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MODERN METHODS OF DIAGNOSTICS OF ACUTE APPENDICITIS IN PATIENTS WITH LIVER CIRRHOSIS: POSSIBILITIES AND LIMITATIONS

Abstract. *Diagnosis of acute appendicitis in patients with liver cirrhosis remains a major clinical challenge due to atypical presentation, limited reliability of laboratory markers, and reduced applicability of standard diagnostic scores. Liver cirrhosis is associated with portal hypertension, ascites, coagulation disorders, and cirrhosis-associated immune dysfunction, which significantly alter the manifestations of acute abdominal pathology and contribute to delayed diagnosis. This narrative review analyzes current evidence on the strengths and limitations of clinical, laboratory, and imaging modalities for diagnosing acute appendicitis in cirrhotic patients. Particular emphasis is placed on the role of ultrasonography, contrast-enhanced computed tomography, and diagnostic paracentesis in differential diagnosis with other causes of acute abdominal pain, including spontaneous bacterial peritonitis. The reviewed data highlight the need for tailored diagnostic algorithms to improve early detection and outcomes in this high-risk patient population.*

Keywords: *acute appendicitis, liver cirrhosis, diagnosis, computed tomography, ultrasonography, ascites, spontaneous bacterial peritonitis, emergency surgery.*

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ЖИГАР ЦИРРОЗИ БЎЛГАН БЕМОРЛАРДА ЎТКИР АППЕНДИЦИТНИ ТАШХИСЛАШНИНГ ЗАМОНАВИЙ УСУЛЛАРИ: ИМКОНИЯТЛАРИ ВА ЧЕКЛАНИШЛАРИ

Аннотация. *Жигар циррози бўлган беморларда ўткир аппендицитни ташхислаш атипик клиник кечиши, лаборатор маркерларнинг ишончлилигининг чекланганлиги ҳамда стандарт диагностик шкалаларнинг қўлланилиш имконияти камайиши сабабли муҳим клиник муаммо бўлиб қолмоқда. Жигар циррози портал гипертензия, асцит, гемостаз тизимидаги бузилишлар ва сирроз билан боғлиқ иммун дисфункция билан кечади, бу эса қорин бўшлиғи аъзоларининг ўткир патологиялари клиник кўринишини сезиларли даражада ўзгартиради ҳамда касалликнинг кеч ташхисланишига олиб келади. Мазкур адабиётлар шарҳида жигар циррози бўлган беморларда ўткир аппендицитни ташхислашда клиник, лаборатор ва инструментал усулларнинг имкониятлари ва чекланишлари бўйича замонавий маълумотлар таҳлил қилинган. Айниқса ультратовуш текшируви, контраст кучайтирилган компьютер томографияси ҳамда диагностик парацентезнинг ўткир қорин оғриғининг бошқа сабаблари, жумладан спонтан бактериал перитонит билан дифференциал ташхисдаги аҳамиятига алоҳида эътибор қаратилган. Кўриб чиқилган маълумотлар ушбу юқори хавф гуруҳига кирувчи беморларда касалликни эрта аниқлаш ва даволаш натижаларини яхшилаш мақсадида махсус диагностик алгоритмларни ишлаб чиқиш зарурлигини кўрсатади*

Калит сўзлар*: ўткир аппендицит, жигар циррози, ташхис, компьютер томографияси, ультратовуш текшируви, асцит, спонтан бактериал перитонит, шошилинч жарроҳлик.*

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СОВРЕМЕННЫЕ МЕТОДЫ ДИАГНОСТИКИ ОСТРОГО АППЕНДИЦИТА У ПАЦИЕНТОВ С ЦИРРОЗОМ ПЕЧЕНИ: ВОЗМОЖНОСТИ И ОГРАНИЧЕНИЯ

Аннотация. *Диагностика острого аппендицита у пациентов с циррозом печени остаётся серьёзной клинической проблемой вследствие атипичного клинического течения, ограниченной надёжности лабораторных маркеров и сниженной применимости стандартных диагностических шкал. Цирроз печени сопровождается развитием портальной гипертензии, асцита, нарушений системы гемостаза и иммунной дисфункции, ассоциированной с циррозом, что значительно изменяет клинические проявления острой абдоминальной патологии и способствует задержке постановки диагноза. В данном обзорном*

исследовании проанализированы современные данные о возможностях и ограничениях клинических, лабораторных и инструментальных методов диагностики острого аппендицита у пациентов с циррозом печени. Особое внимание уделено роли ультразвукового исследования, компьютерной томографии с контрастным усилением, а также диагностического парацентеза при проведении дифференциальной диагностики с другими причинами острой абдоминальной боли, включая спонтанный бактериальный перитонит. Представленные данные подчёркивают необходимость разработки адаптированных диагностических алгоритмов, направленных на улучшение раннего выявления заболевания и клинических исходов у данной группы пациентов высокого риска.

Ключевые слова: *острый аппендицит, цирроз печени, диагностика, компьютерная томография, ультразвуковое исследование, асцит, спонтанный бактериальный перитонит, неотложная хирургия.*

Relevance. Acute appendicitis remains one of the most common causes of emergency surgical interventions worldwide. Despite significant advances in diagnostics and treatment, timely recognition of this condition continues to pose a clinical challenge, particularly in patients with severe comorbidities. A distinct subgroup is represented by patients with liver cirrhosis, in whom acute appendicitis is characterized by an atypical course, a high rate of diagnostic errors, and unfavorable outcomes [1,2].

Liver cirrhosis is accompanied by systemic pathophysiological disturbances, including portal hypertension, ascites, coagulopathy, hypersplenism, metabolic disorders, and cirrhosis-associated immune dysfunction. These changes not only distort the clinical presentation of the "acute abdomen" but also substantially reduce the diagnostic value of standard clinical, laboratory, and instrumental investigations [3]. A number of studies have shown that in patients with liver cirrhosis, acute appendicitis is more frequently diagnosed at the stage of complicated disease, leading to increased postoperative complications, prolonged hospital stay, and higher mortality [4].

In the absence of specialized diagnostic algorithms for this category of patients, the risk of delayed diagnosis and inappropriate management decisions increases. This necessitates a systematic analysis of contemporary diagnostic methods for acute appendicitis in patients with liver cirrhosis, with an assessment of their capabilities and limitations.

Literature Review

The classical clinical presentation of acute appendicitis is well described and includes sequential migration of pain, localized tenderness in the right iliac fossa, signs of peritoneal irritation, and a systemic inflammatory response. However, in patients with liver cirrhosis these signs are often poorly expressed or completely absent [5].

Ascitic fluid reduces contact between the inflamed appendix and the parietal peritoneum, resulting in diminished pain intensity and blunting of peritoneal signs. Hypoalbuminemia and tissue edema further reduce peritoneal reactivity, while the presence of hepatic encephalopathy limits the reliability of patient complaints and medical history assessment [6]. Taken together, these factors lead to low sensitivity and high variability of clinical diagnosis of appendicitis in patients with cirrhosis.

Leukocytosis is traditionally considered one of the key laboratory markers of acute appendicitis. However, in patients with liver cirrhosis its diagnostic value is significantly reduced due to hypersplenism and suppression of bone marrow hematopoiesis [7]. In some cases, the inflammatory process may occur without marked changes in the leukocyte count.

C-reactive protein is widely used to assess systemic inflammatory response; however, its levels in patients with liver cirrhosis may be elevated due to bacterial translocation, spontaneous bacterial peritonitis, and other infectious complications unrelated to appendicitis [8]. Procalcitonin is regarded as a more specific marker of bacterial infection, yet it also has limitations, as its concentration may increase in sepsis of various etiologies and in severe hepatic insufficiency [9].

Thus, laboratory inflammatory markers in patients with liver cirrhosis have limited specificity and cannot be considered independent diagnostic criteria.

The Alvarado and AIR diagnostic scores are widely used for risk stratification of acute appendicitis in the general population. However, their application in patients with liver cirrhosis remains controversial [10].

Most parameters included in these scores (leukocytosis, migration of pain, severity of localized symptoms) are often absent or minimally expressed in cirrhotic patients, leading to underestimation of the total score and false-negative results [11]. Contemporary reviews emphasize that these scoring systems have not been validated for patients with chronic liver disease and do not account for the degree of hepatic insufficiency, which limits their clinical applicability [12].

Ultrasound examination is the first-line imaging modality in suspected acute appendicitis due to its accessibility and safety. However, in patients with liver cirrhosis its diagnostic value is substantially reduced [13].

Ascites, pronounced meteorism, obesity, and anatomical alterations of abdominal organs hinder visualization of the appendix. In addition, the informative value of the method largely depends on the operator's experience. According to the literature, the sensitivity of ultrasound in diagnosing appendicitis in patients with cirrhosis is significantly lower than in the general population [14].

Contrast-enhanced computed tomography is regarded as the most informative diagnostic method for acute appendicitis, especially in patients with

atypical clinical presentation. In patients with liver cirrhosis, CT allows not only identification of the inflamed appendix but also assessment of the extent of inflammation, presence of abscesses, peritonitis, and secondary infection of ascitic fluid [15].

CT plays a particularly important role in the differential diagnosis between acute appendicitis and spontaneous bacterial peritonitis, whose clinical manifestations may overlap. A limitation of the method is the need for contrast agents, which requires caution in patients with hepatorenal dysfunction [16]. Nevertheless, most authors recognize CT as the method of choice for diagnosing acute appendicitis in patients with liver cirrhosis.

Magnetic resonance imaging may be considered an alternative to CT in cases of contraindications to contrast administration or ionizing radiation. However, its use in emergency surgery is limited by availability, examination duration, and the requirement for patient hemodynamic stability [17].

In the presence of ascites, diagnostic paracentesis with analysis of ascitic fluid is a mandatory step. Detection of neutrophilic pleocytosis ≥250 cells/mm^3 indicates bacterial peritonitis but does not unequivocally exclude secondary peritonitis, including appendicitis [8,15].

Conclusions

1. The diagnosis of acute appendicitis in patients with liver cirrhosis is highly challenging and characterized by the limited informativeness of clinical and laboratory findings.
2. Laboratory inflammatory markers have low specificity and require cautious interpretation in the context of cirrhosis-associated infectious complications.
3. Ultrasound examination remains relevant as an initial imaging modality; however, its diagnostic value in patients with cirrhosis is limited.
4. Contrast-enhanced computed tomography is the most informative method for diagnosing and differentially evaluating the causes of acute abdominal syndrome in this patient population.
5. The presented data substantiate the need to develop specialized diagnostic algorithms tailored to patients with liver cirrhosis, aimed at early detection of acute appendicitis and reduction of complication rates.

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