

Physician - Coronary Artery Diseases and Surgery

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Study of the Effect of Fat Mass Index and Fat Free Mass Index on Postoperative Complications and Hospitalization in Patients Undergoing Isolated Coronary Artery Bypass Grafting Operation

Osman Türe¹, Fatih Öztürk², Elif Demirbaş², Koray Ak², Sinan Arsan²

¹Mardin Education and Research Hospital, Mardin, Türkiye

²Marmara University Pendik Training and Research Hospital, İstanbul, Türkiye

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E-mail: osmnture@gmail.com

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Objective: This study aimed to investigate the effect of preoperative fat mass and fat-free mass measurements on postoperative morbidity and mortality in patients scheduled for coronary artery bypass grafting (CABG).

Methods: In the prospective study conducted preoperative biochemistry analyses, sex, age, height, weight, body mass index, body surface area, fat mass index (FMI), fat-free mass index (FFMI), fat mass ratio (FMR), and fat-free mass ratio (FFMR) of 120 individuals were recorded. The number of vessels with CABG, postoperative need for inotropic drugs, time of extubation, total duration of intubation, duration of intensive care unit stay, duration of hospitalization, presence of wound drainage, cases of revision, development of pulmonary embolism, postoperative atrial fibrillation, ventricular arrhythmia, postoperative need for an intra-aortic balloon pump and extracorporeal membrane oxygenation, and death. For FMR, FFMR, and FMI, thresholds were determined by receiver operating characteristic analyses on wound drainage. The FFMI was evaluated within the ranges of 18.7 to 21 kg/m² in males and 14.9 to 17.2 kg/m² in females.

Results: Receiver operating characteristic analysis yielded the following thresholds: FMR, 0.26; FFMR, 0.73; and FMI, 7.46. Sex, age, body mass index, hypertension, diabetes, the need for postoperative continuous positive airway pressure or Vapotherm, wound drainage, need for inotropes, intensive care, and length of hospitalization were observed to be associated with FMI, FMR, and FFMR. Furthermore, FMR and FFMR were associated with pulmonary embolism. Patients with FFMI in the normal range had significantly less atrial fibrillation and wound drainage.

Conclusion: Preoperative fat mass measurements (FMI, FMR, FFMR, and FFMI) could effectively predict postoperative morbidity and mortality in patients after CABG. The findings underscore the importance of including fat and fat-free masses in operative risk calculations, as it can significantly enhance the accuracy of predicting complications, improving patient outcomes.

Keywords: Coronary artery bypass grafting, fat mass, fat-free mass, FMI, FMR, FFMI, FFMR, morbidity.

Table 1. Comparison of postoperative and operative results of the groups based on the fat free mass ratio threshold

	Fat-free mass ratio (FFMR)		p
	≤0.73 (n=59)	>0.73 (n=61)	
Age (years) †	62.9±8.1	57.2±10.0	0.001*
Male	43 (72.9)	59 (96.7)	0.001*
Women	16 (27.1)	2 (3.3)	
Diabetes mellitus	34 (57.6)	20 (32.8)	0.011*
Hypertension	42 (71.2)	27 (44.3)	0.005*
Chronic obstructive pulmonary disease	5 (8.5)	6 (9.8)	0.999*
Hyperlipidemia	25 (42.4)	21 (34.4)	0.479*
Height (cm) †	165.8±8.4	171.5±6.8	<0.001**
Body weight (kg) ‡	80.9 [60.0 – 135.0]	77.0 [54.9 – 100.0]	0.005**
Body mass index (kg/m ²) ‡	30.0 [24.2 – 44.0]	26.4 [18.4 – 31.1]	<0.001**
Body Surface Area (m ²) ‡	1.9 [1.6 – 2.5]	1.9 [0.0 – 2.2]	0.413**
NSTEMI [‡]	29 (49.2)	22 (36.1)	0.206*
STEMI [‡]	5 (8.5)	4 (6.6)	0.741*
STS score [§]	6.2 [2.7 – 13.0]	3.6 [0.3 – 14.1]	<0.001**
EuroSCORE score [§]	0.8 [0.4 – 3.3]	0.7 [0.3 – 2.4]	0.039**
Preoperative ejection fraction (%) [‡]	60.0 [27.0 – 72.0]	60.0 [25.0 – 65.0]	0.690**
Total duration of intubation (hours) [‡]	16.0 [7.0 – 240.0]	12.0 [7.0 – 480.0]	0.001**
Time of extubation (hours) [‡]	14.0 [7.0 – 36.0]	12.0 [7.0 – 480.0]	0.001**
Need for CPAP/vapotherm [‡]	22 (37.3)	6 (9.8)	0.001*
Need for inotropes [‡]	38 (64.4)	14 (23.0)	<0.001***
Atrial fibrillation [‡]	16 (27.1)	11 (18.0)	0.331*
Pulmonary Embolism [‡]	5 (8.5)	0 (0.0)	0.026*
Wound drainage [‡]	49 (83.1)	8 (13.1)	<0.001***
Length of stay in postoperative intensive care unit (days) [‡]	2.0 [1.0 – 20.0]	1.0 [1.0 – 36.0]	<0.001**
Length of hospitalization (days) [‡]	11.0 [4.0 – 121.0]	7.0 [4.0 – 36.0]	<0.001**
Mortality [‡]	5 (8.5)	3 (4.9)	0.487*

‡: n (%), †: Mean ± Standard Deviation, §: Median [Minimum-maximum], *Independent Samples T-Test, **Mann-Whitney U test, ***Pearson Chi-Square or Fisher's Exact test.

Table 2. Comparison of postoperative and operative results of the groups based on the fat mass index threshold

	Fat Mass Index (FMI)		p
	>7.46 (n=54)	≤7.46 (n=66)	
Age (years) †	62.4±8.4	58.0±10.0	0.011*
Men [‡]	40 (74.1)	62 (93.9)	0.006*
Women [‡]	14 (25.9)	4 (6.1)	
Diabetes mellitus [‡]	33 (61.1)	21 (31.8)	0.002*
Hypertension [‡]	38 (70.4)	31 (47.0)	0.017*
Chronic obstructive pulmonary disease [‡]	4 (7.4)	7 (10.6)	0.752*
Hyperlipidemia [‡]	25 (46.3)	21 (31.8)	0.152*
Height (cm) †	166.4±8.7	170.6±7.2	0.005*
Body weight (kg) §	83.0 [60.0 – 135.0]	75.0 [54.9 – 100.0]	<0.001**
Body mass index (kg/m ²) §	30.4 [24.7 – 44.0]	26.4 [18.4 – 31.1]	<0.001**
Body Surface Area (m ²) ‡	2.0 [1.6 – 2.5]	1.9 [0.0 – 2.2]	0.016**
NSTEMI [‡]	26 (48.1)	25 (37.9)	0.344*
STEMI [‡]	4 (7.4)	5 (7.6)	0.999*
STS score [§]	6.2 [0.3 – 13.0]	4.0 [1.3 – 14.1]	<0.001**
EuroSCORE score [§]	0.8 [0.4 – 3.3]	0.7 [0.3 – 2.4]	0.013**
Preoperative ejection fraction (%) [‡]	60.0 [27.0 – 72.0]	60.0 [25.0 – 65.0]	0.632**
Total duration of intubation (hours) [‡]	16.0 [7.0 – 240.0]	12.0 [7.0 – 480.0]	<0.001**
Time of extubation (hours) [‡]	15.0 [7.0 – 36.0]	12.0 [7.0 – 480.0]	0.001**
Need for CPAP/vapotherm [‡]	20 (37.0)	8 (12.1)	0.003*
Need for inotropes [‡]	33 (61.1)	19 (28.8)	0.001*
Atrial fibrillation [‡]	15 (27.8)	12 (18.2)	0.302*
Pulmonary Embolism [‡]	4 (7.4)	1 (1.5)	0.173*
Wound drainage [‡]	46 (85.2)	11 (16.7)	<0.001***
Length of stay in postoperative intensive care unit (days) [‡]	2.0 [1.0 – 20.0]	1.0 [1.0 – 36.0]	<0.001**
Length of hospitalization (days) [‡]	10.5 [4.0 – 121.0]	7.5 [4.0 – 36.0]	0.006**
Mortality [‡]	5 (9.3)	3 (4.5)	0.465*

‡: n (%), †: Mean ± Standard Deviation, §: Median [Minimum-maximum], *Independent Samples T-Test, **Mann-Whitney U test, ***Pearson Chi-Square or Fisher's Exact test.

Table 3. Comparison of postoperative and operative results of the groups based on the fat mass ratio threshold

	Fat mass ratio (FMR)		p
	>0.26 (n=57)	≤0.26 (n=63)	
Age (years) †	62.7±8.5	57.5±9.8	0.002*
Men [‡]	42 (73.7)	60 (95.2)	0.002*
Women [‡]	15 (26.3)	3 (4.8)	
Diabetes mellitus [‡]	34 (59.6)	20 (31.7)	0.004*
Hypertension [‡]	40 (70.2)	29 (46.0)	0.013*
Chronic obstructive pulmonary disease [‡]	5 (8.8)	6 (9.5)	0.999*
Hyperlipidemia [‡]	25 (43.9)	21 (33.3)	0.319*
Height (cm) †	166.4±8.5	170.9±7.2	0.002*
Body weight (kg) §	82.0 [60.0 – 135.0]	76.0 [54.9 – 100.0]	0.001**
Body mass index (kg/m ²) §	30.0 [24.2 – 44.0]	26.4 [18.4 – 31.1]	<0.001**
Body Surface Area (m ²) ‡	2.0 [1.6 – 2.5]	1.9 [0.0 – 2.2]	0.123**
NSTEMI [‡]	30 (52.6)	21 (33.3)	0.051*
STEMI [‡]	4 (7.0)	5 (7.9)	0.999*
STS score [§]	6.2 [0.3 – 13.0]	3.9 [1.3 – 14.1]	<0.001**
EuroSCORE score [§]	0.8 [0.4 – 3.3]	0.7 [0.3 – 2.4]	0.030**
Preoperative ejection fraction (%) [‡]	60.0 [27.0 – 72.0]	60.0 [25.0 – 65.0]	0.632**
Total duration of intubation (hours) [‡]	14.0 [7.0 – 240.0]	12.0 [7.0 – 480.0]	<0.001**
Time of extubation (hours) [‡]	14.0 [7.0 – 36.0]	12.0 [7.0 – 480.0]	0.001**
Need for CPAP/vapotherm [‡]	21 (36.8)	7 (11.1)	0.002*
Need for inotropes [‡]	36 (63.2)	16 (25.4)	<0.001***
Atrial fibrillation [‡]	15 (26.3)	12 (19.0)	0.463*
Pulmonary Embolism [‡]	5 (8.8)	0 (0.0)	0.022*
Wound drainage [‡]	49 (86.0)	8 (12.7)	<0.001***
Length of stay in postoperative intensive care unit (days) [‡]	2.0 [1.0 – 20.0]	1.0 [1.0 – 36.0]	0.001**
Length of hospitalization (days) [‡]	11.0 [4.0 – 121.0]	7.0 [4.0 – 36.0]	<0.001**
Mortality [‡]	5 (8.8)	3 (4.8)	0.475*

‡: n (%), †: Mean ± Standard Deviation, §: Median [Minimum-maximum], *Independent Samples T-Test, **Mann-Whitney U test, ***Pearson Chi-Square or Fisher's Exact test.