

# Effective Use of An Exclusion Diet in Crohn's Disease Combined with Partial Enteral Nutrition in A Patient with Short Bowel Syndrome - A Case Report

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## Abstract

### Introduction:

Short bowel syndrome (SBS) is a gastrointestinal disorder leading to significant impairment of nutrient absorption. Most often, short intestinal obstruction occurs through surgery, as a result of complications of Crohn's disease (CD). Patients with severe SBS often require constant access to parenteral nutrition because oral and enteral nutrition are not fully effective. In its guidelines, ESPEN recognized parenteral nutrition in SBS as a necessary and life-saving procedure.

### Case description:

The presented case concerns a 33-year-old patient with severe SBS complicating Crohn's disease. At the time of nutritional intervention, the patient had only 90 cm of intestine and was unable to eat effectively using the digestive tract. Tolerance of Modulen IBD (Nestle Health Science) was tested. The patient tolerated the proposed product well. It was decided to try to include the patient in the ModuLife dietary program. ModuLife is a program based on the principles of the Crohn's Disease Exclusion Diet (CDED). Additionally, it uses Modulen IBD. After 12 weeks, the patient continued the recommended diet, gained weight, reported reduced abdominal pain, and parenteral nutrition could be reduced.

### Conclusions:

Thanks to the immunomodulatory and nutritional effect of Modulen IBD and the implementation of an anti-inflammatory elimination diet in the patient, the nutritional status of intestinal epithelial cells, as well as intestinal motility and absorption, improved. We suggest that this type of dietary approach could be used in other cases of SBS.

**Keywords:** nutrition therapy; nutritional support; malnutrition; enteral nutrition; crohn disease

## Introduction

Short bowel syndrome (SBS) is a form of intestinal failure characterized by impaired intestinal function, which leads to significant impairment of nutrient absorption. As a result, SBS causes limited absorption of nutrients and water, often exacerbated by persistent diarrhea, which leads to fluid and food loss in excess of food and fluid intake. The consequence of this condition is the occurrence of water and electrolyte disturbances and progressive malnutrition, which, if untreated, can lead to the death of the patient. Apart from emergency laparotomies and intestinal ischemia, one of the most common causes of SBS is extensive surgical resections resulting from complications of Crohn's disease (CD) [1]. CD is a transmural, segmental inflammatory process that can affect any part of

the gastrointestinal tract, from the mouth to the anus. The etiology of the disease is not fully understood, but it is suggested that a combination of genetic, environmental, and immunological factors leads to a chronic inflammatory state. A characteristic feature of CD is the alternation of periods of exacerbation and remission of the disease [2]. Adaptive mechanisms allow the preservation of small bowel function after removal of 40-50% of it, provided that the duodenum, the terminal part of the ileum and the ileocecal valve are left. In the case of removal of a larger part of the small bowel or the ileocecal valve, SBS develops. Patients with severe SBS require continuous access to parenteral nutrition, because oral and enteral nutrition is often insufficiently effective. ESPEN in its

guidelines defined parenteral nutrition in patients with SBS as a mandatory life-saving procedure [3]. The CDED diet (Crohn's Disease Exclusion Diet) is an effective nutritional treatment in pediatric patients, and according to the latest studies, also in adult patients with Crohn's disease in inducing disease remission. The aim of the diet is to reduce pro-inflammatory factors in the diet, such as food additives, induce disease remission and improve the patient's nutritional status. However, there is no data on the effectiveness of the CDED diet in SBS. Proper nutritional status plays a key role in the care of patients with IBD. Nutritional intervention should be a priority at the time of diagnosis and should be carried out in parallel with primary treatment [4-6]. The aim of this article is to describe the case of a patient with severe SBS who was successfully

treated with an exclusion diet for Crohn's disease with partial enteral nutrition.

### Case description:

In November 2023, a 33-year-old patient presented to the dietitian's office to attempt oral nutrition. The patient has been using parenteral nutrition at home for over two years. In 2009, she was diagnosed with Crohn's disease, which has a severe course with intolerance, contraindications, and numerous episodes of non-response to pharmacological treatment, including standard immunosuppressive therapy and corticosteroids. The patient has undergone multiple courses of biologic therapy. At the time of nutritional intervention, the total length of the patient's intestine was approximately 90 cm (small intestine - 30 cm, large intestine - 60 cm).

2009	Diagnosis of Crohn's disease
2010	Treatment with infliximab
2011	Loss of response to treatment
2012	Treatment with adalimumab
2015/16	Loss of response to treatment
01.03.2018	Treatment with ustekinumab
03.2020	Loss of response to treatment
07.2021	Intolerance to treatment and conversion to vedolizumab
08.2021	Initiation of home parenteral nutrition
10.10.2022	Loss of response to treatment and partial resection of the small intestine and large intestine, removal of the ileocecal valve, adhesiolysis, removal of inflammatory tumor within the intestinal loop anastomosis, removal of enterocutaneous fistulas from the small intestine, creation of a colostomy.
15.03.2023	Disruption of anastomosis with formation of fistulas to the postoperative wound, removal of fistulas and drainage of the peritoneal cavity
02.11.2023	Restoration of intestinal continuity by anastomosis of the sigmoid to the sigmoid side by side, continuation of parenteral nutrition
20.11.2023	Initiation of ModLife diet therapy - Phase I
01.2024	Phase II of the ModuLife program

**Table 1:** History of the patient's disease.

After the surgeries, the disease remission did not last longer than 6 months. After the surgeries, the disease remission did not last longer than 6 months. After each surgery, the patient remained on biological treatment: adalimumab - 80 mg and upadacitinib - 30 mg. The patient was not qualified for treatment with GLP-2 or ocereotide due to exacerbation of disease symptoms at the time of qualification for the drug program. In the anthropometric examination, with a height of 163 cm, the patient's weight was 42 kg, resulting in a calculated BMI of 15.81. The patient's energy requirement was estimated at 30-40 kcal/kg/d and protein (1.5 g/kg/d). The patient remains on home parenteral nutrition, administered using SmofKabiven extra Nitrogen plus 1500 kcal bags. In the nutrition interview, she states that she only consumes "Chupa-Chups" lollipops, as she experiences gastrointestinal symptoms such as pain, diarrhea, and bloating after each attempt at oral food intake. In the laboratory results, the patient's liver condition before and after the nutritional intervention was without deviations.

### Diagnostic and therapeutic procedures:

Due to the underlying disease of Crohn's disease, a decision was made to try the ModuLife nutritional program. ModuLife is a nutritional program based on the guidelines of the Crohn's Disease Exclusion Diet (CDED). The patient's energy requirement was estimated to be around 1000 calories per day. Due to previous failures in initiating oral nutrition, it was

decided to incorporate Modulen IBD (Nestle Health Science) into the patient's diet. The patient was advised to take 6 scoops of Modulen IBD dissolved in 210 ml of water, twice a day. In this amount, the patient provided 500 kcal and 17.5 g of protein. The patient was instructed to drink Modulen IBD in small portions. It was decided to introduce Modulen IBD without any other orders, thanks to which the patient could assess his tolerance to the product. After three days of reported good tolerance by the patient, it was proposed to implement the ModuLife nutrition program based on the CDED principles. The patient received information about the program in electronic form and access to the ModuLife mobile application. The nutritional plan was established for 7 meals a day based on the products recommended in the first phase of the ModuLife program with a daily energy value of 500-700 calories and Modulen IBD supplementation at 6 scoops twice a day, increasing the energy intake to around 500kcal. The total energy intake recommended for the patient was within 1000-1200 calories per day. Additionally, supplementation with vitamin D3 - Devikap 15000 IU/ml, in the form of drops, at a dose of 2-3 drops per day was decided. Throughout the implementation and adherence to the CDED diet, the patient remained on home parenteral nutrition. Additionally, the patient remained in constant contact with the supervising dietitian throughout the entire period of implementation and adherence to the diet.

Twelve weeks later, the patient returned to the dietitian's office to consult on further nutritional management. Up to this point, the patient had been following the guidelines of the ModuLife program, gradually expanding her diet. Apart from undesirable symptoms experienced after consuming spinach, she reported that she could eat everything else that she had

incorporated into her diet so far. During the interview conducted by the patient, as she expanded her diet, she reduced the calorie content of the parenteral nutrition bags to 1350 kcal. In the anthropometric examination, her current weight was 46.1 kg, with a BMI of 17.4. She did not report any abdominal pain symptoms.

	<b>Befor intervention</b>	<b>After intervention</b>
Weight	42kg	46kg
Body mass index	15,81	17,4
Energy from parenteral nutrition	1500 kcal	1350kcal

**Table 2:** Nutritional intervention

## Discussion:

The described case concerns a patient with SBS has only 90 cm of intestine and was unable to effectively nourish herself except through parenteral means. During the initial visit to the dietitian's office, she expressed regret about never having eaten a tomato sandwich, as it was her biggest dream, since everything she eats exacerbates her diarrhea, bloating, and abdominal pain. After the mechanical causes of her symptoms were excluded in the endoscopic examination, the decision was made to try oral nutrition in the form of Modulen IBD. The product was well tolerated, so it was proposed to implement the Crohn's Disease Exclusion Diet (CDED) - Modulife Diet for the patient. This diet has been shown to be effective in pediatric patients and, as recent studies suggest, also in adult CD patients in inducing disease remission [4, 7-9]. In the nutritional regimen used, the CDED diet was supplemented with Modulen. The preparation had to provide the patient with 50% of her energy needs, which lasted for 6 weeks. In the next 6 weeks, the supply of Modulen was reduced to 25% of the patient's caloric requirement, supplementing the diet with products indicated in the CDED diet guidelines. Modulen provides a nutritionally complete, normocaloric, and normoprotein diet, rich in medium-chain fatty acids, and also contains transforming growth factor TGF- $\beta$ 2. TGF- $\beta$ 2 plays a role in cell differentiation, proliferation, wound healing, and immune system function. The effect of its interaction, even on the same cell lines, is diverse and may vary depending on the clinical situation [5].

The aim of the CDED diet is to limit exposure to food components that have an adverse effect on the gut microbiota, as well as the functioning of the intestinal barrier. Another argument in favor of implementing the CDED diet in Crohn's disease is to avoid pro-inflammatory dietary factors, such as food additives [4, 8, 10, 11]. Among the recommended foods are chicken breast meat, eggs, potatoes, various fruits, and vegetables. Some products are prohibited, including processed foods, animal fat, gluten, and dairy, with the list of forbidden foods decreasing in subsequent phases of the nutrition program. In their research, Levin et al. emphasizes the effectiveness of the discussed nutritional intervention [4, 8]. Children who were fed the CDED diet with the addition of Modulen IBD tolerated the diet better than children fed only with the industrial diet. Obtaining clinical remission was associated with a reduction in inflammation, as evidenced by decreased levels of serum CRP and fecal calprotectin. Beneficial changes in the composition of gut microbiota were also observed, including an increase in Firmicutes and a decrease in Proteobacteria in feces [4,8]. The results of many clinical studies show an improvement in the nutritional status of people who used the principles of the CDED diet, by replenishing deficiencies in nutrients, trace elements, and vitamins involved in tissue repair mechanisms and immune defense [10, 11]. The authors of studies investigating the use of

CDED in combination with partial enteral nutrition using Modulen in patients with Crohn's disease emphasize not only its anti-inflammatory effects but also the improvement in nutritional status due to the continuous contact of the preparation with the diseased mucous membrane of the gastrointestinal tract. Such dietary intervention improves tolerance to nutrition using the gastrointestinal tract and allows for gradual increase in meal portions [4, 9].

## Conclusions:

We conclude that the nutritional and immunomodulatory effect of Modulen IBD and the inclusion of anti-inflammatory and elimination diet principles, can improve nutritional status of intestinal epithelial cells, as well as intestinal motility and absorption. We suggest that this type of nutritional approach could be considered in other cases of SBS.

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