Coronary Angiography Results of a Newly Opened Heart Center

Yeni Açılan Bir Kalp Merkezinin Koroner Anjiografi Sonuçları

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Abstract

Introduction Bandırma and the surrounding districts are in a geographical location with a dynamic population and a large number of immigrants due to university, industry, agriculture and trade. In this context, the coronary artery disease profile can be evaluated as a reflection of the country in general. In this study, it was aimed to determine the coronary artery disease profile of patients who underwent coronary angiography in Bandırma Training and Research Hospital, a new heart center, and the region where the hospital is located.

Materials and Methods Patients who underwent coronary angiography after the establishment of the heart center in Bandırma Training and Research Hospital were included in the study. The patients' age, gender, diagnosis, which treatment decision was made as a result of coronary angiography, stent restenosis, graft patency and coronary artery anomalies were evaluated.

Results The number of patients who underwent coronary angiography was 3238 and 1079 unstable angina pectoris, 959 stable angina pectoris, 573 non-ST elevation myocardial infarction, 325 inferior myocardial infarction, 258 anterior myocardial infarction, 37 posterior myocardial infarction, 7 lateral myocardial infarction was diagnosed. The mean age of the patients was 62±12 years, and the mean age of angiography in females was 4 years longer than males. It was observed that medical treatment was given to 1209 patients, percutaneous coronary intervention to 1630 patients, and bypass surgery to 399 patients.

Conclusion The region is a location with a dynamic population and heavy migration due to the university, agriculture, trade, developed industry and port. Therefore, since the population of our region includes races from various regions of the country, we concluded that our results in the study may reflect the country-wide.

Keywords Coronary angiography, Coronary artery disease, Coronary Anomaly

Özet

Giriş Bandırma ve çevre ilçeler, üniversite, sanayi, tarım ve ticaret nedeniyle dinamik bir nüfusa sahiptir ve çok sayıda göç alan bir coğrafi konumdadır. Bu bağlamda koroner arter hastalığı profili ülke genelinin bir yansıması olarak değerlendirilebilir. Bu çalışmada, yeni bir kalp merkezi olan Bandırma Eğitim ve Araştırma Hastanesi'nde ve hastanenin bulunduğu bölgede koroner anjiyografi yapılan hastalarda koroner arter hastalığı profilinin belirlenmesi amaçlanmıştır.

Gereç ve Yöntemler Çalışmaya Bandırma Eğitim ve Araştırma Hastanesi'nde kalp merkezi kurulduktan sonra koroner anjiyografi yapılan hastalar dahil edildi. Hastaların yaşı, cinsiyeti, tanıları, koroner anjiyografi sonucunda hangi tedavi kararı verildiği, stent restenozu, greft açıklığı ve koroner arter anomalileri değerlendirildi.

Bulgular Koroner anjiyografi yapılan 3238 hasta dahil edildi. 1079 kararsız anjina pektoris, 959 kararlı anjina pektoris, 573 ST yükselmesiz miyokard enfarktüsü, 325 inferior miyokard enfarktüsü, 258 anterior miyokard enfarktüsü, 37 posterior miyokard enfarktüsü, 7 lateral miyokard enfarktüsü teşhisi konuldu. Hastaların yaş ortalaması 62±12 olup kadınlarda anjiyografi yaş ortalaması erkeklerden 4 yıl fazlaydı. 1209 hastaya medikal tedavi, 1630 hastaya perkütan koroner girişim ve 399 hastaya bypass cerrahisi uygulandığı görüldü.

Sonuç Bölge, üniversite, tarım, ticaret, gelişmiş sanayi ve liman nedeniyle dinamik bir nüfusa ve yoğun göçe sahip bir lokasyondur. Dolayısıyla bölgemizin popülasyonu ülkenin çeşitli bölgelerinden ırkları içerdiğinden, çalışmadaki sonuçlarımızın ülke genelini yansıtabileceği sonucuna vardık.

Anahtar Kelimeler Koroner anjiyografi, Koroner arter hastalığı, Koroner Anomali

INTRODUCTION

Cardiovascular diseases (CVD) constitute the main public health problem that causes the highest mortality and morbidity in the world and in our country. According to the data of the Turkish Statistical Institute, circulatory system diseases take the first place among the causes of death in 2021 with 33.4% (1).

In the 10-year follow-up data of the Heart Disease and Risk Factors in Turkish Adults (TEKHARF) study, initiated by the Turkish Society of Cardiology in 1990, approximately 420 thousand coronary events occur annually in our country, of which 120 thousand occur in patients with previously diagnosed coronary artery disease (CAD). Recurrence consists of 180 thousand new acute coronary syndrome (ACS) and 120 thousand new chronic stable coronary artery disease (CCAD), which is more common in women (2).

Bandırma and the surrounding districts are in a geographical location with a dynamic population and intensive immigration due to university, industry, agriculture and trade. In this context, the coronary artery disease profile can be evaluated as a reflection of the country in general rather than local data.

In this study, it was aimed to investigate the diagnosis of CAD, frequency, age, gender difference, stent and graft patency rate and coronary artery anomalies in patients who applied to the emergency department and cardiology outpatient clinic of Bandırma Training and Research Hospital.

MATERIAL and METHODS

Our study was approved by the Bandırma Onyedi Eylül University, Faculty of Health Sciences Non-invasive Clinical Researches Ethics Committee (Date: 23/02/2023, Decision No: 321). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. The files and angiography images of the patients who applied to the emergency department and cardiology outpatient clinic between 07/2019 and 07/2022, the date of coronary angiography (CAG) service in Bandırma Training and Research Hospital, were retrospectively analyzed.

Patients' age, gender, diagnosis, CAG results, which decision was made and the treatment strategy was chosen as a result of angiography, stent restenosis, if there was graft patency, coronary artery anomalies were evaluated.

Coronary artery lesions; were classified as normal, 50% and below, 50%-70%, 70% and above. Stent restenosis was defined as 50% or more in any coronary artery. Graft patency was classified as normal or 50% or more stenosis. If myocardial bridge (MB) and coronary slow flow (CSF) were detected in any coronary artery, it was evaluated as present or absent. Treatment decisions as a result of CAG were classified as medical follow-up/ percutaneous coronary intervention (PCI)/ coronary artery bypass grafting (CABG).

Statistical analyzes were performed using SPSS 23. The conformity of the variables to the normal distribution was examined by visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). In the comparison between groups, parametric and non-parametric tests were used in accordance with the data. Student's t test was used for independent samples for normally distributed parameters and Mann-Whitney U test was used for non-normally distributed variables. Values with $p<0.05$ were considered statistically significant.

RESULTS

The number of patients who underwent CAG was 3238. 1079 unstable angina pectoris (USAP), 959 stable angina pectoris (SAP), 573 non-ST elevation myocardial infarction (NSTEMI), 325 Inferior myocardial infarction (MI), 258 Anterior MI, 37 Posterior MI, 7 Lateral MI was diagnosed. It was observed that the number of patients who underwent CAG for any reason in men was approximately twice that of women (Table 1).

Table 1. *Distribution of Diagnoses by Gender*

	NSTEMI	USAP	SAP	AMI	IMI	PMI	LMI	Total
Female	166	304	470	61	74	12	2	1089
	15,2%	27,9%	43,2%	5,6%	6,8%	1,1%	0,2%	100%
Male	407	775	489	197	251	25	5	2149
	18,9%	36%	22,8%	9,2%	11,7%	1,2%	0,2%	100%
Total	573	1079	959	258	325	37	7	3238
	17,7%	33,3%	29,6%	8%	10%	1,1%	0,2%	100%

NSTEMI: non-ST elevation myocardial infarction, USAP: unstable angina pectoris, SAP: stable angina pectoris, IMI: Inferior myocardial infarction, AMI: anterior myocardial infarction, PMI: posterior myocardial infarction, LMI: lateral myocardial infarction

The mean age of the patients was 62±12 years, and the mean age was 4 years more in women than in men. In addition previous history of PCI and bypass was found to be much more common in males (Table 2). In our study, the number of patients with normal coronary artery by CAG was 333, and it was 10% of the total patients. When patients who underwent CAG with the diagnosis of SAP were examined, there were mostly insignificant stenosis in the left anterior descending coronary artery (LAD), circumflex coronary artery (CX), and right coronary artery (RCA). In 10% of the patients, 70% or more stenosis was observed in one or more of the coronary arteries. In two patients, 70% or more stenosis was detected in the left main coronary artery (LMCA). 4% of the patients had CFA and 3.7% had MB. It was determined that medical treatment decision was made in 926 patients, PCI decision was made in 25 patients, and CABG decision was made in 8 patients. The mean age was 59±12 years.

Table 2. Age and Coronary Artery Disease History of the Patients by Gender

	Total	Female	Male	P value
Age	62 ±12	64 ±12	60 ±12	<0.001
Pr. PCI	434 (13,4%)	95 (8,7%)	339 (15,8%)	<0.001
Pr. CABG	186 (5,7%)	32 (2,9%)	154 (7,2%)	<0.001

Pr. PCI: Previous Percutaneous Coronary Intervention; Pr. CABG: Previous Coronary Artery Bypass Grafting Surgery

CAG was performed in 1652 patients with the diagnosis of USAP and NSTEMI. The mean age of these patients was 63±12 years. Lesions of 70% or more were detected in 1040 patients in LAD, 883 in CX, and 843 patients in RCA. In LMCA, 128 patients had 50% or more stenosis. CSF was detected in 1% of the patients and MB was found in 1.4%. It was observed that 1012 patients were treated for PCI, 357 patients for CABG, and 283 patients for medical treatment.

In patients treated with the diagnosis of STEMI; Acute Inferior MI was diagnosed in 325 patients and their mean age was 62±11, 258 patients had Acute Anterior MI and mean age was 60±13, 37 patients had Acute Posterior MI and mean age was 64±12.7, 7 patients had Acute Latertal MI and mean age was 58±15 years. Looking at the genders, 473 were male and 147 were female. It was seen that PCI was decided in 588 patients and CABG decision was made in 32 patients. A total of 23 patients, 7 in Anterior MI, 15 in Inferior MI, and 1 in Posterior MI, had 50% or more significant stenosis in the LMCA. PCI was decided for 245 patients with anterior MI, and CABG for 13 patients. PCI was decided for 307 patients who were treated with the diagnosis of inferior MI, and CABG was decided for 18 patients. In patients with posterior MI, PCI was decided in 36 patients and CABG in 1 patient.

When CAG reports made for any reason were examined, lesions of 70% or more were observed as 1423 in LAD, 1130 in CX, and 1225 in RCA. Of 400 patients who had undergone PCI at any time in the past, 172 had stent restenosis in at least one vessel. Considering the distribution of the coronary artery, 90 out of 211 patients with stent implanted in LAD, 50 out of 134 patients with stent implanted in CX, and 58 out of 124 patients with stent implanted in RCA had stent restenosis. In 48 of 186 patients with a previous history of bypass, 50% or more stenosis was observed in one and/or more than one vessel, and the diagnosis was USAP/NSTEMI in most of the patients.

Coronary artery anomaly was detected in 23 patients; It was seen that LAD and CX originate from separate ostia in 14 patients, RCA originates from the left coronary sinus in 4 patients, CX originates from the right coronary ostium in 3 patients, and coronary artery fistula in 2 patients.

DISCUSSION

STEMI constitutes a quarter of all ACS, and USAP and NSTEMI constitute the remainder (3). The prevalence of USAP and NSTEMI associated with the increase in the elderly and diabetic population and early diagnosis has gradually increased and has become two-thirds of all ACS (4). When the data of our region were examined, it was seen that two-thirds of ACS were USAP and NSTEMI. The elderly population is increasing due to the fact that the region is more preferred by the elderly for holiday purposes in the summer season. It may be the reason for the increased rate of USAP and NSTEMI in ACS.

Normal coronary artery ratio as a result of CAG is an important parameter that shows the effective use of CAG. In a study conducted with 12201 patients who underwent elective CAG in our country, the frequency of normal coronary artery disease was found to be 27%. Critical coronary lesions were in LMCA in 3%, LAD in 55%, Cx in 39%, RCA in 41%, and IM in 2% of patients (5). In another study conducted in our country, 14.6% normal coronary arteries were found in patients who underwent CAG, while severe CAD was found in 59.8%. Single-vessel disease was observed in 47.5% of patients with obstructive CAD, two-vessel disease was observed in 28.4%, and 3-vessel disease was observed in 24.1% patients (6). In our study, the normal coronary rate was found to be 10%. We think that CAG was performed more frequently in our hospital due to acute coronary syndrome because angiography service was just started in our region and CCAD patients received service from developed hospitals in important cities close to our region. Critical lesion distribution was observed as LMCA 4.3%, LAD 43%, CX 34%, RCA 38%. The number of inferior myocardial infarctions was higher in patients with STEMI due to its association with RCA and CX. 325 inferior myocardial infarction, 258 anterior myocardial infarction, 37 posterior myocardial infarction, 7 lateral myocardial infarction were diagnosed. When the treatment decisions were examined according to the CAG results, it was determined that 926 patients were given medical treatment, 25 patients were PCI, and 8 patients were CABG. In USAP

patients, it was observed that 556 patients were treated for PCI, 292 patients for CABG, and 231 patients for medical treatment. It was observed that in NSTEMI patients, PCI was decided in 456 patients, CABG in 65 patients, and medical treatment in 52 patients. It was determined that PCI was applied to most of the STEMI patients, CABG decision was taken in 32 patients and no medical treatment decision was made.

The number of CAG was 2 times higher, PCI history 3 times, and bypass history 5 times higher in men. While the rate of CAD was higher in women, the diagnosis of ACS was more common in men, and the mean age of CAG was found 4 years earlier in men. Until menopause, ischemic heart disease is 4 times more common in men than women. In the postmenopausal period, the prevalence is equal in men and women. The lower incidence of ischemic heart disease in the premenopausal period may be due to the positive effects of estrogen on the lipid profile (7-8). The habit of going to the hospital is higher in women than in men, so women can be diagnosed early while they are still stable. In addition, patients who underwent CAG due to SAP may not fully reflect our region. It is known that our region is close to major cities and health centers, and that patients who are scheduled for CAG in the summer season have CAG in their places of residence due to the problem of accompaniment or accommodation. In a study conducted in the southern Marmara region, 66% of the patients who underwent CAG were male and 34% were female. The majority of the patients are between the ages of 50-59 (5). In another study conducted in our country, the mean age of patients who underwent coronary angiography was 62.1, and 63% of these patients were male. 13.6% of the patients had a previous history of stenting and 8.8% had a previous history of CABG (6). It has been found that the incidence of myocardial infarction is significantly lower in women and increases dramatically after menopause. It is also known that CAD mortality is higher in women than in men (9). However, in general, women's symptoms related to CAD are not given enough attention and they benefit from advanced diagnostic procedures less than men (10).

CABG is the major treatment option in patients with three-vessel disease, reduced left ventricular function, and significant LMCA lesions. The LMCA provides blood flow to 75% or more of the heart muscle. In centers where coronary angiography is performed, significant stenosis in the LMCA is seen around 6% (11-12). In our study, the rate of significant lesions in LMCA was 4.3%. It was determined that the bypass decision was mostly made in USAP/NSTEMI patients with 3-vessel disease.

CSF is a pathology at the microvascular level, characterized by slow clearance of the opaque material without significant stenosis in the epicardial coronary vessels, which can sometimes cause angina, a disease seen at a rate of 1-7% (13). In a study conducted in Turkey, the frequency of CSF was 3.5%, and SAP was the most common (34%) in admission clinics, while USAP (33%) was the second most common. (14). In our study, the rate of CSF was found to be 1.8% and the diagnosis was mostly SAP, followed by USAP and NSTEMI in the second place.

MB is defined as the passage of some or all of the coronary arteries, which should be epicardial, through the heart muscle. During systole, while the heart contracts, the vessel passing through it narrows and findings such as coronary artery occlusion occur. It is seen between 1.5% and 16% in humans. It can cause problems ranging from asymptomatic to death, although rare (15). This disease is usually seen in the middle of the LAD vein, which is the largest vein of the heart. In our study, MB rate was around 1.85% and it was mostly found in patients who underwent CAG for LAD and SAP. In a study conducted in the Central Anatolia region of our country, the frequency of MB was found to be 0.94% (16). In a similar study conducted in the Eastern Anatolia region, it was found to be 1.1% (17). In a coronary angiography study in which twenty-five thousand nine hundred and eighty-two patients were retrospectively analyzed, MB was detected in a total of 316 patients, and its prevalence was found to be 1.22% in this study (18).

Congenital coronary artery anomalies are seen in 0.5% of the society. In a previous study in our country, the rate of coronary artery anomaly was found to be 0.42%. The most common anomaly is LAD and CX originating from separate ostia. This is followed by RCA exiting the left coronary sinus and CX exiting the right coronary sinus. Although these anomalies are rare, they are important because they cause

myocardial dysfunction, arrhythmia, syncope, angina, and sudden death (19-20). In our study, the rate of coronary artery anomaly was 0.7%, most of which consisted of LAD and CX originating from separate ostia. In addition, 4 patients with RCA originating from the left coronary sinus, 3 patients with CX originating from the right coronary ostium and 2 patients with coronary artery fistula were detected. In another retrospective study conducted in Turkey and involving 70,850 people; The frequency of major coronary artery anomaly was found to be 0.24% (21).

Percutaneous coronary intervention procedures were initiated with balloon angioplasty in the 1970s. Despite the high success rates in the early period, the biggest problem was restenosis, which developed around 50%. In order to cope with this problem, coronary stenting has been started, but it has not been successful at the desired level. In the general evaluation of studies, it is known that restenosis develops around 40% after stenting, although it may vary according to patient characteristics and lesion character (22-25). In our study, it was determined that the problem of retcenosis, which we see around 40%, is also an important problem for our region. In a study conducted in our country, the rate of angiographic restenosis in drug-eluting stents (DES) was 13%, while the rate of restenosis in bare metal stents (BMS) was 34% (26). In another study conducted in our country, restenosis was observed in 43% patients with BMS, while restenosis was observed in 23% patients with DES (27).

CONCLUSION

Bandırma and its surrounding settlements are located at the intersection of three important cities such as İstanbul, İzmir and Bursa. The region is a location with a dynamic population and heavy migration due to the university, agriculture, trade, developed industry and port. In coronary angiography performed for any reason in our country, the rates of saphenous disease, stent stenosis, coronary artery anomaly, MB, CFA are not clear. When the literature is examined for the profile of coronary artery disease in our country, the data of our country in general regarding cardiovascular diseases are limited.

Therefore, since the population of our region includes races from various regions of the country, we concluded that our results in the study may reflect the country-wide.

Ethics Committee Approval:

The study was initiated with the approval of the Bandırma Onyedi Eylül University Faculty of Health Sciences Medical Researches Ethics Committee (Date: 23/02/2023, Decision No: 321).

Conflict of Interest Statement:

The authors have no conflicts of interest to declare.

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Author Contributions:

All of the authors declare that they have all participated in the design, execution, and analysis of the paper and that they have approved the final version

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