Peculiarities Of Coronary Artery Lesions In Patients With Acute Myocardial Infarction And Atrial Fibrillation

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ABSTRACT

Lesions and severity of CHD are also associated with the occurrence of FP. Several studies have found a significant correlation between right coronary artery (RCA) infarction or lesion and VVFP [15,17,18]. Controversially, several studies have shown that patients with VVFP are more likely to have left main coronary artery disease (MI). PURPOSE: To evaluate the features of coronary artery lesions in patients with atrial fibrillation and anterior and inferior wall myocardial infarction of the left ventricle. Results of the study: To reveal the localization and degree of coronary artery (CA) lesions we performed coronary angiography in 124 patients with AMI of anterior and inferior localization accompanied by FP. Among the patients with AMI+FP there were significantly more patients with high risk of cardiovascular complications. In particular, among AMI patients with inferior myocardial wall lesions+FP.

Keywords: right coronary artery, first-time atrial fibrillation, coronary heart disease, acute coronary syndrome, angiography.

INTRODUCTION: The population with coronary heart disease (CHD) complicated by atrial fibrillation (AF) is rapidly increasing. A strong correlation between the two diseases has been reported, and many common risk factors they share may play an important role in their development. In addition, CHD may directly contribute to the progression of FP by affecting reentry formation, focal ectopic activity, and neuronal remodeling. At the same time, FP also influences CHD through three aspects: 1) atherosclerosis, 2) mismatch of blood supply and oxygen consumption, and 3) thrombosis. In conclusion, CHD and FP may exacerbate each other and seem to form a vicious circle. For patients with CHD complicated by FP, major studies and guidelines have focused on antithrombotic therapy and rhythm control, which are of paramount importance in these patients [2,5,8].

Coronary heart disease (CHD) is the leading cause of death in both developed and developing countries and has increased from 27.3% to 31.4% in recent decades. Given current lifestyles, the incidence of CHD will continue to increase. Many studies have shown that patients with CHD tend to develop atrial fibrillation (AF), especially in first-onset AF (VVFP) followed by acute myocardial infarction (AMI). It has been reported that the incidence of VVFP after AMI may exceed 50%[1,11,15].

FP is the most common arrhythmia in the general population, and the incidence of FP has increased four- to fivefold over the past half century[2,6,9]. Considering the burden of polygenic and clinical risk factors, the risk of FP among patients older than 55 years of age reaches 37.1% [8,12,14]. In parallel, it has been reported that patients with FP are more likely to have coronary artery disease. When encountering CHD and FP simultaneously, the longevity of individuals is jeopardized [16,20].

Although an objective relationship between CHD and FP has been proven by a series of studies, the underlying mechanisms are unclear.

Over the past four decades, patients with CHD have been shown to be more prone to develop FP than the general population, and vice versa. In the Framingham Study, CHD doubled the incidence of many types of FP in men and quadrupled the risk of transient FP in women [17,21]. The incidence of FP varies according to the type of CHD, regions and different monitoring methods, but is higher than in healthy individuals, ranging from 4.1% to 58%. On the other hand, FP was an independent predictor and 2.2 times increased the probability of new coronary events. According to the REGARDS (Reasons for Geographic and Racial Differences in Stroke) study, the incidence of myocardial infarction (MI) was approximately twice as high in patients with FP [19,23,26]. This association was particularly prominent in women and blacks. To be precise, the incidence of CHD in patients with FP was as high as 34%. To make matters worse, patients with CHD and FP together tend to have worse outcomes, including higher rates of complications and mortality, regardless of the type of CHD and FP. It has been observed that VVFP after AMI was likely to have a worse prognosis [7,18,22,25].

The lesions and severity of CHD are also associated with the occurrence of FP. Some studies have found a significant correlation between infarction or right coronary artery (RCA) lesions and VVFP [15,17,18]. Controversially, several studies have shown that patients with VVFP are more likely to have left main coronary artery disease (MI). According to a study in Israel, severe CHD in the PCA and left envelope was a significant predictor of early FP, whereas left main and left anterior descending CHD was associated with late FP. Thus, VVFP is more common in severe CHD, and the incidence of VVFP is proportional to the degree of myocardial ischemia. Blockade of atrial branches, which usually originate from the PCA and supply blood to the atria, explains the association between PCA lesions and FP. It has been reported that the incidence of atrial infarction ranges from 0.7% to 52% in patients with ST-segment elevation myocardial infarction (STEMI), and two-thirds of them develop FP or atrial flutter [21,27,28].

At the same time, some studies indicate that coronary artery lesions are more common in patients with FP. Nucifora et al.detected coronary atherosclerosis and obstructive CHD (≥50% lumen narrowing) more frequently in patients with FP, and lesions were more common in the left main or proximal part of the left anterior descending artery. Patients with both FP and chronic coronary syndrome (CCS) tend to have a single-vessel lesion that is more frequently identified in the PCA. However, no study has illustrated coronary artery lesions in patients with FP and acute coronary syndrome [22].

Aim of the study: to evaluate the features of coronary artery lesions in patients with atrial fibrillation and myocardial infarction of the anterior and inferior wall of the left ventricle.

Materials and methods of research: The study was conducted in the radiosurgical operating room equipped with angiocardiographic apparatus "Philips Azurion 3 M15" (Netherlands). Angiometric and morphometric calculations were performed using computer programs built into the system.

RESULTS: To reveal localization and degree of coronary arteries (CA) lesion we performed coronary angiography in 124 patients with anterior and inferior localization AMI accompanied by FP by catheterization of femoral artery in 34 (27,4%) and radial artery in 90 (72,6%) patients, also in 112 patients with isolated AMI. One CA lesion in patients with AMI+FP was found in 43 (34,7%) patients, two CA lesions in 48 (38,7%), three or more CA

lesions in 33 (26,6%) patients Among patients with AMI without FP, one CA lesion was significantly more frequent and amounted to 51,7% (n=58). The lesion of two CAs and lesion of three or more CAs was observed in 32.1% (n=36) and 16.2% (n=18) of patients, respectively.

When comparing the number of affected arteries among patients with anterior and posterior wall AMI + FP, we found that, among patients with inferior wall AMI, lesions of 3 and more CAs were significantly more frequent than in patients with anterior wall AMI (Table 1).

Table 1.

Number of diseased arteries among AMI patients with and without FP

Number of affected SCs	Inferior wall AMI + FP, (n=68)	Anterior wall AMI + FP, (n=56)	AMI without FP, (n=112)	P-value
1st SC affected	30,9%(n=21)	39,3% (n=22)	51,7 (n=58)	0,001
2 SCs affected	38,0% (n=26)	39,2% (n=22)	32,1 (n=36)	0,05
Loss of 3 SCs and more	30,9% (n=21)	21,4% (n=12)	16,2 (n=18)	0,001

According to the frequency of coronary artery lesions, the most committed lesion in all three groups was the anterior interventricular artery (AIJA), then the right coronary artery (RCA), diagonal branch (DV), envelope branch (EB), blunt edge branch (BEB), posterior interventricular branch (PIB), and left coronary branch (LB).

And so, among the patients with inferior wall AMI and paroxysms of FP, lesions of PMJA (54,4%), DV (23,5%), OV (20,5%), and VTC (16,2%) were significantly more frequent.

Thus, the most vulnerable coronary arteries appeared to be the PMJCA, right CA, diagonal and envelope branches, particularly among patients with inferior wall AMI and paroxysms of FP.

Eighty-one patients with AMI+FP and 56 patients with AMI without FP with hemodynamically significant stenosis were identified for assessment of CA lesions using the SYNTAX Score calculator.

Using, the SYNTAX Score calculator, we were able to assess the anatomic complexity of existing coronary artery lesions in patients and to compare the probability of developing an adverse cardiovascular event.

Each coronary artery lesion was scored. The results were summarized to interpret the overall severity of the coronary lesion and to calculate the patients' risk group. Patients were divided into 3 groups according to the Syntax test results: Group 1, patients scoring ≤22 points were categorized as low-risk, Group 2, patients scoring 23-32 points were categorized as intermediate-risk, and Group 3, patients scoring ≥33 points were categorized as high-risk.

High-risk patients with cardiovascular complications were significantly more common among AMI+FP patients. In particular, among AMI patients with inferior myocardial wall lesion+FP the high-risk group amounted to 38.3%, whereas among patients with anterior myocardial lesion there were 32.3% of them.

Conclusions: Thus, the obtained results of the study prove that patients with AMI+FP, particularly among patients with inferior wall AMI have a high risk of cardiovascular catastrophes such as sudden cardiac death, myocardial infarction, stroke and require timely highly specialized diagnosis and treatment.

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