

New-onset atrial fibrillation after an acute coronary syndrome: experience of the cardiology department at Mohammed VI University Hospital in Marrakech (a study of 155 cases)

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Abstract

To determine the frequency of atrial fibrillation (AF) in patients admitted for acute coronary syndrome (ACS) and to identify factors that may predict it, we conducted a retrospective, descriptive, and comparative observational study involving patients admitted for ACS who had no prior history of AF. Our study included 155 patients hospitalized for ACS. We found that 9.6% of these patients developed new-onset AF. We identified several predictors for new-onset AF: being elderly, having chronic kidney disease, a history of stroke and having high uric acid level. The occurrence of new-onset AF in patients with ACS was found to be 9.6%. Given the strong association between ACS and AF, routine screening for AF in these patients is advisable.

Keywords: atrial fibrillation, acute coronary syndrome, predictive factors

Introduction

Acute coronary syndromes (ACS) are a public health concern due to their high prevalence and the significant cardiovascular morbidity associated with them, particularly atrial fibrillation (AF) [1,2].

There is a pathophysiological link that can explain the association between ACS and new-onset AF. Numerous epidemiological studies have shown a frequent coexistence of these conditions [3]. Nevertheless, the prevalence of new-onset AF in patients hospitalized for ACS ranges from 2% to 37% across various studies [4, 5].

To our knowledge, there is no epidemiological data regarding the prevalence of new-onset AF during ACS in the Moroccan population.

The onset of new-onset AF during ACS is associated with increased cardiovascular morbidity and mortality [4, 5]. Several studies have focused on identifying predictive factors for new-onset AF to improve prevention of this arrhythmic complication. However, these predictive factors reported in the literature remain controversial [6,7,8].

In this work, we aimed to evaluate the prevalence of new-onset AF in a population hospitalized for ACS and its predictive factors.

Methodology

We conducted a retrospective, observational study from January 2023 to December 2023 in a cardiology department.

Study Participants

We included patients over 18 years old who were hospitalized for acute coronary syndrome (ACS). Patients with a previous diagnosis of atrial fibrillation (AF) or AF due to causes other than ACS were excluded.

Study Procedure

For each patient, we collected demographic data, cardiovascular risk factors, and associated comorbidities. We conducted a physical examination, an electrocardiogram (ECG), laboratory tests, and a transthoracic echocardiogram (TTE). Thromboembolic and hemorrhagic risks were evaluated using the following scores: GRACE [9,10], CHA2DS2-VASc [11], CRUSADE [12] and HAS-BLED [13].

We also recorded the type of ACS (STEMI, NSTEMI), coronary angiography findings, and myocardial revascularization strategy. Based on the ECG, we identified patients with new-onset AF and specified for each patient the class of new-onset AF (early or late, based on whether it appeared within 24 hours or later after hospitalization), rhythm management strategy, antiarrhythmic treatment, and anticoagulant therapy.

Results

Population Characteristics and Prevalence of New-Onset Atrial Fibrillation (AF):

In this study, we examined 155 patients hospitalized for acute coronary syndrome (ACS). The average age of these patients was 59 years, with a predominance of males, male-to-female ratio of 3.2. Smoking (73%), hypertension (43%), diabetes (44%), dyslipidemia (58%), and obesity (10%). Regarding comorbidities, 17% of the patients had a history of ischemic cardiomyopathy, 7.4% suffered from chronic kidney disease, and 7% had previously experienced a stroke.

Out of the 155 admitted patients, 81 (52.2%) were hospitalized for STEMI, 68 (43.8%) for NSTEMI, and 6 (3.8%) for unstable angina. Among the patients with STEMI, 56 (69.1%) had an evolving ischemia. Coronary angiography was performed in 98% of patients and 63 patients (40.6%) had 1 vessel disease, 38 (24.5%) had 2 vessels disease, 35 (22.5%) had 3 vessels disease, and 19 (12.2%) had no significant disease.

In terms of revascularization technical, 101 patients, which is about 65%, underwent angioplasty (PCI). 2 of these patients (1.3%) did not have a successful outcome from the procedure, 23 patients (14.8%) required coronary artery bypass grafting (CABG). For the remaining 29 patients, representing 18.7% of the total, a decision was made to proceed with medical treatment alone.

In the echocardiographic finding, 31 patients (20%) showed left ventricular systolic dysfunction. Elevated left ventricular filling pressures (LVFP) were found in 20 patients (12.9%), and 35 patients (22.5%) had a dilated left atrium.

A high risk of mortality, determined by the GRACE score, was found in 34 patients (21.9%). Additionally, 30 patients (19.3%) had a CHA₂DS₂-VASC score of 2 or higher, indicating a significant risk of thromboembolism. Furthermore, 11 patients (7%) had a HAS-BLED score of 3 or more, placing them at a high risk of bleeding.

During their hospital stay, 15 patients had atrial fibrillation (AF), which means that 9.6% of the study population. Out of those who developed AF, it was identified early in 12 patients, making up 80% of the cases. To help maintain a regular heart rhythm, 8 of these patients (53.3%) were prescribed amiodarone, an antiarrhythmic medication. Additionally, 9 patients (60%) were treated with vitamin K antagonists.

The clinical and paraclinical characteristics of the study population are summarized in Table I and Table II.

Predictive Factors of New-Onset Atrial Fibrillation:

Women were significantly more likely to develop new-onset atrial fibrillation (33% compared to 19%). There were no major differences in cardiovascular risk factors between those who did and did not develop new-onset AF. However, patients who developed AF were more likely to have a history of coronary artery disease and chronic kidney disease.

At admission, patients with new-onset atrial fibrillation (AF) were more likely to have left heart failure (40% compared to 18%).

We didn't find a link between new-onset AF and the type of acute coronary syndrome (ACS). There was a notable association between PCI failure and AF (7% compared to 0.7%).

The analysis of blood parameters showed that anemia was more common in patients with newly diagnosed atrial fibrillation, occurring in 55.3% of cases compared to 28%.

For the echocardiographic evaluation, the left ventricular ejection fraction (LVEF) was lower in patients with newly diagnosed atrial fibrillation (AF) (44% versus 48%). Additionally, these patients were more likely to have elevated left ventricular filling pressures, enlarged left atria, right ventricular dysfunction, and systolic pulmonary arterial hypertension.

We noticed that patients with atrial fibrillation (AF) had a much higher risk of blood clots and bleeding compared to those without AF. Moreover, patients who had a high GRACE score, indicating a high risk of death during their hospital stay, as well as a higher risk of bleeding, were more frequently found in the AF group.

Discussion:

Prevalence of New-Onset Atrial Fibrillation (AF) in Acute Coronary Syndromes (ACS)

In our study, we found that 10% of patients admitted for ACS developed new-onset AF. Research from various sources [4, 5, 6, 14, 15, 16, 17, 18, 19] highlights a strong link between these two conditions, with AF prevalence rates varying widely from 2% to 37%. This range is due to differences in the age and severity of the patients studied. Additionally, variations in diagnostic tools and evolving treatment strategies for both AF and ACS may also contribute to these differences in prevalence.

Various research conducted showed a frequency of de novo atrial fibrillation (AF) ranging from 6 to 20%. In the GUSTO I [14] study involving 40,981 patients suffering from ST-segment elevation myocardial infarction (STEMI), AF was observed in 10.4%. These findings were confirmed by the GUSTO III study and the research by Eldar et al. [6], which reported an AF frequency of 8.9% in patients admitted for myocardial infarction.

Although primary percutaneous coronary intervention (PCI) can help reduce the risk of developing new-onset atrial fibrillation (AF) in patients hospitalized for ST-elevation myocardial infarction (STEMI), many studies from the PCI era still report high rates of AF, similar to those found in our research. For example, the OACIS study by Kinjo and al. [16], which included 2475 patients treated with PCI for STEMI, found a new-onset AF rate of 12%. Similarly, a study by Lin and his team [17], involving 783 STEMI patients treated with primary PCI, observed an AF rate of 10.9%.

However, a lower prevalence of atrial fibrillation (AF) than what we reported in our study was recently observed by Congo et al. [18], who found new-onset AF prevalence of 5.8%. This difference might be due to a higher rate of comorbidities in our study population, which could amplify the impact of acute coronary syndrome (ACS) on developing AF.

On the other hand, the CARISMA study [19], which involved 271 patients who had experienced a myocardial infarction (MI), found a much higher prevalence of new-onset AF at 37%. In this study, the use of an implantable Holter monitor, which is more sensitive than an ECG for detecting asymptomatic AF, revealed a new-onset AF rate four times higher than in our series.

Most studies suggest a significant link between AF and ACS. Several theories have been proposed: ACS seems to trigger hemodynamic [3], autonomic [20], and inflammatory [21] changes that can lead to structural and electrical remodeling of the heart, creating conditions that favor the development of new-onset AF.

Identifying Predictive Factors for New-Onset Atrial Fibrillation in Acute Coronary Syndromes

Recognizing the increased risk of cardiovascular complications and death associated with both atrial fibrillation (AF) and acute coronary syndromes (ACS), researchers have focused on identifying the factors that can predict

the onset of AF. This knowledge is crucial for better prevention and management of this serious rhythm disorder.

In our study, we found that age is a significant factor in predicting new-onset AF in patients with ACS.

Most research supports our results, demonstrating that aging is a consistent independent predictor of new-onset AF during ACS [6, 14, 16, 17, 18, 22, 23]. In fact, older age indicates a more significant structural remodeling of the atria [23].

Our study indicated that chronic kidney disease (CKD) is linked with new-onset AF. Several studies have described CKD as a predictive factor for the development of AF in the general population [24, 25]. Notably, the study by Mrdovic et al. [26] also identified CKD as an independent predictor of new-onset AF. Bahouth et al. [27] reported similar results.

In our study, we also found that a history of stroke is a predictive factor for new-onset AF during ACS. Our results are consistent with several studies in the literature [6, 14, 16, 17, 18, 22, 23]. The presence of a history of stroke might result from previously undiagnosed paroxysmal AF due to its minimally symptomatic nature, particularly in older adults [28].

We further observed that in our study, a hyper uricemia is a predictive factor for new-onset AF. These findings are consistent with two studies that evaluated the relationship between uric acid and AF during ACS [29, 30]. Recently, an association between AF occurrence and elevated uric acid has been observed, which is thought to be related to oxidative stress and inflammation [29, 31].

Study Limitations: Detailed Analysis

This study has inherent limitations, particularly its confinement to a single center, which restricts its applicability to a broader population.

We utilized ECG to detect AF, which is not highly sensitive for asymptomatic and paroxysmal forms. As a result, some patients diagnosed with new-onset AF might have already had undiagnosed paroxysmal AF due to its paucisymptomatic nature, potentially causing an overestimation of the new-onset AF prevalence in our study.

Conclusion

Our study has shown that atrial fibrillation (AF) continues to be a common complication of acute coronary syndromes (ACS), despite improvements in its therapeutic management.

Systematic screening for AF in patients admitted for ACS is a relevant approach given an incidence that can reach 37% and its negative prognostic impact. However, the cost of effective detection methods is a concern, as is the absence of reliable clinical scores to identify which patients should benefit from such screening.

Based on our study's findings, these scores could include criteria such as elderly patients, hyper uricemia, and a history of chronic kidney disease (CKD) and stroke. Further large-scale, epidemiologically robust studies are required to confirm these hypotheses.

What is already known on this topic

1.Prevalence of de novo atrial fibrillation (AF) in patients with acute coronary syndrome (ACS):

- The prevalence of de novo AF in patients hospitalized for ACS is 9.6%. Previous studies report a prevalence ranging from 2% to 37%, depending on the population studied and the diagnostic methods used.

2.Predictive factors for de novo AF:

- The main predictive factors identified for de novo AF include advanced age, chronic kidney disease, a history of stroke, and elevated uric acid levels. These factors are consistent with findings from several prior epidemiological studies.

3.Impact of de novo AF on morbidity and mortality:

- The onset of de novo AF in patients with ACS is associated with increased cardiovascular morbidity and mortality. For example, patients with de novo AF have a higher risk of in-hospital death and thromboembolic and hemorrhagic complications, underscoring the importance of proper screening and management of this arrhythmia.

What this study adds

1. Identification of new specific predictive factors:

- Our study specifically highlighted that hyperuricemia is an important predictive factor for de novo AF in patients with ACS. This association has been attributed to oxidative stress and inflammation.

2.Detailed analysis of the Moroccan population:

- Unlike previous studies, our research provides epidemiological data on the prevalence and predictive factors of de novo AF in the Moroccan population, thereby filling a gap in the existing literature. This allows for a better understanding of the regional specificities and needs of this population.

3.In-depth comparison of clinical and paraclinical characteristics:

- The study thoroughly compared the clinical and paraclinical characteristics of patients with and without de novo AF, highlighting significant differences such as higher GRACE scores, lower left ventricular ejection fraction, and more frequent right ventricular dysfunction in patients with de novo AF. These analyses help better target preventive and therapeutic interventions for this at-risk subpopulation.

Competing interests

The authors declare no competing interest.

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