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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

AKUT KARIN PATOLOJİLERİ İLE ACİL SERVİSE BAŞVURAN GERİATRİK HASTALARDA PROGNOZU ÖNGÖRMEDE KLİNİK KIRILGANLIK ÖLÇEĞİ'NİN ETKİNLİĞİNİN DEĞERLENDİRİLMESİ: PROSPEKTİF ÇALIŞMA

EVALUATION OF THE EFFICACY OF THE CLINICAL FRAILTY SCALE IN THE PREDICTION OF PROGNOSIS IN GERIATRIC PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT WITH ACUTE ABDOMINAL PATHOLOGIES: A PROSPECTIVE STUDY

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ÖZET

AMAÇ: Klinik kırılganlık indeksi, 1 (çok iyi) ile 9 (ölümcül hasta) arasında değişen bir kırılganlık puanı oluşturmak amacı ile işlev, komorbidite ve biliş dahil olmak üzere belirli alanları değerlendirir. Bu çalışmanın amacı, akut abdominal patolojileri olan geriatrik hastalarda mortaliteyi öngörmede klinik kırılganlık indeksinin etkinliğini araştırmaktır.

GEREÇ VE YÖNTEM: 01.10.2020 - 31.03.2021 tarihleri arasında acil servise akut abdomen patolojisi ile başvuran 65 yaş üstü hastalar çalışmaya alındı. Klinik kırılganlık indeksi hesaplanıp kaydedildi ve 1'den 9'a kadar gruplara ayrıldı. İstatistiksel analiz SPSS 22.0 ile gerçekleştirildi.

BULGULAR: Çalışmamıza 151 hasta dahil edildi ve hastaların %53'ü kadın hasta idi. Yaş ortalaması 75,57±8,078 olup; 22(14,56%) hasta ex oldu. Hastalarımızın klinik kırılganlık indeksi incelemesinde mortal olan grupta CFS istatistiksel anlamlı olarak daha yüksek düzeyde tespit edildi (p<0,001). Hastalarımızın 83 (%55)'ü opere edildi. Opere olan ve opere olmayan grupta klinik kırılganlık indeksinin mortalite ile ilişkisi bakımından istatistiksel olarak anlamlı fark gözlenmemiştir (p=0,613). Yaşın 75 ve üzeri olmasını kriter olarak eklediğimizde mortaliteyi predikte etmede klinik kırılganlık indeksi ile mortalite arasında istatistiksel fark olup olmadığı da araştırıldı. Eğri altında kalan alanlar (EAA) karşılaştırıldığında ise, kırılganlık indeksi ile 75 yaş üstü kriteri ile birlikte olan kırılganlık indeksinde istatistiksel olarak anlamlı fark görülmedi. (Eğri altında kalan alan kırılganlık indeksi ve kırılganlık indeksi-yaş p=0.597, de Longe quality test).

SONUÇ: Klinik kırılganlık indeksi yüksekliği ve klinik kırılganlık indeksi-yaş, mortalite ile genellikle ilişkilidir fakat opere edilmeme, medikal tedavinin yeterli olacağı düşüncesi ya da komorbiditeler nedeni ile risk bilgilendirilmesi nedenli olarak bu durum ortaya çıkabilmektedir. Geriatrik hastalarda kırılganlık indeksi yüksekliği operasyon kararında tek başına yeterli olmayabilir.

ANAHTAR KELİMELER: Geriatrik hastalar, Kırılganlık indeksi, Cerrahi

ABSTRACT

OBJECTIVE: The CFS (Clinical Frailty Score) evaluates specific domains including function, comorbidity, and cognition to generate a frailty score ranging from 1 (very fit) to 9 (terminally ill). The aim of this study was to investigate the efficacy of CFS in the prediction of mortality in geriatric patients with acute abdominal pathologies.

MATERIAL AND METHODS: Patients over 65 years who presented to the emergency department with acute abdominal pathologies between October 1, 2020 and March 31, 2021 were included in the study. Clinical Frailty Score was calculated and categorized into groups from 1 to 9. Statistical analyses were performed using SPSS version 22.0.

RESULTS: The study included 151 patients, of whom 53% were female. The mean age was 75.57±8.078 years. Twenty-two (14.56%) patients died. Clinical Frailty Score was found to be statistically significantly higher in the non-survivor group (p<0.001). Eighty-three (55%) of the patients underwent surgery. There was no statistically significant relationship between Clinical Frailty Score and mortality in the operated and non-operated groups (p=0.613). We added an age of 75 and over as a criterion (Clinical Frailty Score -age) and compared its predictive ability for mortality with CFS. There was no statistically significant difference between Clinical Frailty Score and Clinical Frailty Score-age in terms of the area under the curve values in the prediction of mortality (the area under the curve Clinical Frailty Score and Clinical Frailty Score-age p=0.597, DeLong quality test).

CONCLUSIONS: High Clinical Frailty Score and Clinical Frailty Score-age are generally associated with mortality, but this may occur due to non-operation, the thought that medical treatment will be sufficient, or risk information due to comorbidities. In geriatric patients, an increased Clinical Frailty Score may not be sufficient alone in making a surgery decision.

KEYWORDS: Geriatrics, Fraility index, Surgery

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INTRODUCTION

Elderly patients are considered to be a high-risk surgical group due to many factors such as variable physiological reserve in surgical care and follow-up, increased susceptibility to hypovolemia, anoxia, infections, immobilization, constipation, and comorbidities. In this group, surgical risk assessment should be undertaken meticulously due to the decrease in cardiovascular reserve and glomerular filtration rate and changes in the ventilation/perfusion ratio (1).

Frailty phenotypes have been developed to define geriatric patients in physiological, psychological and social terms even if they do not present with any organic disease, and these phenotypes have been categorized based on factors such as incontinence, delirium, and falling (2 - 3). For this purpose, frailty phenotypes defined by Fried et al. (4) and the Clinical Frailty Score (CFS) developed by Rockwood et al. (5) are used. CFS evaluates specific domains, including function, comorbidity, and cognition to generate a frailty score ranging from 1(very fit) to 9 (terminally ill).

The primary aim of this study was to investigate the efficacy of CFS in the prediction of mortality in geriatric patients with acute abdominal pathologies. The secondary outcome was the efficacy of CFS in predicting mortality in operated and non-operated patients.

MATERIAL VE METHODS

Study Design

This study was planned as a prospective cohort study and conducted in Umraniye Training and Research Hospital, which is a tertiary healthcare center with 836 beds and receives 2.8 million patient presentations a year, of which 600,000 are made to the emergency department. Approximately 35% of emergency department admissions are geriatric patients.

The emergency department of the hospital contains a resuscitation unit, as well as green, red and yellow zones.

Patient Population

Patients over the age of 65 years who presented to our emergency department with acute abdominal pathologies between October 1, 2020 and March 31, 2021 were included in the study. All patients under 65 years, those that were over 65 but that directly applied to one of our outpatient clinics, those that presented to the emergency department with complaints other than acute abdominal pathologies, and those with missing data or unknown outcomes were excluded from the study.

Data Collection

The patients' admission symptoms, vital signs, examination findings, and laboratory test results were recorded. Age, gender, comorbidities (hypertension, diabetes mellitus, coronary artery disease, chronic obstructive pulmonary disease, chronic kidney disease, and congestive cardiac failure), presence of malignancy, operation status, diagnoses during hospitalization, hemogram parameters (white blood cell, neutrophil, lymphocyte, hemoglobin, hematocrit, and red cell distribution width) and clinical outcomes (ward admission, intensive care admission, and discharge) were evaluated. According to the outcomes, the patients were classified as those that were discharged, those that were hospitalized, those that refused treatment, and those admitted to the intensive care unit. The 30-day mortality rate and length of hospital stay (LOHS) were noted. According to the mortality status, the patients were divided into two groups as survivor and non-survivor, and a mortality analysis was performed using the National Death Notification System, which shows deaths from all causes. CFS was calculated and categorized into groups from 1 to 9, and the patients with a CFS of ≥4 were considered to be frail.

Our primary outcome was the relationship of CFS with 30-day mortality, and our secondary outcome was the relationship between CFS and mortality in operated and non-operated patients.

Assessment of CFS

Frailty was evaluated according to CFS. According to this scoring, the patients were classified as follows: CFS 1, very fit (active and motivated patients); CFS 2, well (patients without active disease symptoms); CFS 3, managing well (patients with controllable comorbidities);CFS 4,

apparently vulnerable (patients with disease symptoms); CFS 5, mildly frail (patients with limited dependence on others for outdoor activities, such as shopping and daily living activities, such as housework); CFS 6, moderately frail (patients dependent on others for all outdoor activities and some domestic needs); CFS 7, severely frail (patients dependent on others for all activities); CFS 8, very severely frail (bedridden patients); CFS 9, terminally ill (5). In our study, the threshold fragility was dichotomized as ≥4; however, there are also studies using a CFS cut-off score of 5 (6).

Ethical Committee

For the study, ethical approval was obtained from the local clinical research ethics committee of our hospital (date: Sep 08, 2020; number: B.10.1.TKH.4.34.H.GP.0.01/326).Patients that had a sufficient level of consciousness and the relatives of patients that were not adequately conscious were invited to participate in the study. An informed consent form was signed by the patients or their relatives who agreed to participate in the study.

Statistical Analysis

Statistical analysis was performed using SPSS version 22.0. The conformance of variables to normal distribution was examined by visual (histogram and probability graphs) and analytic methods (the Kolmogorov-Smirnov test). The chi-square test was conducted to evaluate the relationship between categorical data. The Mann-Whiney U test was used to compare non-parametric numerical data between two groups. If there were more than two groups, the Kruskal-Wallis test was used to compare non-parametric numerical data. We also formed a characteristic curve (ROC) for 30-day mortality and obtained the area under the curve (AUC) values for individual variables. The AUC values of the parameters were calculated and tested mutually for significance with the DeLong quality test. $p<0.05$ was accepted as statistically significant.

RESULTS

Of the total 151 patients included in the study, 53% were female. The mean age was 75.57 ± 8.078 years. Twenty-two (14.56%) patients died. **Table 1** shows the baseline characteristics diagnoses and outcomes of the patients in the sample. Of the patients in the non-survivor group, %50 died after admission to the intensive care unit, 22,7 % after admission to wards, 18,2 % after discharge from hospital, 4,5 % after referral to an external intensive care unit within 30 days. There was a statistically significant difference between the survivor and non-survivor groups in terms of clinical outcomes ($p<0.001$).CFS was found to be statistically significantly higher in the non-survivor group ($p<0.001$). A CFS of ≥ 4 was found in 81.81% of the patients in this group ($p<0.001$).

Table 1: Relationship of demographic characteristics, comorbidities, outcomes, and the Clinical Frailty Score with mortality in geriatric patients admitted to the emergency department with acute abdominal pathologies

	Total	**Survivor**	**Nonsurvivor**	**p**
	151(%100)	129(%85,44)	22(%(14.56%)	
Age (mean, ±)	75.57 ± 8.078	75.05 ± 8.013	78.64 ± 7.950	0.055
Gender(n,%)0.444				
Female	80 (53.0%)	70 (54.3%)	10 (45.5%)	
Male	71 (47.0%)	59 (45.7%)	12 (54.5%)	
Comorbidities (n,%)				
HT	121 (80.1%)	103 (79.8%)	18 (81.8%)	0.546
DM	37 (24.5%)	33 (25.6%)	4 (18.2%)	0.456
COPD	37 (24.5%)	30 (23.3%)	7 (31.8%)	0.116
CAD	66 (43.7%)	53 (41.1%)	13 (59.1%)	0.531
CKD	21 (13.9%)	17 (13.2%)	4 (18.2%)	0.065
Malignancy	27 (17.9%)	20 (15.5%)	7 (31.8%)	0.069
Arthritis	37 (24.5%)	35 (27.1%)	2 (9.1%)	
Fever (mean, ±)				
Hearth rate/min(mean, ±)	36.5 ± 0.346	36.46 ± 0.336	36.68 ± 0.349	**0,003**
Systolic TA(mean, ±)	88.43 ± 18.432	86.02 ± 16.179	102.59 ± 24.193	**0.002**
Diastolic TA(mean, ±)	129.75 ± 23.972	131.64 ± 21.981	118.68 ± 31.771	**0.014**
Saturation %(mean, ±)	73.32 ± 13.801	74.44 ± 13.351	66.77 ± 14.880	**0.024**
	95.79 ± 2.822	96.27 ± 1.948	93.00 ± 4.918	**p <0.001**
Blood parameters				
HGB	12.96 ± 10.428	12.41 ± 2.205	16.14 ± 27.105	**0.002**
HTC	37.50 ± 8.588	38.20 ± 8.592	33.40 ± 7.499	**0.006**
Platelet	270.62 ± 122.197	258.32 ± 112.062	342.68 ± 154.098	0.026
RDW	16.17 ± 10.397	15.98 ± 11.164	17.27 ± 3.311	**p<0.001**
Neutrophil	12.18 ± 31.067	12.29 ± 33.520	11.51 ± 6.698	0.145
Lymphocyte	2.59 ± 10.159	2.66 ± 10.885	2.21 ± 3.844	0.641
Urea	53.75 ± 47.918	50.41 ± 49.194	73.32 ± 34.356	**p<0.001**
Creatinine	1.42 ± 2.780	1.44 ± 2.997	1.32 ± 0.676	0.124
AST	78.25 ± 181.948	68.60 ± 117.021	134.77 ± 386.109	0.24
ALT	55.25 ± 100.515	57.08 ± 105.379	44.50 ± 65.861	0.635
LOHS	5.31 ± 5.266	5.04 ±4.942	6.91 ± 6.789	0.373
Diagnosis				**p<0.001**
Acuteappendicitis	4 (2.6%)	4 (3.1%)	0	
Ileus	39 (25.8%)	35 (27.1%)	4 (18.2%)	
Abscess	7 (4.6%)	6 (4.7%)	1 (4.5%)	
Pancreatitis	21 (13.9%)	21 (16.3%)	0	
Cholecystitis	30 (19.9%)	27 (20.9%)	3 (13.6%)	
Hernia	18 (11.9%)	17 (13.2%)	1 (4.5%)	
Multi-trauma	2 (1.3%)	2 (1.6%)	0	
Perforation	5 (3.3%)	3 (2.3%)	2 (9.1%)	
Diverticulitis	2 (1.3%)	2	0	
Mesentericischemia	9 (6.0%)	3 (2.3%)	6 (27.3%)	
GIS bleeding	9 (6.0%)	7 (5.4%)	2 (9.1%)	
Rectussheathhematoma	1 (0.7%)	1 (0.8%)	0	
Malignancy	1 (0.7%)	0	1 (4.5%)	
Anal fissure	1 (0.7%)	0	1 (4.5%)	
Acute abdomen	1 (0.7%)	0	1 (4.5%)	
Fornier gangrene	1 (0.7%)	1 (0.8%)	0	
Operation (n,%)	83 (55%)			
Frailty score	2.751.390	2.53 ± 1.341	4.09 ± 0.811	**p<0.001**
				p<0.001
Frailty score<4	100 (66.23%)	96 (74.41%)	4 (18.18%)	
Frailty score≥4	51 (33.77%)	33 (25.59%)	18 (81.81%)	
Outcome				**p<0.001**
Admission to ward	71 (47.0%)	66 (51.2%)	5 (22.7%)	
Admission to ICU	13 (8.6%)	2 (1.6%)	11 (50.0%)	
Discharge	60 (39.7%)	56 (43.4%)	4 (18.2%)	
Refused treatment	5 (3.3%)	4 (3.1%)	1 (4.5%)	
Referral to external ICU	2 (1.3%)	1 (0.8%)	1 (4.5%)	
LHOS	5.31 ± 5.266	129 (85.44)	22 (14.56%)	**0.397**

(HT, hypertension; DM, diabetes mellitus; COPD, chronic obstructive pulmonary disease; CAD, coronary artery disease; CKD, chronic kidney disease; CCF,congestive cardiac failure; GIS, gastrointestinal system; HGB, hemoglobin; HCT,hematocrit; RDW, red cell distribution width; AST,aspartate aminotransferase; ALT, alanine aminotransferase; GIS, gastrointestinal system; ICU:intensive care unit; LHOS, length of hospital stay.)

Eighty-three (55%) of our patients underwent surgery. The mean age of the operated patients was 74.86 ± 7.827 years, and 43 (51.8%) were female. Fifteen (18.07%) of the operated patients died, 10 (66.7%) after admission to the intensive care unit and five (33.3%) after admission to the wards. There was a significant difference between the operated and non-operated groups in terms of clinical outcomes (p<0.001). CFS was significantly higher among both the operated and non-operated patients in the non-survivor group (p<0.001 and p=0.001, respectively). In the non-survivor group, CFS was ≥4 in 80% of the operated patients (p<0.001) and85.7% of the non-operated patients (p=0.002).There was no statistically significant relationship between CFS and mortality in the operated and non-operated groups (p=0.613). LOHS was statistically significantly higher in the operated group compared to the non-operated group (p=0.002). The baseline characteristics of the operated and non-operated groups are shown in **Table 2**.

Table 2: Relationship of mortality and investigated parameters in operated and non-operated groups

	Non-operated				Operated			
	Total	Survivor	Non-survivor	p	Total	Survivor	Non-survivor	p
Age (mean, ±)	76.3 ± 8.4	76.2 ± 8.3	76.7 ± 9.945	0.91	74.8 ± 7.8	73.9 ± 7.6	79.53 ± 7.05	0.012
Gender (n, %)				0.14				0.896
Female	37(54.4)	35(57.4%)	2 (28.6%)		43 (51.8)	35 (51.5%)	8 (53.3%)	
Male	31(45.6%	26 (42.6%)	5 (71.4%)		40 (48%)	33 (48.5%)	7 (46.7%)	
Comorbidities (n, %)								
HT	54(79%)	49(80%)	5 (71.4%)	0.58	67(80.7%)	54 (79.4%)	13 (86.7%)	0.519
DM	13(19%)	13(21%)		0.17	24 (28.9%)	20 (29.4%)	4 (26.7%)	0.832
COPD	17(25%)	14 (23%)	3 (42.9%)	0.25	20 (24%)	16 (23.5%)	4 (26.7%)	0.797
CAD	33(48%)	30 (49%)	3 (43%)	0.75	33 (40%)	23 (33.8%)	10 (66.7%)	0.019
CKD	9 (13%)	8 (13.1%)	1 (14.3%)	0.93	12(14.5%)	9 (13.2%)	3 (20.0%)	0.5
CCF	11(16%)	11 (18%)		0.22	12 (14.5%)	10 (14.7%)	2 (13.3%)	0.891
Malignancy	10(14.7)	8 (13%)	2 (28.6%)	0.274	17 (20.5%)	12 (17.6%)	5 (33.3%)	0.173
Arthritis	20(29%)	18 (29.5%)	2 (28.6%)	0.959	17 (20.5%)	17 (25.0%)	0	0.03
Fever (mean,±)	36.5±0.36	36.48±0.34	36.81±0.308	0.01	36.5 ± 0.37	36.45 ± 0.330	36.62 ± 0.359	0.075
Hearth rate/min(mean,±)	87.24±19	84.26± 17	113.14±20.37	0.001	89.4± 17.52	87.59 ± 15.245	97.67 ± 24.867	0.161
Systolic TA (mean, ±)	129.18±24	132.1±23.4	103.43±21.35	0.003	129.92±23.5	131.21 ± 20.787	125.8 ± 33.883	0.329
Diastolic TA (mean, ±)	72.49±15	73.59±14.4	62.86 ± 15.963	0.05	74.19 ± 13	75.21 ± 12.377	68.6 ± 14.549	0.128
Saturation % (mean, ±)	95.91±2.5	96.2 ± 1.8	93.43 ± 5.350	0.126	95.74 ± 3.1	96.34 ± 2.070	92.8 ± 4.887	0.001
Blood parameters								
HGB(g/dl)	12.21±2.4	12.4 ± 2.35	10.57 ± 2.999	0.106	13.52±13.8	12.42 ± 2.079	18.73 ± 32.794	0.008
HTC (%)	38.1±10.6	38.6 ± 10.7	34.07 ± 8.577	0.18	36.89±6.5	37.84 ± 6.057	33.09 ± 7.246	0.022
Platelet(103µ/L)	235±100	225.98± 90	315 ± 146.521	0.123	301.71±131	287.34±121.8	355.6 ± 160.800	0.152
RDW	17.4±15.3	17.16± 16	19.53 ± 4.897	0.003	15.18 ± 2.1	14.93 ± 2.176	16.22 ± 1.562	0.004
Neutrophil(103µ/L)	14.14± 45	14.37± 47.5	12.13 ± 7.501	0.18	10.58±10	10.42 ± 10.770	11.23 ± 6.549	0.456
Lymphocyte(103µ/L)	3.79± 15	4.05± 15.7	1.49 ± 0.649	0.65	1.59±2.06	1.40 ± 0.710	2.55 ± 4.647	0.5
Urea(mg/dL)	48.2±32.5	47.55±33.7	53.82 ± 20.771	0.215	58.37± 56.9	52.98 ± 59.931	82.42 ± 36.149	<0.001
Creatinine(mg/dL)	1.62±3.9	1.69± 4.16	1.04 ± 0.612	0.449	1.25 ± 1.14	1.22 ± 1.231	1.46 ± 0.683	0.014
AST(IU/L)	88.16± 140.7	90.23± 147.15	70.14 ± 65.733	0.25	69.65± 209	49.21 ± 77.206	164.93 ± 467.6	0.397
ALT(IU/L)	63.71± 106.5	64.41± 111.9	57.57 ± 36.687	0.254	47.93± 94.8	50.50 ± 99.498	38.40 ± 76.187	0.859
LHOS	3.97± 3.47	4.00± 3.6	3.71 ± 2.289	0.943	6.37±6.15	5.97 ± 5.764	8.40 ± 7.707	0.397
Diagnosis				0.019				0.001
Acute appendicitis	0	0	0		4 (4.8%)	4 (5.9%)	0	
Ileus	18	17 (27.9%)	1 (14.3%)		21 (25.3%)	18 (26.5%)	3 (20%)	
Abscess	0	0	0		7 (8.4%)	6 (8.8%)	1 (6.7%)	
Pancreatitis	18	18 (29.5%)	0		3 (3.6%)	3 (4.4%)	0	
Cholecystitis	14	11 (18.0%)	3 (42.9%)		16 (19.3%)	16 (23.5%)	0	
Hernia	6	6 (9.8%)			12 (14.5%)	11 (16.2%)	1 (6.7%)	
Multi-trauma	2	2 (3.3%)			0	0	0	
Perforation	0	0	0		5 (6.0%)	3 (4.4%)	2 (13.3%)	
Diverticulitis	2	2 (3.3%)			0	0	0	
Mesenteric ischemia	0	0	0		9 (10.8%)	3 (4.4%)	6 (40.0%)	
GIS bleeding	7	5 (8.2%)	2 (28.6%)		2 (2.4%)	2 (2.9%)	0	
Rectus sheath hematoma	0	0	0		1 (1.2%)	1 (1.5%)	0	
Malignancy	0	0	0		1 (1.2%)	0	1 (6.7%)	
Anal fissure	1		1 (14.3%)		0	0	0	
Acute abdomen	0	0	0		0	0	0	
Fornier gangrene	0	0	0		1 (1.2%)	0	1 (6.7%)	
Operation (n,%)	0	0	0		1 (1.2%)	1 (1.5%)	0	
Frailty score	2.72 ± 1.3	2.56 ± 1.24	4.14 ± 0.690	0.001	2.80 ± 1.47	2.50 ± 1.430	4.07 ± 0.884	p<0.001
				p =0.002				p<0.001
Frailty scoref<4	48(70.6%	47 (77.0%)	1 (14.3%)		52 (62.7%)	49 (72.1%)	3 (20.0%)	
Frailty score≥4	20(29.4%	14 (23.0%)	6 (85.7%)		31 (37.3%)	19 (27.9%)	12 (80.0%)	
Outcome			<0.001					<0.001
Admission to ward	0 (0%)				71 (85.5%)	66 (97.1%)	5 (33.3%)	
Admission to ICU	2 (2.9%)		2 (28.6%)		11 (13.3%)	2 (2.9%)	9 (60.0%)	
Discharge	60 (88%)	56 (91.8%)	4 (57.1%)		0 (0%)			
Referral to external ICU	1 (1.5%)	1 (1.6%)			1 (1.2%)	0	1 (6.7%)	
LHOS	3.97±3.47	4.00± 3.59	3.71 ± 2.289		6.41±6.178	5.97±5.764	8.40±7.707	

(HT, hypertension; DM, diabetes mellitus; COPD, chronic obstructive pulmonary disease; CAD, coronary artery disease; CKD, chronic kidney disease; CCF,congestive cardiac failure; GIS, gastrointestinal system; HGB, hemoglobin; HCT,hematocrit; RDW, red cell distribution width; AST,aspartate aminotransferase; ALT, alanine aminotransferase; GIS, gastrointestinal system; ICU:intensive care unit; LHOS, length of hospital stay.)

In the correlation analysis between CFS, mortality and LOHS, a positive correlation was found between CFS and mortality(r=0.41;p<0.001), but no correlation was observed between LOHS and CFS (r=0.025, p=0.762) or between LOHS and mortality (r=0.073, p=0.375) **(Figure1)**.

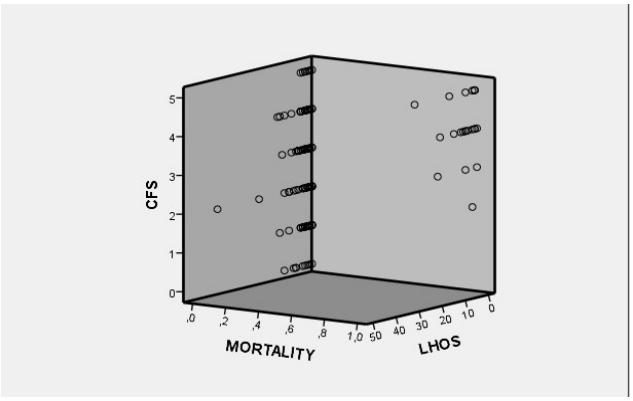

Figure 1: Correlation analysis between CFS, mortality and LOHS

We added the age of 75 years and over as a criterion (CFS-age) and investigated whether there was a statistical difference between CFS and CFS-age in predicting mortality. According to the diagnostic test performance analysis report of CFS and LOHS in predicting mortality, CFS and CFS-age were statistically significant in predicting mortality at a cut-off value of 4 for both [area under the curve (AUC): 0.828 (0.758-0.885) and 0.817 (0.746-875), respectively; p<0.001 for both] **(Table 3)**. When the AUC values of CFS and CFS-age were compared, no statistically significant difference was detected (Delta AUC 0.011; z statistic 0.528;p=0.597, DeLong quality test).

Table 3: Accuracy of the Clinical Frailty Score and Clinical Frailty Score-age in predicting 30-day all-cause mortality

Scores	AUC	95% CI	p	Accuracy	Cut-off value	Sensitivity	Specificity	PPV	NPV	LR+	LR-
CFS	0.828	0.758-0.885	<0.001	56.24	>3	81.82	74.42	35.3	96	3.20	0.24
CFS-A	0.817	0.746-875	<0.001	49.68	>4	63.64	86.05	43.7	93.3	4.56	0.42

(AUC, area under the curve; CI, confidence interval; PPV, positive predictive value; NPV, negative predictive value; CFS:Clinical Frailty Score; CFS-A, Clinical Frailty Score-age)

DISCUSSION

In this study, a statistically significant relationship was found between CFS and mortality in geriatric patients presenting to the emergency department with acute abdominal pathologies regardless of the operation status of the patients. Comorbidities can affect mortality in geriatric patients. It has been found that preoperative and postoperative renal failure is

associated with mortality (7, 8). Since diabetes mellitus affects multiple organs and systems, hypo-hyperglycemia monitoring is extremely important in geriatric patients (8). In addition, postoperative pulmonary complications account for 40% of perioperative mortality. Cardiac complications can predict morbidity and long-term mortality similar to pulmonary complications in major non-cardiac operations (7 - 9). In our study, no statistically significant relationship was observed between mortality and cardiac and pulmonary diseases, kidney pathologies, hypertension, and diabetes. We consider that different results being obtained in the evaluation of the relationship between comorbidities and mortality was effective in the introduction of CFS into clinical practice.

In our study, as predicted, there was a statistically significant relationship between vital signs and mortality, and laboratory parameters were also examined. There was a statistically significant correlation between low hematocrit and high RDW (red cell distribution width) and mortality. Urea elevation was also associated with mortality. Undoubtedly, changes in kidney function and changes in hemogram parameters were effective in making the operation decision. Only 55% of the patients included in our study could be operated on, and the rate of patients who died after discharge in the non-operated group was recorded as 18.2%. We think that the preference of more medical treatment in patients with comorbidities due to the risk of operation caused the absence of a statistically significant relationship between comorbidity and mortality. However, our study included acute abdomen pathologies. The risks of the operated patients related to the operations in question would also differ according to the diagnosis. We observed that there is no mortality in the patients diagnosed with cholecystitis and in the operated group. However, while all patients diagnosed with mesenteric ischemia were operated, the mortality rate was 40% among all patients. Our patients, who were planned to be hospitalized according to the clinical situation at the emergency service admission, were classified according to the admission sites at the first admission, whether they were operated or not. Mortality rate after admission to ward was determined as 22.7%. This patient group was admitted to the intensive care unit during the hospital stay due to the changes in their clinical conditions. Although CFS is evaluated based on clinical opinion, it is an easy and rapid test that is expected to predict patient prognosis (10). The effect of CFS in determining prognosis after cardiac surgical interventions has been discussed in the literature. CFS has been shown to provide supportive data in the prediction of mortality and disability in geriatric patients undergoing aortic valve replacement (11). Rodrigues et al., investigating the relationship between CFS and cardiovascular surgery outcomes, reported that mortality, LOHS, vasopressor requirement, and ventilator follow-up were higher among the patients considered to be frail according to CFS (12). In percutaneous coronary interventions (PCIs), a statistically significant correlation was found between postprocedural mortality and CFS (13). In a study in which patients undergoing PCIs were examined prospectively, a statistically significant relationship was observed between LOHS and CFS. Similarly, Hamonangan et al. found a statistically significant relationship between complications after PCIs and frail patients (14). It has also been suggested that CFS is associated with mortality and postoperative complications following head and neck surgery, and 30-day mortality and admission to the intensive care admission following vascular surgery (15, 16). In our study, 11 (84.61%) of the 13 patients admitted to the intensive care unit died, and a statistically significant relationship was found between CFS and mortality, which is in agreement with the literature. Although we did not observe a statistically significant correlation between LOHS and CFS in all patients, LOHS was significantly higher in the operated group compared to the non-operated group ($p=0.002$).

In a previous study, using different frailty evaluations, it was concluded that the postoperative outcomes of not only cardiac but also oncological and thoracic surgery were negatively affected (17). On the other hand, in meta-analyses, CFS, was found to be superior to the other frailty scales in predicting mortality and prognosis (18). In a geriatric study conducted in Australia with 1,125 patients, a statistically significant relationship was found between mortality and CFS and LOHS, and a statistically significant

difference was observed between respiratory comorbidity and mortality (19). In a study investigating the relationship between CFS and mortality after elective colorectal surgery, Okabe et al. found that CFS was statistically significantly associated with advanced age, postoperative complications, and LOHS (15). In another study, it was determined that discharge could be predicted using the fragility index (20). In a study evaluating patients undergoing elective and emergency surgery, higher CFS was associated with fewer discharges, more postoperative complications, and more deaths (21). CFS dichotomization has been performed in different clinical studies by classifying different values. Similar to our study, Hewitt et al. reviewed emergency surgery admissions and included 2,279 patients in the sample, and reported that LOHS and 30-day mortality were higher among the patients with a CFS of 4 and above (22). In our study, we added age (75 and over) as a criterion and observed no statistically significant difference between CFS and CFS-age in predic ting mortality. This shows that CFS alone has a strong clinical predictive ability for mortality. In our study, the relationship between CFS and mortality was evaluated separately for the operated and non-operated patients, and a significant relationship was found between mortality and CFS in both groups. In a study by Li et al., examining emergency acute abdominal pathologies, CFS was determined to be 3 in 35.1% of the patients, and 4.5% of the patients required a second operation while 13.6% presented to the hospital department for the second time or died after 30 days. The authors noted that there was a statistically significant relationship between the frail status and mortality (23). According to our mortality evaluation, none of the patients that were alive during the 30-day period required an operation.

To the best of our knowledge, the only other study in the literature examining the predictive ability of CFS in the mortality of operated and non-operated geriatric patients belongs to Hewitt et al. The authors evaluated 325 general surgery patients and found that 28% were frail (CFS ≥ 5), and the hospital stay was longer in the frail group (24). In our study, CFS was associated with mortality in both the operated and non-operated groups, and there was no superiority of the CFS-mortality relationship for either group. The operated patients were longer and had a longer hospital stay. In brief, we determined that CFS was associated with mortality, but this parameter alone does not seem to be sufficient in making a decision not to operate on a patient. The use of index calculations alone, such as CFS may not be enough to estimate surgical risk, and bedside expert opinion is essential (25).

Geriatric surgery patients should be carefully examined. Although a high CFS is generally associated with mortality, it may also be caused by the patient not undergoing surgery, considering that medical treatment will be sufficient, or having been informed about risks due to comorbidities. In geriatric patients, an increased CFS may not be sufficient alone in making a surgery decision.

Limitations of the our study, mortality was measured over three months. No distinction was made in the decision of whether or not to perform an operation, with the physicians recommending surgery, admission to wards for medical treatment, or discharge after their examination of the patients. It was not known whether any of the patients underwent surgery after the 30-day period. Lastly, CFS was not evaluated in the postoperative period.

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