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Chronic Fascioliasis of Bovine; A Pathological Study in Kirkukabattoir

Ahmed Abdullah Sultan
Department of Pathology and Poultry Diseases, college of Veterinary Medicine, Tikrit University
alsultan5877@tu.edu.iq

Abstract

Fascioliasis is a serious parasite infection that can source morbidity and death in a variety of animals, including cattle, sheep, and goats, in addition toextra domestic ruminants.The goal of the investigation was aimed to identify gross and microscopic lesions in cattle with chronic fascioliasis infection in the Kirkukabattoir.from January to March 2021, fifteen infected bovine livers of altered ages were collected from the Kirkuk abattoir and examinedgrossly.Gross inspectionshowedan enlarged bile duct, huge abscesses, migrational fibrosis on the visceral surface of the liver, and, and fibrosis of the bile duct after a longitudinal cut of the liver.Histopathologically, an extensive variety of liver lesions were found. The most prominent lesions were the formation of fibrous connective tissue around the intrahepatic bile ducts, in addition to hyperplastic lining epithelium of the bile duct with papillary projection.The bile pigment, atrophy, calcification, necrosis with filtration of immune cells, and nutmeg liver showed in the chronic stage of fascioliasis under microscopic examination. The conclusion of the current study results showed thatthe persistence of infection for long period without treatment leads to liver fibrosis and nutmeg liver.

Introduction

Liver fluke illness (fascioliasis) is a serious parasite infection that can cause morbidity and death in a variety of animals, including cattle, sheep, and goats, as well as other domestic ruminants**(Abdullah Sultan, 2019)**. The*Fasciola hepatica* and *F. gigantica* produce fascioliasis globally, posing a significant challenge to cattle productivity as well as human health in endemic regions **(Siles-Lucas *et al.*, 2021)**.The life cycle of these parasites is complicated, a snail

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intermediate host, a carrier (such as aquatic plants), and a mammal ultimate host (e.g. cattle, sheep but also humans). People are sick by eating raw water plants contaminated with encysted metacercariae of Fasciola spp. Livestock get infected by grazing on polluted pastures, whereas humans get infected by eating raw water plants (e.g., watercress or others) **(WHO, 2007)**. pathogenicity is high in both the acute and chronic phases **(Gonzalez-Miguel *et al.*, 2020)**, with severe clinical manifestations and consequences**(Rondelaud *et al.*, 2006)**.Fluke translocation throughout the liver parenchyma and hematographic migration of mature flukes, fascioliasis is linked to liver damage and produces hemorrhagictracts**(Zewde *et al.*, 2019)**, and necrosis of the liver tissue, followed by granulation, resulting in liver cirrhosis**(Ozer *et al.*, 2003)**, and related with worm load and the immunological response of the host**(Adams, 2018)**.Furthermore, in the chronic stage of histopathology, tissue healing processes might result in extensive fibrosis **(Harrington *et la.*, 2017)**, and*F. hepatica* causes inflammation as well as hyperplasia of the bile duct epithelium during this phase **(Kaida *et al.*, 2020)**, Furthermore, bile retained in bile ducts as a result of biliary cholestasis is one of the causes of oxidative stress in *Fasciola* sp. infection, where biliary cholestasis is a source of hydro-peroxides (OH), superoxide anion (O2-), and hydrogen peroxide formation (H2O2). Furthermore, liver fibrosis increases the formation of free radicals, resulting in oxidative stress. Eosinophils, neutrophils, and macrophages, which are powerful oxidant producers that not only attack parasites but also cause tissue damage, are linked to fascioliasis-induced hepatobiliary system inflammation **(Bahrami *et al.*, 2014)**.The goal of this research is to look at the chronic disorders that affect the livers of slaughtered cattle in the Kirkuk slaughterhouse in Iraq from January to March 2021.

Materials and Methods

FromJanuary to March 2021, regular trips to the Kirkuk slaughterhouse were made. The hepatic system was given special attention during routine postmortem examinations of slaughtered cattle for gross pathological and histopathological changes.

- Collected sample

The liver samples were taken at random from scarified cattle ofthe animals ages ranging from months to three years for both sexes.

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- histopathological examination

The collected specimens were routinely stained with Hematoxylin and Eosin (H&E) (**Suvarna*et al.*,2018**).

Results and Discussion

- Gross pathological examination

The gross fascioliasis lesions detected in the liver emerge on the liver's visceral surface, the bile duct is noticeably enlarged**figure 1**with huge abscesses on the surface of the liver**figure 2**and, the results agreed with the **Rasool and Al-Dabhawi (2020)** who reported swelling of bile duct with a focal abscess on surface of liver that infected with fascioliasis, in addition to, swollen and distended liver characterized by curved edges in **figure 3(A)** and, the results approved with **Islam *et al.*, (2016)**that reported livers that were somewhat swollen and enlarged, with circular margins.Congestion also hard whitish areas inside the parenchyma were signs of fibrosis **figure 4**, these results agreed with **Mohamed *et al.*, (2021)** that reported the same signs in bovine infected with fascioliasis.Migrational traces were randomly scattered throughout the livers **figure 3 (B)** and, agreed with (**Abdullah Sultan, 2019)**.

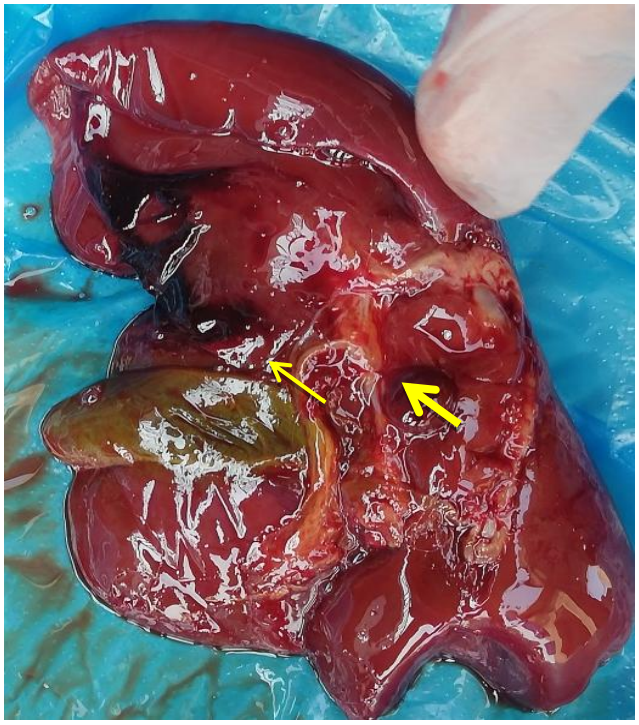

Figure 1:liver, cow. Enlarged bile duct(*arrows*), and slightly distended bile duct (*thin arrows*).

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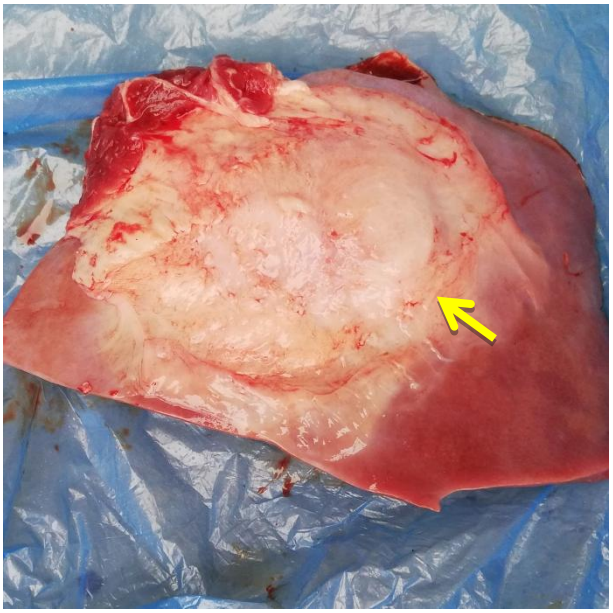

Figure 2:liver, cow. Large abscess on external surface of liver that infected with fascioliasis (*arrows*).

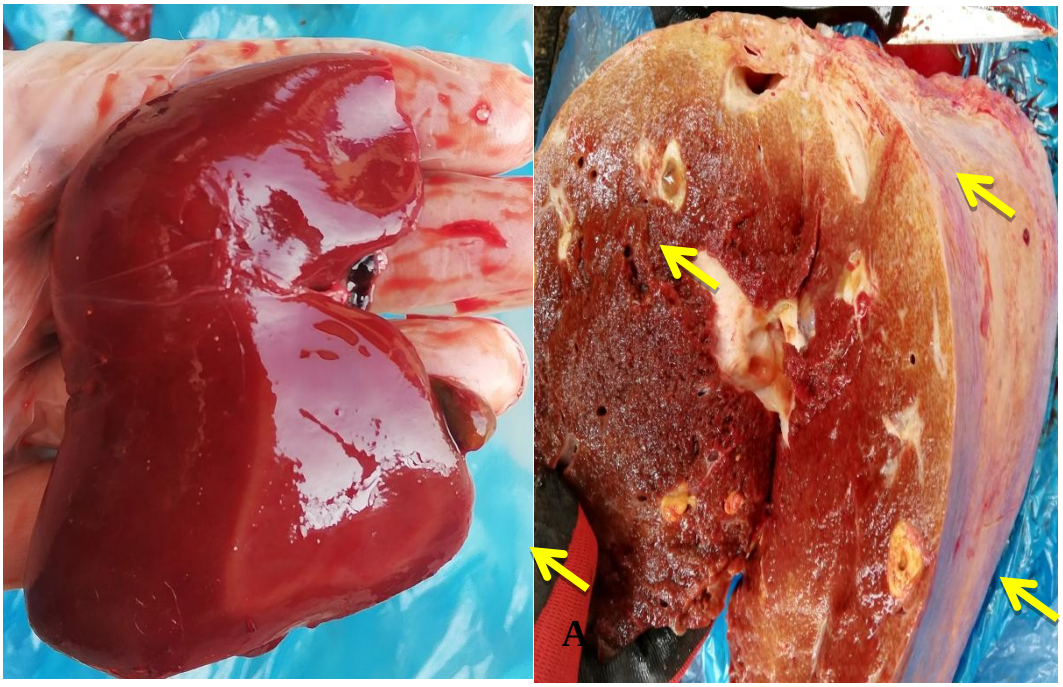

Figure 3:*Fasciola* spp. infection, liver, cow. A, swollen and distended liver characterized by curved edges (*arrows*). **B,** Migration***Fasciola* sp.** in many sites of liver parenchyma (*arrows*).

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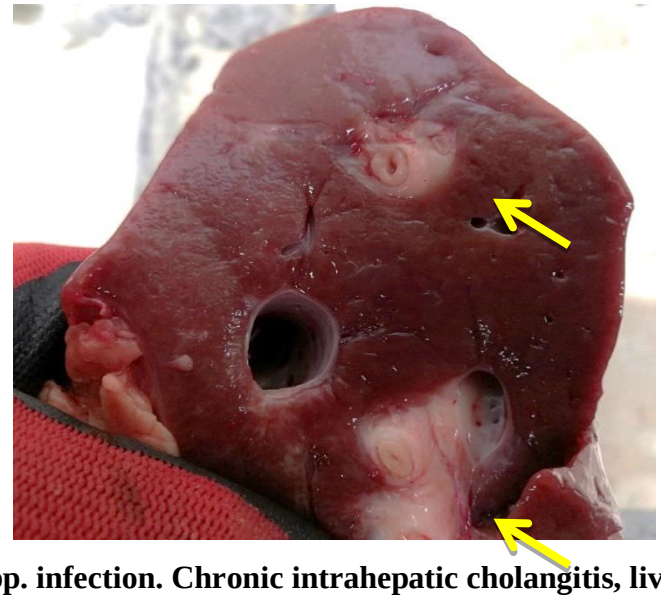

Figure 4: *Fasciola* spp. infection. Chronic intrahepatic cholangitis, liver, cow.Mature flukes live in the greater extra-hepatic and intra-hepatic bile ducts, causing chronic cholangitis and bile duct blockage, which leads to ectasia, as well as duct stenosis and peri-ductular fibrosis, which thickens the walls and causes the ducts to become increasingly prominent (arrows).

- histopathological examination

A wide range of liver lesions appeared under microscopic examination, The bile duct wall was thickened, and the lining epithelium was hyperplastic, encircling the intra-hepatic bile ducts with considerable development of fibrous connective tissue**figure 5,6**these results agree with **Islam *et al.*, (2016)**who observed that fibrous tissue growth thickened the bile duct wall, and the lining epithelium displayed hyperplastic alterations, as well as, the notice calcification in the bile duct of necrotic tissue with parasitic infection for reducing the spread of infection within the tissue of liver**figure 6**, these results agree with **Hassanin et al., (2017)**who reported the formation of calcification sheep liver that infected with fascioliasis. Haemorrhage and bile pigment deposition in the hepatic parenchyma tissue spaces **figure 7**, and these results approve with **McGavin *et al.*,(2001)** who reported deposition of bile pigment with haemorrhage in liver damage, in addition to emigrational tracesof fibrosis with excessive accumulation of collagenis the most common pathologic hallmark of several clinical diseases characterized by tissue fibrosis**figure 7,**these results reach an agreement with **Lalor *et al.*, (2021)**who discovered that the considerable tissue damage caused by migration via the liver prompts a wound healing response that involves

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an influx of immune cells and the formation of fibrosis to repair the damage. The microscopic examination of liver cirrhosis was indicated by different dark and light spots like nutmeg appearance**figure 8,** these results agree with **Hassanin *et al.*, (2017)** who reported the nutmeg liver due to chronic fibrosis and leads to anoxic centrilobularnecrosis and the spaces formed in places of the damaged cells become filled by blood and, the infiltration of fibroblastsand in the region of fibrosis and abscess development, there is a large proliferation of fibrous connective tissue mixed with lymphocytes and a few mononuclear cells, as well as line demarcation **figure 9,10** and these observation corresponding with **Sayed *et al.*, (2008)** who reported tissue damage of liver provide anaerobic condition allow to the proliferation of bacteria thatinduce hepatocellular necrosis and abscessestablishment with infiltration of immune cells.The liver of cattle showeddegenerativechanges characterized by vacuolation of the hepatocytes**figure 11,** these consequences agree with **Dar *et al.*, (2018)**they found that hepatocytes displayed a fatty alteration with evident vacuolation in the cytoplasm.

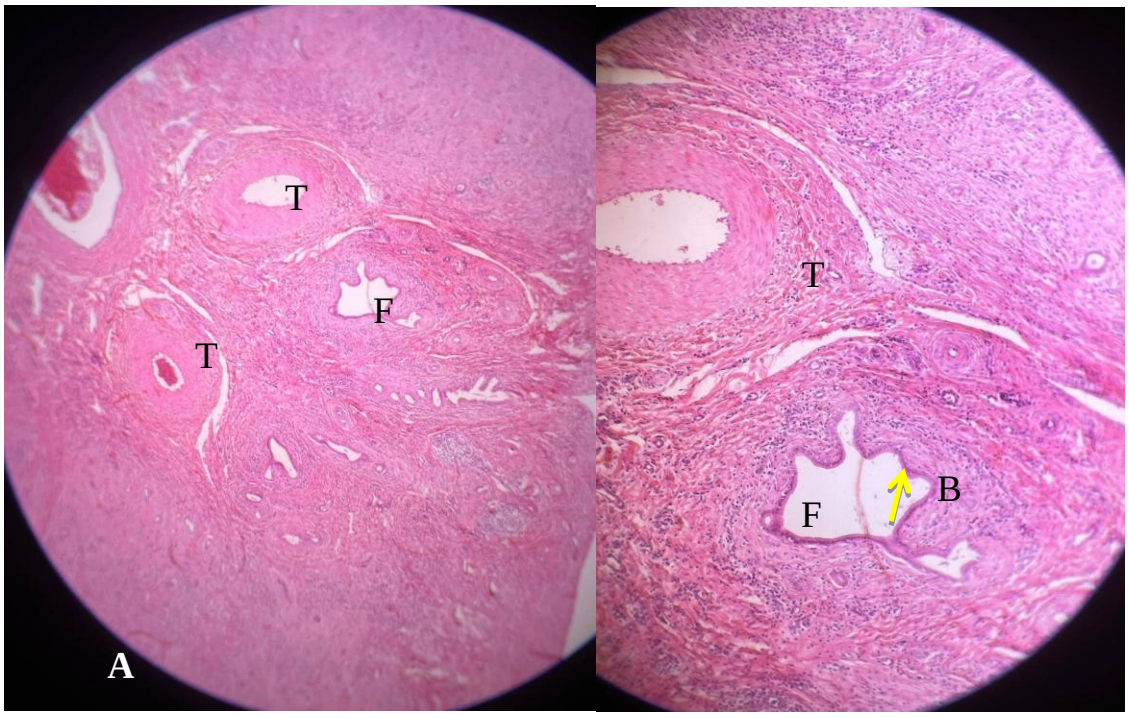

Figure 5: Chronic Cholangitis, Liver, Cow. A,distinctly noticeable peri-ductular fibrosis(F), biliary duct dilatation (B), thicking of blood vessels in portal area (T), and biliary epithelial papillary projections (*arrows*) **X4.B,** same previous figure A**X10.**

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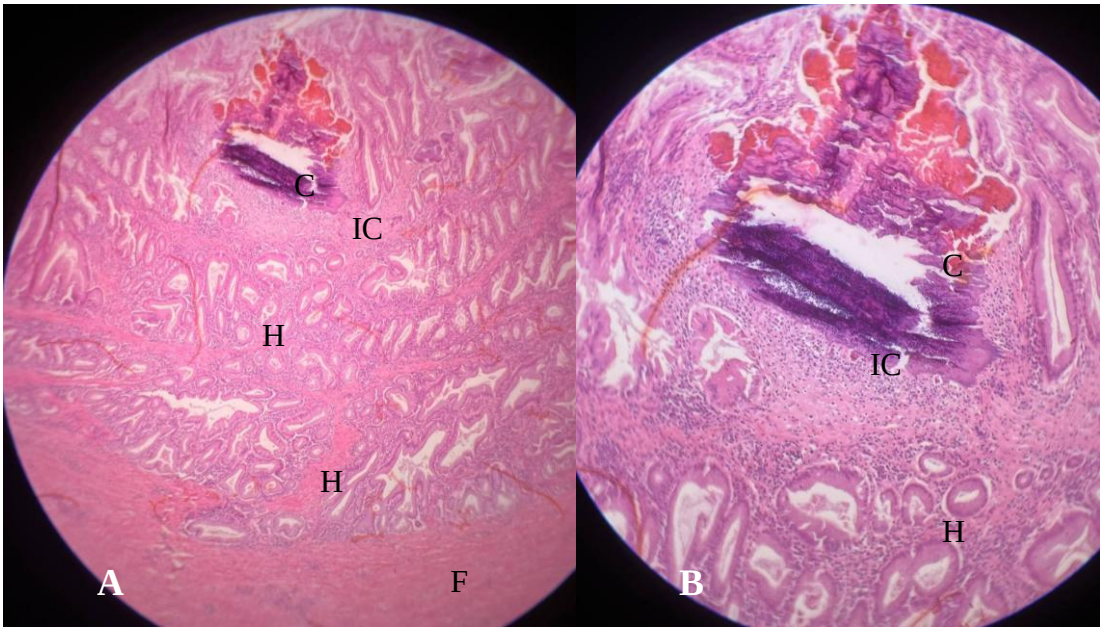
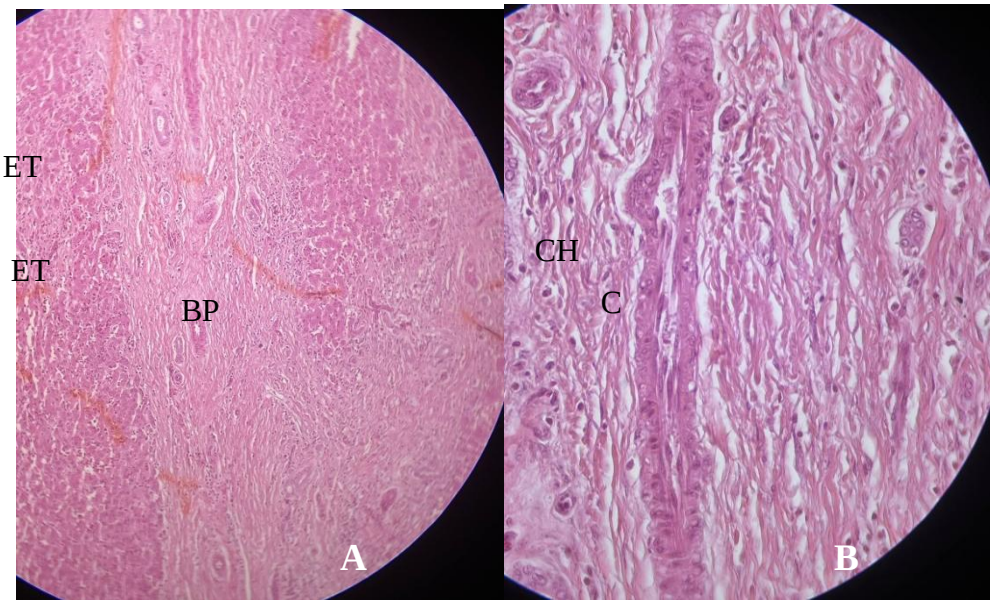


Figure 6: Liver, cow. A, hugehyperplasia of the bile duct (H), fibrosis (F), infiltration of immune cells (IC), calcification of bile duct (C)**4X. B,** same previous figure A **X10.**



BP

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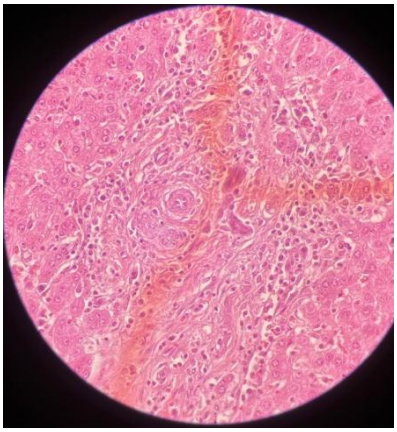

Figure 7: Liver, cow. A, emigrational traces of fibrosis (ET) with excessive accumulation of collagen (C), collapse and hyperplasia of the bile duct (CH) and bile pigment between parenchyma of the liver (BP) **X10. B,**same previous figure A**X40. C,** same previous figure A**X40**.

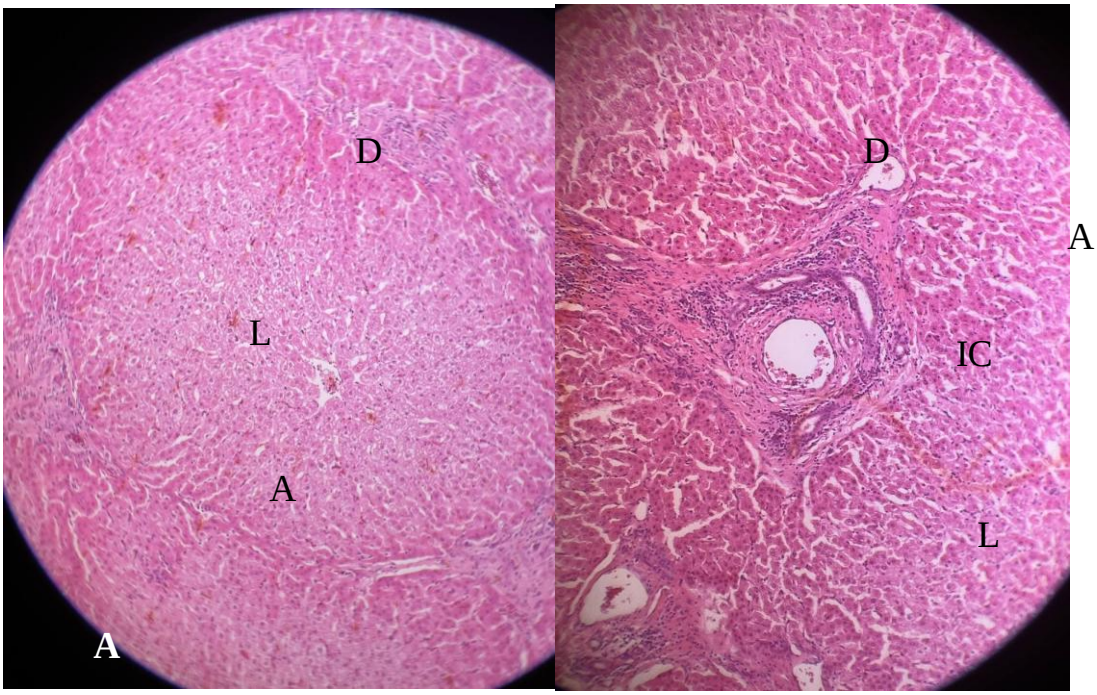

Figure 8:Liver, cow. A, different dark (D) and light (L) spots like nutmeg appearance, atrophy of the hepatic cords in the centrilobular area (A), and infiltration of immune cells in portal area (IC)**X4. B,** same previous figure A **X10.**

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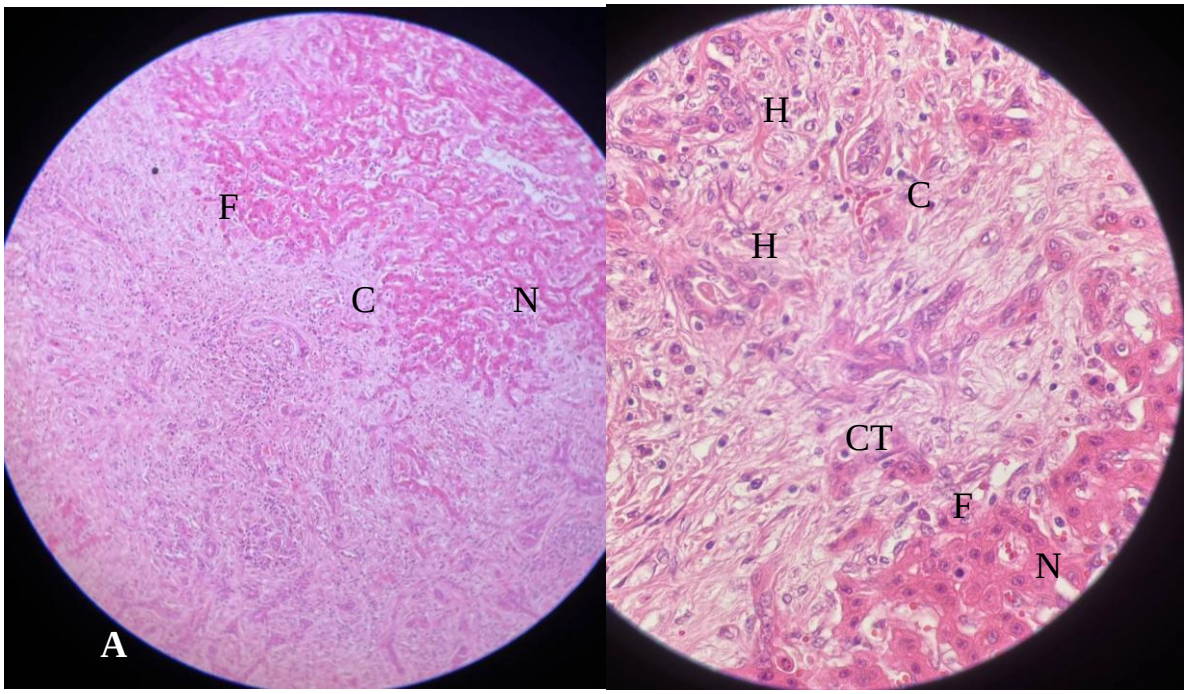

Figure 9:Liver, cow. A, Infiltration of fibroblasts (F), abundant collagen connective tissue (CT), congestion of blood vessels in the parenchyma (C), many hyperplasia of the bile duct (H), and some normal cells of hepatocyte between the fibrosis parenchyma (N) **10X.B,** same previous figure A **X40.**

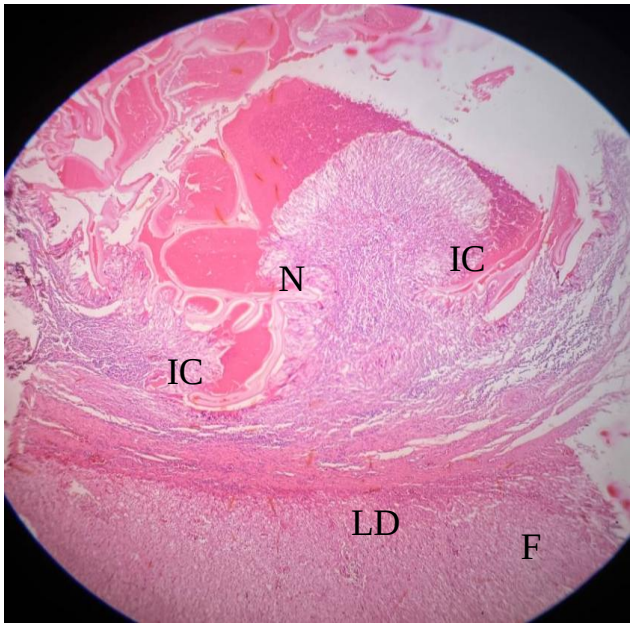

Figure 10: Liver, cow. Necrotic debris is seen in abscesses (N), surrounded by a huge number of inflammatory cells (IC), line demarcation (LD), and fibrosis (F) **X10.**

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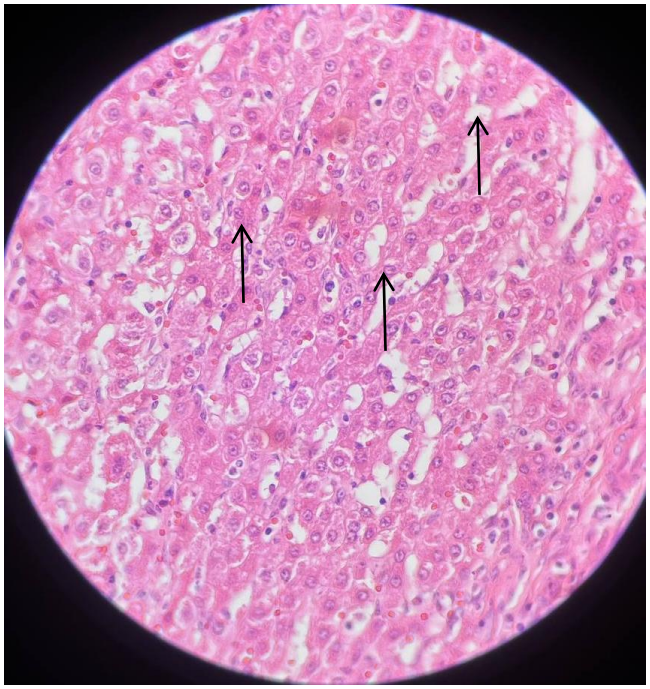

Figure 11: Liver, cow. Swelling different hepatocytes by a rise in size and characterized by opaque cytoplasm**40X.**

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