural distortion [7]. The current study concluded that the canine hepatic fibrosis was associated with a serious inflammatory events represented by multiple lesions vary in it severity in which the histopathology revealed a range of lesions vary from mild hepatic degenerative changes to severe fibrotic features associated with canine hepatic fibrosis and early cirrhosis.

Materials and Methods

The 12 dogs with clinical evidence of acute or chronic liver disease from 40 liver samples were collected, which were presented to liver biopsies to the faculty of veterinary medicine at the University of Basrah. The samples of dog fibrosis / cirrhosis were a medical procedure performed to obtain a small piece of liver tissue to diagnose liver fibrosis during the period from August 2019 to February 2020.

The livers were collected and thoroughly examined, after a clinical evidence of liver disease, the liver histopathology were detected from the diseased and control Dogs. All dog owners provided informed consent prior to enrolling in the study. Subsequently, the histological steps was conducted according to [8] in which the specimens were washed in water for removal of the blood then placed it in a plastic container, which contains formalin a concentration of 10%. These specimens were washed with tap water to remove excess fixation. The obtained specimens used for routine hematoxylin and eosin stains and Masson's trichrome staining, the stigma of these special stain used allows for the identification of more clinically important information than is available on the slicks of the hicnosis and eosin alone, and important for establishing a specific diagnosis. This method yields specimens for histological examination to study the microscopic changes in the tissue of the liver fibrosis.

Results

The histopathological results (H&E stain) revealed that the liver showed islands of liver cells separated by strips of fibrous and collagen cells, moderate numbers of macrophages, lymphocytes and plasma cells, besides, there was a dilation of center vein and filled with inflammatory cells infiltration mainly polymorphic inflammatory cells, in addition marked area of degenerative changes as form of vaculation of hepatocyte particular in the pericentral vein region (figure 1). The Fibrosis among the chronic hepatitis group/cirrhosis was a wide range of severity and inflammation was observed primarily around fibrous tissue or was surrounded by fibrous tissue but extended to the liver parenchyma (most inflammatory cells were lymphocytes, with slight infiltration by macrophages and justices) (figure 2).

The histochemical results showed a sever deposition of collagen fibers in the portal trait to demonstrate the portal fibrosis associated and liver cirrhosis which appeared surrounded the bile ducts, hepatic artery and portal vein (figure 3). Moreover, it showed a deposition of collagen fibers in the subscapular region and interlobular regions referred to periportal fibrosis (figure 4).

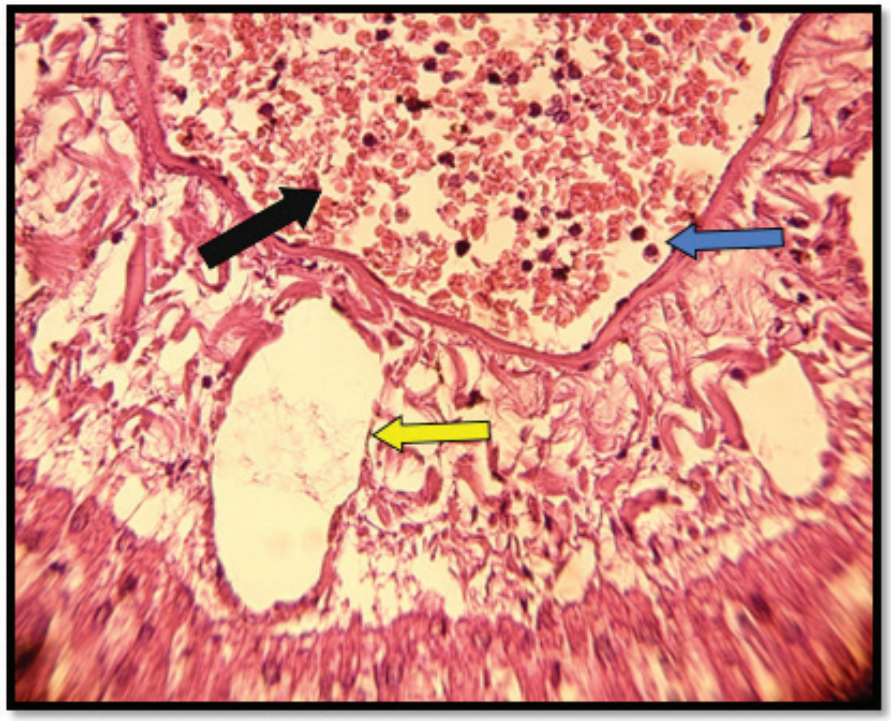

Figure (1) Histopathological section of liver fibrosed animals showed dilation of center vein (black arrow), filled in mononuclear inflammatory cells (blue arrow), in addition there are area of degenerative changes in the form of cystic dilation of hepatocyte particular in the pericentral vein region (yellow arrow) (H&E stain, 400X).

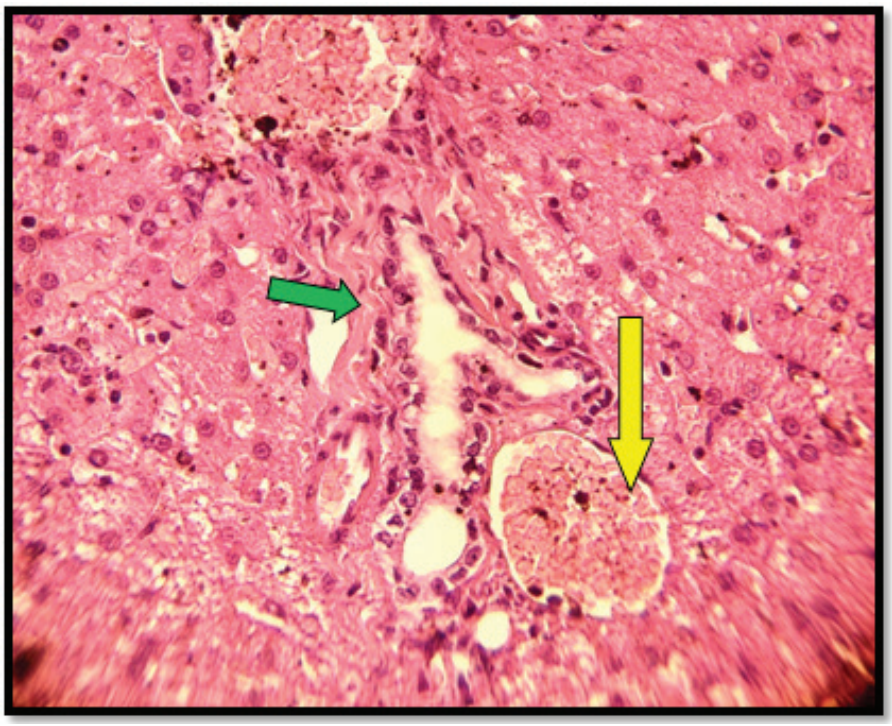

Figure (2) Histopathological section of liver fibrosed animals showed marked fibrosis present within portal area (green arrow) and the inflammation was observed primarily around the fibrous tissue, with portal vein congestion (yellow arrow). (H&E stain, 400X).

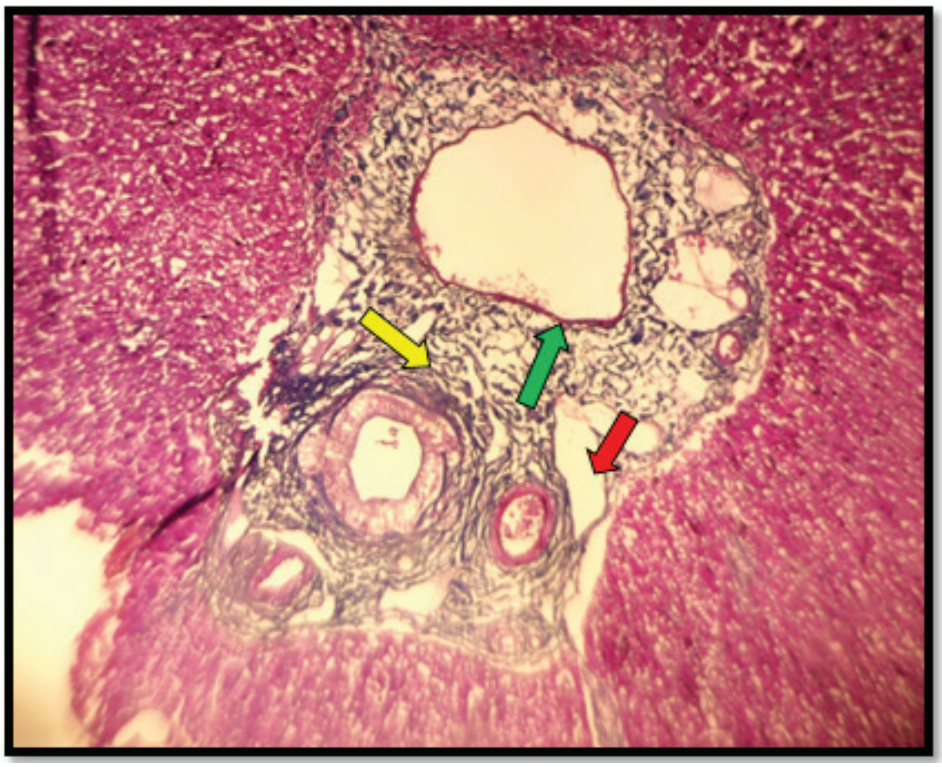

Figure (3): Histochemical section of liver of liver fibrosed animals show sever deposition of collagen fibers stained blue in the portal trait to demonstrate the portal fibrosis associated with liver cirrhosis appeared surrounded the bile ducts (yellow arrow), hepatic artery (red arrow) and portal vein (green arrow). (Masson's trichrome, 100X).

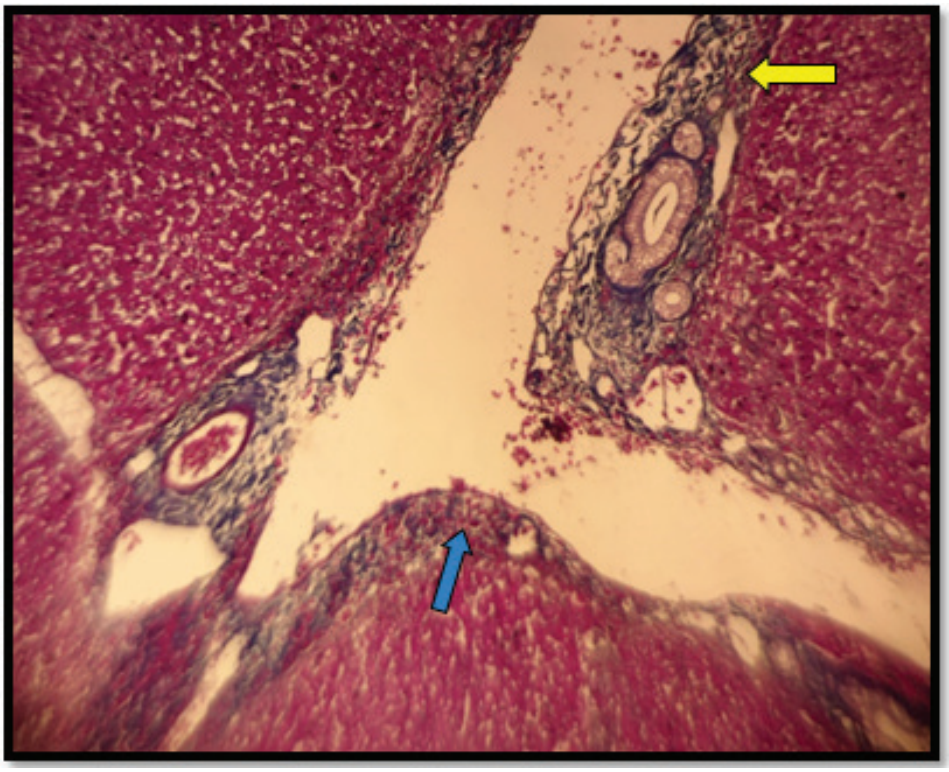

Figure (4): Histochemical section of liver of liver fibrosed animals show deposition of collagen fibers in the subscapular and interlobular regions (blue arrow) referring to periportal fibrosis (yellow arrow) (Masson's trichrome ,400X).

Discussion

Cirrhosis is the final stage of chronic hepatitis and is defined as a diffuse distribution characterized by cirrhosis of the liver and the conversion of the normal liver structure into structurally abnormal nodules, partial or total nodules, and is considered irreversible [9].

The microscopical results showed vary degrees of severity extend from inflammatory cells infiltration to the fibrous tissue lesions in the liver fibrosis animals, therefore, the histopathological result revealed dilation of center vein, also the central vein filled in inflammatory cells infiltration mainly mononuclear inflammatory cells, marked area of degenerative changes as form of vacuolation of hepatocyte particular in the pericentral vein region.

In other sections, there was Fibrosis between the chronic hepatitis group/cirrhosis was a wide range of severity and inflammation was observed primarily around fibrous tissues or was surrounded by fibroblast tissue but extended to the liver parenchyma (most of the inflammatory cells were lymphocytes, with a slight infiltration of macrophages and niatrovia), and in another section the livers deteriorated or necrotic, and the limit plates were damaged with some, Similar results were also recorded by [10] , which these findings in consistence with , who mentioned that liver fibrosed animals extent of hepatic fibrosis, inflammatory cells, cellular debris and fibrosis connective tissue.

Besides, there is fibrous connective tissue with the formation of two sublobules, fibrous connective tissue prominent in gate areas and thin bands tend to encircle small groups of liver cells. In addition, it noticed degradation with balloons and the presence of mild lymphatic inflammatory infiltration, associated with moderate disease, as well as the proliferation of kupffer cells.

The histochemical studies were good diagnostic tools for evaluation of the many hidden aspects of inflammation and repair [11] ; therefore, the current study used several special stains to estimate the role of the tissue against the invaders and the pathological changes.

The histochemical study of the liver fibrosed animals revealed to deposition of collagen fibers in the portal region of the liver, which stained blue to demonstrate the collagen deposition referring to moderate fibrosis in masson's trichrome, stain; also nuclei stained black and cytoplasm of hepatocytes and erythrocytes stained red. On other hands, the other histochemical section of the liver of liver fibrosed animals show severs deposition of collagen fibers stained blue in the portal trait to demonstrate the portal fibrosis associated with a liver abscess in masson's trichrome stain which appeared particularly in the surrounded area of bile ducts, hepatic artery, and portal vein. Also, the other histochemical section of the liver of the liver fibrosed animals showed pericentral vein deposition of collagen fibers stained blue to demonstrate the pericentral vein fibrosis in masson's trichrome stain.

Moreover, the histochemical section of the liver of the liver fibrosed animals which displayed the severe elastic collagen fibers deposition that stained blue around of portal vein revealed to perivascular fibrosis. Nearly similar results clarified by [12] who reported that the collagen fibers which stained blue moreover, the cytoplasm of hepatocytes are stained red with this histochemical stain. The above results were consistent with our microscopical results, which showed severe area of fibrosis particularly in the pericentral vein region as well to the portal area of the affected liver.

Conflict of Interest: None declared.

Source of Funding: Self, no other funding sources.

Ethical Clearance: The ethical committee, college of veterinary medicine, university of Basrah, Iraq, approved the study.

References

1. Xu H, Kong W, Liu L, Chi X, Wang X, Wu R, et al. Accuracy of M2BPGi, compared with Fibro Scan®, in analysis of liver fibrosis in patients with hepatitis C. BMC Gastroenterol. 2017;17(1):62.
2. Ahmed JA. Pathological Assessment of Bovine Liver Abscesses in Basrah Abattoir, Iraq. Egypt J Vet Sci. 2020;51(2):283–91.
3. Higashi T, Friedman SL, Hoshida Y. Hepatic stellate cells as key target in liver fibrosis. Adv Drug Deliv Rev. 2017;121:27–42.
4. Raghu C, Ekena J, Cullen JM, Webb CB, Trepanier LA. Evaluation of potential serum biomarkers of hepatic fibrosis and necroinflammatory activity

in dogs with liver disease. J Vet Intern Med. 2018;32(3):1009–18.

5. Lo RC, Kim H. Histopathological evaluation of liver fibrosis and cirrhosis regression. Clin Mol Hepatol. 2017;23(4):302.
6. Gressner OA, Rizk MS, Kovalenko E, Weiskirchen R, Gressner AM. Changing the pathogenetic roadmap of liver fibrosis? Where did it start; where will it go? J Gastroenterol Hepatol. 2008;23(7pt1):1024–35.
7. Germani G, Hytiroglou P, Fotiadu A, Burroughs AK, Dhillon AP. Assessment of fibrosis and cirrhosis in liver biopsies: an update. In: Seminars in liver disease. © Thieme Medical Publishers; 2011. p. 82–90.
8. Bancroft JD, Gamble M. Theory and practice of histological techniques. Elsevier health sciences; 2008.
9. Favier RP. Idiopathic hepatitis and cirrhosis in dogs. Vet Clin North Am Small Anim Pract. 2009;39(3):481–8.
10. Fraquelli M, Rigamonti C, Casazza G, Conte D, Donato MF, Ronchi G, et al. Reproducibility of transient elastography in the evaluation of liver fibrosis in patients with chronic liver disease. Gut. 2007;56(7):968–73.
11. Hameed AK, Ahmed, JA, Saadon AH, Abdul-Qader AS. Histological Investigation of Pneumonia in Domestic Ducks (*Anas platyrhynchos domesticus*) in Basrah Province, Iraq. Egyptian Journal of Veterinary Sciences. 2021;52(1):121–130.
12. Meurer SK, Karsdal MA, Weiskirchen R. Advances in the clinical use of collagen as biomarker of liver fibrosis. Expert Rev Mol Diagn. 2020;1–23.