

Supplementary table 1. Structure of PGSAS-45

domains	Items	Items		Subscales				
QOL	SF-8(QOL)	1	Physical functioning*	Five or six-point Likert scale	Physical component summary (PCS) Mental component summary (MCS) (Item1-8)			
		2	Role physical*					
		3	Bodily pain*					
		4	General health*					
		5	Vitality*					
		6	Social functioning*					
		7	Role emotional*					
		8	Mental health*					
Symptoms	GSRS symptoms	9	Abdominal pains	Seven-point Likert scale	Esophageal reflux subscale (item 10, 11, 13, 24)			
		10	Heartburn	Except item 29 and 32	Abdominal pain subscale (item 9, 12, 28)			
		11	Acid regurgitation		Meal-related distress subscale (item 25–27)			
		12	Sucking sensations in the epigastrium		Indigestion subscale (item 14–17)			
		13	Nausea and vomiting		Diarrhea subscale (item 19, 20, 22)			
		14	Borborygmus		Constipation subscale (item 18, 21, 23)			
		15	Abdominal distension		Dumping subscale (item 30, 31, 33)			
		16	Eructation					
		17	Increased flatus		Total symptom scale (above seven subscales)			
		18	Decreased passage of stools					
	19	Increased passage of stools						
	20	Loose stools						
	21	Hard stools						
	22	Urgent need for defecation						
	23	Feeling of incomplete evacuation						
	24	Bile regurgitation						
	25	Sense of foods sticking						
	26	Postprandial fullness						
	27	Early satiation						
	28	Lower abdominal pains						
	Symptoms		29	Number and type of early dumping symptoms				
			30	Early dumping general symptoms				
			31	Early dumping abdominal symptoms				
			32	Early dumping abdominal symptoms				
			33	Late dumping symptoms				
			Living status	Meals (amount)1	34	Ingested amount of food per meal*	Five-point Likert scale	Quality of ingestion subscale* (item 38–40)
					35	Ingested amount of food per day*		
	36	Frequency of main meals						
	37	Frequency of additional meals						
	Meals (quality)	38		Appetite*				
		39		Hunger feeling*				
		40		Satiety feeling*				
	Meals (amount)2	41		Necessity for additional meals				

	Social activity	42	Ability for working	
QOL	Dissatisfaction (QOL)	43	Dissatisfaction with symptoms	Dissatisfaction for daily life subscale (item 43–45)
		44	Dissatisfaction at the meal	
		45	Dissatisfaction at working	

Supplementary table 2. QOL assessment by PGSAS-45 for Distal Gastrectomy

DG Main outcome measures (post operative month 12)		Control group (n=35)		CNC group (n=27)		p value	Cohen's d
		Mean	SD	Mean	SD		
Symptoms	Esophageal reflux subscale	1.84	0.84	1.81	0.91	0.90	
	Abdominal pain subscale	1.80	0.73	1.72	0.75	0.66	
	Meal-related distress subscale	2.16	0.81	1.99	0.80	0.41	
	Indigestion subscale	2.01	0.71	2.05	0.83	0.87	
	Diarrhea subscale	2.10	0.96	1.65	0.66	0.039**	0.52
	Constipation subscale	2.10	0.89	2.38	1.12	0.31	
	Dumping subscale	1.58	0.68	1.58	0.68	0.99	
	Total symptom score	1.94	0.47	1.88	0.58	0.67	
Living status	Change in body weight (%) *	-11.50	8.65	-6.43	7.16	0.011**	0.63
	Ingested amount of food per meal*	6.17	2.05	7.04	1.95	0.10	0.43
	Necessity for additional meals	2.11	0.84	1.91	0.72	0.29	
	Quality of ingestion subscale*	3.67	0.93	3.62	1.02	0.85	
	Ability for working	2.25	1.19	1.91	1.13	0.23	
QOL	Dissatisfaction with symptoms	1.72	0.90	1.81	1.04	0.70	
	Dissatisfaction at the meal	2.33	1.00	2.13	1.22	0.45	
	Dissatisfaction at working	1.75	0.89	1.56	0.86	0.39	
	Dissatisfaction for daily life subscale	1.96	0.76	1.99	0.91	0.91	
	Physical component summary*	47.02	8.07	48.83	6.56	0.35	
	Mental component summary*	48.84	5.30	49.63	6.24	0.61	

Outcome measures with * higher score indicating better condition.

Outcome with ** was considered statistically significant.

Interpretation of effect size in Cohen's d: ≥ 0.20 as small, ≥ 0.50 as medium, ≥ 0.80 as large.

Supplementary table 3. QOL assessment by PGSAS-45 for Proximal Gastrectomy

PG	Main outcome measures (post operative month 12)	Control group (n=5)		CNC group (n=7)		p value	Cohen's d
		Mean	SD	Mean	SD		
Symptoms	Esophageal reflux subscale	1.55	0.75	1.5	0.67	0.91	
	Abdominal pain subscale	2.27	0.74	1.38	0.45	0.076**	1.51
	Meal-related distress subscale	2.67	0.82	1.57	0.53	0.055**	1.65
	Indigestion subscale	2.30	0.75	1.86	0.68	0.37	
	Diarrhea subscale	2.53	0.50	2.19	0.69	0.38	
	Constipation subscale	2.53	1.11	2.10	0.89	0.53	
	Dumping subscale	1.87	1.11	1.10	0.15	0.24	
	Total symptom score	2.25	0.67	1.67	0.41	0.18	
Living status	Change in body weight (%) *	-17.03	3.71	-8.37	5.74	0.016**	1.72
	Ingested amount of food per meal*	5.60	0.80	7.67	1.49	0.029**	1.68
	Necessity for additional meals	2.00	0.63	1.86	0.99	0.79	
	Quality of ingestion subscale*	2.93	0.25	2.81	0.99	0.78	
	Ability for working	2.40	0.80	1.43	0.49	0.073	1.53
QOL	Dissatisfaction with symptoms	2.00	0.63	1.14	0.35	0.048**	1.78
	Dissatisfaction at the meal	3.60	0.49	1.86	0.64	0.00065**	2.98
	Dissatisfaction at working	2.40	1.36	1.43	0.49	0.23	
	Dissatisfaction for daily life subscale	2.67	0.63	1.48	0.39	0.015**	2.38
	Physical component summary*	47.26	4.20	48.16	4.27	0.75	
	Mental component summary*	45.83	4.24	54.02	3.03	0.013**	2.29

Outcome measures with * higher score indicating better condition.

Outcome with ** was considered statistically significant.

Interpretation of effect size in Cohen's d: ≥ 0.20 as small, ≥ 0.50 as medium, ≥ 0.80 as large.

Supplementary table 4. QOL assessment by PGSAS-45 for Total Gastrectomy

TG Main outcome measures (post operative month 12)		Control group (n=5)		CNC group (n=4)		p value	Cohen's d
		Mean	SD	Mean	SD		
Symptoms	Esophageal reflux subscale	2.25	1.10	2.5	0.81	0.74	1.60
	Abdominal pain subscale	2.07	0.93	1.92	0.43	0.79	
	Meal-related distress subscale	2.73	0.80	4.25	1.11	0.10	
	Indigestion subscale	2.55	1.20	2.56	0.37	0.99	
	Diarrhea subscale	2.20	0.50	2.58	0.64	0.42	
	Constipation subscale	2.33	0.92	2.08	0.28	0.63	
	Dumping subscale	1.47	0.93	2.5	1.19	0.26	
	Total symptom score	2.23	0.68	2.63	0.50	0.40	
Living status	Change in body weight (%)*	-16.41	3.95	-17.33	9.71	0.86	
	Ingested amount of food per meal*	5.75	2.77	5.75	2.05	1	
	Necessity for additional meals	2.67	1.25	2.00	0.89	0.38	
	Quality of ingestion subscale*	3.40	0.88	3.33	0.97	0.93	
	Ability for working	3.00	1.29	2.40	0.8	0.42	
QOL	Dissatisfaction with symptoms	2.17	1.07	2.6	1.36	0.62	
	Dissatisfaction at the meal	2.83	1.34	2.4	1.36	0.64	
	Dissatisfaction at working	2.83	1.34	2.4	1.02	0.60	
	Dissatisfaction for daily life subscale	2.87	1.05	2.83	0.90	0.97	
	Physical component summary*	41.65	10.47	43.59	1.16	0.73	
	Mental component summary*	49.53	7.53	46.38	2.93	0.48	

Outcome measures with * higher score indicating better condition.

Outcome with ** was considered statistically significant.

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Supplementary Table 5. QOL assessment by surgical procedure

Main outcome measures (post operative month 12)		Surgical Procedure						p value (ANOVA)	Turkey-Kramer test	Cohen's d
		DG(n=27)		PG(n=7)		TG(n=4)				
		Mean	SD	Mean	SD	Mean	SD			
Symptoms	Esophageal reflux subscale	1.81	0.91	1.5	0.67	2.5	0.81	0.22		
	Abdominal pain subscale	1.72	0.75	1.38	0.45	1.92	0.43	0.41		
	Meal-related distress subscale	1.99	0.80	1.57	0.53	4.25	1.11	<0.01*	DG versus TG p<0.01*	2.6
									PG versus TG p<0.01*	3.1
	Indigestion subscale	2.05	0.83	1.86	0.68	2.56	0.37	0.37		
	Diarrhea subscale	1.65	0.66	2.19	0.69	2.58	0.64	0.023*	DG versus TG P=0.043*	2.4
	Constipation subscale	2.38	1.12	2.10	0.89	2.08	0.28	0.75		
	Dumping subscale	1.58	0.68	1.10	0.15	2.5	1.19	0.014*	PG versus TG P=0.01*	1.7
									DG versus TG P=0.059	2.2
	Total symptom score	1.88	0.58	1.67	0.41	2.63	0.50	0.032*	PG versus TG P=0.029*	1.9
									DG versus TG P=0.051	1.3
Living status	Change in body weight (%)	-6.43	7.16	-8.37	5.74	-17.33	9.71	0.017*	DG versus TG P=0.012*	1.4
	Ingested amount of food per meal	7.04	1.95	7.67	1.49	5.75	2.05	0.33		
	Necessity for additional meals	1.91	0.72	1.86	0.99	2.00	0.89	0.14		
	Quality of ingestion subscale	3.62	1.02	2.81	0.99	3.33	0.97	0.20		
	Ability for working	1.91	1.13	1.43	0.49	2.40	0.8	0.30		
QOL	Dissatisfaction with symptoms	1.81	1.04	1.14	0.35	2.6	1.36	0.07	PG versus TG P=0.057	1.9
	Dissatisfaction at the meal	2.13	1.22	1.86	0.64	2.4	1.36	0.74		
	Dissatisfaction at working	1.56	0.86	1.43	0.49	2.4	1.02	0.12		
	Dissatisfaction for daily life subscale	1.99	0.91	1.48	0.39	2.83	0.90	0.06	PG versus TG P=0.047	1.9
	Physical component summary	48.83	6.56	48.16	4.27	43.59	1.16	0.28		
	Mental component summary	49.63	6.24	54.02	3.03	46.38	2.93	0.09	PG versus TG P=0.098	2.3

Outcome with * was considered statistically significant.

Interpretation of effect size in Cohen's d: ≥ 0.20 as small, ≥ 0.50 as medium, ≥ 0.80 as large.