

Nutritional status of gastric cancer patients after radical gastrectomy

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Background

- **Stomach cancer is the most common cancer in KOREA**
- **Malnutrition after gastrectomy has been regarded as a necessary consequence.**
- **Poor nutritional status : decreased**
 - **Quality of life**
 - **Functional status**
 - **Response to therapy**
- **Early diagnosis and management is essential.**

Materials & Methods

Materials

: 2005.11 - 2006.7

Gastric cancer patients

Radical gastrectomy with D₂ dissection : 80 cases

: Among this group

Total gastrectomy : 9 cases

Subtotal gastrectomy : 71 cases

B I gastroduodenostomy: 53 cases

B II gastrojejunostomy : 18 cases

Methods

: Check Nutritional status

By measuring : PreOP 1day, Post OP 7 day,

Post op 6 month and 12 month

Check: Weight, Percentage of weight loss during last 6 months

Body Mass Index

Mid-arm circumference : check three times (mean)

Triceps skin fold thickness: check three times (mean)

Mid-arm muscle circumference : MAC - (TSF X 0.3412)

Serum albumin, protein, cholesterol, TLC (total lymphocyte count)

: **Nutritional assessment : Three methods**

SGA (subjective global assessment)

Check : Weight loss prior 6 month, 2 week

Diet change (regular, soft, starvation)

Gastrointestinal function

(vomiting, diarrhea, anorexia)

Physical examination

(subcutaneous fat loss, edema, ascites)

NRI (Nutrition Risk Index)

$(1.519 \times \text{serum albumin [g/L]}) + 0.417 \times (\text{present weight/usual weight} \times 100)$

over 100 : not malnourished

97.5-100 : mild malnutrition

83.5-97.5 : moderate malnutrition

lower 83.5 : severe malnutrition

NRS 2002 (Nutritional Risk Screening)

Initial screening : BMI, weight loss within the last 3months
Reduced dietary intake in the last week
illness state

Final screening :

Impaired nutritional status

Weight loss, BMI, Impaired general condition

The state of food intake

Severity of disease : chronic disease, major surgery, ventilation

Age

Results

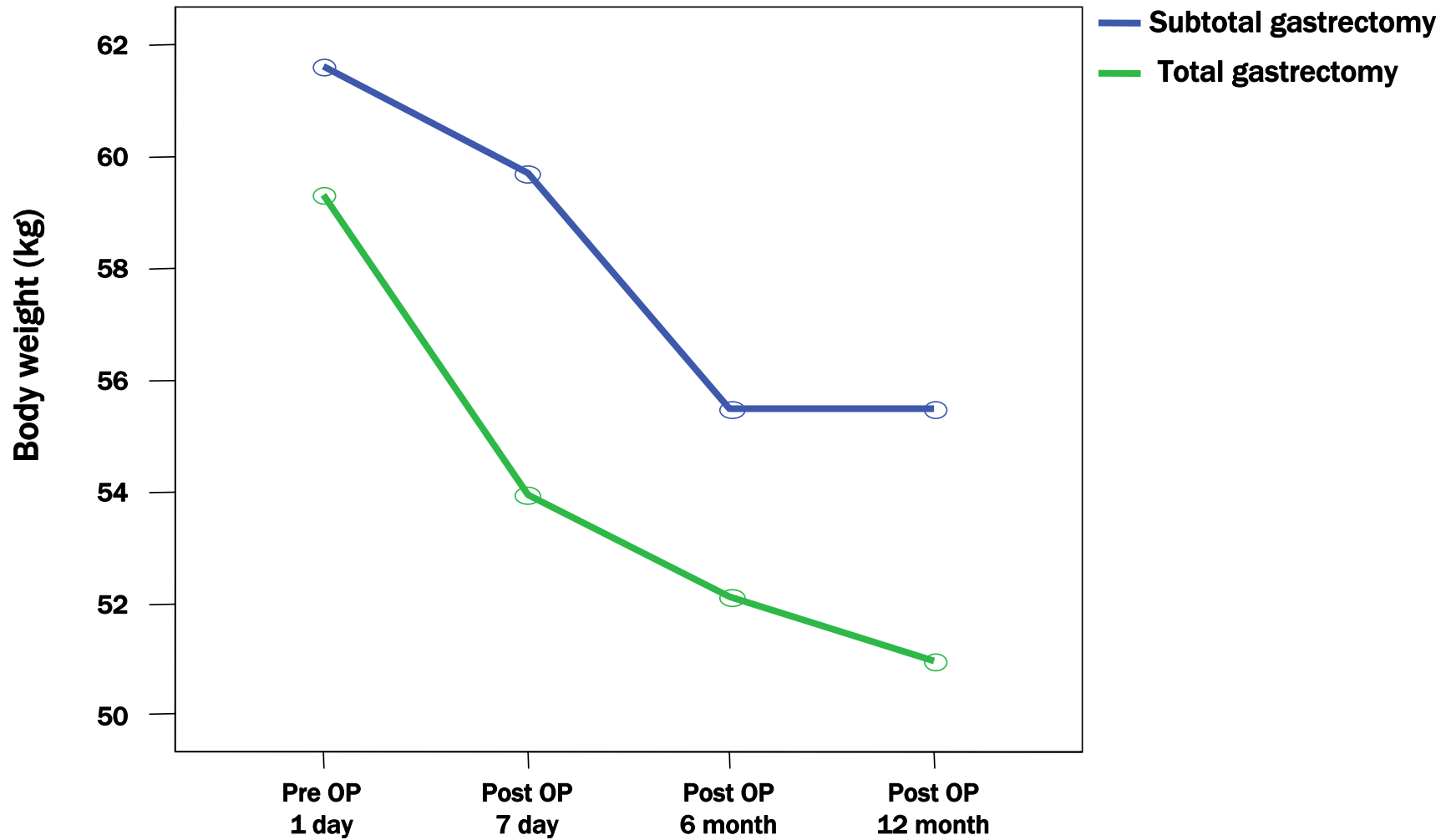
Patient clinical characteristics

	Subtotal	Total	p-value
Age (year)	58.5±11.9	56.5±13.2	0.675
Sex			0.735
male	27(50.9)	10(55.6)	
female	26(49.1)	8(44.4)	
Stage			0.003
I	57(81.4)	5(55.6)	
II	8(11.4)	0(0)	
III	2(2.9)	3(33.3)	
IV	3(4.3)	1(11.1)	
Complication			0.219
major	2(2.8)	1(11.1)	
minor	24(33.8)	1(11.1)	
Hospital stay (day)	12.8±8.4	16.4±6.8	0.176

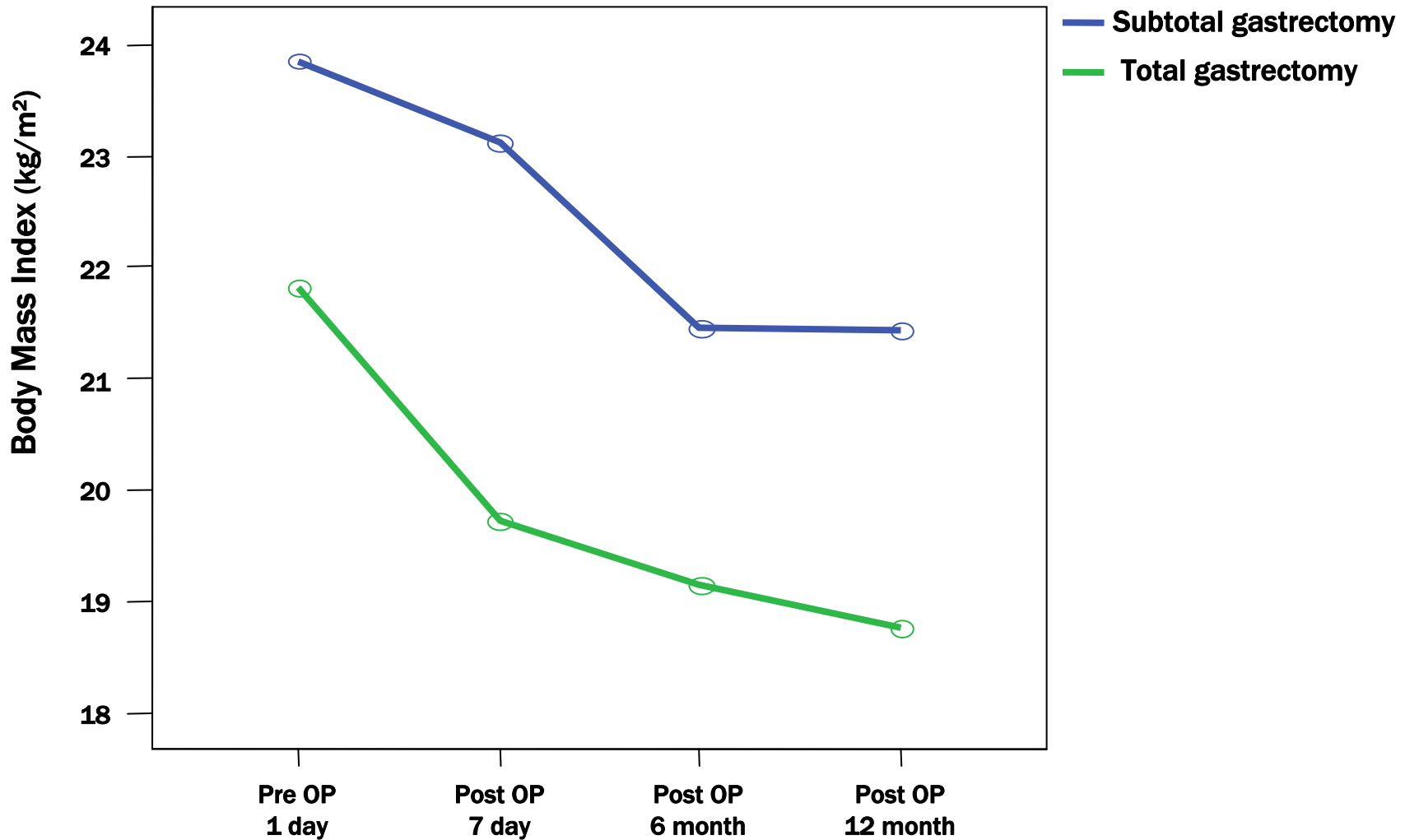
Body weight (kg) and BMI (kg/m²) after gastrectomy for gastric cancer

	Subtotal	Total	p-value
Weight (kg)			
Pre OP 1 day	61.4 ± 8.8	59.2 ± 9.7	0.546
Post OP 7 day	59.5 ± 8.4	53.9 ± 15.8	0.323
Post OP 6 month	55.4 ± 8.2	52.0 ± 8.7	0.301
Post OP 12 month	55.2 ± 8.6	50.9 ± 7.3	0.129
Weight loss rate during 6 months (%)			
Pre OP 1 day	2.78 ± 4.5	3.21 ± 3.4	0.745
Post OP 6 month	9.94 ± 5.1	12.01 ± 4.9	0.267
Post OP 12 month	0.55 ± 1.0	1.24 ± 1.9	0.318
BMI (kg/m²)			
Pre OP 1 day	23.9 ± 2.7	21.8 ± 2.5	0.040
Post OP 7 day	23.2 ± 2.7	19.7 ± 5.1	0.075
Post OP 6 month	21.4 ± 2.4	19.1 ± 2.0	0.010
Post OP 12 month	21.5 ± 2.4	18.7 ± 1.5	0.000

The change of Body weight after radical gastrectomy



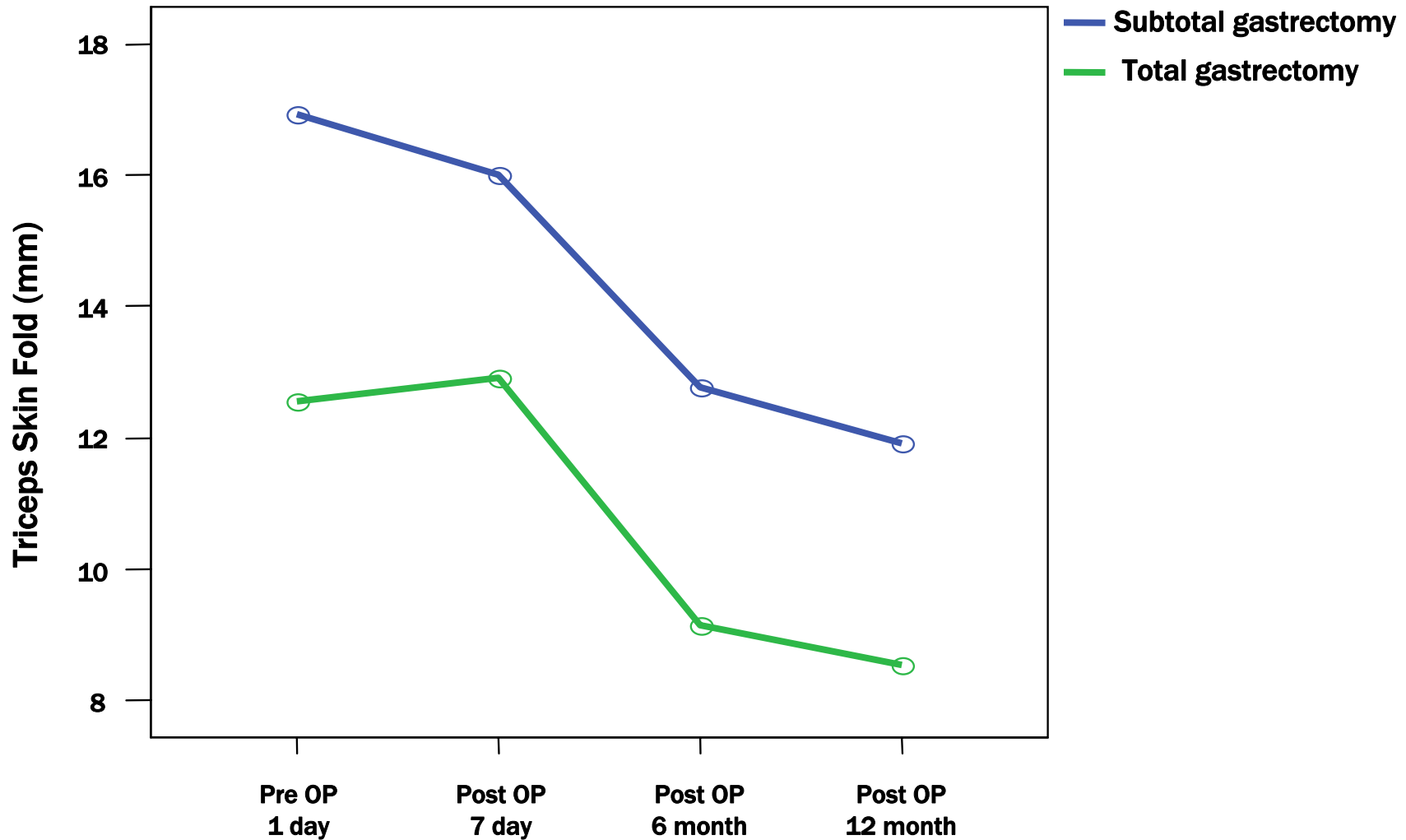
The change of Body Mass Index after radical gastrectomy



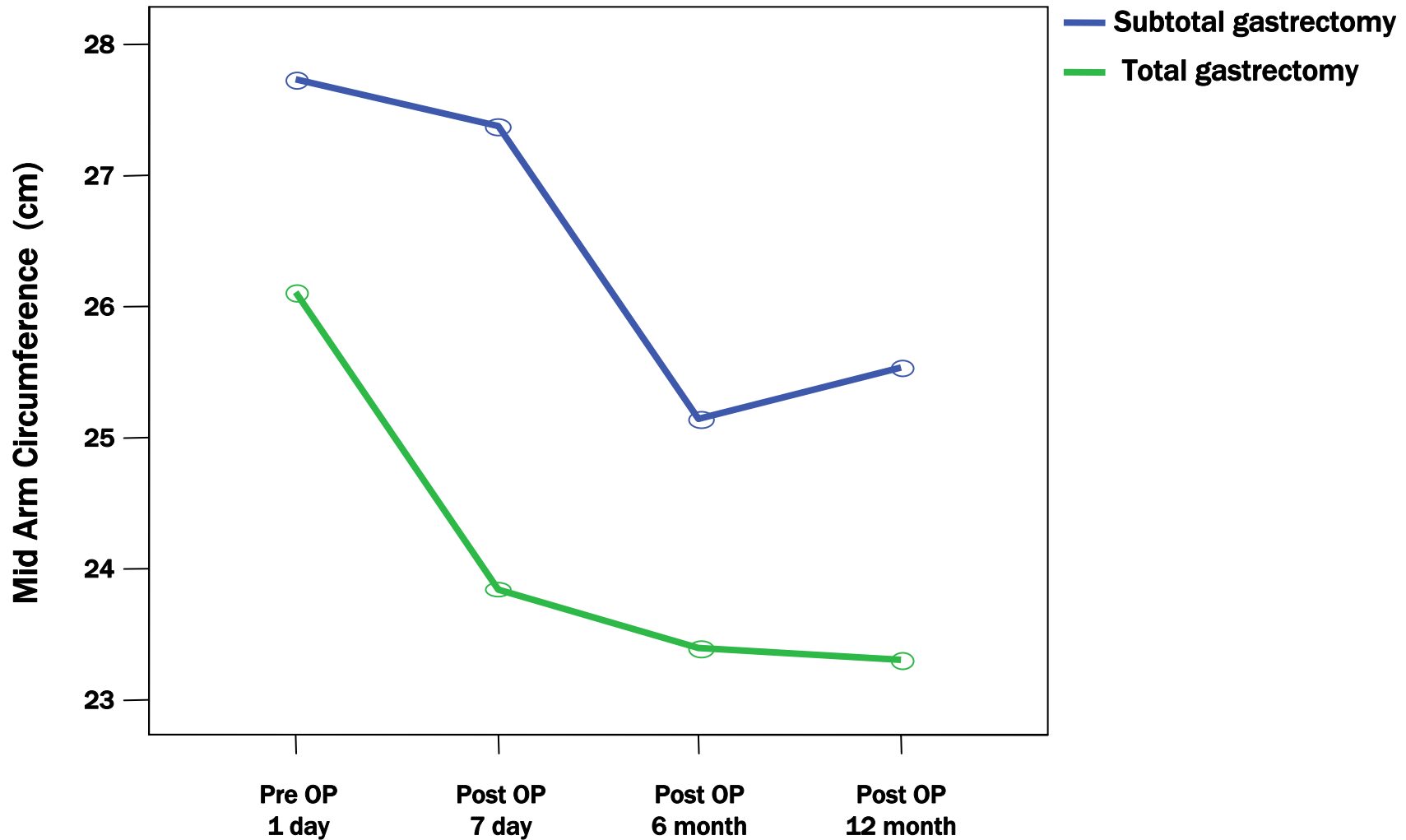
Anthropometric measurement (TSF,MAC, MAMC) after gastrectomy for gastric cancer

	Subtotal	Total	p-value
TSF (mm)			
Pre OP 1 day	17.0 ± 7.5	12.5 ± 6.0	0.065
Post OP 7 day	16.3 ± 7.6	12.9 ± 8.1	0.263
Post OP 6 month	12.7 ± 6.5	9.1 ± 4.8	0.069
Post OP 12 month	12.1 ± 6.2	8.5 ± 4.1	0.038
MAC (cm)			
Pre OP 1 day	27.7 ± 2.5	26.1 ± 2.3	0.076
Post OP 7 day	27.3 ± 2.2	23.8 ± 4.4	0.045
Post OP 6 month	25.1 ± 4.9	23.3 ± 2.4	0.102
Post OP 12 month	25.5 ± 2.4	23.3 ± 2.1	0.015
MAMC (cm)			
Pre OP 1 day	22.3 ± 2.9	22.1 ± 3.0	0.840
Post OP 7 day	22.2 ± 2.5	19.7 ± 6.5	0.297
Post OP 6 month	21.5 ± 4.4	20.5 ± 2.3	0.316
Post OP 12 month	21.6 ± 2.4	20.6 ± 2.4	0.249

The change of Triceps Skin Fold after radical gastrectomy



The change of Mid Arm Circumference after radical gastrectomy



Serologic nutritional status(TLC, Albumin, Cholesterol, protein) after gastrectomy for gastric cancer

	Subtotal	Total	p-value
TLC			
Pre OP 1 day	1863 ± 493	1938 ± 747	0.777
Post OP 6 month	1799 ± 633	1593 ± 706	0.451
Post OP 12 month	1752 ± 578	1592 ± 668	0.532
Albumin (g/dl)			
Pre OP 1 day	3.88 ± 0.3	3.70 ± 0.2	0.094
Post OP 6 month	4.28 ± 0.2	4.22 ± 0.3	0.627
Post OP 12 month	4.30 ± 0.2	4.05 ± 0.5	0.242
Total cholesterol			
Pre OP 1 day	170.9 ± 37.4	154.8 ± 70.4	0.521
Post OP 6 month	168.2 ± 38.1	168.7 ± 33.7	0.972
Post OP 12 month	173.3 ± 31.4	173.3 ± 53.9	1.000
Total protein			
Pre OP 1 day	6.87 ± 0.6	6.66 ± 0.5	0.304
Post OP 6 month	7.18 ± 0.5	7.40 ± 0.4	0.235
Post OP 12 month	7.25 ± 0.5	7.08 ± 0.7	0.548

The status of Anemia (Iron, ferritin, Vit B₁₂) after gastrectomy for gastric cancer

	Subtotal	Total	p-value
Serum iron			
Pre OP 1 day	72.9 ± 37.6	78.9 ± 31.6	0.611
Post OP 6 month	110.4 ± 52.8	97.4 ± 36.8	0.389
Post OP 12 month	118.2 ± 57.8	122.1 ± 66.8	0.888
Serum ferritin			
Pre OP 1 day	77.7 ± 75.3	73.5 ± 130.5	0.928
Post OP 6 month	74.9 ± 81.3	139.0 ± 186.8	0.368
Post OP 12 month	60.2 ± 64.4	83.0 ± 164.2	0.729
Vitamin B₁₂			
Pre OP 1 day	686.5 ± 249	543.5 ± 133	0.016
Post OP 6 month	666.8 ± 281	377.7 ± 136	0.000
Post OP 12 month	709.1 ± 330	268.1 ± 83	0.000

Correlation coefficient and ρ value between patient data and nutritional assessment techniques

	SGA		NRS-2002		NRI	
	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>
Age(yr)	- 0.133	0.187	- 0.297	0.003	- 0.112	0.267
Weight (kg)	0.149	0.138	0.390	0.000	0.163	0.105
Weight loss (%)	0.729	0.000	0.519	0.000	0.159	0.113
MAC (cm)	0.214	0.032	0.418	0.000	0.217	0.030
TSF (mm)	0.239	0.017	0.328	0.000	0.159	0.115
BMI (kg/m ²)	0.260	0.009	0.458	0.000	0.199	0.047
Albumin (g/Dl)	0.040	0.694	0.173	0.085	0.783	0.000
TLC	0.009	0.932	0.065	0.518	0.168	0.094
Total cholesterol	- 0.014	0.888	0.026	0.797	0.320	0.001
Total protein	0.065	0.521	0.115	0.255	0.587	0.000

The change of nutrition status (SGA) according to the resection type after gastrectomy for gastric cancer

	Well nourished	Mild Malnourished	Severe malnourished	p-value
Pre OP 1 day				0.096
Subtotal	51 (71.8%)	16 (22.5%)	4 (5.6%)	
Total	4 (44.4%)	5 (55.6%)	0	
Post OP 6 month				0.235
Subtotal	14 (20.9%)	21 (31.3%)	32 (47.8%)	
Total	1 (11.1%)	1 (11.1%)	7 (77.8%)	
Post OP 12 month				0.315
Subtotal	51 (71.8%)	20 (28.2%)		
Total	5 (55.6%)	4 (44.4%)		

The change of nutrition status (NRS-2002) according to the resection type after gastrectomy for gastric cancer

	Well nourished	Mild Malnourished	Severe malnourished	p-value
Pre OP 1 day				0.009
Subtotal	44 (62.0%)	25 (35.2%)	2 (2.8%)	
Total	1 (11.1%)	8 (88.9%)	0	
Post OP 6 month				0.047
Subtotal	13 (19.4%)	30 (44.8%)	24 (35.8%)	
Total	0	2 (22.2%)	7 (77.8%)	
Post OP 12 month				0.013
Subtotal	44 (62.0%)	22 (31.0%)	5 (7.0%)	
Total	1 (11.1%)	6 (66.7%)	2 (22.2%)	

The change of nutrition status (NRI) according to the resection type after gastrectomy for gastric cancer

	Well nutrition	Mild malnutrition	Moderate malnutrition	Severe malnutrition	p-value
Pre OP 1day					0.238
Subtotal	30(42.3%)	21(29.6%)	20(28.2%)	0	
Total	2(22.2%)	2(22.2%)	5(55.6%)	0	
Post OP 6 month					0.122
Subtotal	43(61.4%)	13(18.6%)	10(14.3%)	4(5.7%)	
Total	3(33.3%)	1(11.1%)	4(44.4%)	1(11.1%)	
Post OP 12 month					0.374
Subtotal	59(89.4%)	3(4.5%)	2(3.0%)	2(3.0%)	
Total	7(77.8%)	0	1(11.1%)	1(11.1%)	

Summary I

- On admission, **31%** of the gastric cancer patients were malnourished according to the SGA, and **60%** of the patients were malnourished according to the NRI
- Postoperative 6 month, **51%** of the patients were severe malnourished and total **70%** of the patients were malnourished according to the SGA
- During the first postoperative 6 months, body weight, BMI, TSF and MAC were significantly decreased, but, there was no significant difference between postoperative 6 months and 12 months

Summary II

- Total gastrectomy patients showed significantly decreased nutritional status compared to subtotal gastrectomy patients at postoperative 12 months
- TLC, protein, cholesterol and iron showed no difference between two groups during the postoperative period
- The assessment of nutrition status of the gastrectomy patient after postoperative 12 months needed the combination of different nutritional assessment tools (anthropometric measurement, BMI)