

THE ROLE OF PROBLEM-BASED TEACHING TECHNOLOGIES IN EDUCATING STUDENTS ABOUT LIVER CIRRHOSIS

Dexkanbaeva Z.A., Boykobilova M.Y.

Abstract. This article explores the effectiveness of using problem-based teaching methods in educating medical students about liver cirrhosis. It highlights how interactive and clinical scenario-based education improves students' understanding of the pathogenesis, diagnosis, and management of cirrhosis. Through case analysis, virtual simulations, and collaborative discussions, students develop independent clinical reasoning and practical skills. The findings support that problem-based teaching plays a crucial role in enhancing students' readiness for real-life clinical practice.

Key words: liver cirrhosis, problem-based learning, interactive teaching, clinical thinking, simulation, case-based scenarios, medical education.

Introduction. Liver cirrhosis (LC) is a chronic, progressive disease characterized by irreversible fibrosis and nodular replacement of liver tissue. This process leads to liver dysfunction and the development of serious complications. Liver cirrhosis is often caused by long-term hepatitis B and C, chronic alcoholism, fatty hepatitis, autoimmune hepatitis, metabolic diseases, and drug exposure. According to the World Health Organization, millions of people worldwide suffer from this disease every year. In-depth study of the pathogenesis, clinical manifestations, diagnostic methods, and treatment of liver cirrhosis in medical education increases the practical training of students. Liver cirrhosis is one of the diseases with a high mortality rate worldwide. According to the World Health Organization, hundreds of thousands of people die from liver cirrhosis every year. The prognosis is especially unfavorable in late-detected cases and patients in the decompensation stage. Also, the fact that cirrhosis of the liver is accompanied by severe complications such as liver failure, portal hypertension, ascites, variceal bleeding, and hepatocellular carcinoma makes it one of the most important pathologies in clinical practice.

Correct and in-depth teaching of cirrhosis of the liver in medical education is an important factor in increasing the professional potential of doctors. Although traditional teaching methods equip students with theoretical knowledge, they may not be sufficient to form the skills to analyze real clinical cases, make a diagnosis, and develop a treatment plan. Therefore, the need to introduce innovative, interactive, and problem-based learning technologies in the modern medical education system is increasing. Problem-based learning technologies are an advanced pedagogical approach aimed at developing students' independent analysis, research, identification of cause-and-effect relationships, clinical decision-making, and practical skills. Especially in complex diseases such as liver cirrhosis, the use of this approach contributes to the in-depth knowledge of students. With the help of such approaches, knowledge on the pathogenesis of liver cirrhosis, clinical symptoms, laboratory and instrumental diagnostics, as well as modern treatment principles is instilled through interactive methods. In this regard, teaching liver cirrhosis through a problem-based approach plays an important role in deepening students' knowledge, preparing them for independent thinking and clinical situations. This article analyzes the effectiveness of problem-based teaching technologies in teaching liver cirrhosis, and highlights their impact on practical education using advanced methods.

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Materials and methods. For the study, scientific articles, clinical guidelines and sources on pedagogical methods published in 2018–2024 were analyzed. The effectiveness of the problem-based approach in teaching liver cirrhosis was studied using the PubMed, Scopus, Google Scholar and eLIBRARY databases.

Purpose of the study. To analyze the role of problem-based learning technologies in effectively teaching students the topic of liver cirrhosis and to determine the impact of this method on the practical educational process.

Main part. Liver cirrhosis (LC) is one of the most common and dangerous diseases in medicine, and its timely detection and correct treatment are of great importance in clinical practice. In order for students to master the LC perfectly, it is necessary to use problem-based learning technologies along with traditional methods in the educational process. In order to teach LC in depth, it is necessary to connect theoretical knowledge with practice. The problem-based learning methodology is one of the most effective approaches in this regard. The main elements of problem-based learning:

Teaching through situational problems: students solve a clinical situation related to LC, thereby developing their analytical thinking and diagnostic skills.

Interactive discussions: active participation of students is ensured, knowledge is deepened.

Virtual simulations: based on clinical signs, laboratory results, ultrasound or biopsy indicators, realistic conditions are approximated.

In clinical education, these methods provide the following results: develop clinical thinking; teach diagnosis and differential diagnosis; form independent decision-making; develop teamwork, consultation and evidence-based thinking. Through the problem-based teaching method, students are actively involved in the topic being studied, develop the ability to think and make decisions based on real clinical situations. Problem-based teaching includes the following pedagogical approaches to teaching clinical practice: analysis of clinical cases; lessons based on situational problems; team discussion and decision-making; simulation training; use of digital resources.

Clinical Case Analysis: Students identify clinical signs that occur in the compensation and decompensation stages of JS. For example, a patient may have ascites, hepatic encephalopathy, hemorrhagic diathesis, sarcopenia. Based on such cases, students will acquire the skills to make an independent diagnosis.

Case-based lesson: Each lesson is organized around specific clinical cases related to JS. For example, a patient with acute liver failure due to cirrhosis due to hepatitis C is discussed.

Group discussion and decision-making: By working in groups, students learn from each other, present arguments, and make evidence-based decisions.

Simulation training: Procedures such as liver biopsy, ascites puncture, portomanometry are simulated virtually. This prepares students for real-world practice.

Use of digital resources: Applications such as Medscape, UpToDate, LiverAtlas provide an opportunity to visually study the clinic and diagnostics of JS.

Sample case:

Students are presented with the clinical condition of patients with JS at different stages and with different clinical and laboratory indicators. The student is expected to analyze the patient's history, identify the main complaints, evaluate laboratory tests, and as a result make the correct diagnosis, propose a hepatoprotective and symptomatic treatment plan.

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Case 1: A 40-year-old male patient has been drinking alcohol for many years. He consulted a doctor with general weakness, decreased appetite, abdominal enlargement, and edema in the legs. The sclera of his eyes was yellow, ascites was detected in the abdomen. Laboratory tests showed increased ALT, AST levels, decreased prothrombin index, and low hemoglobin levels. Ultrasonography showed a reduced liver volume, uneven surface, as well as splenomegaly and portal vein dilatation. Task: Based on this clinical case, students should substantiate the diagnosis of liver cirrhosis in the patient, identify the probable etiology, assess the stage based on the Child-Pugh scale, perform basic laboratory tests and develop a treatment plan.

Case 2: A 55-year-old female patient was under chronic observation for viral hepatitis C. Over the past month, she has had changes in her mental state, decreased mental activity, indifference to others, slurred speech, and sleep disturbances. Physical examination reveals "flapping tremor", yellow sclera, and the liver margin is not palpable. Blood ammonia levels are elevated, bilirubin levels are high, INR>1.6. Task: Students should identify the encephalopathy syndrome in the decompensation stage of JS, assess the patient's condition, and develop immediate treatment measures (e.g., lactulose, rifaximin, protein restrictions).

Case 3: A 60-year-old male patient was suddenly admitted to the hospital with black stools. History: liver cirrhosis, splenomegaly, ascites. Diagnosis: bleeding from esophageal varices due to portal hypertension. The patient has low blood pressure, rapid pulse, and pale lips. Assignment: Students should immediately assess resuscitation measures, plan medications to stop bleeding, and endoscopic care. Also, decisions are expected on prophylaxis, antibiotic therapy, and albumin infusion.

Case 4: A 47-year-old female patient has increased ascites on the background of liver cirrhosis. Over the past week, body temperature has increased, weakness has increased. An abdominal aspirate was taken and it showed a high number of neutrophils. Diagnosis: spontaneous bacterial peritonitis. Assignment: Students should identify this complication that occurred on the background of JS, select antibiotic therapy, justify the approach with albumin, and prescribe urgent laboratory and instrumental examinations.

Case 5: A 33-year-old patient is under dispensary supervision with JS, which developed against the background of autoimmune hepatitis. She is currently in the 16th week of pregnancy. The gynecologist referred her to a therapist. The patient has elevated liver enzymes, normal bilirubin, and normal INR. There are no clinical changes. Assignment: Students should plan the monitoring of a pregnant patient for JS, identify risk factors, and develop a multidisciplinary approach with a gynecologist. All of these methods allow for in-depth knowledge of JS, case analysis, independent thinking, and, if necessary, the use of a multidisciplinary approach. For example, if a patient with a problematic case of JS has variceal bleeding due to portal hypertension, the student will learn to develop a treatment plan together with a gastroenterologist, surgeon, and intensivist.

Conclusion. Problem-based learning technologies in teaching liver cirrhosis play an important role in increasing the effectiveness of the educational process, preparing students for real clinical situations and forming clinical thinking in them. While traditional approaches are aimed only at providing theoretical knowledge, problem-based learning allows for their independent application and transformation into practical skills. Liver cirrhosis is one of the most complex clinical diseases in medicine, and effective education in it requires in-depth study of JS. The use of problem-based learning technologies increases not only the theoretical knowledge of students, but also their clinical and practical training. This approach is of great importance in strengthening the readiness for in-depth

analysis of JS, drawing conclusions in real situations, and working with patients. The widespread introduction of the problem-based approach in medical educational institutions creates the basis for students to become highly qualified doctors. The problem-based approach strengthens the skills of in-depth analysis of JS, identifying clinical aspects of the disease, and developing an effective diagnostic and treatment plan. This prepares students not only for tests, but also for their future professional activities. Such an approach increases the student's activity, motivation and confidence, turning him into a qualified doctor who can make independent decisions.

Thus, teaching liver cirrhosis through problem-based methods should become an integral component of modern medical education. Education based on innovative technologies and problem situations serves to form high professional potential in students.

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