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Atrial Fibrillation in Young Patients: Risk Factors, Diagnosis and Treatment

Amina Sobirovna
EMU University 5th year, General Medicine
aminabotirova31@gmail.com[1]
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Abstract: Study Goal: to evaluate the clinical and demographic characteristics, structure of forms, and risk factors of atrial fibrillation (AF) in young patients. A single-center cohort study included 30 patients aged 30 to 45 years with documented AF. The diagnostic complex included a 12-lead ECG, 24-hour Holter ECG monitoring, transthoracic Echocardiography (TTE), and laboratory testing (assessment of thyroid function, electrolytes, eGFR, CRP). Paroxysmal AF was recorded in 33.3% (n = 10) of patients. Among potential factors associated with the development of arrhythmia, hereditary predisposition predominated — 26.7% (n = 8). Arterial hypertension and thyroid diseases were detected with equal frequency — 16.7% (n = 5) each, and intensive physical exercise was noted in 6.7% (n = 2) of patients.
AF in young patients is characterized by a high frequency of the paroxysmal form and a polyetiological nature with a leading role of hereditary burden. The obtained data emphasize the need for early comprehensive examination and an individualized choice of treatment tactics (including rhythm control strategy) in this category of patients.
Keywords: atrial fibrillation, young age, risk factors, hereditary predisposition, paroxysmal form, rhythm control.

Introduction

Atrial fibrillation (AF) is one of the most common cardiac rhythm disorders and represents a significant medical and social problem in modern cardiology. The disease occurs more frequently in elderly individuals and patients with concomitant cardiovascular pathology, but AF can also develop in young people, including individuals of young and middle age. In rarer cases, this arrhythmia is detected in adolescents and children. The prevalence of AF among the young population is significantly lower than among the elderly, but its detection at a young age is of particular clinical importance.

The occurrence of AF in young patients can be caused by a wide range of factors. In addition to traditional cardiovascular diseases, hereditary predisposition, congenital and structural heart diseases, thyroid diseases, metabolic disorders, obesity, alcohol consumption, intensive physical exertion, and other potentially modifiable risk factors can play a role. In a number of cases, establishing a single cause for the development of arrhythmia is impossible, which emphasizes the need for a comprehensive examination of young patients with newly diagnosed AF.

The problem of timely diagnosis is of particular relevance. In young people, symptoms of AF may be nonspecific, episodic, or virtually absent, as a result of which the disease may remain undiagnosed. Meanwhile, timely detection of arrhythmia allows identifying its possible causes and

risk factors, assessing the probability of developing complications, and selecting the optimal patient management strategy. The most serious complication of AF is thromboembolic stroke, but prolonged existence of arrhythmia can also contribute to the progression of structural and functional changes in the heart and deterioration in the quality of life.

The importance of studying AF in young patients is also due to the fact that the early age of its onset potentially increases the duration of the period during which the patient lives with arrhythmia and its associated risk factors. Therefore, early diagnosis, correction of modifiable risk factors, prevention of complications, and timely selection of an optimal treatment strategy can be of fundamental importance for long-term cardiovascular prognosis.

In recent years, new data have emerged on the mechanisms of AF development, risk factors, possibilities for early diagnosis, and modern approaches to treatment. The results of clinical studies allow a new evaluation of the role of rhythm and heart rate control, catheter ablation, anticoagulant therapy, and correction of concomitant conditions. At the same time, management of young patients requires an individual approach taking into account age, the cause of arrhythmia occurrence, presence of structural heart damage, risk of thromboembolic complications, and long-term prospects of treatment.

In connection with this, studying the characteristics of the occurrence and course of atrial fibrillation in young patients, risk factors for its development, modern methods of diagnosis, prevention of complications, and therapeutic approaches is an urgent direction in modern cardiology. Analysis of the results of modern scientific research makes it possible to assess the prevalence and clinical significance of AF in this age group, determine the most significant risk factors, and compare the effectiveness of various treatment strategies.

Goal of the study — to conduct an analysis of modern literature data on atrial fibrillation in young patients, to study the main risk factors and causes of its development, modern methods of diagnosis and prevention of complications, as well as to evaluate the effectiveness of various therapeutic approaches to determine the most justified management strategy for this category of patients.

Materials and Methods

A single-center cohort study was conducted with 30 patients aged 30 to 45 years inclusive with a documented diagnosis of "atrial fibrillation" (AF) of paroxysmal or persistent form, who were undergoing examination and treatment at a medical institution. All participants underwent examination according to a single diagnostic protocol. Inclusion criteria:

- Age of patients from 30 to 45 years inclusive.
- Documented episode of AF according to 12-lead ECG or Holter monitoring data (absence of P waves, presence of irregular f waves with an atrial rhythm frequency > 300 bpm, most pronounced in lead V1, as well as irregular RR intervals).
- Presence of a signed informed voluntary consent to participate in the study.

Exclusion criteria:

- Presence of ischemic heart disease (IHD), past myocardial infarction, or hemodynamically significant valvular heart defects.
- Chronic heart failure (CHF) NYHA functional class III–IV.

- Past acute myocarditis or pericarditis within the last 6 months.
- Severe concomitant somatic and endocrine diseases in the stage of decompensation.

A comprehensive clinical, instrumental, and laboratory examination of patients was carried out in accordance with current clinical guidelines of the European Society of Cardiology (ESC) for the diagnosis and management of patients with atrial fibrillation.

- **Clinical and Anamnestic Examination:** a detailed anamnesis was collected with an assessment of risk factors (family history of rhythm disorders, alcohol consumption, level of physical activity, sports history). The severity of AF symptoms was assessed using the EHRA (European Heart Rhythm Association) scale.
- **Electrocardiography (ECG):** a standard 12-lead resting ECG was performed for all patients. Rhythm character, PQ and QRS intervals, corrected QT interval, as well as the presence of signs of premature ventricular excitation syndrome (WPW) were analyzed. Diagnostic criteria for AF on ECG were: absence of P waves, f (fibrillation) waves between QRS complexes, and irregular R-R intervals.
- **Holter ECG Monitoring:** daily ECG monitoring was carried out over 24–48 hours. The frequency and duration of AF paroxysms, circadian index, presence of pauses, as well as concomitant rhythm and conduction disorders were evaluated.
- **Transthoracic Echocardiography (EchoCG):** dimensions of heart chambers, anteroposterior dimension, and indexed volume of the left atrium were evaluated. Left ventricular systolic function was assessed by ejection fraction (LV EF) calculated by Simpson's method. Additionally, LV diastolic function parameters were analyzed.
- **Laboratory Tests (including thyroid function tests):** assessment of thyroid function: level of thyroid-stimulating hormone (TSH) and free thyroxine (free T4). Concentration of main blood serum electrolytes (K+, Mg2+, Na+). Lipid profile indicators. Creatinine with calculation of glomerular filtration rate (eGFR according to the CKD-EPI formula). Level of C-reactive protein (CRP).

Results

The study included 30 patients with documented atrial fibrillation (AF) aged 30 to 45 years. The distribution of patients by age was as follows: 20 patients (66.7%) were 30 years old, 3 patients (10.0%) — 35 years old, 2 patients (6.7%) — 40 years old, and 5 patients (16.7%) — 45 years old.

In the study group, men predominated — 20 people (66.7%), while women accounted for 10 people (33.3%).

Clinical Forms of Atrial Fibrillation

When analyzing clinical options for AF, the paroxysmal form was detected in 10 patients (33.3%). In the remaining 20 patients (66.7%), other forms of AF were noted, which need to be specified according to medical documentation data.

The paroxysmal form is characterized by the occurrence of arrhythmia episodes that cease spontaneously or after therapeutic measures. Identification of this form in young patients is of important clinical importance, since the episodic nature of rhythm disorders can make their timely

registration on a standard ECG difficult and requires long-term cardiac rhythm monitoring if necessary.

Factors Associated with the Development of Atrial Fibrillation

When analyzing the history and clinical data in the examined patients, various factors potentially associated with the occurrence of AF were identified.

The most common was a hereditary predisposition to cardiac rhythm disorders, which was detected in 8 patients (26.7%). Arterial hypertension was noted in 5 patients (16.7%), thyroid diseases — also in 5 patients (16.7%). Intensive physical exercise was noted in 2 patients (6.7%).

Thus, hereditary burden occurred most frequently among the studied factors. Arterial hypertension and thyroid diseases were detected with equal frequency.

It should be noted that the listed factors are not mutually exclusive and could combine in one patient. Therefore, their total frequency may exceed 100%.

Distribution of patients by age, sex, and main factors

Indicator	n	%
Total patients	30	100
Men	20	66.7
Women	10	33.3
Age 30 years	20	66.7
Age 35 years	3	10.0
Age 40 years	2	6.7
Age 45 years	5	16.7
Mean age	33.7 ± 5.9	—
Paroxysmal AF	10	33.3
Hereditary predisposition	8	26.7
Arterial hypertension	5	16.7
Thyroid diseases	5	16.7
Intensive physical exercise	2	6.7

In general, the study results show that AF occurs among young patients as well, with both paroxysmal disease variants and various potential factors associated with its development being identified in the study group. Hereditary predisposition had the highest frequency, emphasizing the need for careful family history collection in young patients with heart rhythm disorders.

Conclusion

The paroxysmal form of AF was recorded in 33.3% (n = 10) of the examined, which emphasizes the need for active use of long-term ECG monitoring for its timely verification.

The leading factor associated with the development of AF in young patients is a hereditary predisposition to heart rhythm disorders (26.7%, n = 8). Arterial hypertension and thyroid diseases were detected with equal frequency — 16.7% (n = 5) each, and in 6.7% (n = 2) of patients, manifestation of arrhythmia was associated with intensive physical exertion.

The obtained results emphasize the importance of a comprehensive primary examination of young individuals with rhythm disorders, including careful collection of family history, assessment of thyroid function, and 24-hour ECG monitoring. Early diagnosis and an individualized approach to correcting modifiable risk factors serve as the basis for choosing an optimal treatment strategy (rhythm control / catheter ablation). For a more accurate assessment of risk factors, features of the course, and comparison of the effectiveness of various treatment methods for AF in young patients, it is necessary to conduct prospective studies on an expanded sample with a long observation period.

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