Clinical and Paraclinical Characteristics of Patients With Coronary Artery Anomalies

Lucian Predescu[1], Adrian Bucsa[1], Marian Croitoru[1], Adrian Mereuta[1,2], Pavel Platon[1], Marin Postu[1], Lucian Zarma[1], Leonard Licheardopol[3], Dan Deleanu[1]

Abstract

Introduction: Coronary artery anomalies are rare congenital abnormalities often found incidentally on conventional coronary angiogram or coronary computed tomography angiography. They may result in various clinical outcomes. The objective of this study was to investigate the prevalence of coronary artery anomalies, the clinical and laboratory characteristics of patients with coronary artery anomalies, and the outcomes at five-year follow-up of these patients in a high-volume coronary interventional center in Romania.

Materials and Methods: To define the study population we reviewed all coronary angiograms performed between 01.01.2014 and 31.12.2014. A total number of 5832 coronary angiograms were analyzed, and we identified 31 patients with coronary artery anomalies.

Results: The prevalence of coronary artery anomalies was 0.53%. Eighty-seven point four percent of the patients had origin and distribution anomalies, and twelve point nine percent of the patients had a coronary artery fistula. The most common coronary artery anomalies were the anomalous origin of the right coronary artery and the anomalous origin of the left circumflex artery from the initial segment of the right coronary artery. Sixty-one point three percent of the patients underwent coronary angiogram due to atypical chest pain. Twenty-nine percent of the patients had significant coronary artery disease. No death or significant complication were recorded in the 31 patients during the 5 years follow-up.

Conclusions: The prevalence of coronary artery anomalies in this study was slightly lower but still like that of previous studies. The majority of patients presented with atypical symptoms, and only a minority had coronary artery disease. In the context of no death or significant complication at 5-year follow-up highlights the benign prognosis of most coronary artery anomalies.

Keywords

coronary anomalies, coronary artery disease.

Abstract

Introducere: Anomaliile coronariene sunt anomalii congenitale rare întâlnite adesea întâmplător la coronarografie. Obiectivul acestui studiu a fost de a investiga prevalența anomaliilor coronariene, caracteristicile clinice și de laborator ale pacienților cu anomalii coronariene și evolutia la 5 ani a acestor pacienți într-un centru de cardiologie interventionala din România cu volum mare de proceduri.

Materiale Și Metode: Pentru a defini populația studiată, am analizat toate coronarografiile efectuate în perioada 01.01.2014 și 31.12.2014. Au fost analizate un număr total de 5832 de coronarografii și am identificat 31 de pacienți cu anomalii coronariene.

Rezultate: Prevalența anomaliilor coronariene a fost de 0,53%. 87,4% dintre pacienți au avut anomalii de origine și distribuție, iar 12,9% dintre pacienți au avut o fistulă a arterei coronare. Cele mai frecvente anomalii ale arterei coronare a fost originea anomală a arterei coronare drepte și originea anomală a arterei circumflexe din segmentul inițial al arterei coronare drepte. 61.3% dintre pacienți au efectuat coronarografie pentru durere toracică atipică. 29% dintre pacienți aveau și leziuni coronariene semnificative. Rata mortalității a fost de 0% la 5 an de urmărire.

Concluzii: Prevalența anomaliilor coronarine în acest studiu a fost ușor mai mică, dar totuși similară cu cea din alte studii. Majoritatea pacienților au prezentat simptome atipice și doar o minoritate au avut boală coronariană. Rata mortalității de 0% la urmărirea pe 5 ani arată prognosticul benign al majorității anomaliilor coronariene.

Cuvinte cheie

anomalii coronariene, boală coronariană.

Introduction

The widespread application of coronary angiography has resulted in more frequent identification of congenital coronary artery anomalies and an improved understanding of the clinical significance of such anomalies [1,2]. Coronary artery anomalies are rare congenital abnormalities often found incidentally on conventional coronary angiogram or coronary computed tomography angiography. They may result in various clinical outcomes. Coronary artery anomalies may be abnormalities of the origin, course, or structure of the epicardial coronary arteries. An anomalous origin of one or more coronary arteries is detected in about 0.16-1.3% of patients undergoing coronary angiography [3-8].

The objective of this study was to investigate the prevalence of coronary artery anomalies, the clinical and laboratory characteristics of patients with coronary artery anomalies, and the outcomes

*Corresponding author: Lucian Predescu MD, PhD, "CC Iliescu" Emergency Institute for Cardiovascular Diseases, Bucharest; E-mail address: lucianpredescu@gmail.com.

[1]"CC Iliescu" Emergency Institute for Cardiovascular Diseases, Bucharest
[2]"Carol Davila" University of Medicine and Pharmacy, Bucharest
[3]University of Medicine and Pharmacy, Galati

 https://doi.org/10.2478/rjc-2022-0001

sciendo

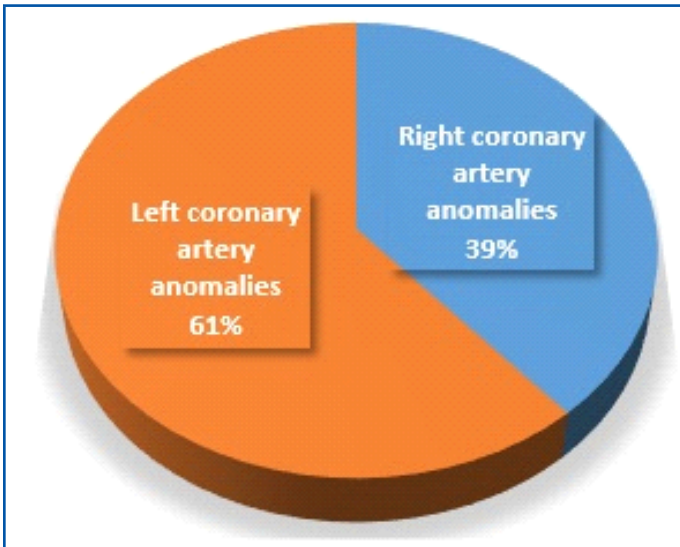


Figure 1 - Frequency of left and right coronary artery anomalies.

Table 1 - Baseline clinical characteristics of patients with coronary anomalies

• Age		65 (42-81)
• Gender	Female	31%
	Male	59%
• Presenting symptoms		
Typical chest pain		32.25%
Atypical chest pain		61.29%
No chest pain		6.46%
Presenting with STEMI		6.45%
Presenting with NSTE-ACS		6.45%
• Risk factors		
Hypertension		77.4%
Diabetes		16.12%
Dyslipidemia		64.51%
Smoking		25.8%
• Underling cardiac problems		
Previous myocardial infarction		16.12%
Previous coronary intervention		25.8%
Previous dilated cardiomyopathy		19.35%
Valvular heart disease (at least moderate severity)		35.5%

STEMI – ST segment elevation myocardial infarction, NSTE-ACS – non-ST segment elevation acute coronary syndrome

at 1-year follow-up of these patients in a high-volume coronary interventional center in Romania.

Materials and Methods

To define the study population, we reviewed all coronary angiograms performed between 01.01.2014 and 31.12.2014. A total number of 5832 coronary angiograms were analyzed, and we identified 31 patients with coronary artery anomalies. We included in the study the patients with anomalies in the origin, course, and number of coronary arteries and with coronary fistulas. We excluded from the study population patients with myocardial bridging of

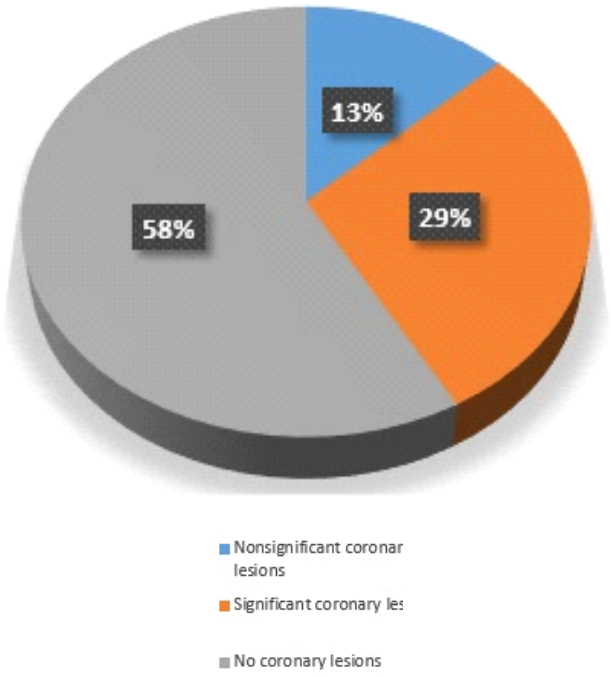


Figure 2 - Types of coronary lesions between patients with coronary artery anomalies.

coronary artery because they represent another category of patients that can erroneously raise the incidence of coronary artery anomalies. All clinical, laboratory, and angiographic data were recorded.

Results

The annuary prevalence of coronary artery anomalies was 0.53% in our study population. Eighty-seven point four percent of the patients had origin and distribution anomalies, and twelve point nine percent of the patients had a coronary artery fistula. In 61% of cases the left coronary artery was anomalous and 39% of cases had an anomaly involving the right coronary artery (figure 1).

The mean age at diagnosis was 65 years and 59% were male patients. Sixty-one point three percent of the patients underwent coronary angiogram due to atypical chest pain (table 1). The most common cardiovascular risk factors between patients with coronary anomalies were hypertension (77.4%) and dyslipidemia (64.51%). Sixteen point one percent of the patients with coronary anomalies had a previous myocardial infarction and twelve point nine percent presented with myocardial infarction, either ST segment elevation myocardial infarction (STEMI) or non-ST segment elevation myocardial infarction (NSTEMI).

Twenty-nine percent of the patients had significant coronary artery disease (figure 2). Most of the patients had no coronary lesions (58%). The most common coronary artery anomalies were the anomalous origin of left circumflex artery from the right coronary artery (38.71%) (figure 3) and the anomalous origin of right coronary artery from right coronary sinus of Valsalva (19.35%) (table 2) and



Figure 3 - Anomalous origin of left circumflex artery from the right coronary artery.

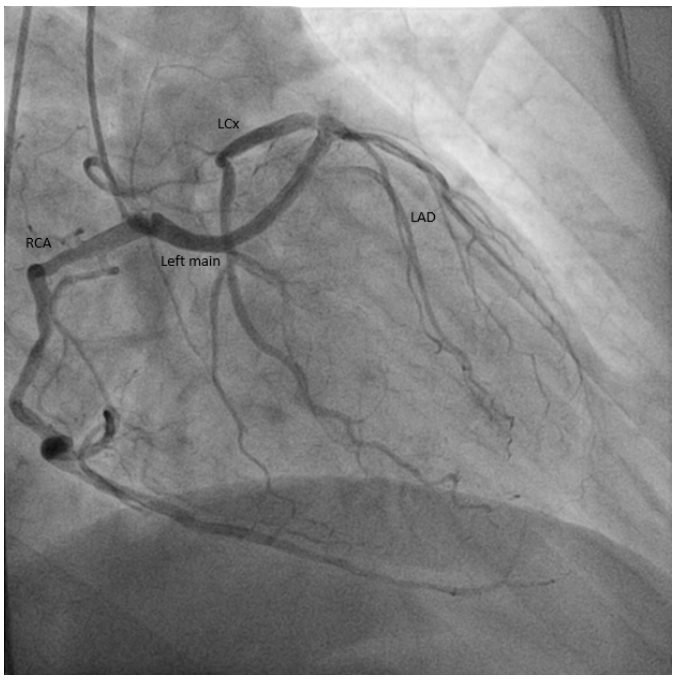


Figure 4 - Anomalous origin of left coronary artery from right coronary sinus of Valsalva (8).

the least common was anomalous origin of RCA from the LAD (0.017%) (figure 5). Eight (25.8%) patients underwent coronary revascularization by percutaneous coronary intervention (7 patients – 22.58%) or coronary artery bypass grafting (1 patient – 3.22%). No death or significant complication were recorded in the 31 patients during the 5 years follow-up.

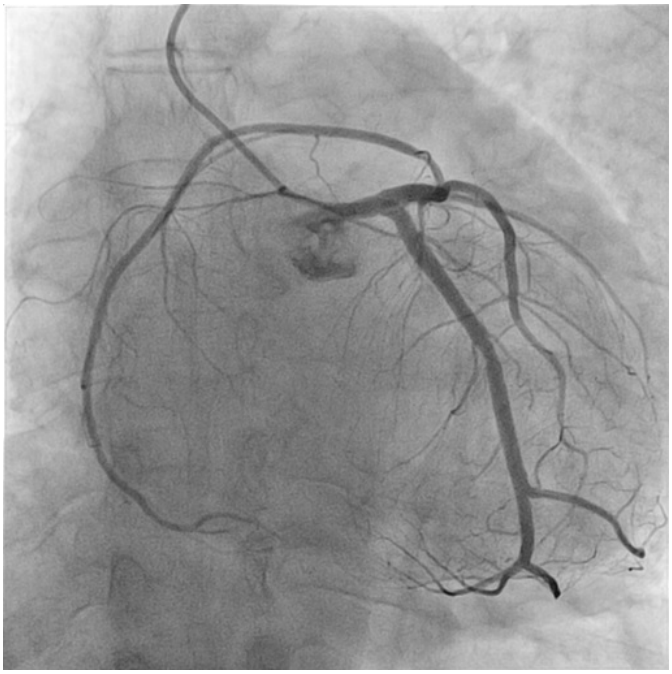


Figure 5 - Anomalous origin of right coronary artery from the left anterior descending artery.

Discussions

Among patients undergoing diagnostic coronary artery angiography, we found an overall incidence of congenital anomalous aortic origin of the coronary artery of 0.53%; this is in agreement with the 0.16-1.3% incidence reported in other series [3-8]. There was a slightly more male patients with coronary artery anomalies, possibly because the diagnostic coronary angiograms are performed more often in male patients compared to females.

In most studies, the most prevalent coronary artery anomaly was anomalous origin of right coronary artery, ranging from 31% to 79% depending on study population [3-8]. This is different from our study where the most common coronary artery anomaly was the anomalous origin of left circumflex artery from the right coronary artery (38.71%). The anomalous origin of right coronary artery was encountered in 19.35% of cases.

Garg et al. found that only 28% of their patients had evidence of atherosclerosis (significant stenosis of proximal vessel in 21% of the patients) [3]. Our study agrees with others; twenty-nine percent of the patients had a significant coronary artery stenosis of the anomalous artery or of a normal artery.

Most coronary artery anomalies are a benign finding during coronary angiogram. Although in some cases severe ischemia with sudden death can occur to the frank compression of the anomalous vessel between the aorta and pulmonary artery [9]. Hemodynamic changes during exercise may exacerbate disturbances in flow. In adults, ischemia may also be a consequence of atherosclerotic lesions within either normal or anomalous vessels. In our study 29% of the patients had significant coronary artery disease. Although the significant number of patients with coronary lesions, previous

Table 2 - Annuary incidence of different types of coronary artery anomalies

Type of coronary artery anomaly		Number	Incidence among 5832 (%)
Anomalous origin of LCx from the RCA		12	0.205%
Anomalous origin of RCA from right coronary sinus of Valsalva		6	0.102%
Anomalous origin of RCA from left coronary sinus of Valsalva		3	0.051%
Anomalous origin of LCA from right coronary sinus of Valsalva (figure 4)		1	0.017%
Fistulas	LCx to left atrium	1	0.017%
	LCx to pulmonary artery	2	0.034%
	LAD to pulmonary artery	1	0.017%
Anomalous origin of marginal branch from right coronary sinus of Valsalva		1	0.017%
Anomalous origin of RCA from the LAD		1	0.017%
Anomalous origin of LAD from right coronary sinus of Valsalva		1	0.017%
Anomalous origin of LAD from the RCA		1	0.017%
Anomalous origin of LCx from right coronary sinus of Valsalva		1	0.017%

LCx – left circumflex artery, RCA – right coronary artery, LCA – left coronary artery, LAD – left anterior descending artery

myocardial infarction, and myocardial revascularization, at five-year folllow-up no deaths were recorded. This in accordance with the principle that most coronary anomalies have a good prognosis.

Conclusions

The prevalence of coronary artery anomalies in this study was slightly lower but still similar to that of previous studies [5]. Different from others reports, the most common coronary artery anomaly was the anomalous origin of left circumflex artery from the right coronary artery. Angiographic recognition of these vessels is important because of their clinical significance and importance in patients undergoing coronary angioplasty or cardiac surgery. Most patients presented with atypical symptoms, and only a minority had coronary artery disease. In the context of no death or significant complication at 5-year follow-up highlights the benign prognosis of most coronary artery anomalies.

Conflict of interest

none declared.

Disclosures

The authors declare that there is no conflict of interest.

REFERENCES

1. Ouali S, Neffeti E, Sendid K, Elghoul K, Remedi F, Boughzela E. Congenital anomalous aortic origins of the coronary arteries in adults: a Tunisian coronary arteriography study. Arch Cardiovasc Dis. 2009;102(3): 201-208.

2. Angelini P. Coronary artery anomalies--current clinical issues: definitions, classification, incidence, clinical relevance, and treatment guidelines. Tex. Heart Inst. J. 2002;29(4): 271-78.

3. Garg N, Tewari S, Kapoor A, Gupta DK, Sinha N. Primary congenital anomalies of the coronary arteries: a coronary: arteriographic study. Int. J. Cardiol. 2000;74(1): 39-46.

4. Barriales Villa R, Moris C, Lopez Muniz A, Hernandez LC, San Roman L, Barriales Alvarez V, et al. [Adult congenital anomalies of the coronary arteries described over 31 years of angiographic studies in the Asturias Principality: main angiographic and clinical characteristics]. Rev Esp Cardiol. 2001;54(3): 269-81.

5. Angelini P, Velasco JA, Flamm S. Coronary anomalies: incidence, pathophysiology, and clinical relevance. Circulation 2002;105(20): 2449-54.

6. Cademartiri F, Runza G, Luccichenti G, Galia M, Mollet NR, Alaimo V, et al. Coronary artery anomalies: incidence, pathophysiology, clinical relevance and role of diagnostic imaging. Radiol. Med. 2006;111(3): 376-91.

7. Namgung J, Kim JA. The prevalence of coronary anomalies in a single center of Korea: origination, course, and termination anomalies of aberrant coronary arteries detected by ECG-gated cardiac MDCT. BMC Cardiovasc. Disord. 2014;14: 48.

8. Predescu L. et al., Coronary anomalies, Romanian Journal of Cardiology 2015;25(1): 70-71.

9. Basso C, Maron BJ, Corrado D, Thiene G. Clinical profile of congenital coronary artery anomalies with origin from the wrong aortic sinus leading to sudden death in young competitive athletes. J. Am. Coll. Cardiol. 2000;35(6): 1493-501.