

# Prehabilitation in preparing patients with inflammatory bowel diseases for surgery, including nutritional treatment and psychological support

## *Prehabilitacja w przygotowaniu pacjentów z nieswoistymi chorobami zapalnymi jelit do operacji z uwzględnieniem postępowania żywieniowego i wsparcia psychicznego*

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**Słowa kluczowe:** choroba Leśniowskiego-Crohna, wrzodziejące zapalenie jelita grubego, prehabilitacja, postępowanie okołoperacyjne.

### Abstract

Despite progress in the pharmacological treatment of inflammatory bowel diseases (IBD), surgery is still an integral part of the treatment of ulcerative colitis and Crohn's disease. The probability of adverse effects of the procedure in this group of patients is related to the specificity of IBD and depends on modifiable and non-modifiable risk factors. Optimization of health must therefore rely on a multi-directional and individualized approach to a patient. Proper preparation of the patient for surgery consisting in nutritional and psychological support, improvement of physical efficiency and encouragement to give up addictions can bring a real benefit in improving the treatment results. The paper discusses the principles, benefits and limitations of the use of elements of prehabilitation in the surgical treatment of patients with IBD.

### Streszczenie

Pomimo postępu leczenia farmakologicznego nieswoistych chorób zapalnych jelit (NChZJ) chirurgia nadal jest integralną częścią terapii wrzodziejącego zapalenia jelita grubego i choroby Leśniowskiego-Crohna. Prawdopodobieństwo wystąpienia niepożądanych następstw zabiegu jest w tej grupie chorych związane ze specyfiką NChZJ oraz zależne od modyfikowalnych i niemodyfikowalnych czynników ryzyka. Optymalizacja stanu zdrowia musi polegać na wielokierunkowym i zindywidualizowanym podejściu do chorego. Właściwe jego przygotowanie do operacji polegające na wsparciu żywieniowym, psychologicznym, poprawie wydolności fizycznej i zachęceniu do rezygnacji z nałogów może przynieść realną korzyść dla poprawy wyników leczenia. W pracy omówiono zasady, korzyści i ograniczenia wykorzystania elementów prehabilitacji w leczeniu chirurgicznym pacjentów z NChZJ.

### Introduction

Despite significant advances in the diagnosis and treatment of inflammatory bowel diseases (IBD), approximately 40% of patients with severe ulcerative colitis (UC) require proctocolectomy, and the risk of surgery in patients with Crohn's disease (CD) lasting 10 years or more is about 50%. Therefore, there is a real need for multidirectional preparation of patients with CD and UC for surgical procedures in

order to minimize the risk of postoperative complications [1–4]. The probability of undesirable consequences of a procedure in this group of patients is not only related to the specificity of IBD, but also depends on modifiable and non-modifiable risk factors, such as age, comorbidities, functional efficiency, nutritional status, psychological condition, etc. Nowadays, a multimodal approach is suggested to prepare a patient for surgery. Optimization of health must therefore rely

on a multi-directional and individualized approach to a patient.

Proper preparation of patients for surgery in IBD, increasing the safety of the perioperative period, should include the assessment of the nutritional status and implementing appropriate nutritional treatment, as well as psychological and physical support (preparatory exercises) and assessment of the cardiovascular, respiratory, kidneys and coagulation systems. An inseparable element of preparation should be the reduction of addictions that increase the risk of postoperative complications (smoking, drugs, alcohol).

The protocol which takes into account the most important aspects of preparation has been defined as prehabilitation for several years now [5].

### Prehabilitation

The aim of prehabilitation is comprehensive preparation for surgical treatment, which aims to lead to optimal health, ensuring good tolerance of treatment (the best in a given health situation), reducing the risk of complications and the fastest possible recovery, taking into account recovery after previously used therapies [4–6]. The existing approach complying with the Enhanced Recovery After Surgery (ERAS) procedure has mainly focused on elements of perioperative care aimed at reducing surgical stress. Prehabilitation extends the interest in a patient's functional status to the preoperative period [5, 7]. Although the approach to bowel surgery in accordance with the ERAS protocol and recommendations for prehabilitation is not new, the implementation of these programs in individual units is still unsatisfactory. The adopted components of the prehabilitation protocol are as follows:

1. Nutritional status assessment and nutritional support (mainly ONS in combination with immunonutrition).
2. Improvement of physical efficiency through proper physical preparation (exercises).
3. Psychological support.
4. Giving up addictions (cigarettes, alcohol) [4–8].

### Nutritional improvement guidelines

The prevalence of malnutrition in patients with IBD ranges from 20% to 85%. Protein-energy malnutrition and nutrient deficiencies are more common in patients with CD where the disease process takes place mainly in the small intestine [9]. The causes of malnutrition in IBD result from anorexia caused by ailments after a meal, increased concentration of pro-inflammatory cytokines, malabsorption within the inflamed intestine and loss of nutrients in the GI tract, as well as increased energy expenditure in general. Medications that may cause nausea and vomiting and reduce the absorption of micro- and macro-elements are also important [9]. During the exacerbation, a mixed picture of inflammation and mal-

nutrition develops with a slightly increased energy expenditure, relatively increased lipid oxidation and decreased carbohydrate oxidation. Patients with IBD most often develop malnutrition with a dominant decrease in body weight. Due to dehydration resulting from frequent diarrhea, plasma albumin levels may be falsely low in these patients, and low albumin levels are commonly seen in patients with UC who do not have malabsorption.

Malnutrition is associated with weight loss and impaired mobility associated with sarcopenia and worse condition of the gastrointestinal tract, lower circulatory and respiratory efficiency, as well as fluid and electrolyte balance disorders. Since some patients with sarcopenia do not have reduced body weight, and they are even overweight or obese, it is very important to assess the nutritional status using well-known and available methods other than just measuring body weight. It should be emphasized that patients with sarcopenia requiring surgical treatment are at a higher risk of complications [10].

IBD patients qualified for surgical treatment require careful, comprehensive nutritional preparation. Enteral nutrition should be used as the intervention of choice, preferably oral nutrition using polymeric diets, while parenteral nutrition should only be considered in exceptional situations where energy and protein requirements cannot be met by the enteral route. Preoperative nutrition is aimed at providing the right amount of protein (1.2–1.5 g/kg of body mass), which reduces catabolism and activates anabolism. After supplementation with arginine, omega-3 fatty acids and ribonucleotides in the preoperative period of only 5–7 days, a reduction in the number of infections and shortening of the hospitalization period were observed [8].

A review of the literature clearly indicates a beneficial impact of nutritional prehabilitation, alone or in combination with an exercise program, on the postoperative course [11]. Tube feeding is the preferred form of therapy for patients with active CD. Undernourished patients with higher disease activity should receive enteral nutrition. They should be treated with a polymeric diet in continuous infusion through a nasogastric tube or percutaneous endoscopic gastrostomy (PEG). The use of sip diets has a similar therapeutic effect, but IBD patients generally do not consume enough preparations necessary to cover their needs for nutrients [12].

Enteral nutrition is the best method for mild to moderate CD.

The demand according to ESPEN guidelines is as follows: energy 25–35 kcal/kg/day, protein 1.2–1.5 g/kg/day, glucose 3–6 g/kg/day, fat up to 2 g/kg/day, water 30–40 ml/kg/day; moreover, adequate supply of vitamins, macroelements and microelements should be planned [13]. Continuous infusion 20–24 h a day is recommended, because bolus doses cause more frequent complications in the form of diarrhea, reflux

and abdominal pain. The recommended period of using enteral nutrition is from 2 to 4 weeks, also in terms of preparation for the planned surgery. The principles of preparation are set out in the following ESPEN guidelines, selectively quoted below [8].

### **Recommendation 3B according to ESPEN guidelines**

Documented malnutrition in patients with IBD should be treated appropriately as it worsens prognosis, complication rates, mortality and quality of life. Oral iron supplementation should be initiated in any patient with a hemoglobin concentration below 10 g/dl. If oral supplementation is ineffective, intravenous infusion of iron should be administered. Intravenous iron supplementation increases Hgb in 80% of patients with CD and UC. Patients with severely exacerbated CD are at higher risk of vitamin D and calcium deficiency and reduced bone density. Steroid treatment is an additional risk factor in patients with ileum disease or after resection of this segment of the small intestine, and during treatment with sulfasalazine, it may be necessary to administer vitamin B<sub>12</sub> and folic acid due to impaired absorption of these components [8].

### **Recommendation 19 according to ESPEN guidelines**

In patients with CD, every effort should be made to avoid dehydration to minimize the risk of thromboembolism [8].

### **Recommendation 22A according to ESPEN guidelines**

Enteral nutrition (EN) appears to be safe and may be recommended as adjunctive therapy in accordance with standard nutritional practice in patients with severe UC [8].

### **Recommendation 22B according to ESPEN guidelines**

Parenteral nutrition (PN) should not be used in UC unless intestinal failure occurs [8].

### **Recommendation 23B according to ESPEN guidelines**

In emergency surgery, nutritional treatment of patients (EN, PN) should be initiated if the patient is undernourished during surgery or if an oral diet cannot be resumed within 7 days after surgery [8].

### **Recommendation 24A according to ESPEN guidelines**

Patients who do not meet their energy and/or protein needs should be encouraged to take oral nutrition supplements (ONS) in the perioperative period [8].

### **Recommendation 24B according to ESPEN guidelines**

Patients who do not meet their energy and/or protein needs from normal food and ONS should receive EN in the perioperative period [8].

### **Recommendation 24C according to ESPEN guidelines**

If malnutrition is diagnosed, surgery in IBD should be performed, with a possible delay of 7–14 days, and during this time intensive nutritional treatment should be used [8].

### **Recommendation 25A according to ESPEN guidelines**

EN should always be preferred over the parenteral route, but combinations of EN and PN should be considered in patients with an indication for nutritional support and in whom > 60% of energy requirements cannot be met by the enteral route [8].

## **Prehabilitation in IBD**

Prehabilitation, which should be applied to all patients undergoing surgery for IBD, according to the ERAS protocols, may be useful in minimizing the risk of postoperative complications. To date, there are no studies on IBD surgery that include nutritional rehabilitation as a routine practice that should be implemented not only in severe malnutrition, but in all cases.

According to the Consensus on Surgery for Crohn's Disease, the principles of ERAS after colon surgery in IBD patients should be applied whenever possible [14]. In addition, recent updates of the ERAS guidelines for colorectal surgery in the broad sense indicate that an early oral diet is safe even 4 h after surgery [4].

No significant relationship was found between early postoperative complications and early oral nutrition after surgery in IBD, but it has been shown that after oncological resection of the large intestine, nutrition in the early postoperative period is associated with a significant reduction in overall complications [4, 15]. Oncology patients who underwent prehabilitation as an intervention before colorectal surgery showed an improvement in lean body mass and improved functional gait performance, assessed 4 weeks after surgery. Nutritional prehabilitation alone or in combination with an exercise program significantly reduced hospitalization by 2 days in patients undergoing colorectal surgery [11].

In the study by Fiorindi *et al.* [4] on prehabilitation, the study group consisted of 61 patients (45 CD, 16 UC). Based on energy needs and the occurrence of gastrointestinal symptoms, a personalized nutritional care plan was provided to each patient in order

to meet the estimated needs: total energy expenditure, calculated using predictive patterns, and a protein goal of 1.2–1.5 g/kg of ideal body mass. According to the ERAS recommendations, the procedure used consisted of a prepared rehabilitation program, including nutritional intervention, personalized dietary counseling, protein supplementation, and in the case of malnutrition, a hypercaloric oral nutrition supplement [4]. Preoperative parenteral and enteral nutrition was not used in any patient, as there was no evidence of severe malnutrition. The aim of the rehabilitation program was to maintain or restore good nutritional status, optimize body composition (i.e. increasing body mass or lean mass if necessary) and increase of the concentration of macroelements and microelements in the blood serum. At follow-up, CD patients showed modest improvements in all body composition parameters, while UC patients remained at stable levels. The reasons for this situation also lie in the presence of postoperative ileostomy (93% in UC vs. 3% in CD of the study cohort), which has a significant impact on the values of nutritional status. However, in both CD and UC patients, there were no significant changes in body composition based on the global assessment of the perioperative period. These data may be misleading, because it might seem that prehabilitation is not able to change nutritional parameters in the long term. However, the authors [4] stated that this is a positive result, as prehabilitation alleviated the catabolism caused by the surgical procedure. These authors' studies also showed that the clear liquid diet was started early, as early as 1.6 days in CD and 1.5 days in UC, and a semi-solid, low-residue diet was started after 2.4 days in CD and 2.3 days in UC and a low residue solid diet was started after 3.6 days in CD and 3.5 days in UC.

The authors conducted a two-dimensional analysis to investigate the relationship between refeeding time and surgical outcome. Patients with earlier resumption of feeding were hospitalized for a significantly shorter period of time and they had a faster recovery of bowel function. The exceptionally low incidence of postoperative complications was probably related to long-term rehabilitation, which could have influenced the relationship between perioperative nutritional intervention and early surgical complications in IBD patients (beneficial effect of prehabilitation) [4].

Nutritional prehabilitation had a positive impact on the body composition of IBD patients scheduled for surgery. This effect of mitigating the impact of surgery on the risk of complications is especially important in patients at high nutritional risk.

Also, a good practice in surgical oncology is the use of preoperative nutritional support in patients who cannot receive more than 50% of the recommended nutritional requirements for more than seven consecutive days or are severely undernourished [16]. This practice should also be transferred to the group of patients with IBD prepared for surgery. Thus, preha-

bilitation in all IBD patients undergoing surgery, as in the ERAS protocols, may be useful in minimizing risk.

Early postoperative feeding in IBD seems to be feasible, well tolerated and has a positive impact on restoring bowel function and time of hospitalization [4].

Another paper presenting the benefits of prehabilitation is the paper by Ferrandis *et al.* [17]. The authors analyzed the impact of personalized prehabilitation (PP) before ileocaecal resection, as the most common procedure in patients with CD, on postoperative complications of anastomosis in patients with CD in a group of 90 patients with a high risk of postoperative complications. PP included nutritional support, antibiotic therapy or abscess drainage, discontinuation or reduction of corticosteroid dose. Patients were considered to be at high risk for complications if they showed at least one of the following 3 risk factors: hypoalbuminaemia < 30 g/l or weight loss > 10% in the last 6 months; treatment with corticosteroids before surgery (within 4 weeks before surgery); or the occurrence of preoperative intra-abdominal sepsis (abscess or intestinal fistula) according to the ECCO 2020 guidelines. The overall anastomosis complication rate was 11.1%; 64 (71.1%) patients had preoperative prehabilitation (median duration of PP – 37 days). Prehabilitation significantly reduced the rate of anastomotic complications 90 days after surgery (6.25% vs. 23.1%;  $p = 0.031$ ) and reoperation (3.1% vs. 19.2%;  $p = 0.019$ ). The analysis of this subgroup showed no differences in the readmission rate and hospitalization time. Administration of biological treatment within 3 months before surgery was not a risk factor for postoperative complications [17].

The ERAS guidelines for colorectal surgery indicate that an early oral diet is safe 4 h after surgery, and therefore normal food intake or EN should be started early after surgery also in most patients with IBD [14].

It is recommended to use improved principles of recovery in colorectal surgery in order to improve the postoperative course and reduce the risk of complications. These protocols should also be adapted to the specific needs of patients with IBD [1].

The guidelines in the cited paper [1] are very similar to the ESPEN recommendations. We administer parenteral nutrition only when its use is justified and necessary, when enteral nutrition is ineffective, e.g. in partial and complete gastrointestinal obstruction of the GI tract, in other complications such as leaky gut, high-output fistula, in acute form of CD and toxic megacolon (UC) [18].

## Physical preparation

The frequency of occurrence of sarcopenia in CD is 52% and 37% in UC. It was shown that patients with IBD and sarcopenia required surgery more often and had a higher risk of complications [19]. Post-proctocolectomy surgical site infections in patients with

UC [20] and postoperative abscesses in CD patients [21] were found to be more frequent. Postoperative complications were more common in patients with sarcopenia younger than 40 years old [19]. Optimization of nutritional status and improvement of physical efficiency may improve the results of surgical treatment in this group of patients. However, there are no standardized methods of assessing the physical efficiency of patients with IBD and their results [22]. In practice, a simple self-report questionnaire can be used on the basis of which a physiotherapist can assess and recommend a set of exercises [23]. The cardiopulmonary stress test is an objective method of assessing aerobic endurance [24].

Physical (physiotherapeutic) preparation consisting in various exercises should be widely promoted as an important element of preparing a patient for surgery. However, little is known about the intensity and duration of recommended exercise in patients with IBD. It seems that intense exercise can exacerbate inflammation and symptoms [25]. Although Crohn's disease is widely regarded as a disease of the young, the number of people diagnosed with CD in old age is increasing. A particular problem in this group may be frailty, which may have a greater impact on adverse postoperative outcomes than age [26]. Aerobic and resistance exercise performed three times a week for 4 weeks has been shown to have a beneficial effect on improving walking patterns in elderly patients qualified for colorectal surgery [27]. General improvement in physical condition is an important element of prehabilitation.

### Psychological support

The combination of advanced elements of prehabilitation makes the patient feel "the feeling of being taken care of", which can positively affect: their metabolic parameters, mental state, as well as attitude to the procedure, motivation to follow the recommendations and trust in the surgical team (patient-doctor communication) [6, 28]. There is a need for perioperative psychological care for patients with IBD who are being considered for surgery. Specific tools and interventions of psychological assessment for patients with IBD undergoing surgery remain largely unexplored [1, 29]. In the process of treating patients, a very important element is how the patient perceives a stress event (illness) and how they respond to it [30]. Patients with IBD experience various difficulties. A long period of hospitalization, isolation from the environment, lack of acceptance of the disease, and the need to modify life plans are the main areas of patients' difficulties, which are accompanied by shame, a sense of injustice, anxiety and depression, and often anxiety-depressive disorders [31]. Examples of possible psychological intervention are cognitive behavioral therapy and acceptance and commitment

therapy (ACT). The aim of cognitive-behavioral therapy is to change thoughts and beliefs, which results in a change in behavior and emotional change, and thus a reduction of the patient's suffering. ACT, on the other hand, focuses on acceptance and being present here and now (working on accepting the disease), mindfulness and defusion (observing experiences without judging), living in accordance with values; commitment and flexibility (behaviors consistent with values) and development despite the barriers encountered. It is worth emphasizing that ACT promotes greater care for one's own health through changes in the willingness to accept one's ailments, detachment from thoughts and moving towards a meaningful life despite the disease [32].

Responsibility in the treatment process, especially in chronic patients, should be shared equally.

There should be good communication between the doctor and the patient, based on mutual understanding. It is therefore necessary to get to know the doctor with the patient through careful observation, active listening and empathy. Rita Charon proposed the idea of narrative medicine, in which the emphasis is put on the patient's individual narrative about their illness. This approach, therefore, involves listening carefully to the patient's story, which reflects the biographical, psychological and socio-cultural context of their illness and the process of coping with it. The concordance approach used in medical communication leads to therapeutic effects in the doctor-patient relationship. Concordance is an agreement with the doctor that focuses on the relationship and interaction between the patient and the doctor. It is aimed at the patient's understanding of the purpose of diagnostic and therapeutic activities, strengthening their acceptance and commitment. The beliefs and preferences of both the doctor and the patient are taken into account, but the patient is the most important. This approach assumes that a medical consultation is a negotiation between equal partners: the doctor and the patient [33]. This approach also applies to the broader concept of patient support in taking medication [34]. Therefore, concordance assumes inviting the patient to co-create the therapy system.

### Giving up addictions

It is very important to be aware of the increased risk of postoperative complications due to addictions such as smoking and alcoholism. In people burdened with these addictions, there is a higher risk of wound healing disorders, postoperative infections, anastomotic leaks and cardiopulmonary complications, as well as higher postoperative mortality [6, 35].

Persuading the patient to give up addictions in the preoperative period is very difficult and following the recommendations for changing behavior is very often ineffective. The stress associated with

the surgery additionally makes it difficult to achieve the proper implementation of prehabilitation recommendations.

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### Conflict of interest

The authors declare no conflict of interest.

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