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THE BENEFITS OF GOOD NUTRITION IN PREVENTING POST-SURGICAL ILEOSTOMY COMPLICATIONS

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Abstract

Background and Aims: *Ileostomy induces important local and general complications. The present study evaluates if nutrition therapy can influence the development of these complications.* ***Methods:*** *We evaluated a group of 43 patients with ileostomy, without general complications after the surgical intervention, starting from the second day following surgery, for a period of 8 weeks. The mean age was 58.2 ±8.7 years and body mass index (BMI) of 28.2 ±6.5 kg/m^2. The patients were divided into 2 groups: one following a diet prescribed by a nutrition specialist (group 1), and another with scarce notions of nutrition given by the attending surgeon (group 2).* ***Results****: When comparing group 1 with group 2, we observed: obstruction of the ileostomy in 1% vs. 49% (p<0.01); skin abrasions around the ileostomy in 21% vs. 97% (p<0.01); unpleasant odors at the site of the stoma in 16% vs. 99% (p<0.01); mean BMI 26.2 ± 4.3 kg/m^2 vs. 19.4 ± 3.3 kg/m^2 (p<0.01); natremia 138.1 ± 2.1 mEq/l vs. 129.2 ± 3.3 mEq/l (p<0.01); kalemia 4.2 ± 0.2 mEq/l vs. 3.1 ± 0.3 mEq/l (p<0.01).* ***Conclusion****: A correct nutrition of patients with ileostomy reduces the rate of local and general complications related to surgical procedures.*

key words: *ileostomy, complications, nutrition.*

Background and Aims

Ileostomy consists of an artificial surgical opening of the small intestine to the skin surface. This procedure is performed in patients suffering from small intestine malignant tumors or in those patients that undergo abdominal radiotherapy, with a secondary involvement of the small intestine (perforations, strictures, hemorrhage or fistulas). The creation of the ileostomy represents a palliative solution to avoid the obstructive phenomenon that occurs in the intestinal lumen. Therefore, the absorption function of the large bowel is altered, mostly resulting in a hydric deficit [1]. In this context, malnutrition appears by excessive discharge of intestinal contents through the ileostomy, discharge that is more or less pronounced depending on the level of the ileostomy [2]. Malnutrition occurs through the loss of vitamins and minerals (especially vitamins of group B and potassium), insufficient absorption of fats, proteins and carbohydrates. We emphasize that malnutrition is usually amplified by the dehydration that accompanies the ileostomy

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surgical procedure (especially because of the bypassed colonic intestinal circuit) [2,3].

In order to prevent or to reduce the local or general complications that arise after the ileostomy, we wanted to evaluate if a nutrition adapted to the alimentary needs of the organism (group 1) compared to limited nutrition knowledge (group 2) could ameliorate the local and general health of the patients.

Materials and Methods

The study included a total of 43 patients with ileostomy without general complications after surgery. Patients were divided in two groups: group 1 with 21 subjects, respectively group 2 with 22 subjects. All of them signed an informed consent at the beginning of the study. The mean body mass index (BMI) for group 1 was 27.8 ± 6.2 kg/m^2 vs. 28.2 ± 5.8 kg/m^2 for group 2. A total of 73.90 % of patients were males and 26% females, equally divided into the 2 groups. The patients entered the study from the first postoperative day and were observed for 8 weeks thereafter. The mean age of patients in the two groups was similar: 58.1 ± 8.8 years vs. 57.9 ± 8.6 years. The 2 groups were educated regarding nutrition in 2 different ways: for the first group the diet was prescribed by a nutrition specialist, while the second group received very summary dietary advice from the attending surgeon. We emphasize that all the patients received from the surgeon approximately the same dietary recommendations, while group 1 received intensive and individualized nutrition knowledge.

In group 1, the electrolyte losses caused by the ileostomy were measured (the liquid discharge through the stoma was collected in special containers, and sodium and potassium were determined by ion-selective-electrode (ISE) methods), and substituted by a correct hydric enteral intake (water, orange and grapefruit juice, milk for those who tolerated it, etc.). Hemoglobin was determined using the photocolorimetric method.

Table 1. Food with low fiber content recommended in patients with ileostomy. Adapted after [4].

Type of food	*Allowed*	*Not recommended*
Milk	Whole milk, low-fat milk (only if the patient has a good tolerance to it)	
Other drinks	Coffee, tea, carbonated drinks, pear / peach / apple / apricot nectar , strained fruit juice	Alcoholic drinks, prune juice, unstrained fruit juice
Soups	Strained soups, soups made out of allowed food	
Meat, fish	Fresh beef, pork, veal, lamb, chicken, turkey, low-fat fish	Tough meat with fibrous collagen tissue
Cheese	All allowed	
Eggs	All allowed	
Vegetables	Peeled potatoes (boiled, mashed, baked), asparagus (cooked), beetroot, cauliflower, cucumber, turnip	Unpeeled potatoes, beans, broccoli, Brussel sprouts, carrots, corn, peas, olives
Cereal	White bread, rice, wheat flour, macaroni, noodles, spaghetti	Whole wheat, crispy biscuits, graham, tough muffins, whole-wheat cereal, cornflakes
Fruit	Cooked, preserved, baked, peeled and seedless: peach, apricots, pear, cherries	Raw fruit, fruit with seeds and unpeeled fruits, grapes, prunes, fruit cocktail, pineapple, strawberry, apples, bananas, nuts
Fats	Butter, vegetable fat, vegetable oil, sour cream, medium chain triglycerides	
Desert	Flavored gelatin, ice-cream, simple pudding, fruit-juice sponge cake, sherbet	Tarts, pies, deserts that contain nuts, grapes, seeds, coconut

Immediately after the surgical procedure, the diet of group 1 consisted mostly of liquids, and then nutrients with a low fiber content were

introduced one at a time (see Table 1). Over a period of several weeks, nutrition was diversified with products that tend to resemble an unrestricted diet.

Patients in group 1 received also a vitamin B12 supplement (especially those who had terminal ileal resections), hydrosoluble vitamins (especially vitamin C - 100 mg/day, B1 - 0.5 mg/1000kcal, B2 - 0.6mg/1000kcal, PP - 6.6mg/1000 kcal, B6 - approx. 2.2 mg/day), liposoluble vitamins (vitamin D - 100 UI/day, vitamin E - 1 UI/kg/day, vitamin F – 1% of the total daily ingested calories, vitamin K - 15 mg/day, vitamin A – 5000 UI/day). Keeping in mind the high energetic value of lipids, we also administered 20 g medium-chain triglycerides that do not need biliary salt in order to be absorbed. On the other hand, these kinds of triglycerides have a four times higher absorption rate than long-chain triglycerides. At the same time, these patients received vitamin F (essential polyunsaturated fats), as well as a large intake of calcium, magnesium and zinc, which in normal conditions are excessively lost through the ileostomy. These minerals can be found in dairy products, saturated fats, vegetable oils, carbohydrate-dense products, etc.

In group 2, nutritional education consisted in general notions, mostly linked to the use of liquids and nothing nutritionally organized able to avoid the complications of ileostomy.

Statistical analysis: Statistical analysis was performed using the PRISM statistical software version 6. The comparison between variables was performed using Student T test. P value < 0.05 was considered statistically significant.

Results

In the group that received specialized dietary advice (group 1), compared to those that followed an unsuitable diet (group 2), we observed that obstruction of the stoma occurred in 1 % vs. 49% of subjects ($p<0.01$). Also, in the same conditions, BMI in group 1 decreased from 27.8 ± 6.2 kg/m2 to 25.3 ± 4.5 kg/m2, while in group 2 the decrease was from 28.2 ± 5.8 kg/m2 to 19.3 ± 3.5 kg/m2 ($p<0.01$). Unpleasant odors and flatulence were present in group 1 in 16% of patients, while in group 2 it was reported in 99% of patients ($p<0.01$). Excessive evacuation through the ileostomy was present in group 1 in 21% of cases, while in group 2 in 97% ($p<0.01$). Only 16% of patients in group 1 had fatigue, while in group 2, 88% complained of this condition ($p<0.01$). Natremia level in group 1 was 138 ± 2 mEq/l, higher when compared to group 2, that had a mean natremia of 129 ± 3 mEq/l ($p<0.01$). Kalemia was 4.2 ± 0.2 mEq/l vs. 3.1 ± 0.3 mEq/l ($p<0.01$). Anemia was one of the most frequent side effects, with a mean hemoglobin value of 10.9 ± 1 g/dl in group 1 vs. 8.8 ± 1.2 g/dl in group 2 ($p<0.05$).

Discussion

The large differences observed between the 2 groups that were studied are, partially, the consequence of lack of good knowledge regarding the optimal nutritional requirements in patients with ileostomy. The fact that immediately after surgery approximately 2000 ml liquids are lost per day, along with 60-100 mEq of sodium per day and 7-12 mEq/day of potassium per day, the substitution of these deficits represents the first and most important therapeutic measure [3,5,6]. Inadequate nutritional intervention can be followed by dehydration, arterial hypotension, dry skin, oligoanuria, fatigue, nausea, somnolence, a decrease in appetite and shortness of breath [7,8]. Iatrogenic hypernatremia can lead to hypercalciuria, with unpleasant consequences (muscle cramps, panic attacks, an increase in urinary lithiasis, mental disorders, etc.).

It is important for patients to understand that a decrease in the volume of liquids ingested does not diminish liquids lost through the ileostomy,

leading instead to general dehydration. If patients are chronically and profoundly dehydrated (group 2), the diuresis decreases and there is an increase in the incidence of complications of urine hyperconcentration (e.g. urinary lithiasis, etc.) [9,10].

The resection of the terminal segment of the ileum, the level where vitamin B12 is absorbed, enforces the parenteral supplementation of this vitamin [11-13]. Excessive evacuation of the intestinal contents through the ileostomy leads to loss of nutrients that cannot be absorbed to an optimum level (e.g.: vitamins, carbohydrates, aminoacids, fatty acids, etc.). The bigger the losses (group 2), the larger the decrease observed in BMI ($p < 0.01$).

As we already mentioned, administering medium-chain triglycerides is beneficial because they are high in energy – 9 kcal/gram, compared to 4 kcal/gram of carbohydrates and proteins – and because they can be easier absorbed in the intestinal lumen [3,14].

Anemias in ileostomy patients occur due to the loss of essential nutrients involved in the synthesis of hemoglobin on one hand and, on the other hand, because of the vessel fragility at the level of the stoma, that can lead to hemorrhage if there is an excessive evacuation of the intestinal content [15].

Intestinal obstruction is avoided by the consumption of products with a low content of fibers and if the patient is properly hydrated (see Table 2). Not following these recommendations leads to abdominal pain, unpleasant odor of the contents being evacuated through the stoma, nausea and vomiting [16-18].

In the absence of specialized nutritional advice or due to lack of implementation of such recommendations, the patients in group 2 have a lower tolerance to the presence of the ileostomy.

As this is a frequent procedure for those who suffer from intestinal malignant tumors, representing a risk factor for denutrition, further weight loss is strongly discouraged, because it reduces the endurance to the oncologic status [19]. On the other hand, the decrease in BMI reduces the tolerance for chemotherapy and, on the contrary a normal or slightly overweight BMI increases the chances for survival.

Table 2. Recommendations on feeding patients with ileostomy. Adapted after [4].

1. Increase of food diversity is done gradually, one food at a time, so that each food tolerance can be investigated. Weight loss and decrease in BMI is therefore limited.
2. In order to prevent the obstruction of the stoma :
   - Increase quantity of liquids
   - Use strained plum and grape juice in order to increase the liquidity of the intestinal content discharged through the ileostomy
   - Avoid food rich in vegetal fibers, such as seeds and nuts
   - Assure that the patient can chew food well
   - Cautiously introduce food that could cause problems : celery, lettuce, green peas, mushrooms, peanuts, coconuts, tomatoes, pineapple, raw fruit, fruit with seeds, some Chinese vegetables, untendered meat
3. In order to prevent excessive evacuation of the intestinal content through the ileostomy, food that can accelerate it are carefully introduced : apple juice, plum juice, milk, cooked beans, cabbage, broccoli, spinach, spicy food, raw fruits
4. When a type of food creates problems, it must be eliminated for a while and then re-introduced. In time, tolerance might be developed.
5. In order to prevent flatulence and unpleasant odors :
   - Eliminate food that can generate such things (they can be re-introduced after some time) : asparagus, cabbage, peppers, leek, garlic, raw fruit, carbonated drinks, green peas and dry peas, beer, mustard, spicy food, fish, onions, eggs, melons, cucumbers, high-fat food – such as cookies and fried food, some types of cheese
   - Avoid chewing gum
   - Do not use straws to sip liquids
   - Chew food with mouth closed
   - Provide regular meals
   - Consider adding yoghurt and cranberry juice

Conclusions

The data of our study confirm that nutrition can play an important role in the management of patients with an ileostomy. Even if the study was conducted on a limited number of subjects,

ileostomy not being a very common surgical procedure, the local complications (obstruction of the stoma, excessive evacuation of the intestinal content with skin erosions caused by the intestinal enzymes, unpleasant odors around the stoma, etc.) and general complications (dehydration, muscle cramps, abdominal cramps, weight loss, etc.) were considerably lower in those with an intensive nutritional intervention. Dietary advice given by a dietician specialized in this field can also assure better results following chemotherapy.

We hope that this study can be a starting point for other evaluations that involve a larger number of patients, from which a more exhaustive experience can be obtained.

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