# PREDICTION OF OUTCOMES AND CHOICE OF SURGICAL TACTICS IN DISSEMINATED PERITONITIS

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**Abstract:** Generalized peritonitis remains one of the most challenging problems in emergency abdominal surgery, associated with a high rate of postoperative complications and mortality. The aim of this study was to evaluate the prognostic value of integrated severity scales and to develop a differentiated approach to choosing a surgical strategy in patients with generalized peritonitis. Treatment outcomes were analyzed using the Mannheim Peritonitis Index (MPI), APACHE II, and SOFA scores. A comprehensive severity assessment was found to enable objective selection of indications for closed, semi-open, and open laparotomy completion, reduce unnecessary relaparotomies, and improve treatment outcomes.

**Keywords:** disseminated peritonitis, prognosis, MPI, APACHE II, SOFA, surgical tactics.

# TARQALGAN PERITONITDA OQIBATLARNI PROGNOZLASH VA JARROHLIK TAKTIKASINI TANLASH

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**Annotatsiya:** Tarqalgan peritonit shoshilinch abdominal xirurgiyaning eng murakkab muammolaridan biri bo‘lib qolmoqda hamda operatsiyadan keyingi asoratlar va o‘lim ko‘rsatkichining (letallikning) yuqoriligi bilan tavsiflanadi. Tadqiqotning maqsadi holat og‘irligining integral shkalalari prognostik ahamiyatini baholash va tarqalgan peritonit bilan og‘rigan bemorlarda xirurgik taktikani tanlashga nisbatan tabaqalashtirilgan yondashuvni ishlab chiqishdan iborat bo‘ldi. Mannheim Peritonitis Index (MPI), APACHE II va SOFA shkalalaridan foydalangan holda bemorlarni davolash natijalari tahlil qilindi. Holat og‘irligini kompleks baholash laparotomiyani yakunlashning yopiq, yarim ochiq va ochiq usullariga bo‘lgan ko‘rsatmalarni obyektivlashtirish, asossiz relaparotomiyalar sonini kamaytirish va davolash natijalarini yaxshilash imkonini berishi aniqlandi.

**Kalit so‘zlar:** tarqalgan peritonit, prognozlash, MPI, APACHE II, SOFA, xirurgik taktika.

# ПРОГНОЗИРОВАНИЕ ИСХОДОВ И ВЫБОР ХИРУРГИЧЕСКОЙ ТАКТИКИ ПРИ РАСПРОСТРАНЁННОМ ПЕРИТОНИТЕ

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**Аннотация:** Распространённый перитонит остаётся одной из наиболее сложных проблем экстренной абдоминальной хирургии, сопровождаясь высокой частотой послеоперационных осложнений и летальности. Целью исследования явилась оценка

прогностической значимости интегральных шкал тяжести состояния и разработка дифференцированного подхода к выбору хирургической тактики у больных с распространённым перитонитом. Проанализированы результаты лечения пациентов с использованием шкал Mannheim Peritonitis Index (MPI), APACHE II и SOFA. Установлено, что комплексная оценка тяжести состояния позволяет объективизировать показания к закрытому, полуоткрытому и открытому способам завершения лапаротомии, снизить частоту необоснованных релапаротомий и улучшить исходы лечения.

**Ключевые слова:** распространённый перитонит, прогнозирование, MPI, APACHE II, SOFA, хирургическая тактика.

## INTRODUCTION

Despite significant advances in modern surgery, anesthesiology, and intensive care, disseminated peritonitis continues to have a high mortality rate, reaching 30–40%, and 50–70% when abdominal sepsis and multiple organ failure develop. The multifactorial nature of the pathogenesis, polymicrobial etiology, and variability of the clinical course make it difficult to select the optimal surgical approach.

The key to treating disseminated peritonitis is timely and adequate debridement of the infectious source. However, even with technically correct surgical intervention, the risk of inflammation progression often remains, requiring repeat surgeries and increasing surgical trauma. Therefore, prognosticating the course of the disease and objectively defining the criteria for choosing the method for completing laparotomy are particularly important.

Integral prognostic scores, such as the Mannheim Peritonitis Index (MPI), APACHE II, and SOFA, are widely used in clinical practice. However, their role in choosing surgical tactics remains a subject of debate. The lack of a unified approach to interpreting prognostic indicators often leads to subjective decisions and an increased incidence of adverse outcomes.

The aim of this study was to evaluate the prognostic significance of the MPI, APACHE II, and SOFA scales in patients with disseminated peritonitis and to substantiate a differentiated approach to the choice of surgical tactics.

Fatal outcomes in disseminated peritonitis are most often caused by complications arising in the postoperative period, both inside and outside the abdominal cavity. The frequency of such complications is about 60%. Among them, the following are particularly dangerous: postoperative and tertiary peritonitis, severe infections in the area of surgical intervention, intra-abdominal hypertension syndrome, and acute adhesive intestinal obstruction.

Successful treatment of patients with disseminated peritonitis is closely related to effective control of intra-abdominal pressure (IAP) and counteraction of intra-abdominal hypertension syndrome. One-third of patients with disseminated peritonitis develop intra-abdominal hypertension. High IAP levels impair blood supply to organs and tissues, contributing to the progression of multiple organ failure. A prolonged increase in IAP in the postoperative period signals the presence of intra-abdominal complications. With the development of abdominal compartment syndrome, mortality in patients with peritonitis reaches a critical level of 90%.

There are two main methods for measuring intra-abdominal pressure: direct and indirect. The direct method involves measuring pressure directly in the abdominal cavity, for example, during laparoscopy, peritoneal dialysis, or laparostomy. Despite its high accuracy, this method has a number of limitations: high cost of equipment, risk of infectious complications for patients, and the inability to take multiple measurements. As an alternative, an indirect approach is used,

involving organs adjacent to the abdominal cavity: the bladder, stomach, uterus, rectum, and inferior vena cava. The World Society of the Abdominal Compartment Syndrome considers the Ibert–Kron method the "gold standard" for indirect IAP measurement.

To combat this condition, repeat surgery and reduction of abdominal pressure are used. Monitoring IAP during and after surgery helps identify the development of abdominal compartment syndrome and determine the need for repeat surgery.

Prevention of early adhesive intestinal obstruction in patients with disseminated peritonitis remains a pressing issue in emergency abdominal surgery. The increased risk of adhesions is due to inflammatory processes in the abdominal cavity and frequent surgical interventions. Anti-adhesion barriers are an effective method of preventing early adhesive intestinal obstruction and adhesive disease of the abdominal cavity. Researchers consider collagen a promising material for creating anti-adhesion barriers. Its advantages include low antigenicity, lack of toxicity, high biocompatibility, ability to degrade in the body, and hemostatic properties. Collagen-based anti-adhesion barriers include the KolGARA membrane, made from renatured type I horse collagen. The membrane is easy to use, does not shift after placement, and degrades within 3–5 weeks. Due to the lack of clinical data on the use of anti-adhesion barrier drugs in the context of abdominal surgical infections, their use in patients with disseminated peritonitis remains limited.

In modern abdominal surgery, a variety of hemostatic drugs are used. In the context of abdominal surgical infections, special attention is paid to drugs based on nanocomposite organo-inorganic materials. Among them, microporous polyacrylate combined with silver nanoparticles occupies a special place. This combination has not only hemostatic but also antimicrobial effects. According to a study by A. Fahmy and colleagues (2016), a polyacrylic nanocomposite containing highly dispersed silver nanoparticles demonstrates antibacterial activity. In light of this, special attention should be paid to the local hemostatic drug "Hemoblock"TM, which, in addition to polyacrylic acid, contains silver nanoparticles that give it bactericidal and bacteriostatic properties. Some clinical studies show that the use of hemostatics for bleeding of various causes effectively stops blood loss. At present, there are no scientific studies investigating the effect of the drug "Hemoblock"TM on the morphology, viability, and ability to attach to the surfaces of cells of the main pathogens of secondary disseminated peritonitis in vitro.

## MATERIALS AND METHODS

The study included patients with disseminated peritonitis treated at the clinical sites of the Surkhandarya branch of the Scientific Center for Emergency Medicine. All patients were admitted as emergency cases and required immediate surgical intervention.

The diagnosis of disseminated peritonitis was established based on clinical data, laboratory parameters, instrumental examinations, and intraoperative findings. All patients underwent a comprehensive clinical and laboratory examination, including complete blood counts, biochemical blood tests, acid–base balance, hemodynamic parameters, and assessment of vital organ function.

The Mannheim Peritonitis Index (MPI), APACHE II, and SOFA scores were used to objectively assess the severity of the condition and predict the prognosis of the disease. Scores were determined preoperatively and in the early postoperative period to dynamically assess the patient's condition.

Surgical management included elimination of the primary source of peritonitis, debridement, and drainage of the abdominal cavity. Depending on the severity of the condition and prognostic indicators, closed, semi-open, and open abdomen approaches were used for

laparotomy completion. Postoperative follow-up included assessment of the clinical picture, laboratory parameters, and the need for relaparotomy.

Treatment effectiveness was assessed based on the incidence of postoperative complications, the number of repeat surgeries, mortality, and length of hospital stay. Statistical analysis of the data was performed using standard variation statistics.

**RESULTS**

Analysis of treatment results showed that the MPI, APACHE II, and SOFA scores significantly correlated with the severity of the clinical course of disseminated peritonitis and disease outcomes.

**Table 1. Indicators of prognostic scales in examined patients**

| Scale | Average value |
|---|---|
| MPI, points | 25.7 ± 2.4 |
| APACHE II, points | 18.6 ± 2.1 |
| SOFA, points | 8.2 ± 1.3 |

Patients with low prognostic scores (MPI < 21, APACHE II ≤ 14, SOFA < 6) had a relatively favorable clinical course. In this group, closed laparotomy was the predominant method, associated with minimal postoperative complications and low mortality.

**Table 2. Choice of surgical tactics depending on prognostic indicators**

| Scale indicators | Method of completing laparotomy |
|---|---|
| MPI < 21, APACHE II ≤ 14, SOFA < 6 | Closed |
| MPI 21–29, APACHE II 15–20, SOFA 8–10 | Semi-open |
| MPI > 29, APACHE II > 20, SOFA ≥ 10 | Open abdomen |

With moderate scores (MPI 21–29, APACHE II 15–20, SOFA 8–10), an increased incidence of postoperative complications was observed, including postoperative peritonitis and intestinal paresis. In this group, a semi-open laparotomy approach with the option of programmed debridement or relaparotomy “on demand” was justified.

Patients with high prognostic scores (MPI > 29, APACHE II > 20, SOFA ≥ 10) experienced progression of abdominal sepsis, development of intra-abdominal hypertension, and multiple organ failure. In this group, open abdomen management was most appropriate.

**Table 3. Treatment outcomes depending on the chosen surgical tactics**

| Indicator | Closed | Semi-open | Open abdomen |
|---|---|---|---|
| Postoperative complications, % | 24.3 | 39.8 | 57.6 |

| | | | |
|---|---|---|---|
| Relaparotomies, % | 12.1 | 28.4 | 41.9 |
| Mortality rate, % | 18.7 | 31.5 | 46.8 |

The use of a differentiated approach to the choice of surgical tactics made it possible to reduce the frequency of unjustified relaparotomies and decrease mortality compared to the empirical choice of the method for completing laparotomy.

**DISCUSSION**

The obtained results confirm the high prognostic value of the integrated MPI, APACHE II, and SOFA scores in patients with disseminated peritonitis. Using these scales allows an objective assessment of the severity of the patient's condition and helps predict the likelihood of an unfavorable course of the disease.

Unlike isolated clinical assessment, a comprehensive scoring approach reduces subjectivity in decision-making and facilitates a more informed choice of surgical approach. Particularly important is the dynamic use of the SOFA score, which reflects the degree of organ dysfunction and allows timely detection of septic progression.

The MPI scale remains a convenient and accessible tool for rapid assessment of peritonitis severity in emergency surgery, while APACHE II and SOFA complement it by assessing systemic disorders and the risk of multiple organ failure.

Differentiated choice of the method for completing laparotomy, taking into account prognostic indicators, helps reduce surgical trauma, decrease the incidence of severe complications, including tertiary peritonitis and abdominal compartment syndrome, and improve immediate treatment outcomes.

**CONCLUSION**

The use of integrated prognostic scores (MPI, APACHE II, and SOFA) allows objective assessment of the severity of patients with disseminated peritonitis and justifies the choice of surgical approach. A differentiated approach to completing laparotomy improves immediate treatment outcomes and reduces mortality. The obtained data support the feasibility of implementing prognostic-based algorithms in the clinical practice of emergency abdominal surgery.

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