Anthropometric Assessment After Proctocolectomy Due to Ulcerative Colitis

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Abstract. *Background: Postoperative changes in patient anthropometric and nutritional statuses after proctocolectomy due to ulcerative colitis (UC) are unclear. Patients and Methods: Between January 2015 and December 2017, nine patients who underwent proctocolectomy with temporary ileostomy (PTI) for UC at our hospital were enrolled in this study. For the comparison group, eight patients who underwent low anterior resection (LAR) with temporary ileostomy for rectal cancer in the same period were recruited. Data, including body weight; body mass index (BMI); levels of total protein, albumin, cholinesterase, and hemoglobin; and lymphocyte counts, were analyzed. The changes in these parameters before surgery until 6 months after surgery were compared. Results: Before surgery, the levels of total protein, albumin, cholinesterase, hemoglobin and lymphocyte counts in the PTI group were significantly worse than those in the LAR group. However, significant differences were not identified in these factors at 1 month after surgery. The BMI was significantly lower in the PTI group than in the LAR group until 3 months after surgery. An increase in body weight to greater than that prior to surgery was found from 4 months after surgery in the PTI group. The LAR group did not have any effect of surgery in terms of any factor. Conclusion: BMI appears to be the most useful predictor of clinical and nutritional changes postoperatively.*

Patients suffering from ulcerative colitis (UC) are characterized by high malnutrition rates; this is the most important patient-related risk factor for complications after surgery (1, 2).

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Therefore, ways of providing nutrition and energy, thereby promoting the early recovery of patients, have become key considerations for the surgical treatment of UC. Postoperative changes in patient anthropometric and nutritional statuses after proctocolectomy due to UC remain unclear (3). The aim of this study was to identify factors predicting the clinical and nutritional changes postoperatively.

Patients and Methods

Patients. Between January 2015 and December 2017, nine patients (six males and three females) who underwent proctocolectomy with ileal pouch-anal anastomosis with temporary ileostomy (PTI) for UC were enrolled in this study. During the same period, eight male patients who underwent low anterior resection (LAR) with temporary ileostomy for lower rectal cancer at our hospital were recruited to the control group (Table I). All seventeen patients underwent ileostomy closure 6 months after surgery. Body weight and hematological/biochemical parameters were investigated to assess the nutritional status of the patients. The hematological/ biochemical parameters included the levels of total protein, albumin, cholinesterase, and hemoglobin, as well as lymphocyte counts. The preoperative body weight was measured at 1 week before surgery, and the body weight was measured again every month until 6 months after surgery. Body mass index (BMI) was calculated using the standard formula: weight (kg)/height (m)².

Statistical analysis. Continuous variables were expressed as the means and ranges. The Wilcoxon rank-sum test was used for the comparison of continuous variables, and the chi-square test was used for the comparison of categorical data. A p-value of less than 0.05 indicated significance. All data were analyzed using the Statistical Package for Social Sciences (SPSS) 24.0 (IBM SPSS, Tokyo, Japan).

Results

Comparison of hematological/biochemical parameters before and after surgery between the two groups. The levels of total protein, albumin, cholinesterase, and hemoglobin and the lymphocyte counts in the PTI group were significantly lower than those in the LAR group before surgery (Figures 1-5; Table I). Nevertheless, no significant differences were identified in these factors from 1 month after surgery (Table I).

Figure 1. Course of total protein in patients of proctocolectomy (n=9) (PTI) and low anterior resection (n=8) (LAR) groups during the study.

Figure 3. Course of hemoglobin in patients of proctocolectomy (n=9) (PTI) and low anterior resection (n=8) (LAR) groups during the study.

Figure 2. Course of albumin in patients of proctocolectomy (n=9) (PTI) and low anterior resection (n=8) (LAR) groups during the study.

Figure 4. Course of cholinesterase in patients of proctocolectomy (n=9) (PTI) and low anterior resection (n=8) (LAR) groups during the study.

Comparison of BMI between the two groups. The BMI in the PTI group was significantly lower than that in the LAR group until 3 months after surgery (Figure 6; Table II). However, significant differences were not identified in terms of the BMI between the groups from 4 months after surgery.

Comparison of body weight changes after surgery between the two groups. The body weight loss was the greatest at 1 month after surgery in both groups, with the PTI group experiencing greater loss. Body weight gradually increased subsequently in both groups, without significant differences between groups (Figure 7; Table III). Body weight in the PTI group increased to become greater than that before surgery from 4 months after surgery.

Discussion

Patients suffering from UC lose nutrition because of the nature of the disease and its related clinical manifestations (1, 2). Approximately 23.4% of patients with UC are malnourished (4). An improved nutritional status results in lower postoperative complication rates, and in some cases can even prevent surgery by reducing the activity of the disease (5-8). When the colon and rectum are removed by proctocolectomy, the patient's digestive and absorptive functions are impaired, and their nutritional status is further worsened by stress caused by the surgery and anesthesia (9). The actual postoperative changes in anthropometric and nutritional statuses after proctocolectomy due to UC remain

Figure 5. Course of lymphocyte counts in patients of proctocolectomy (n=9) (PTI) and low anterior resection (n=8) (LAR) groups during the study.

Figure 6. Course of body mass index in patients of proctocolectomy (n=9) (PTI) and low anterior resection (n=8) (LAR) groups during the study.

Table I. Clinicopathological features of the patients.

Characteristic	Timepoint	Proctocolectomy (n=9)	Low anterior resection (n=8)	p-Value
Mean age (range), years		36.0 (19-62)	64.1 (35-80)	<0.001
Gender, n (%)	Male	6 (67)	8 (100)	0.245
	Female	3 (33)	0 (0)	
Mean total protein (range), g/dl	Before surgery	5.8 (4.9-6.7)	7.0 (5.9-7.7)	<0.001
	1 Month after surgery	6.9 (6.4-7.3)	6.8 (6.2-7.3)	
Mean albumin (range), g/dl	Before surgery	2.4 (2.1-2.8)	4.2 (3.5-4.5)	<0.001
	1 Month after surgery	3.5 (3.3-3.8)	3.7 (3.0-3.9)	
Mean hemoglobin-(range), g/dl	Before surgery	9.3 (8.3-10.5)	14.2 (12.9-15.6)	<0.001
	1 Month after surgery	12.3 (10.3-14.1)	13.4 (11.8-14.5)	
Mean ChE, (range), U/l	Before surgery	75.6 (61.0-90.0)	312.8 (2280-394.0)	<0.001
	1 Month after surgery	236.4 (173.0-288.0)	256.0 (156.0-314.0)	
Mean lymphocyte count (range), n/ml	Before surgery	645.0 (455.0-1542.0)	1603.9 (1105.0-2150.0)	<0.001
	1 Month after surgery	1294.4 (1175.0-1547.0)	1596.9 (1104.0-1944.0)	

ChE: Cholinesterase.

Table II. Comparison of body mass index (BMI) between groups during the study.

Time point relative to surgery	Mean BMI (range), kg/m ²		p-Value
	Proctocolectomy (n=9)	Low anterior resection (n=8)	
Before	21.6 (16.4-25.7)	23.9 (22.0-27.1)	0.298
After 1 month	19.5 (14.5-22.1)	23.0 (20.1-25.2)	0.037
After 2 months	19.5 (13.9-22.9)	22.9 (19.9-25.2)	0.028
After 3 months	20.0 (13.9-22.9)	23.0 (19.9-25.2)	0.037
After 4 months	22.2 (15.8-25.0)	23.3 (20.0-25.3)	0.908
After 5 months	22.2 (16.7-24.5)	23.4 (20.0-25.3)	0.728
After 6 months	22.3 (16.7-24.5)	23.3 (20.0-25.3)	0.817

unclear (3). Accordingly, we tried to identify the factors predicting clinical and nutritional changes postoperatively. In this study, the levels of total protein, albumin, cholinesterase, and hemoglobin and the lymphocyte counts

in the PTI group were significantly worse than those in the LAR group before surgery. However, no significant differences were identified in these factors 1 month after surgery. When the patients had resumed an adequate oral

Table III. Comparison of body weight changes after surgery between groups during the study.

Time point relative to surgery	Mean body weight change (range), kg*		p-Value
	Proctocolectomy (n=9)	Low anterior resection (n=8)	
After 1 month	-6.0 (-2.7--9.7)	-2.3 (-9.2-1.2)	0.037
After 2 months	-5.9 (-2.7--11.7)	-2.4 (-9.2-1.2)	0.082
After 3 months	-4.5 (-11.7-1.5)	-2.3 (-9.2-1.5)	0.203
After 4 months	2.2 (-4.9-14.7)	1.5 (-5.0-1.5)	0.163
After 5 months	2.3 (-4.2-14.7)	1.2 (-5.0-1.5)	0.081
After 6 months	2.6 (-5.5-14.7)	1.4 (-5.0-1.5)	0.064

*Relative to pre-surgical value.

Figure 7. Change of body weight after surgery in patients of proctocolectomy (n=9) (PTI) and low anterior resection (n=8) (LAR) groups during the study.

intake, the levels of these factors improved immediately. Although the levels of total protein, albumin, cholinesterase, and hemoglobin and the lymphocyte counts had recovered to presurgical levels in the LAR group 1 month after surgery, body weight loss was the greatest at that time. After surgery, the change of body weight was not similar to that of the levels of these factors. Liu et al. reported that body weight loss was the greatest 3 months after surgery, and body weight gradually recovered subsequently in patients who underwent LAR (10).

On the other hand, the BMI in the PTI group was significantly worse than that in the LAR group until 3 months after surgery. However, significant differences were not identified in terms of the BMI between groups from 4 months after surgery. BMI recovery to preoperative levels was required 4 months after surgery. An increase in the body weight to more than that before surgery was found from four months after surgery.

Proctocolectomy with ileal pouch-anal anastomosis has become the gold-standard surgical treatment for UC (11). Nevertheless, some patients who have undergone this procedure continue to have postoperative problems, including malnutrition, frequent defecation and severe pouchitis (12). Temporary ileostomy appears to be closed at more than 4 months after surgery.

In conclusion, the BMI appears to be the most useful predictor of clinical and nutritional changes postoperatively.

Conflicts of Interest

The Authors declare that there are no conflicts of interest regarding this study.

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