

**A RISK-ADAPTED STRATEGY FOR PREVENTION OF
RECURRENT ABDOMINAL ADHESIONS BASED ON
IMMUNOLOGICAL PROFILING AND MINIMALLY
INVASIVE SURGERY**

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Relevance. Abdominal adhesive disease remains one of the most significant unresolved problems in modern abdominal surgery. According to large European cohort studies, postoperative adhesions develop in 60–90% of patients after abdominal interventions, and up to 30–40% of all cases of intestinal obstruction are directly associated with adhesive processes. In the European Union alone, adhesive intestinal obstruction accounts for tens of thousands of hospital admissions annually, creating a substantial economic burden on healthcare systems.

Data from the United States indicate that nearly 20–25% of patients who undergo abdominal surgery require readmission due to adhesion-related complications, while the risk of recurrence after the first episode of adhesive intestinal obstruction reaches 15–35%. In Japan and China, the incidence of adhesive disease continues to rise due to increased surgical activity and population aging, making it a growing public health concern.

Despite the widespread implementation of minimally invasive techniques, including laparoscopy and barrier agents, recurrence rates remain high. One of the key limitations of current approaches is the lack of

individualized risk assessment based on immunological and molecular mechanisms underlying adhesion formation.

Recent advances in immunology have demonstrated that cytokine imbalance (IL-6, TGF- β 1, VEGF), disturbances in fibrinolysis (PAI-1, tPA), and dysregulation of extracellular matrix remodeling play a central role in adhesion formation and recurrence. However, these parameters are rarely integrated into routine clinical decision-making.

Therefore, the development of an integrated, risk-adapted algorithm that combines immunological profiling with minimally invasive surgical strategies represents a highly актуальная задача, aimed at reducing recurrence rates, improving patient outcomes, and optimizing healthcare resources.

Study Objective: To develop and evaluate a risk-adapted strategy for the prediction and prevention of recurrent abdominal adhesions based on immunological assessment and minimally invasive surgical techniques.

Materials and Methods. Materials and Methods:

The study included 265 patients with adhesive abdominal disease and adhesive intestinal obstruction who were treated at the surgical departments of the Bukhara branch of the Republican Scientific Center for Emergency Medical Care (RSC EMC), Uzbekistan.

The reference group consisted of 20 apparently healthy individuals without a history of abdominal surgery. The main cohort included 245 patients, divided into a control group (137 patients) who received standard treatment and a study group (128 patients) managed using the developed risk-adapted algorithm.

The proposed approach was based on sequential risk stratification using the PAS (Peritoneal Adhesion Score), followed by differentiated immunotherapy and selective minimally invasive surgical interventions.

Results and Discussion. Systematization of the control group results and analysis of the dynamics of immunological parameters in the main cohort

showed that surgical intervention and subsequent immunoprophylaxis cannot be considered in isolation. Combining these stages into a single treatment and diagnostic algorithm, in which the decision on treatment strategy is based on the prognostic scale "PAS," proved to be of practical importance. This approach allowed us not only to record the baseline risk level in patients undergoing emergency surgery or conservative treatment for APFS but also to adjust it in the early postoperative period through differentiated immunotherapy. Repeated stratification enabled the selective administration of elective laparoscopic interventions with the use of prophylactic measures, ultimately making the entire system comprehensive and consistent.

Elective laparoscopic interventions in patients in the main group were limited and prophylactic in nature. They were aimed at eliminating key obstacles to passage, minimizing surgical trauma, and creating conditions for favorable peritoneal healing. The use of laparoscopy in combination with an ultrasonic coagulator (Harmonic, Ethicon), mandatory peritonealization, and targeted use of barrier agents formed the basis of the developed strategy for elective surgery for APFS.

Elective laparoscopic surgery after immunoprophylaxis minimizes surgical trauma, specifically isolates risk areas, and transitions the patient from a high-risk to a low-risk category. The use of an ultrasonic surgical coagulator (Harmonic, Ethicon), mandatory peritonealization, and local barrier agents form the basis of preventive care.

Based on the research and application of optimized approaches, we have developed a "Treatment and Diagnostic Algorithm for Predicting and Preventing Recurrence of SBBP and OCCI." The core of the algorithm is the sequential stratification of patients and the selection of appropriate treatment at each stage, which allows for the integration of surgical intervention and immunoprophylaxis into a single system. The algorithm is based on a "decision

tree" principle, with initial events and subsequent steps linked to the risk assessment results using the PAS scale and its dynamics.

In the first stage, if conservative decompression of OCCI is ineffective, emergency surgery is performed. At this stage, preventative measures are already implemented, including gentle adhesiolysis, limited use of coagulation, peritonealization of damaged areas, and local placement of barrier dressings. If possible, all of the above are performed laparoscopically. If conservative resolution of the acute pulmonary embolism is successful, a baseline for further observation is established.

After stabilization, the patient's PAS score is calculated, and based on the score, they are divided into three categories: "high risk" (≥ 25 points), "low risk" (6-24 points), and "no risk" (≤ 5 points). This "first cutoff" determines the initial trajectory for subsequent patient management. Accordingly, differentiated immunoprophylactic therapy is prescribed depending on the risk category.

For "high risk" patients, the emphasis is on suppressing IL-6, correcting fibrinolytic imbalances, and stabilizing microcirculation; therapy involves the combined use of several drugs. For "low risk" patients, more gentle regimens are used, aimed at maintaining fibrinolytic potential and limiting the activity of the fibrotic cascade. For "no risk" patients, immunoprophylaxis is not administered and they are monitored closely.

Monitoring is performed after 30 days, then after 3 and 6 months. Progress is assessed not only by the PAS score but also by the clinical presentation. If the PAS score decreases and symptoms resolve, observation is the only strategy. If "high risk" patients remain, therapy is extended or intensified. If the scores increase, a review of the strategy is required, with a consultation.

In cases of persistently high risk, combined with clinical symptoms of SBBP and frequent episodes of acute cerebral palsy, the patient is recommended to undergo elective laparoscopic surgery. This procedure is

selective: only significant adhesions are removed, an ultrasonic coagulator (Harmonic, Ethicon) is used, peritonealization of injured areas, and targeted placement of barrier devices are mandatory. This procedure is considered a logical continuation of immunoprophylaxis, not an alternative.

After planned interventions, the PAS is reassessed at the same time points. If the risk level changes to low or zero, the intensity of immunoprophylaxis is reduced to maintenance. If the risk persists, an additional course of correction is considered.

Thus, the proposed treatment and diagnostic algorithm has enabled the integration of surgical tactics and immunoprophylaxis into a unified system for managing patients with SBBP and acute cerebral palsy. Consistent patient stratification using the PAS scale and the selection of interventions based on risk level reduced the number of patients with a poor prognosis, decreased recurrence and mortality rates, and reduced the need for repeat emergency surgeries. Incorporating this algorithm into clinical practice enables not only individualized treatment but also the reproducible achievement of more favorable outcomes through a combination of pathogenetically based therapy and gentle, minimally invasive surgery.

CONCLUSIONS:

The proposed risk-adapted strategy provides an effective framework for the prevention of recurrent abdominal adhesions. The integration of immunological profiling with minimally invasive surgery allows for personalized management, improved outcomes, and reduced recurrence rates, supporting its implementation in clinical practice.

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