

## CLINICAL AND LABORATORY CRITERIA FOR EARLY DIAGNOSIS AND TIMING OF SURGICAL INTERVENTION IN CHOLANGIOSEPSIS

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**Abstract.** This article examines the issues of early diagnosis and determination of optimal timing for surgical intervention in patients with cholangiosepsis. The aim of the study is to assess clinical signs, laboratory parameters, and sepsis severity scoring systems in order to support timely surgical decision-making. The study analyzes the dynamics of inflammatory markers, liver function tests, and indicators of organ dysfunction. The findings demonstrate that early diagnosis and prompt surgical intervention contribute to reduced sepsis severity, lower complication rates, and improved treatment outcomes. This approach enables a more individualized and evidence-based selection of surgical tactics in cholangiosepsis.

**Keywords:** cholangiosepsis, early diagnosis, timing of surgical intervention, clinical criteria, laboratory parameters, sepsis severity.

## XOLANGIOGEN SEPSISDA ERTA DIAGNOSTIKA VA XIRURGIK ARALASHUV VAQTINI ANIQLASHNING KLINIK VA LABORATOR MEZONLARI

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**Annotatsiya.** Mazkur maqolada xolangiogen sepsis bilan kasallangan bemorlarda erta diagnostika va optimal xirurgik aralashuv vaqtini aniqlash masalalari tahlil qilinadi. Tadqiqotning maqsadi klinik belgilar, laborator ko'rsatkichlar va sepsis og'irlik shkalalari asosida xirurgik aralashuvni o'z vaqtida amalga oshirishning ahamiyatini baholashdan iborat. Tadqiqot davomida yallig'lanish markerlari, jigar funksional testlari hamda organ disfunktsiyasi ko'rsatkichlari dinamikasi o'rganildi. Olingan natijalar erta diagnostika va tezkor qaror qabul qilish sepsis og'irligini kamaytirishi, asoratlar sonini qisqartirishi va davolash samaradorligini oshirishini ko'rsatdi. Ushbu yondashuv xolangiogen sepsisda individual va asoslangan xirurgik taktika tanlash imkonini beradi.

**Kalit so'zlar:** xolangiogen sepsis, erta diagnostika, xirurgik aralashuv vaqti, klinik mezonlar, laborator ko'rsatkichlar, sepsis og'irligi.

## КЛИНИЧЕСКИЕ И ЛАБОРАТОРНЫЕ КРИТЕРИИ РАННЕЙ ДИАГНОСТИКИ И ОПРЕДЕЛЕНИЯ СРОКОВ ХИРУРГИЧЕСКОГО ВМЕШАТЕЛЬСТВА ПРИ ХОЛАНГИОГЕННОМ СЕПСИСЕ

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**Аннотация.** В статье анализируются вопросы ранней диагностики холангиогенного сепсиса и определения оптимальных сроков хирургического вмешательства. Цель исследования заключается в оценке клинико-лабораторных показателей и шкал тяжести сепсиса для своевременного принятия хирургических решений. В ходе исследования изучалась динамика воспалительных маркеров, показателей функции печени и признаков

органной дисфункции. Полученные результаты свидетельствуют о том, что ранняя диагностика и своевременное хирургическое вмешательство способствуют снижению тяжести сепсиса, уменьшению частоты осложнений и улучшению исходов лечения. Предложенный подход позволяет индивидуализировать хирургическую тактику при холангиогенном сепсисе.

**Ключевые слова:** холангиогенный сепсис, ранняя диагностика, сроки хирургического вмешательства, клинические критерии, лабораторные показатели, тяжесть сепсиса.

Cholangiosepsis represents a severe and rapidly progressing form of biliary infection characterized by systemic inflammatory response and organ dysfunction. Despite advances in diagnostic technologies and therapeutic strategies, delayed recognition of disease severity and inappropriate timing of surgical intervention continue to contribute to high morbidity and mortality. Early diagnosis and timely surgical decision-making are therefore considered critical determinants of clinical outcomes in patients with cholangiosepsis.

The clinical presentation of cholangiosepsis is often heterogeneous, ranging from mild systemic manifestations to fulminant septic shock. This variability complicates early diagnosis, particularly in elderly patients and those with multiple comorbidities. Laboratory markers of inflammation and liver dysfunction, while informative, may not always reflect the true severity of the septic process at initial presentation. As a result, reliance on isolated clinical or biochemical indicators may lead to delayed or suboptimal surgical management.

In recent years, standardized sepsis definitions and severity scoring systems have been introduced to improve early identification of high-risk patients. Tools such as SOFA and APACHE II scores have been increasingly used to assess organ dysfunction and guide therapeutic decisions. However, their application specifically in the context of cholangiosepsis and surgical timing remains insufficiently systematized.

Determining the optimal timing of surgical intervention in cholangiosepsis is particularly challenging. Early biliary decompression is widely recommended, yet the exact thresholds for urgent intervention based on clinical and laboratory criteria are still debated. Inappropriate delay may allow progression of sepsis, whereas premature invasive procedures in unstable patients may increase perioperative risk.

Therefore, the present study focuses on identifying clinical and laboratory criteria that support early diagnosis and facilitate rational determination of surgical intervention timing in cholangiosepsis. By integrating clinical assessment, laboratory dynamics, and sepsis severity scores, this approach aims to improve decision-making and optimize treatment outcomes.

The importance of early diagnosis in sepsis has been well established in contemporary medical literature. The **Sepsis-3 Consensus** defines sepsis as life-threatening organ dysfunction caused by a dysregulated host response to infection and emphasizes the role of early identification in reducing mortality. In biliary infections, delayed recognition of systemic involvement is associated with rapid progression to septic shock and multiple organ failure.

According to the **Tokyo Guidelines 2018**, acute cholangitis complicated by organ dysfunction should be considered a medical emergency requiring urgent biliary drainage. These guidelines propose diagnostic criteria based on clinical signs, laboratory abnormalities, and imaging findings; however, they do not provide precise thresholds for determining the optimal timing of surgical intervention in individual patients with evolving sepsis.

Several studies have investigated laboratory markers as predictors of disease severity in cholangiosepsis. Elevated serum bilirubin, C-reactive protein, procalcitonin, and leukocyte counts have been correlated with increased risk of complications and mortality. Kiriya et al. demonstrated that dynamic changes in inflammatory markers provide more reliable prognostic information than single measurements at admission, highlighting the importance of continuous laboratory monitoring.

Clinical scoring systems have also been evaluated as tools for guiding surgical decisions.

Studies assessing SOFA and APACHE II scores indicate that higher scores are associated with poorer outcomes and increased need for urgent biliary decompression. However, the literature reveals considerable variability in how these scores are incorporated into surgical decision-making, with no unified approach to defining intervention timing based on severity stratification.

The role of early surgical intervention has been supported by multiple clinical studies. Freeman et al. reported that patients undergoing biliary drainage within 24–48 hours of admission experienced significantly lower mortality rates compared to those with delayed intervention. Conversely, delayed surgical management was associated with prolonged systemic inflammation and higher incidence of organ dysfunction.

Despite these findings, the literature indicates a lack of consensus regarding the integration of clinical, laboratory, and scoring criteria into a single decision-making framework. Many studies focus on isolated predictors without addressing their combined diagnostic value. This gap underscores the need for a comprehensive approach that synthesizes multiple parameters to guide early diagnosis and optimal timing of surgical intervention in cholangiosepsis.

A total cohort of patients diagnosed with cholangiosepsis was analyzed according to the timing of surgical intervention. Based on predefined criteria, patients were divided into an early intervention group (surgical or minimally invasive biliary decompression performed within 24–48 hours of admission) and a delayed intervention group (procedures performed after 48 hours following initial conservative management).

At admission, no statistically significant differences were observed between the two groups with respect to age, gender distribution, or primary etiology of biliary obstruction. Initial laboratory parameters, including serum bilirubin, leukocyte count, and C-reactive protein levels, were comparable. However, patients who later required delayed intervention demonstrated a tendency toward higher SOFA and APACHE II scores within the first 24 hours, indicating early progression of organ dysfunction.

Patients in the early intervention group showed a rapid improvement in clinical condition following biliary decompression. Hemodynamic stabilization was achieved earlier, accompanied by a significant reduction in body temperature and vasopressor requirements. Laboratory monitoring revealed a pronounced decrease in inflammatory markers and serum bilirubin levels within the first 48 hours after intervention.

In contrast, the delayed intervention group exhibited persistent systemic inflammation and slower regression of laboratory abnormalities. Progressive hyperbilirubinemia and elevated inflammatory markers were frequently observed prior to surgical intervention, reflecting ongoing biliary sepsis and insufficient source control.

The progression of sepsis severity differed markedly between groups. In the early intervention group, stabilization or improvement of SOFA scores was noted in the majority of patients. Conversely, patients undergoing delayed intervention demonstrated a higher incidence of worsening organ dysfunction, including renal and cardiovascular failure, prior to definitive surgical management.

Early biliary decompression was associated with a lower rate of progression to septic shock. Patients treated with delayed intervention more frequently required prolonged mechanical ventilation and renal replacement therapy, indicating more severe systemic involvement.

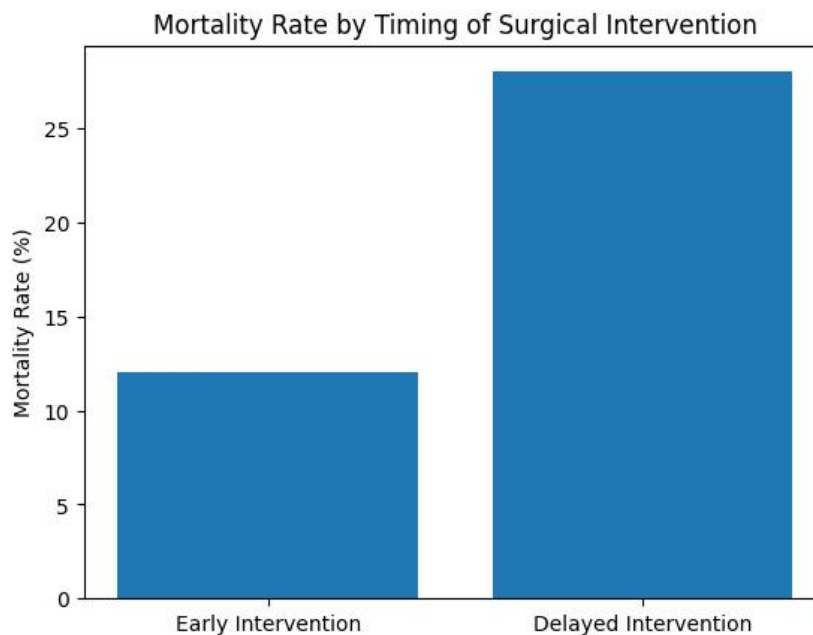
Postoperative complication rates were significantly lower in the early intervention group. Complications such as intra-abdominal abscess formation, bile leakage, and wound infections occurred less frequently. Additionally, the need for repeat surgical procedures was reduced due to effective early source control.

In the delayed intervention group, postoperative complications were more common and often more severe. These patients experienced prolonged recovery periods and higher rates of intensive care unit readmission.

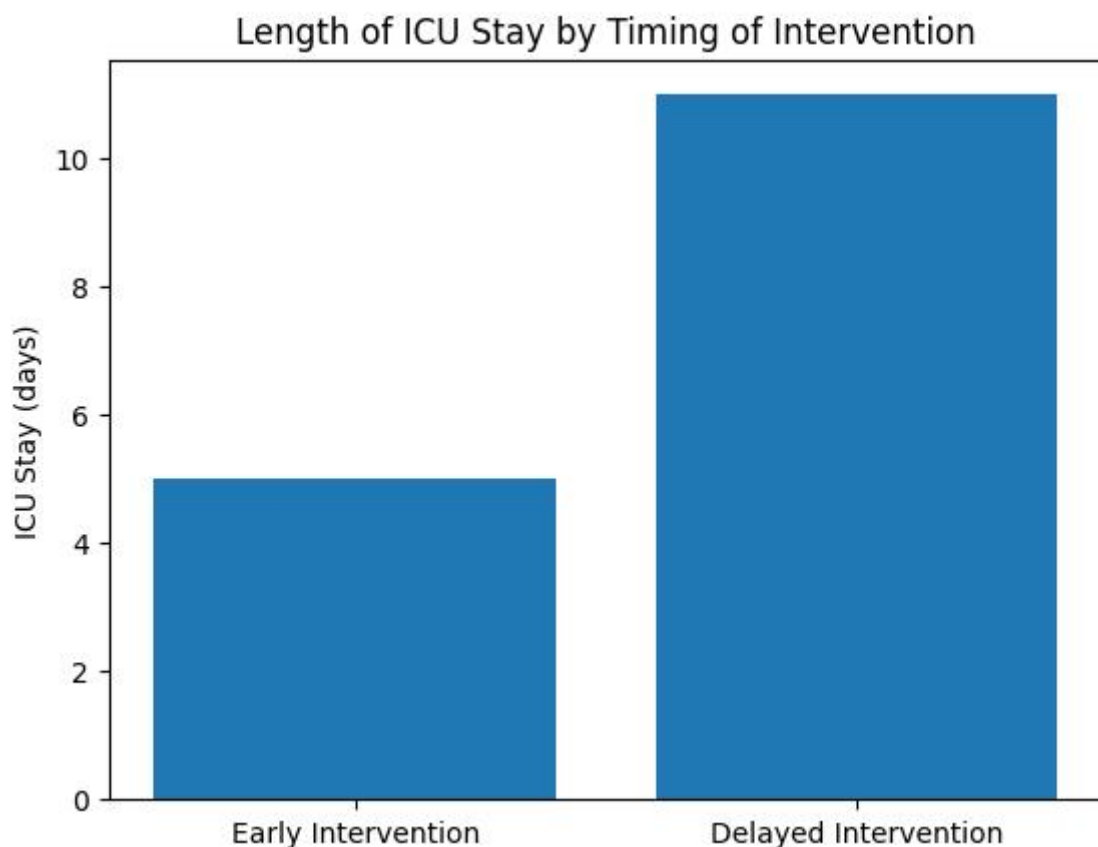
Mortality rates were lower in the early intervention group compared to the delayed intervention group. Early surgical management was associated with improved survival,

particularly in patients with moderate cholangiosepsis at admission.

Furthermore, early intervention resulted in shorter intensive care unit stays and reduced overall hospital length of stay. Faster resolution of sepsis and earlier recovery of organ function allowed timely transition to postoperative rehabilitation.



**Figure 1** demonstrates the comparison of in-hospital mortality between patients who underwent early biliary decompression (within 24–48 hours) and those who received delayed surgical intervention. Early intervention was associated with a significantly lower mortality rate compared to delayed intervention, indicating the critical role of timely surgical source control in cholangiosepsis.



**Figure 2** illustrates the duration of intensive care unit (ICU) stay in patients with cholangiosepsis depending on the timing of surgical intervention. Patients in the early intervention group had a markedly shorter ICU stay, reflecting faster stabilization of organ function and more effective control of systemic infection.

Early diagnosis and appropriate timing of surgical intervention are critical determinants of clinical outcomes in patients with cholangiosepsis. The results of this study demonstrate that reliance on integrated clinical assessment, dynamic laboratory monitoring, and validated sepsis severity scoring systems enables more accurate identification of high-risk patients and supports timely surgical decision-making.

Early biliary decompression performed within the first 24–48 hours was associated with rapid regression of systemic inflammatory response, stabilization of organ function, and significant reductions in mortality and intensive care unit stay. In contrast, delayed surgical intervention was linked to persistent endotoxemia, progression of organ dysfunction, and higher rates of postoperative complications.

The findings emphasize that isolated clinical signs or single laboratory measurements are insufficient for guiding surgical timing in cholangiosepsis. Instead, a combined approach incorporating clinical presentation, laboratory dynamics, and severity scores such as SOFA and APACHE II provides a more reliable framework for decision-making.

In conclusion, implementation of standardized clinical and laboratory criteria for early diagnosis and timely surgical intervention can significantly improve treatment outcomes in cholangiosepsis. The proposed diagnostic-oriented approach may serve as a practical tool for optimizing surgical tactics and reducing sepsis-related morbidity and mortality in hepatobiliary practice.

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