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CLINICAL PREDICTORS OF CORONARY HEART DISEASE IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFTING WITH ASSESSMENT OF NOSOLOGICAL STRUCTURES BY FREQUENCY OF MULTIVESSEL CORONARY ARTERY DISEASE IN GENDER-AGE ASPECTS

Mamarazhapova Dilorom Abdullaevna
PhD in Medical Sciences, Cardiologist of the Highest Category

Abstract: Objective: To identify clinical predictors of coronary heart disease with assessment of nosological structures by frequency of multivessel coronary artery disease in gender-age aspects in patients after CABG.

Material and methods: The study was conducted at the "American Hospital" clinic in Tashkent. A cross-sectional retrospective study was conducted, which included 234 patients (81.6% men, 18.3% women, mean age 61.5 ± 5.1 years) who underwent elective coronary artery bypass grafting (CABG) in 2022. Inclusion criteria were: confirmed diagnosis of coronary heart disease (CHD), indications for elective CABG, and a complete set of clinical and instrumental data. Nonparametric statistical methods were applied for analysis using SPSS 26.0 and R 4.0.2 programs.

Results: According to the study results, patients in the 60-69 age group demonstrated the highest frequency of multivessel disease (45.7% of cases), with this category of patients predominantly receiving 3-4 grafts. History of arterial hypertension was recorded in 98.3%, diabetes mellitus in 32.4% of patients, serving as concomitant and competing diseases in all operated patient groups. Most patients were operated on for exertional angina, with the majority having Class III exertional angina, comprising 53.8% without a history of AMI. The average number of grafts placed was 3.1±1.0 and 3.3±0.9, with nearly 2/3 of operated patients (63.2%) receiving 3 vessel grafts, 21.3% - 2 vessels, 3% - 1 vessel, and 12.4% underwent placement of 4 vessel grafts. Among these, the highest frequency of multivessel disease was associated with AMI: 70% (3 vessels), ACS: 66.6%, exertional angina: 59.7%. Diabetes mellitus: 68.4%, PIMI: 52.9%.

Conclusions: The obtained data indicate an age-dependent character of multivessel coronary lesions with maximum expression in patients aged 60-69 years. Key clinical predictors were identified (AMI, type 2 diabetes, hypertension) that require special attention when planning revascularization in patients over 60 years. The study results emphasize the need for a differentiated approach to patient selection for CABG, taking into account age characteristics and comorbid background.

Practical significance: The results help optimize patient selection for CABG, individualize approach and minimize risk of complications and improve long-term outcomes.

Keywords: Coronary artery bypass grafting (CABG), Multivessel coronary artery disease, coronary heart disease (CHD), Acute myocardial infarction (AMI), Acute coronary syndrome (ACS).

Relevance

Coronary artery bypass grafting (CABG) is one of the main methods of myocardial revascularization in patients with multivessel coronary artery disease. However, the success of the operation and long-term results largely depend on individual characteristics of patients, including age, gender, presence of comorbidities, and the nature of coronary lesions.

The relevance of this study is due to the need to identify clinical predictors that may affect the frequency of multivessel disease and CABG outcomes, especially in gender-age aspect. Consideration of these factors will optimize patient selection for surgical treatment, minimize the risk of complications, and improve postoperative results. Special attention is paid to patients over 60 years of age, who, as shown in the study, have the highest frequency of multivessel disease and high comorbid burden.

Objective

To identify clinical predictors of CHD in patients who underwent coronary artery bypass grafting with assessment of nosological structures by frequency of multivessel coronary artery disease in gender-age aspects.

Material and Method

A cross-sectional retrospective study was conducted, which included 234 patients who underwent elective coronary artery bypass grafting (CABG) in 2022 at the "American Hospital" clinic (Tashkent). Inclusion criteria were: confirmed diagnosis of coronary heart disease (CHD), indications for elective CABG, and a complete set of clinical and instrumental data necessary for analysis. Exclusion criteria: emergency operations, concomitant severe non-cardiological pathologies in the stage of decompensation, and lack of patient consent to participate in the study.

Demographic, clinical, and laboratory data were systematized and analyzed using modern statistical methods. Qualitative variables are presented as absolute values and percentages, quantitative - as mean with standard deviation (M ± SD) or with 95% confidence interval (CI). Nonparametric criteria (Mann-Whitney test, Kruskal-Wallis) were used to compare groups by continuous indicators, for categorical data - χ^2 test or Fisher's exact test. Statistical significance of differences was determined at $p \leq 0.05$. Data processing was performed using SPSS 26.0 and R 4.0.2 programs.

Ethical approval for the study was obtained from the local committee of the clinic. All patients gave informed consent for the use of their anonymized data for scientific purposes. Results were visualized in tables and graphs for a clear presentation of key patterns.

Results

During the observation period, 234 patients undergoing elective coronary artery bypass grafting were registered. The mean age of patients in the studied cohort was 61.5 ± 5.1 years, ranging from 36 to 82 years. The main 2/3 of patients - 81.6% were men, and only 18.3% were women.

By age aspect among all operated, patients were mainly in the age of 60-69 years comprising - 45.7%, and in the age of 50-59 years - 29% (68 patients). 16.6% were patients aged 70-79 years (39 patients), 7.2% - patients in working age 40-49 years.

The youngest patient who underwent CABG was 34 years old, and in elderly age (80-83 years) it was performed in three patients, comprising 1.3% of all operated. A significant correlation was found between age over 60 years, presence of acute myocardial infarction in history (70% of cases of three-vessel disease) and type 2 diabetes mellitus (68.4% of cases of multiple lesions).

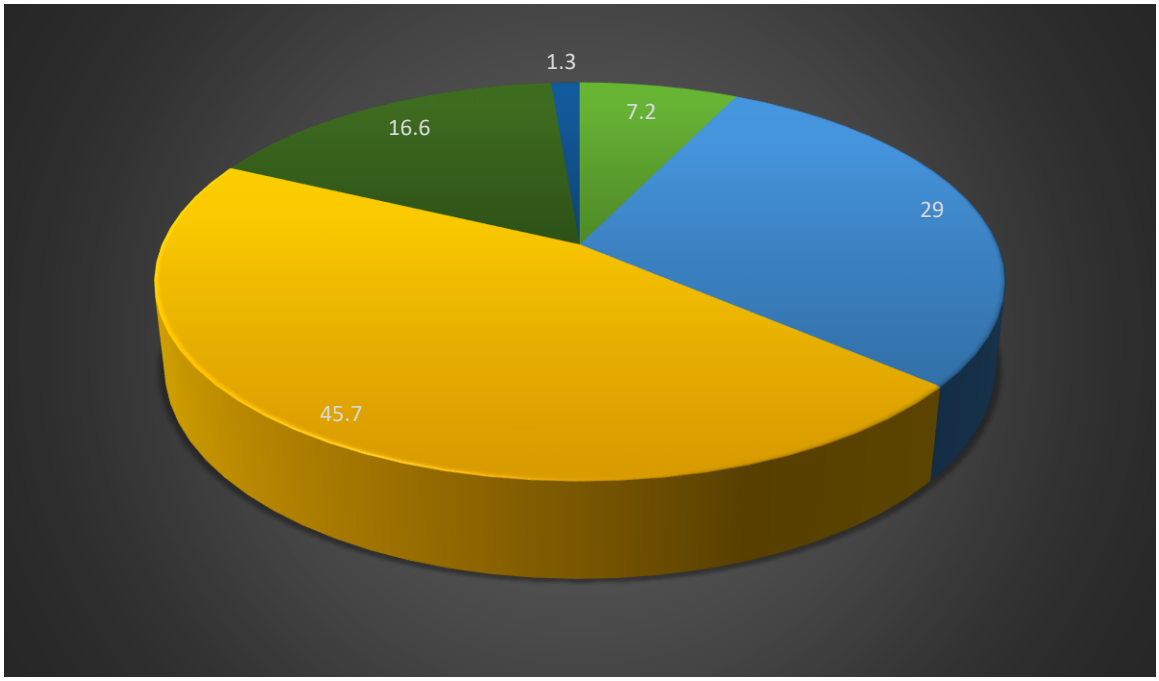


Figure 1. Age aspect of operated patients with coronary artery bypass grafting

The highest frequency of multivessel coronary artery disease was recorded in men aged 60-69 years (48% of cases among men versus 41% among women), with men more often receiving 3-4 grafts. In women, factors such as type 2 diabetes mellitus (72% of multiple lesion cases versus 65% in men) and arterial hypertension (99% of women versus 97.5% of men) played a significant role. In patients of both sexes over 60 years of age, a connection was found between the presence of acute myocardial infarction in history and three-vessel disease (73% in men, 67% in women). Gender differences were manifested in more pronounced comorbidity in women over 70 years of age.

Analysis of data on nosological structures by history among patients with CABG showed hypertensive disease with arterial hypertension (AH) of varying degrees occurred in almost all patients - 98.3%, Type 2 diabetes mellitus was diagnosed in 32.4% of patients. 3.4% of patients had a history of stroke. Chronic obstructive pulmonary disease (COPD) occurred in 7.2% of patients, and pulmonary hypertension (PH) - in 2.1%. 49 patients suffered from obesity, accounting for 21%. 20.5% of patients had liver and biliary tract diseases (Fatty liver, chronic hepatitis, gallstone disease, chronic cholecystitis), and gastrointestinal tract (GIT) diseases were diagnosed in 79 patients, accounting for 33.7%.

Clinical and demographic data are presented in Table 1.

Table 1. Clinical and demographic data of patients with CABG

Parameters	Absolute	%
Male gender	191	81.6
Female gender	43	18.3
Mean age	61.5±5.1 years	(36-82 years)
Arterial hypertension	230	98.3*
Type 2 diabetes mellitus	76	32.4*
History of stroke	8	3.4
Obesity	49	20.9
COPD	17	7.2
CKD	32	13.6

PH	5	2.1
Liver and biliary tract diseases	48	20.5
GIT diseases	79	33.7
Total	234	100

Note: *p<0.05

Thus, of all operated patients, hypertensive disease and diabetes mellitus were considered concomitant and competing diseases, which provoke and complicate the course of pre-operative and post-operative periods. GIT diseases were noted in 1/3 of patients (33.7%), which indicates long-term use of antiplatelet agents (acetylsalicylic acid), which possibly led to various GIT diseases.

Table 2. Nosological structure of patients with CABG included in the study

Parameters	Absolute	%
Silent myocardial ischemia	10	4.2
Stable angina	139	59.4*
Angi I	2	0.8
II	5	2.1
III	126*	53.8*
IV	6	2.6
ACS	42	17.9
Progressive angina		
AMI	60	25.6
History of CA stenting	15	6.4
PIMI	113	48
Atrial fibrillation	9	3.8
CHF	234	100
Total	234	100

Note: *p<0.05

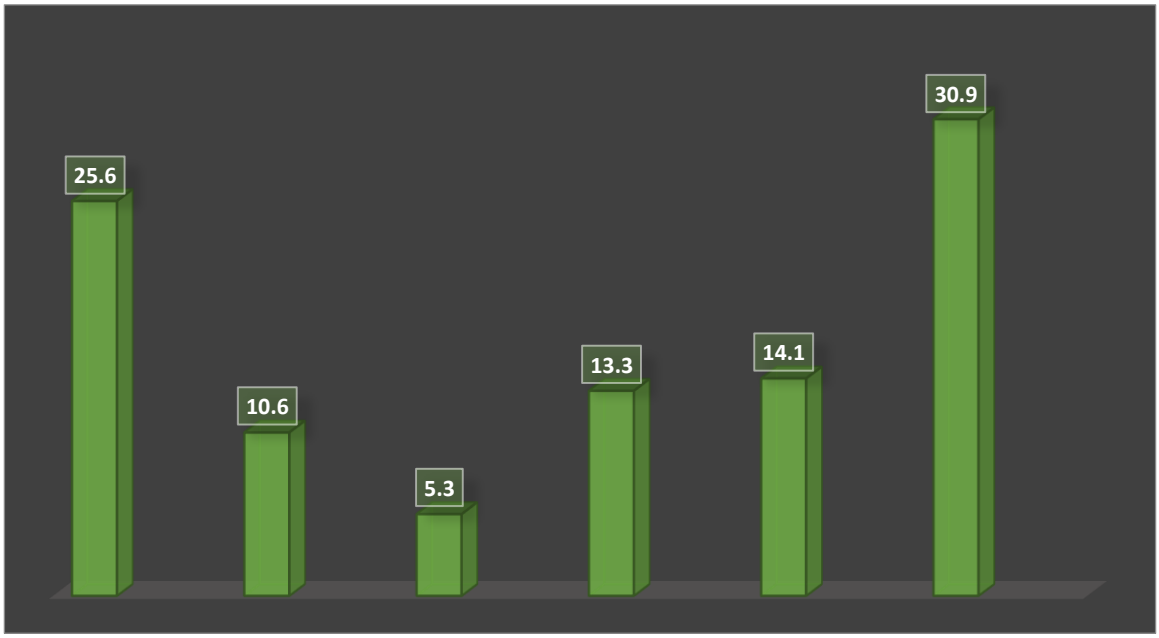
According to our study results, the majority (59.4%) of patients were operated on for exertional angina, with the main part of them having Class III exertional angina, comprising 53.8%, without a history of AMI. Of 139 patients with exertional angina, 40% (n-56) primarily underwent coronary angiography in our clinic with detection of multivessel coronary artery disease, after consultation with a cardiac surgeon, CABG operation was performed. Among the conducted operations, in 6.4% of patients with exertional angina, coronary angiography with coronary artery stenting was previously performed, on average within 5 years. This shows that patients with previously implanted stents do not conduct timely rehabilitation and preventive measures, timely treatment for CHD.

Of those operated, 17.9% were patients with progressive angina (Table 2).

According to the study, after coronary angiography, CABG was performed in 25.6% of patients who presented to the clinic with AMI.

According to anamnestic data, a history of myocardial infarction was diagnosed among 113 operated patients at 48%, of which 25.6% had AMI within 1 year (in 29 patients), 10.6% had AMI 2 years ago (in 12 patients), 5.3% (in 6 patients) 3-4 years ago. More than 5 (5-9 years) years ago in 15 patients (13.3%), more than 10 years ago in 16 patients (14.1%) with a history of myocardial infarction. As shown in the

graph, of 113 patients with a history of myocardial infarction, according to ECG and echocardiography data, it was diagnosed in 35 patients - 30.9% more than diagnosed PIMI. This indicates that patients with unknown history of myocardial infarction do not pay attention to timely diagnosis and treatment, and this leads to multivessel coronary artery disease.



According to the study results, the average number of grafts placed in the cohort was 3.1±1.0 and 3.3±0.9. It should be noted that nearly 2/3 of operated patients, 63.2% (n-148), received 3 vessel grafts. In 21.3% (n-50) 2 vessels, 3% (n-7) - 1 vessel. In 12.4%, operation with placement of 4 vessel grafts was performed.

Table 3. Analysis of data from patients after CABG by nosological structures and by number of grafted arteries

Number of grafted arteries	AMI Abs(%)	Exertional angina Abs(%)	ACS Abs(%)	PIMI Abs(%)	PIMI by ECG and echo Abs(%)	DM in history Abs(%)
1 graft	2 (3.3)	5 (3.6)	1 (2.4)	2 (5.9)	4 (5.1)	2 (2.6)
2 grafts	8 (13.3)	35 (21.5)*	8 (19)	5 (14.7)	15 (19.2)	13 (17.1)
3 grafts	42 (70)*	83 (59.7)	28 (66.6)	18 (52.9)	53 (67.9)	52 (68.4)*
4 grafts	8 (13.3)	16 (11.5)	5 (11.9)	9 (26.5)*	6 (7.7)	9 (11.8)
Total	60	139	42	34	78	76

Analysis of data on the number of grafted arteries shows that all patients with various nosologies had three-vessel disease. Among patients with acute myocardial infarction (AMI), three-vessel disease was noted in 70% of patients, among patients with exertional angina - in 59.7% of cases. In patients with acute coronary syndrome (ACS), three-vessel disease - in 66.6% of cases, with postinfarction cardiosclerosis (PIMI) - in 52.9% of cases. According to data obtained during examination of PIMI by ECG and echocardiography, three-vessel disease - in 67.9% of patients, among patients with diabetes mellitus in history in 68.4% of cases. Four-vessel disease was significantly more registered in patients with a history of PIMI. As mentioned above, patients with PIMI seek coronary angiography late, due to which more multiple affected

vessels are detected. In patients with exertional angina, ACS, DM, PIMI according to ECG and echocardiography data, two and three-vessel disease was mainly noted.

These data confirm the high frequency of multiple vessel lesions in patients with cardiovascular diseases, especially among patients with AMI, PIMI, especially PIMI according to ECG and echocardiography, patients with ACS and exertional angina.

Discussion

The study results confirm that multivessel coronary artery disease has an age dependence, peaking in patients aged 60-69 years. This is consistent with data from other studies indicating progression of atherosclerotic changes with age. It is important to note that men in this age group demonstrate a higher frequency of lesions, while women - greater comorbidity, including diabetes mellitus and arterial hypertension. These gender differences emphasize the need for an individual approach to treatment.

Among the key clinical predictors of multivessel lesions highlighted are:

- Acute myocardial infarction (AMI) in history (70% of cases of three-vessel disease).
- Acute coronary syndrome (ACS) (66.6%).
- Type 2 diabetes mellitus (68.4%).
- Arterial hypertension (98.3%).

These factors not only increase the risk of severe coronary artery disease but also complicate postoperative management of patients. For example, diabetes mellitus is associated with more rapid progression of atherosclerosis and increased risk of restenosis after CABG.

Special attention deserves the high frequency of comorbid conditions, such as GIT diseases (33.7%) and obesity (20.9%), which may be related to long-term use of antiplatelet agents and other factors. This indicates the need for a comprehensive approach to patient management, including correction of concomitant diseases and prevention of complications.

The practical significance of the study lies in the possibility of using the obtained data for:

- Optimization of patient selection for CABG, taking into account age and gender characteristics.
- Development of individual revascularization strategies, especially in patients with high comorbid background.
- Improvement of long-term results through early diagnosis and correction of risk factors.

Overall, the study results emphasize the importance of a differentiated approach to planning CABG, which can contribute to reducing postoperative complications and improving patients' quality of life.

Conclusions

1. The study results show gender-age specificity of multivessel coronary artery disease with peak manifestation in the 60-69 age group, where men demonstrate more frequent lesions, and women - greater comorbid burden.
2. Among operated patients, AH (98.3%) and diabetes mellitus (32.4%) were considered concomitant and competing diseases.
3. The average number of grafts placed was 3.1±1.0 and 3.3±0.9, which is nearly 2/3 of operated patients. In 63.2%, 3 vessels were grafted, in 21.3% - 2 vessels, 3% - 1 vessel, in 12.4% placement of 4 vessels was performed.

4. The highest frequency of multivessel disease is associated with AMI: 70% (3 vessels), ACS: 66.6%, exertional angina: 59.7%. Diabetes mellitus: 68.4%, PIMI: 52.9%.
5. Key clinical predictors AMI, ACS, Type 2 DM, AH were identified, requiring special attention when planning revascularization in patients over 60 years.
6. The study results emphasize the need for a differentiated approach to patient selection for CABG, taking into account age characteristics and comorbid background.

References

1. Knuuti J., Wijns W., Saraste A. et al. 2019 ESC Guidelines for the diagnosis and management of chronic coronary syndromes. European Heart Journal. 2020;41(3):407-477.
2. Neumann F.J., Sousa-Uva M., Ahlsson A. et al. 2018 ESC/EACTS Guidelines on myocardial revascularization. European Heart Journal. 2019;40(2):87-165.
3. Head S.J., Milojevic M., Daemen J. et al. Mortality after coronary artery bypass grafting versus percutaneous coronary intervention with stenting for coronary artery disease: a pooled analysis of individual patient data. The Lancet. 2018;391(10124):939-948.
4. Harskamp R.E., Lopes R.D., Baisden C.E. et al. Saphenous vein graft failure after coronary artery bypass surgery: pathophysiology, management, and future directions. Annals of Surgery. 2013;257(5):824-833.
5. Arnold S.V., Bhatt D.L., Barsness G.W. et al. Clinical management of stable coronary artery disease in patients with type 2 diabetes mellitus: a scientific statement from the American Heart Association. Circulation. 2020;141(19)
6. Lawton J.S., Tamis-Holland J.E., Bangalore S. et al. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization. Journal of the American College of Cardiology. 2022;79(2)
7. Fihn S.D., Blankenship J.C., Alexander K.P. et al. 2014 ACC/AHA/AATS/PCNA/SCAI/STS Focused Update of the Guideline for the Diagnosis and Management of Patients With Stable Ischemic Heart Disease. Journal of the American College of Cardiology. 2014;64(18):1929-1949.
8. Gaudino M., Benedetto U., Fremes S. et al. Association of Radial Artery Graft vs Saphenous Vein Graft with Long-term Cardiovascular Outcomes among Patients Undergoing Coronary Artery Bypass Grafting. JAMA. 2020;324(2):179-187.
9. Levine G.N., Bates E.R., Bittl J.A. et al. 2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease. Journal of the American College of Cardiology. 2016;68(10):1082-1115.
10. Sabik J.F., Blackstone E.H., Gillinov A.M. et al. Influence of Patient Characteristics and Arterial Grafts on Freedom From Coronary Reoperation. Journal of Thoracic and Cardiovascular Surgery. 2016;151(1):116-123.
11. Biancari F., Myllylä M., Lepojärvi S. et al. Frailty is a predictor of short- and mid-term mortality after elective cardiac surgery independently of age. Interactive Cardiovascular and Thoracic Surgery. 2019;28(2):245-251.
12. Park D.W., Ahn J.M., Park H. et al. Ten-Year Outcomes After Drug-Eluting Stents Versus Coronary Artery Bypass Grafting for Left Main Coronary Disease. Circulation. 2020;141(18):1437-1446.