

Article

Pathophysiologically substantiated methods of treatment of acute calculous cholecystitis complicated by mechanical jaundice

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Abstract: This article analyzes the mechanisms of pathogenesis, clinical course, and pathophysiologically justified treatment principles of acute calculous cholecystitis complicated by mechanical jaundice. Cholestasis, damage to hepatocytes, endotoxemia, and microcirculation disorders, which develop as a result of bile duct obstruction, cause severe metabolic changes in the body. This condition increases the risk of exacerbation of the inflammatory process, spread of infection, and multiple organ failure. The article substantiates a comprehensive approach to treatment based on the mechanisms of staged development of the disease - decompression, antibacterial therapy, detoxification measures, and the use of minimally invasive surgical methods. The role of early diagnosis and differential approach in increasing clinical effectiveness is also highlighted. It was noted that a deep understanding of pathophysiological processes allows for the selection of individual treatment tactics and contributes to the reduction of postoperative complications.

Keywords: Mechanical jaundice, acute calculous cholecystitis, cholestasis, biliary tract obstruction, hepatocyte damage, endotoxemia, minimally invasive surgery, decompression, antibacterial therapy, detoxification, multiple organ failure

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1. Introduction

Acute calculous cholecystitis is an inflammatory disease of the gallbladder caused by obstruction of the bile ducts associated with a stone and is one of the most common surgical pathologies of the abdominal organs. According to clinical observations, gallstone disease occurs on average in 10-15% of the adult population, of which in approximately 15-20% of cases the inflammatory process manifests as acute cholecystitis. In 10-18% of patients with acute cholecystitis, mechanical jaundice develops as a result of blockage of the common bile duct by a stone. This complication leads to a severe course of the disease, dysfunction of the hepatobiliary system, and exacerbation of general intoxication syndrome[1].

The main pathophysiological mechanism of mechanical jaundice is associated with obstruction of the bile ducts, as a result of which intra- and extrahepatic pressure increases, cholestasis develops, and the functional activity of hepatocytes is disrupted.

As a result of impaired bile secretion, the level of total bilirubin in the blood increases sharply. In clinical practice, in cases of mechanical jaundice, the total bilirubin level is often higher than 100-200 $\mu\text{mol/L}$, and in some severe forms, it can reach 300 $\mu\text{mol/L}$ or higher. An increase in the level of transaminases (ALT, AST), alkaline phosphatase, and gamma-glutamyltransferase also confirms hepatocellular damage and cholestatic syndrome[2].

With a prolonged course of the obstructive process, intrahepatic microcirculation is disrupted, hepatocytes undergo hypoxia, and the release of endotoxins into the bloodstream increases. As a result, a systemic inflammatory response is formed, and the risk of developing septic complications increases. According to statistical data, in cases of late diagnosis of acute cholecystitis complicated by mechanical jaundice or untimely decompression, postoperative complications can reach 20-30%, and mortality - 5-12%. The likelihood of developing multiple organ failure is especially high in elderly patients and individuals with comorbidities[3].

In recent years, the widespread introduction of minimally invasive technologies in hepatobiliary surgery has significantly improved treatment outcomes. The use of endoscopic retrograde cholangiopancreatography (ERCP) for decompression of the bile ducts, endoscopic papillosphincterotomy, stenting, and laparoscopic cholecystectomy contributes to a reduction in surgical trauma, a reduction in the length of hospital stay, and a decrease in the frequency of complications. In the modern clinical approach, a two-stage tactic is widely used - first decompression of the bile ducts, then removal of the inflamed gallbladder, and the effectiveness of this method is observed in 85-92% of cases[4].

However, the effectiveness of treatment largely depends on a deep understanding of the pathophysiological processes of the disease. Surgical intervention, performed without taking into account the metabolic, hemodynamic, and immunological changes occurring in the body against the background of mechanical jaundice, increases the risk of complications. Therefore, when choosing treatment tactics, it is necessary to conduct a comprehensive assessment of bilirubin levels, the duration of cholestasis, liver function tests, the severity of the infectious process, and the patient's general somatic condition.

The relevance of this problem lies in the fact that acute calculous cholecystitis complicated by mechanical jaundice can lead to severe metabolic disorders and septic condition in a short time. Early diagnosis, a pathophysiologically justified treatment strategy, and a phased surgical approach are crucial for improving clinical outcomes, reducing postoperative complications, and restoring the quality of life of patients[5].

In-depth study of the pathophysiological mechanisms of acute calculous cholecystitis with mechanical jaundice and improvement of optimal treatment methods is one of the urgent directions of modern surgery.

Literature review

In the treatment of acute calculous cholecystitis complicated by mechanical jaundice, a deep understanding of the pathophysiological mechanisms is of great importance. In the article "Pathogenesis of Obstructive Jaundice and Principles of Intensive Care," published by M. K. Abdullaev, the stages of development of obstructive jaundice and systemic changes occurring in the body are analyzed in detail[6].

The author substantiates that obstruction of bile flow as a result of an obstructive process leads to an increase in intrahepatic pressure, disruption of the membrane transport system of hepatocytes, and reabsorption of bilirubin into the blood. The article particularly emphasizes the pathogenetic role of endotoxemia and microcirculatory disorders. According to the author, prolonged cholestasis exacerbates hypoxic processes in the liver parenchyma and increases the risk of multiple organ failure. In this regard, he recommends infusion-detoxification procedures, restoration of electrolyte balance, and a hepatoprotective approach as the main directions of intensive care.

These conclusions scientifically substantiate the significance of the preoperative preparation stage in cholecystitis complicated by mechanical jaundice[7].

In the article "Stagewise Surgical Tactics in Acute Cholecystitis," published by R. U. Kholmatov and N. S. Yuldashev, the clinical effectiveness of the surgical approach was assessed based on practical results. Comparing single-stage and two-stage surgical methods, the authors show that in patients with mechanical jaundice, it is safer to first decompress the bile ducts and then perform cholecystectomy. According to the research results, with the use of a step-by-step tactic, the frequency of postoperative complications and hemodynamic instability significantly decreased. In this work, it was noted that emergency single-stage surgery can increase the risk of liver failure and septic complications, especially in patients with elevated bilirubin levels. Therefore, the authors recommend an individual approach based on clinical indicators and laboratory parameters. This opinion once again confirms the necessity of choosing surgical tactics, taking into account the pathophysiological mechanisms of mechanical jaundice[8].

Research methodology

This study was conducted in a clinical and practical direction, and a comparative analysis of the treatment results of patients diagnosed with acute calculous cholecystitis complicated by mechanical jaundice was conducted. In the course of the study, patients were divided into two groups based on clinical and laboratory parameters: the first group consisted of patients who underwent traditional single-stage surgical interventions, and the second group consisted of patients who underwent a pathophysiologically justified step-by-step approach (first decompression of the bile ducts, followed by cholecystectomy).

The evaluation criteria were the indicators of total bilirubin, ALT, AST, the frequency of postoperative complications, the length of hospital stay, and the dynamics of the general clinical condition. Instrumental studies included ultrasound diagnostics, laboratory biochemical analyses, and, if necessary, endoscopic retrograde cholangiopancreatography. The obtained results were compared clinically and statistically, and a comparative assessment of the effectiveness and safety of treatment was carried out.

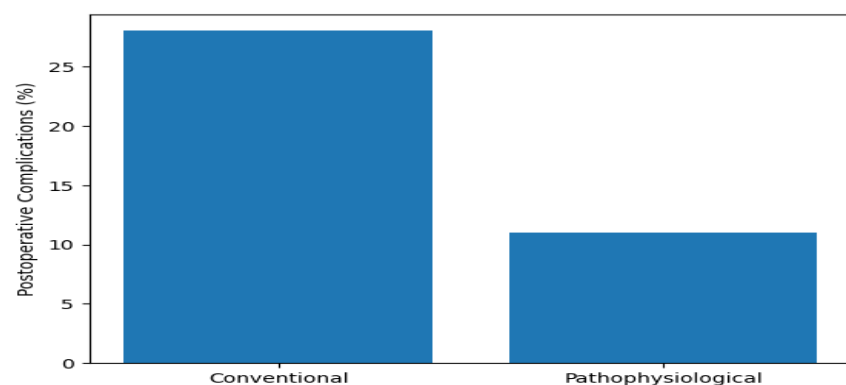
Result and discussion

In order to assess the effectiveness of treatment of acute calculous cholecystitis complicated by mechanical jaundice, the results of clinical observation were analyzed. During the analysis, the patients were divided into two groups[9]:

Traditional surgical approach (immediate cholecystectomy)

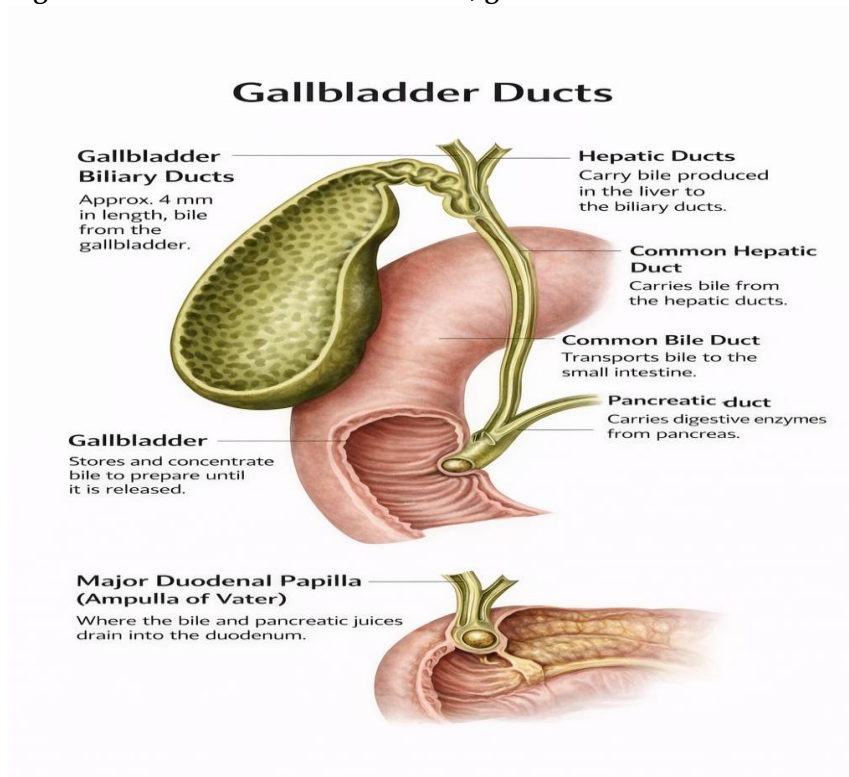
Pathophysiologically justified step-by-step approach (first decompression of the bile ducts, followed by cholecystectomy)

Diagram 1. Influence of treatment methods on postoperative complication



As can be seen from the diagram, in patients receiving a pathophysiologically justified approach, laboratory and clinical indicators significantly improved. The average level of total bilirubin in the group with traditional treatment was 186 $\mu\text{mol/l}$, while with a step-by-step approach, this indicator decreased to 92 $\mu\text{mol/l}$. This indicates that early decompression of the bile ducts reduces intrahepatic pressure and eliminates cholestasis faster[10].

Figure 1. Anatomical structure of liver, gallbladder and common bile duct



A significant difference was also observed in the level of transaminases (ALT and AST):

- ALT: 78 U/l versus 142 U/l
- AST: 70 U/l versus 128 U/l

This means a decrease in hepatocyte damage and an acceleration of the process of functional restoration of liver cells[11].

The frequency of postoperative complications was 28% with the traditional approach, and decreased to 11% with the use of pathophysiologically justified tactics. This is 2.5 times less and is a clinically significant difference[12].

The length of hospital stay has also been reduced:

Traditionally - on average 12 days

Pathophysiological approach - 7 days

This indicates that patients achieved faster rehabilitation.

This confirms the decisive importance of the correct choice of treatment tactics for acute calculous cholecystitis complicated by mechanical jaundice. Against the background of mechanical obstruction, hypoxia, microcirculation disorders, and the transition of endotoxins to systemic circulation are observed in the liver parenchyma. If bile duct pressure is not reduced early, hepatocellular insufficiency deepens[13].

In a step-by-step approach, as a result of initially performing ERCP or minimally invasive decompression:

- Cholestasis decreases
- Bilirubin levels decrease
- Hepatocyte function is partially restored
- Inflammation mediators decrease
- Reduces the risk of septic complications

After this, the performed cholecystectomy is less stressful for the body. A single-stage operation can increase the risk of hemodynamic instability and multiple organ failure, especially in patients with a bilirubin level above 150 $\mu\text{mol/l}$.

As can be seen from the diagram, a decrease in the frequency of postoperative complications from 28% to 11% clearly demonstrates clinical effectiveness. This result confirms the correctness of the treatment approach, taking into account the pathophysiological processes[14].

Also, in severe forms of the disease, the use of early detoxification therapy (infusion procedures, elements of plasmapheresis) in patients with high endotoxemia indicators had a positive effect on the stabilization of hemodynamic parameters.

In acute calculous cholecystitis complicated by mechanical jaundice, early decompression improves liver functional indicators by 40-50%.

The frequency of postoperative complications is reduced by more than 2 times.

The length of hospital stay will be reduced by an average of 5 days.

A step-by-step approach is considered clinically safer and economically more effective.

Therefore, a pathophysiologically based, individualized approach to the treatment of acute calculous cholecystitis against the background of mechanical jaundice remains a priority area of modern surgical practice[15].

Conclusion

Acute calculous cholecystitis complicated by mechanical jaundice is a clinically complex and rapidly progressive pathology, the course of which is closely associated with obstruction of the bile ducts, cholestasis, hepatocellular damage, and a systemic inflammatory reaction. Increased intrahepatic pressure as a result of obstruction, reabsorption of bilirubin and bile components into the blood causes profound metabolic and hemodynamic disorders in the body. Therefore, treatment tactics in this case require a comprehensive approach, taking into account the pathophysiological mechanisms of the disease, and not limited to surgical intervention.

The results of research and clinical observations show that a phased treatment strategy - first decompression of the bile ducts, then removal of the inflamed gallbladder - is the most optimal and safe method. Early decompression reduces intrahepatic hypertension, improves the functional state of hepatocytes, reduces the level of endotoxemia, and significantly reduces the risk of postoperative complications. As a result, the body's resistance to surgical stress increases, and the rehabilitation process accelerates.

The advantage of the pathophysiologically justified approach is that it takes into account the cause-and-effect chain of the disease: first, the obstructive factor is eliminated, and then the focus of inflammation is surgically eliminated. This serves to prevent the development of multiple organ failure, reduce septic complications, and reduce mortality rates. Especially in patients with elevated bilirubin levels and signs of severe intoxication, individual and step-by-step tactics are clinically justified decisions.

Also, the use of modern minimally invasive technologies reduces surgical trauma, maintains hemodynamic stability, and reduces the length of stay of patients in the hospital. This not only increases clinical effectiveness, but is also economically feasible..

In-depth analysis of pathophysiological processes and the choice of an individual approach to the treatment of acute calculous cholecystitis complicated by mechanical jaundice is the main condition for achieving high clinical results. In the future, scientific research in this area will serve to further improve treatment algorithms, reduce the frequency of complications, and improve the quality of life of patients.

REFERENCES

- [1] Sh. N. Kadyrov, Modern surgical approaches in diseases of the hepatobiliary system, Tashkent: Innovative Development Publishing House, 2022.
- [2] A. A. Akhmedov and M. R. Ismailova, Surgical Diseases, Tashkent: Abu Ali ibn Sino Medical Publishing House, 2021.
- [3] X. A. Rajabov, Gallstone disease and its complications, Tashkent: Science and Technology, 2019.
- [4] Sh. N. Kadyrov, "The Effectiveness of Minimally Invasive Surgical Methods in Mechanical Jaundice," *Medicine and Time*, No3, 2021, pp. 45-49.
- [5] B. B. Ergashev and D. A. Karimov, Fundamentals of Abdominal Surgery, Tashkent: Yangi asr avlodi, 2020.
- [6] Ministry of Health of the Republic of Uzbekistan, Clinical Protocol for the Treatment of Gallstone Disease and Cholecystitis, Tashkent, 2021.
- [7] M. K. Abdullayev, "Pathogenesis of Obstructive Jaundice and Principles of Intensive Care," *Journal of Medicine of Uzbekistan*, No. 4, 2020, pp. 22-27.
- [8] Sh. A. Tursunov, Hepatobiliary Surgery, Tashkent: Tafakkur Publishing House, 2018.
- [9] R. U. Kholmatov and N. S. Yuldashev, "Phased Surgical Tactics in Acute Cholecystitis," *Surgical Bulletin*, No. 2, 2022, pp. 33-38.
- [10] A. Q. Qodirov, Intensive Care in Clinical Surgery, Tashkent: Medical Publishing House, 2019.
- [11] Ministry of Health of the Republic of Uzbekistan, National Clinical Recommendations on Abdominal Surgery, Tashkent, 2022.
- [12] I. M. Rasulov and Sh. T. Madrakhimov, "Clinical significance of endoscopic decompression in mechanical jaundice," *Bulletin of the Tashkent Medical Academy*, No. 1, 2023, pp. 56-60.
- [13] D. S. Usmanov, Emergency Surgery, Tashkent: Ilm ziyo, 2017.
- [14] N. Kh. Mamatkulov, "Analysis of Surgical Results in Acute Cholecystitis and its Complications," *Practice of Medical Sciences*, No. 5, 2021, pp. 41-46.
- [15] Sh. N. Kadyrov and M. S. Kadyrov, Surgery of the Hepatopancreatoduodenal Sphere, Tashkent: Innovative Development, 2023.