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Histopathological Aspects of Liver and their Relation with SARS-COV.2

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Abstract

A new coronavirus was discovered in Wuhan, China, in December 2019, itwas found to be the reason behind fatal cases of severe pneumonia and sudden respiratory failure. The pandemic of corona virus disease has progressed as a tremendousthreat to health globally. WHO designated the COVID-19 disease and the associated SARS-CoV-2 virus in February 2020. Although, the respiratory system appears to be principle target of the infection, a few information are available related to involvement of liver and gastro-intestinal tract in COVID-19, that could provokes a systemic infection target a lot of organs in addition of lungs and liver or alimentary tract, especially in elders and those of comorbidity. Studies and papers on histopathology and liver disease in COVID-19 continue to very scarce, therefore, our team aimed revision, collect and summarized the histopathological and other variations in liver architecture and functions that caused by infection with SARS.COV.2. The reviewed studies referred to present histopathological changes accompanied covid19 outbreak. The current review study would help researchers and clinicians to understand the histopathology alteration which can support better planning of management and avoidance of risks in future.

Key words: Histopathology, Liver, SARS-COV.2, COVID -19

Introduction

The newly discovered infection of coronavirus, also named as COVID-19, was originally discovered in Wuhan, China, in December 2019, and has since pervasion over the entire world. The World Health Organization declares global pandemic on March, 2020. The 2019s coronavirus illness (COVID-19), which has zoonotic origins and is typically transmitted through coughs and sneezes or respiratory droplets, has posed a serious threat to humanity (Wang *et al*., 2020).

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The disease first appeared in early December 2019 in Wuhan's seafood market, Hubei, China, and had clinical symptoms that were very similar to viral pneumonia (WHO, 2020). In just two months, this disease has spread to the majority of the world's nations.

According to the World Health Organization (WHO), the COVID-19 outbreak is a pandemic, which poses a significant risk to the global healthcare sector. The severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) that has been discovered as the cause of COVID-19 shares an 82 percent sequence of genome identicalness with the formerly known SARS-CoV-1, which was also discovered in 2002 in China (Lu *et al*., 2020; Zhang *et al.,* 2020). Most people experience a minor infection that goes away on its own, but some individuals get severe pneumonia, and the most serious cases lead to a systemic illness with numerous organ failure (Sonzogni *et al*., 2020). Spike protein makes up the composition of the enclosed virus with single-stranded RNA and is mostly in charge of the pathogenesis in humans.The ACE2 gene encodes the human cell surface receptor Angiotensin Converting Enzyme-2 (ACE-2). The spike protein of the virus attaches to ACE-2 Through its RBD (receptor-binding region), and is stimulated by the after that protein of cell-surface TMPRSS2, which epithelial cells express in several tissues, such as those that line the digestive tract. In severe cases, SARS-CoV-2 causes a systemic disease that may involve the liver, the pancreas, the heart and blood arteries, the kidneys, and also controls changes in the immune system and circulating lymphocytes. ACE-2, serves as a receptor for viral host cell entrance, is widely distributed on the organs directly resulting in viral tissue damage (Huang *et al*., 2020; Mehta *et al*., 2020).

Based on a study performed by (Sood and Bedi, 2022), Additionally, ACE-2 receptors have discovered in the liver and biliary system. An enormous increase in the impairment of liver function and high enzyme levels are signs that a coronavirus infection can cause liver damage (Ma *et al.*, 2020). Hepatocyte degeneration, localized necrosis, the existence of plugs in the biliary system “small bile duct”, and congestion of sinusoids were all seen in Vasquez-Bonilla *et al*. (2020).

Histopathological Findings of Liver

The ACE-2 receptors have been found in hepatic-biliary area, where cholangioblasts are (59.7%) demonstrated increased ACE-2 cell surface receptor expression more than hepatic cells, despite the fact that microscopic abnormalities in tissue of liver in COVID-19 haven't been extensively

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characterized (2.6 %), (Chai *et al*., 2020). Given that cholangiocytes expressed ACE-2 resembles in certain ways that of type-2 alveolar cells, there is a strong likelihood that SARS-CoV-2 might target the liver (Chai *et al*., 2020). Additionally, concurrent medication use has an impact on the hepato-biliary system.People with mild severe illnesses are more likely to suffer from hepatic damage (Li and Ziao, 2020).

In a light microscopic analysis, it was possible to see localized necrosis and hepatic cell degeneration anda few biliary plugs in the small bile duct in addition (Yao *et al.*,2020).Although endothelium cells revealed expression of ACE-2 positively, the liver's sinusoids' endothelial lining might be negativistic for ACE-2, as well as Kupffer cells and hepatocytes. (Hamming *et al*.,2004).However, it is undeniable that other factors, such as concurrent hepatotoxic drug usage, pre-existing chronic liver disease, and COVID-19-related hyper-inflammatory circumstances, can cause ,in addition to SARS-CoV-2 infection, hepatic injury, especially when the patients are in a hypoxic condition (Deshmukh *et al*., 2020). Infection of SARS-CoV-2 can cause liver damage that manifests microscopically demonstrate cirrhosis with a large-scale form of steatosis, abnormal buildup of glycogen in liver cells and large infiltration of lymphocytes in portal area (fig. 1: A, B). In addition to dilatation of sinusoids in zone 3, the portal region has displayed a patch of hepatic necrosis and central-lobule area (Tian *et al*., 2020; Li and Ziao, 2020; Deshmukh *et al*., 2020), (fig. 1: E, F).

According to Li *et al.*, the presence of a large-scale form of steatosis, cirrhosis, buildup of glycogen, infiltration of lymphocytes, and dilatation of sinusoid in liver may be symptomatic of these conditions. Hepatocyte degeneration, stenosis ,necrosis, together with degradation of tissue were thus revealed to be the main results (Li and Xiao, 2020), these results constituent with finding of (Sonzogni *et al.,* 2020) (fig.2), where all of their anatomical findings in lifeless COVID-19 positive individuals are otherwise consistent with vascular-related damage caused by impaired blood flow, resulting in lesions resemble to the histopathological picture seen in syndrome of hepato-pulmonary and obliterative venopathy of portal area (Sempoux and Bioulac-Sage; DeLeve *et al.,* 2009); there may be a possible physio-pathological explanation based on sometimes increased blood flow within liver associated with thrombotic phenomena in liver and heart distress.Modifying intrahepatic blood circulation (Guido *et al*., 2016) was linked to acquired or congenital abnormalities of certain factors that are active during the clotting cascade, a potential mechanism is an immune attack on the endothelial laminea.

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The histopathological outputs of Sonzogni and his companions, (2020) support the idea that endothelial damage, impaired blood flow, or disruption of the coagulation process may be the primary initiating mechanisms behind COVID-19 damage pathogenesis, which may affect many other solid organs in addition to the liver. This idea makes sense of certain recent observations by a British group quite well (Bangash *et al.*, 2020).

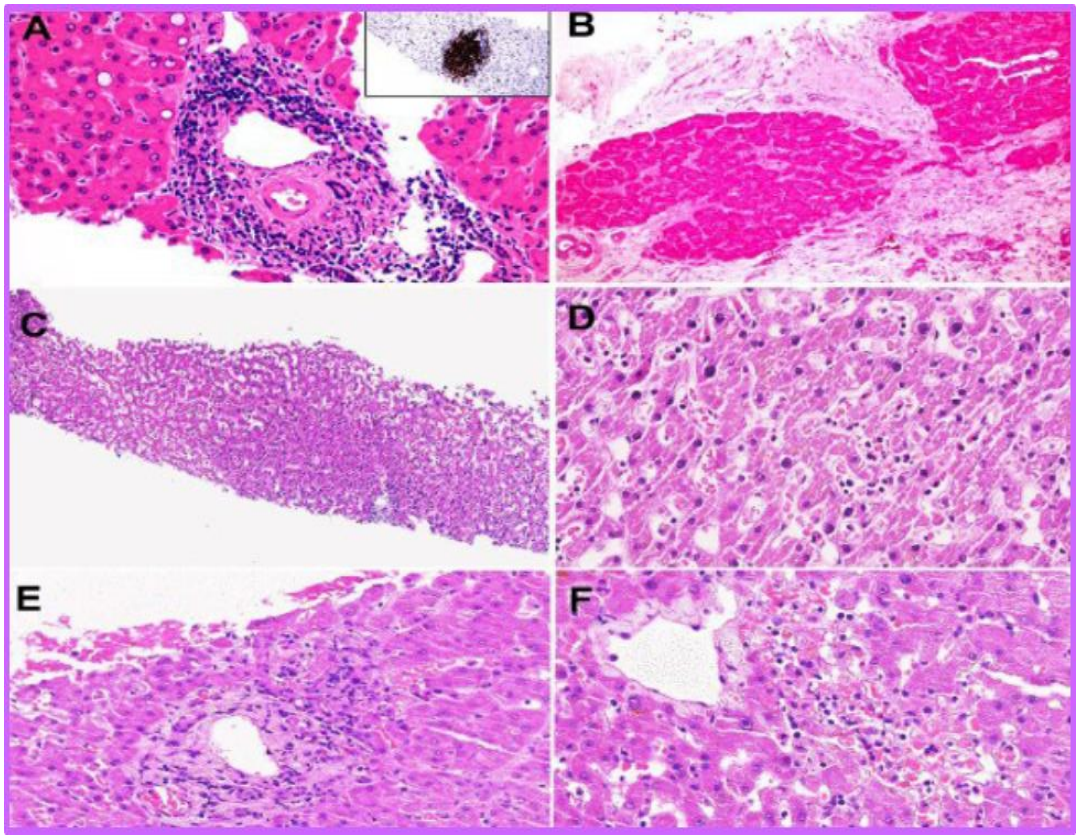

Fig.(1): Photomicrograph illustrated the histopathological features of liver concerned with SARS.COV.2. H&E. Hepatocytes with glycogenated nuclei and unusual tiny lymphocytes that are CD20-positive and heavily encircle the portal triad (inset). Atypical tiny lymphocytes with dense portal infiltration (CD20 immunostaining) and focally glycogenatednuclei of hepatocyte have also seen. (B) Hepatic nodules exhibiting fibrosis, a chirrosis sign. Nodules with extensive fibrosis and cirrhosis. (C) The lymphocyte-filled, dilated hepatic sinusoids. Slight sinusoidal dilatation and elevated infiltration of lymphocytes. (D) High power photomicrograph illustratelymphocytes of sinusoids. (E, F) Injury-related necrosis is visible in the peri-portal and centrilobular regions. "(Politeness: Tian S, Xiong Y, Liu H, Niu L, Guo J, Liao M, et al. ,2020 Pathological investigation of the 2019 novel Covid infection (COVID) through posthumous center biopsies. Mod Pathol. 2020 Apr 14;1-8.)" (Deshmukh et al., 2020).

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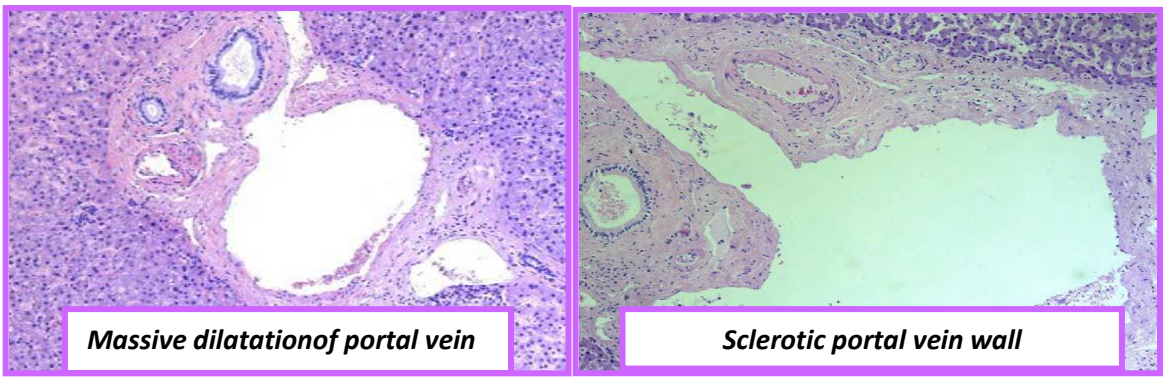

Fig.(2): Histopathological photomicrograph revealed aberrant intrahepatic portal structure area ,Increased number and diffuse ,severedilatation of lumen are characteristics of the intrahepatic portal tree's abnormal structure " (left picture; H&E, 400X) "; dilated arteries also exhibit thicker sclerotic walls (upper right) (H&E, 400X), (Sonzogni et al., 2020).

Conclusion

In spite of SARS.COV.2 mainly affects the respiratory tract and immune system, but other organs, particularly liver and alimentary tract aren't insured, more so in instances of elders and those who have comorbidities. The reviewed studies referred to existenceof histopathological changes in liver accompanied covid19 outbreak. This study of review could be useful authors as well as physicians to comprehend the data about histopathology of liver that concerned with the outbreak, which in turn helps in developing plans for diagnosis and treatment to avoid any future risks.

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