Interpretation of the SARC-F questionnaire in patients undergoing gastrointestinal cancer surgery

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Abstract

Aim: Sarcopenia is a skeletal muscle disorder associated with decreased muscle mass and functional capacity. The SARC-F questionnaire facilitates sarcopenia screening in elderly patients. The present study investigates the applicability of the SARC-F questionnaire to sarcopenia screening in patients scheduled for gastrointestinal cancer surgery and its relationship with postoperative outcomes.

Material and methods: This cross-sectional study was carried out with elderly patients scheduled for gastrointestinal cancer surgery. The study included 71 patients consisting of 47 males and 24 females. The risk of sarcopenia was assessed by the Strength, Assistance with walking, Rising from a chair, Climbing stairs, and Falling (SARC-F) questionnaire. Patients with a SARC-F score ≥4 were considered to be at risk of sarcopenia. The demographic data, nutritional status and comorbidity data of the patients were recorded. Statistical analysis was conducted to assess postoperative complications in those patients at risk of sarcopenia.

Results: The mean age of 71 study patients was 72.6±5.6 years. There were 15 (21.1%) patients with a SARC-F score ≥4. The postoperative complication rate was 60% in patients with a SARC-F score ≥4 in comparison with 28.5% of those with a SARC-F score <4, and the difference was statistically significant (p=0.024). The SARC-F score ≥4 group also had a longer hospital stay (p<0.001). Furthermore, the univariate analysis for postoperative complications revealed that SARC-F scores ≥4, age ≥75 years, and BMI ≥30 kg/m2 were statistically significant.

Conclusion: We believe that the SARC-F questionnaire has a place in sarcopenia screening in patients scheduled for gastrointestinal surgery, and it is possible to predict postoperative adverse outcomes.

Key words: SARC-F, sarcopenia, gastrointestinal cancer

Introduction

Sarcopenia is a skeletal muscle disorder associated with decreased muscle mass and functional capacity. It is common in the elderly but can also occur in young people. Its definition was made by the European Working Group on Sarcopenia in Older People 2 (EWGSOP2) [1]. Sarcopenia is called primary sarcopenia when it is age related, and secondary sarcopenia when it is caused by systemic diseases such as cancer, and organ failure. Secondary sarcopenia can occur in all age groups [2].

According to the definition by EWGSOP2 in 2018, muscle strength is the most important parameter for sarcopenia. The diagnosis of sarcopenia is confirmed by the presence of low muscle quantity or quality. Sarcopenia is considered severe with the detection of low muscle strength, low muscle quantity or quality, and poor physical performance [2].

Previous studies have shown that sarcopenia occurs in 24–45% of patients with gastrointestinal (GI) cancers and is likely to have a negative impact on length of hospital stay and complications [3–5]. Apart from the diagnostic

methods for sarcopenia recommended by EWGSOP2, it is possible to screen elderly patients for sarcopenia using the SARC-F questionnaire developed by Malmstrom and Morley [6,7]. The SARC-F questionnaire, which is a simple method for pre-diagnosing sarcopenia, asks patients questions about 'Strength, Assistance with walking, Rising from a chair, Climbing stairs, and Falling'. The present study will investigate the applicability of the SARC-F questionnaire to sarcopenia screening in patients scheduled for GI cancer surgery and its relationship with postoperative outcomes.

Materials and methods

This cross-sectional study was carried out with patients scheduled for GI cancer surgery at the Department of Gastrointestinal Surgery of Kartal Kosuyolu Educational and Research Hospital between November 2019 and October 2020. The study was approved by the ethics committee of the study hospital (No: 2019/7/103). The study was conducted in accordance with the ethical standards specified in the Declaration of Helsinki, as revised in 2013. The inclusion criteria were being aged 65 years or older; being scheduled for elective surgery due to GI cancer; and having an Eastern Cooperative Oncology Group (ECOG) performance score of 2 or less. The exclusion criteria were having metastatic disease and being scheduled for palliative surgery. Seventy-five patients were included in the study. Two patients were excluded because of incomplete SARC-F questionnaires, and two patients because of having palliative surgery. The study continued with a total of 71 patients comprising 47 males and 24 females (Figure 1).

Figure 1 -Flow chart of the study
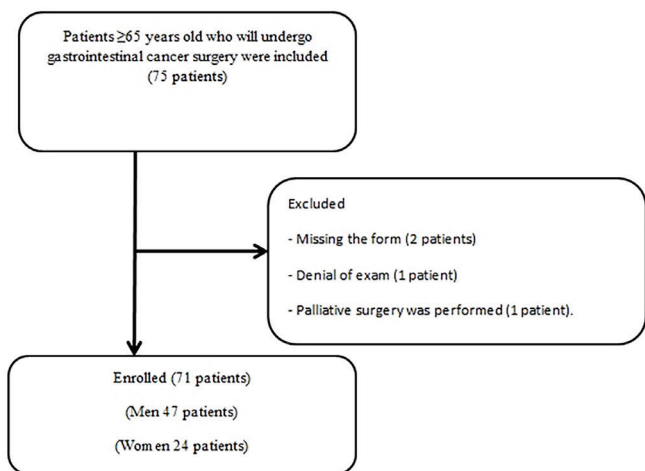
The SARC-F questionnaire was used to assess the risk of sarcopenia. Patients were asked 5 questions in this questionnaire. These questions evaluated the patients' 'strength, need for walking assistance, ability to lift a chair, ability to climb stairs and whether or not the patient has falling issues.' Each question was scored from 0 to 2 points, resulting in a total score of 0–10 points (Table 1). Patients with a SARC-F score ≥4 were considered to be at risk of sarcopenia [3,8]. Patients' demographic data including age, gender, height, weight, body mass index (BMI), smoking, history of abdominal surgery, preoperative hemoglobin levels, site of operation and name of operation were recorded. To evaluate nutritional status and comorbidity, the Nutritional Risk Screening 2002 (NRS-2002) score, Charlson Comorbidity Index (CCI), preoperative albumin levels, preoperative C-reactive protein (Crp) levels and weight

| Table 1 | SARC-F score |

Component	Question	Scoring
Strength	How much difficulty do you have in lifting and carrying 5 kg?	None=0 Some=1 A lot or unable=2
Assistance in walking	How much difficulty do you have walking across a room?	None=0 Some=1 A lot, use aids, or unable= 2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None=0 Some=1 A lot or unable without help=2
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None=0 Some=1 A lot or unable=2
Falls	How many times have you fallen in the past year?	None=0 1-3 falls=1 4 falls=2

| Table 2 | Demographic and clinical characteristics of patients. |

Variables	Total (n=71)	SARC-F		p value
		<4 (n=56)	≥4 (n=15)	
Age (years); mean±SD	72.6±5.6	71.3±4.6	77.6±6.2	0.059
Gender; n(%)				0.002
Male	47 (66.1)	42 (75)	5 (33.3)	
Female	24 (33.9)	14 (25)	10 (66.7)	
Height (cm)	165.1±10.5	166.6±10.4	159.6±9.5	0.84
Weight (cm)	77±15.1	74.8±14.1	85±16.8	0.48
BMI(kg/m2); mean±SD	28.4±5.2	27.1±4.2	33.3±5.5	<0.001
Smoker; n(%)	10 (14)	8 (14.2)	2 (13.3)	0.92
Abdominal operation history; n(%)	14 (19.7)	10 (17.8)	4 (26.6)	0.44
NRS-2002 score(%)				0.49
0-1	34 (47.8)	28 (50)	6 (40)	
≥2	37 (52.2)	28 (50)	9 (60)	
CCI(%)				0.25
0-1	51 (71.8)	42 (75)	9 (60)	
≥2	20 (28.2)	14 (25)	6 (40)	
Preoperative hemoglobulin(g/dL); mean±SD	11.4±1.7	11.6±1.7	10.6±1.7	0.99
Preoperative albumin(g/L); mean±SD	3.8±0.3	3.8±0.3	3.7±0.2	0.031
Preoperative C-reactive protein(mg/L); mean±SD	4.8±2.9	5.8±3.5	4.5±2.6	0.012
Weight loss*; n(%)	10 (14)	10 (17.8)	0	0.74
SARC-F score; mean±SD	2±1.6	1.3±1	4.5±0.7	0.05

Values are presented as mean ± SD (standard deviation) or n (%). Preoperative BMI body mass index, CCI Charlson comorbidity index, NRS-2002 Nutritional Risk Screening-2002 are presented.
*Expresses more than 10% weight loss in the last 3 months.

Table 3 — Operation and postoperative findings of patients

Variables	Total (n=71)	SARC-F <4 (n=56)	≥4 (n=15)	p value
Primary diagnosis; n(%)				0.06
Colon	32 (45)	26 (46.4)	6 (40)	
Rectum	17 (23.9)	12 (21.4)	5 (33.3)	
Gastric	12 (16.9)	10 (17.8)	2 (13.3)	
Pancreas	2 (2.8)	2 (3.5)	0	
Intraabdominal mass	6 (8.4)	6 (10.5)	0	
Others	12(2.8)	0	2 (13.3)	
Operation type; n(%)				0.11
Anterior resection	16 (22.5)	14 (25)	2 (13.3)	
Low anterior resection+loop ileostomy	15 (21.1)	10 (17.8)	5 (33.3)	
Right hemicolectomy	12 (16.9)	10 (17.8)	2 (13.3)	
Left hemicolectomy	2 (2.8)	2 (3.5)	0	
Transvers colectomy	2 (2.8)	0	2 (13.3)	
Subtotal colectomy	2 (2.8)	2 (3.5)	0	
Total gastrectomy	4 (5.6)	2 (3.5)	2 (13.3)	
Subtotal gastrectomy	8 (11.2)	8 (14.2)	0	
Pancreatectomy	2 (2.8)	2 (3.5)	0	
Small bowel resection	2 (2.8)	2 (3.5)	0	
Others	6 (8.4)	4 (7.1)	2 (13.3)	
Postoperative complication; n(%)	25 (35.2)	16 (28.5)	9 (60)	0.024
Lenght of hospital stay; mean±SD	11.3±6.9	9.9±4.0	16.4±11.9	<0.001

loss in the previous 3 months were recorded. Finally, the effect of the SARC-F scores on postoperative complications and length of hospital stay was examined.

Statistical analysis

Categorical variables were presented as number and percentage. Normally distributed continuous variables were presented as mean and standard deviation (SD). Clinical variables were assessed using Student's t-test and Pearson's Chi-square test. Factors with an impact on postoperative complications were assessed using regression analysis. A p value of < 0.05 was considered statistically significant for all tests, and all statistical analyses were conducted using SPSS Statistics, Version 25.0 (IBM, Armonk, NY).

Results

The mean age of 71 study patients was 72.6±5.6 years. The mean age of 15 (21.1%) patients with a SARC-F score ≥4 was 77.6±6.2 years, while the mean age of 56 (78.9%) patients with a SARC-F score < 4 was 71.3±4.6 years (p=0.059). The number of women was significantly higher in the patient group with a SARC-F score ≥4 (66.7% vs 33.3%, p=0.002). The mean BMI was 33.3±5.5 kg/m2 in the SARC-F score ≥4 group in comparison with 27.1±4.2 kg/m2 in the SARC-F score <4 group (p<0.001). Regarding nutritional status, the distribution of the NRS-2002 score ≥2 was similar between groups (p=0.49), while preoperative albumin and Crp levels were significantly lower in the SARC-F score ≥4 group (albumin: 3.8 g/l vs. 3.7 g/l, p=0.031; Crp: 5.8 mg/l vs. 4.5 mg/l, p=0.012). Patients' demographic data and clinical variables are presented in Table 2.

All patients underwent surgery due to gastrointestinal cancers in accordance with oncological surgical principles. Cancer types and surgery types are presented in Table 3. The postoperative complication rate was higher in the SARC-F score ≥4 group (60% vs. 28.5%, p=0.024). The length of hospital stay was also longer in the SARC-F score ≥4 group (9.9±4.0 days vs. 16.4±11.9 days, p<0.001). When the types of complication were examined, the most common complication was surgical site infection in both groups (10/16 patients in the SARC-F score <4 group; 4/16 patients in the SARC-F score ≥4 group). Anastomotic leak did not occur in the SARC-F score <4 group, while it was detected in 3 patients in the SARC-F score ≥ 4 group. Details on complications are presented in Table 4.

The univariate analysis for postoperative complications revealed that SARC-F scores ≥4 (OR=0.267, 95% CI: 0.082–0.872, p=0.029), age ≥75 years (OR=0.301, 95% CI: 0.105–0.862, p=0.025), and BMI ≥30 kg/m2 (OR=0.344, 95% CI: 0.125–0.943, p=0.038) were statistically significant (Table 5).

Table 4 — Types of postoperative complications.

Postoperative complications	SARC-F<4 (n=16)	SARC-F≥4 (n=9)
Surgical site infection	10	4
Anastomotic leakage	0	3
Bleeding	2	2
Pneumonia	2	0
İleus	2	0

Table 5 — Univariate analysis for postoperative complications

	OR	(95%CI)	P value
SARC-F (≥4/<4)	0.267	0.082-0.872	0.029
Age (≥75/<75 years)	0.301	0.105-0.862	0.025
BMI (≥30/<30 kg/m2)	0.344	0.125-0.943	0.038

Discussion

The results of the present study revealed that 21.1% of the patients had a SARC-F score ≥4, suggesting that these patients were at risk of sarcopenia. Furthermore, this patient group had a higher rate of complications following gastrointestinal cancer surgery and had a significantly prolonged hospital stay. In other words, SARC-F scores ≥ 4 were found to result in adverse postoperative outcomes in elderly patients.

There are several recent studies regarding the usability of the SARC-F questionnaire in sarcopenia screening. Among them is the study by HA et al. on sarcopenia screening in elderly patients with hip fractures [9]. The study included 115 patients and concluded that the SARC-F questionnaire could be used in sarcopenia screening in elderly patients with hip fractures.

Another cross-sectional study found that 40% of 77 patients diagnosed with gastrointestinal cancer had a SARC-F score ≥4 and were at risk of sarcopenia [10]. The same study further established that sarcopenia risk was associated with Charlson comorbidity index and NRS-2002 score. This study also included young individuals, which is the most important difference from the present study. In this study we included only elderly patients. Thus, using the SARC-F questionnaire, we calculated the total risk including both the risk of secondary sarcopenia due to cancer and the risk of primary sarcopenia associated with age.

Another study by Soares et al. established SARC-F scores ≥4 in 25.4% of 71 patients with gastrointestinal cancer, which was associated with increased anxiety [8]. The same study found a lower mean BMI in the SARC-F score ≥ 4group. In the present study, however, the mean BMI was statistically significantly higher in the group with sarcopenia risk. We believe this could be due to sarcopenic obesity.

Another study established a sarcopenia risk of 17% based on the SARC-F questionnaire [11]. According to the literature data, the risk of sarcopenia based on the SARC-F questionnaire increases up to 40%. The present study found a sarcopenia risk of 21.1%, which is consistent with the literature. The wide range of sarcopenia risk may be because the patient groups in some studies are not homogeneous, and when compared with other studies, there are for example significant differences in patient selection.

The SARC-F questionnaire does not diagnose sarcopenia but determines the patient's risk of sarcopenia. Our aim was to demonstrate the applicability of this questionnaire to patients scheduled for gastrointestinal cancer surgery and no such research had been conducted until the commencement of the present study. Recent studies have focused on patients with sarcopenia diagnosed using various methods. According to a recently published meta-analysis, sarcopenia is associated with poor postoperative outcomes and decreased survival rates in colorectal cancer patients [12]. Supporting the meta-analysis, our study established a higher rate of postoperative complications and a longer hospital stay in patients with a SARC-F score ≥ 4. Major complications, such as anastomotic leak, were detected in the patient group with sarcopenia risk.

The present study has a number of limitations. First, this was a single-center study. Secondly, the study included a relatively small patient group. Although this is the first sarcopenia screening study in elderly patients scheduled for gastrointestinal cancer surgery, the cancer was not specific to organ, which was another limitation of the study.

Conclusion

In conclusion, we believe that the SARC-F questionnaire has a place in sarcopenia screening in patients scheduled for gastrointestinal cancer surgery, and it is able to predict postoperative adverse outcomes.

Disclosures: There is no conflict of interest for all authors.

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