LIVER CIRRHOSIS: ETIOLOGY, PATHOGENESIS AND MODERN TREATMENT METHODS

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Annotation: This scientific article provides an extensive analysis of the etiological factors leading to liver cirrhosis, the pathogenic mechanisms of the disease, and the modern therapeutic approaches used in contemporary medicine. The article examines the dynamics of liver cirrhosis prevalence based on global and national statistics, diagnostic approaches, and the advantages of modern pharmacological and transplant therapies. Moreover, it highlights the socio-economic impacts of the disease based on clinical cases and survey data.

Keywords: Liver cirrhosis, etiology, pathogenesis, viral hepatitis, alcoholism, portal hypertension, liver failure, antifibrotic therapy, transplantation, clinical protocol.

INTRODUCTION

Liver cirrhosis is a chronic disease characterized by nodular regeneration of hepatic parenchyma and replacement with fibrotic tissue, leading to architectural distortion and functional impairment of the liver. It remains one of the major causes of mortality in both developed and developing countries.According to the World Health Organization (WHO), over 1.2 million people die annually from liver cirrhosis worldwide. The disease has a wide clinical spectrum and can remain asymptomatic for years. In its late stages, however, it presents with serious complications such as portal hypertension, hepatic failure, ascites, variceal bleeding, and hepatic encephalopathy. These complications drastically reduce quality of life and increase healthcare burdens.Cirrhosis can result from various causes, including viral hepatitis (especially types B and C), chronic alcohol use, autoimmune disorders, metabolic syndromes, medications, exposure to toxins, and genetic abnormalities. However, due to late diagnosis in most cases, treatment effectiveness often decreases.In recent years, the treatment of liver cirrhosis has advanced through liver transplantation, antifibrotic agents, hepatoprotectors, regenerative (stem-cell-based) and biological therapies, and interventional methods. Furthermore, molecular and immunological research has deepened the understanding of cirrhosis pathogenesis.Therefore, this paper aims to analyze the etiology, pathogenesis, and modern therapeutic approaches to liver cirrhosis.

RESEARCH METHODOLOGY

This article is based on the analysis of scientific medical literature, clinical protocols, WHO statistical reports, and recent academic papers. The following methods were used:

Literature analysis: Over 30 scientific articles published between 2018–2024 were reviewed.

Statistical analysis: Official data from WHO, the Ministry of Health of Uzbekistan, and other sources were compared.

Observation methods: Based on data from the Republican Specialized Hepatology Center.

Survey: Conducted among 60 patients diagnosed with liver cirrhosis in 2024.

Clinical case analysis: Three real clinical cases were reviewed.

MAIN PART

1. Etiology of Liver Cirrhosis

The main etiological factors include:

a) Viral Hepatitis:

Hepatitis B and C viruses are the most common causes of cirrhosis and hepatocellular carcinoma. Approximately 20–30% of chronic hepatitis C patients develop cirrhosis within 20 years.

b) Alcohol-Related Liver Disease:

Prolonged and excessive alcohol consumption leads to hepatocellular degeneration, inflammation, and fibrosis. Chronic alcoholic hepatitis often progresses to cirrhosis.

c) Autoimmune Hepatitis:

In this condition, the immune system attacks hepatocytes, causing inflammation, necrosis, and fibrosis.

d) Metabolic Disorders:

Wilson's disease (copper metabolism disorder), hemochromatosis (iron overload), and alpha-1-antitrypsin deficiency can cause cirrhosis.

e) Toxic and Drug-Induced Liver Injury:

Long-term exposure to certain drugs (e.g., methotrexate, amiodarone) and chemicals can damage hepatic tissue.

f) Non-Alcoholic Steatohepatitis (NASH):

Recently, obesity, insulin resistance, and metabolic syndrome have become major contributors to non-alcoholic fatty liver disease leading to cirrhosis.

2. Pathogenesis

Liver cirrhosis develops through a complex, long-term process. Initially, hepatocytes become inflamed and necrotic due to various damaging factors. The sequence of pathological events includes:

1. Inflammation and cellular injury

2. Activation of fibroblasts and collagen deposition

3. Formation of fibrotic foci within hepatic tissue

4. Reparative processes with nodular regeneration

5. Portal hypertension and impaired intrahepatic circulation

6. Hepatic failure and systemic complications

3. Modern Treatment Approaches

a) Etiotropic Therapy

For hepatitis B or C — antiviral drugs (Tenofovir, Entecavir, Sofosbuvir)

For autoimmune hepatitis — immunosuppressants (Prednisolone, Azathioprine)

For alcohol-induced cirrhosis — abstinence and psychotherapy

b) Pathogenetic Therapy

Antifibrotic therapy: Pirfenidone, obeticholic acid, simtuzumab slow or stop fibrosis progression.

Antioxidants and vitamins: Vitamins A, D, E, selenium, and zinc support liver function.

Diuretics: Spironolactone, furosemide — for ascites reduction.

Lactulose: For hepatic encephalopathy to remove toxins.

c) Supportive Therapy

Parenteral nutrition and amino acid supplementation

Infusion therapy (albumin, plasma)

Hemostatic therapy for bleeding episodes

d) Liver Transplantation

At the terminal stage, orthotopic liver transplantation is the only effective treatment. The annual survival rate reaches 85–90%. Transplantation priority is determined using the MELD (Model for End-Stage Liver Disease) scoring system.

e) Innovative Approaches

Stem cell therapy: Stimulates regenerative processes.

Gene therapy: Experimental treatment targeting genetic mutations in hepatocytes.

Biosensors and smart monitoring systems: Allow remote patient condition monitoring.

ANALYSIS AND RESULTS

According to data from the Ministry of Health of Uzbekistan (2024), the number of cirrhosis patients increased by 28% from 2020 to 2024.

Survey results (60 patients):

Question	Yes	No
Have you ever had hepatitis before cirrhosis diagnosis?	40 (66%)	20 (34%)
Do you regularly consume alcohol?	21 (35%)	39 (65%)
Has your condition improved during treatment?	42 (70%)	18 (30%)
Have you faced financial difficulties during treatment?	49 (82%)	11 (18%)
Do you consider transplantation an effective treatment?	50 (83%)	10 (17%)

Clinical Case Analysis:

Case 1: A 65-year-old man with decompensated cirrhosis due to hepatitis C, complicated by ascites, hepatic encephalopathy, and variceal bleeding. After interferon-based antiviral therapy, viral replication ceased, but transplantation remained necessary.

Case 2: A 45-year-old woman with autoimmune hepatitis-related cirrhosis. Achieved stable remission with prednisolone and azathioprine therapy.

Case 3: A 52-year-old patient with NASH-associated cirrhosis, obesity, diabetes, and hypertension. Stabilized under individualized diet and hepatoprotective treatment.

CONCLUSION

Liver cirrhosis is a complex, multifactorial, chronic, and progressive disease whose effective management depends on early diagnosis, etiological treatment, and individualized care. Viral hepatitis, alcohol-induced damage, metabolic disorders, and autoimmune processes remain the leading causes.The analyses demonstrate that liver cirrhosis is not only a clinical but also a significant socio-economic problem. Modern approaches such as transplantation, antifibrotic agents, hepatoprotectors, and regenerative methods help mitigate disease outcomes. Therefore, healthcare systems and medical institutions must enhance public awareness, strengthen preventive measures, implement early diagnostic strategies, and integrate innovative therapeutic methods into clinical practice.

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