ATRIAL FIBRILLATION: DIAGNOSIS, THERAPEUTIC MANAGEMENT AND PREVENTION OF THROMBOEMBOLIC COMPLICATIONS IN CARDIAC PATIENTS

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ABSTRACT

Atrial fibrillation (AF) is one of the most prevalent cardiac arrhythmias, often associated with structural heart and lung disease, and is a significant risk factor for thromboembolic complications such as stroke and heart failure. This study aims to review the diagnosis, therapeutic options, and prevention strategies for thromboembolic complications in patients with AF. The research was carried out through a systematic review of the literature, following the PRISMA guidelines, and covers studies published in the last 15 years, extracted from the PubMed, SciELO, and Web of Science databases. The diagnosis of AF is predominantly performed by electrocardiogram, which allows the identification of irregularity and high frequency of ventricular activity. Therapeutic management includes control of heart rhythm and rate, with the use of antiarrhythmic drugs, beta-blockers, and direct oral anticoagulants (ACODs). The choice of treatment is personalized, considering the clinical form of AF and the risk factors of each patient. Anticoagulation plays a crucial role in preventing thromboembolism, especially in patients at high risk of stroke. In addition to pharmacological treatments, non-pharmacological approaches such as electrical

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cardioversion and ablation may be indicated in certain cases. Adherence to treatment and continuous monitoring are essential to reduce complications and improve the quality of life of patients. This study also discusses the challenges and current guidelines for the effective management of AF.

Keywords: Atrial fibrillation. Diagnosis. Therapeutic management. Anticoagulation. Thromboembolism.

INTRODUCTION

Atrial fibrillation (AF) is one of the most prevalent supraventricular arrhythmias, characterized by a complete disorganization of atrial electrical activity, resulting in the loss of the effective contraction capacity of the atria. The change in atrial rhythm leads to an increase in heart rate, with the atria performing irregular, high-frequency movements, which can reach up to 300 beats per minute. This electrical disorganization is often associated with an equally irregular ventricular response, since the high number of atrial impulses that reach the atrioventricular node causes a refractoriness to subsequent stimuli. As a result, ventricular response is unpredictable and can cause a range of clinical complications, including hypotension, pulmonary congestion, angina pectoris, and loss of cardiac output efficiency.

Although atrial fibrillation can occur in previously healthy people, especially in situations such as emotional stress, surgeries, intense physical exertion, excessive alcohol consumption, or vasovagal stimuli, AF is most commonly seen in patients with structural heart and lung disease. Underlying conditions that increase the risk of developing AF include valvular heart diseases such as rheumatic heart disease, non-rheumatic mitral disease, hypertensive heart disease, and heart failure, as well as chronic lung diseases such as pulmonary hypertension and chronic obstructive pulmonary disease (COPD). These factors contribute to the structural and electrical remodeling of the heart, creating an environment conducive to the installation and maintenance of AF.

The morbidity associated with atrial fibrillation is significant and multifaceted. High ventricular rate can lead to a reduction in cardiac output, generating symptoms such as tiredness, dyspnea, and difficulty performing daily activities. In addition, AF episodes may be followed by periods of cardiac pause, which may result in episodes of syncope or presyncope, putting patient safety at risk. Another critical aspect of AF is the risk of intracavitary thrombi, especially in the left atrium, where blood stasis favors thrombogenesis. Embolization of these thrombi into the systemic circulation can result in serious complications, such as ischemic stroke, one of the most feared events in patients with AF. The loss of the contribution of atrial contraction to cardiac output also aggravates heart failure, particularly in patients with cardiac comorbidities.

In addition to physical complications, atrial fibrillation significantly impacts patients' quality of life. The discomfort generated by palpitations, the fear of the recurrence of arrhythmia episodes, and anxiety related to the risk of thromboembolic complications are factors that contribute to the psychological distress of patients. Effective management of AF,

therefore, should not only focus on controlling rhythm and heart rate, but also consider the emotional and psychosocial aspects associated with the disease.

The diagnosis of atrial fibrillation can be made through clinical examinations, such as electrocardiogram (ECG), and other complementary tests, which aim to assess the nature and severity of the arrhythmia, as well as identify associated conditions. The therapeutic management of AF includes a multifaceted approach, which involves restoring sinus rhythm, controlling ventricular rate, and using anticoagulants to prevent thromboembolic complications. The choice of treatment depends on the patient's characteristics, the comorbidities present, and individual risk factors.

Prevention of thromboembolic complications in patients with atrial fibrillation is a top priority in the management of the disease. The risk of thrombus formation is substantially increased in patients with AF, especially in those with additional risk factors such as advanced age, hypertension, diabetes mellitus, and heart failure. In this context, the use of direct oral anticoagulants (ACODs) has been shown to be an effective strategy in reducing the incidence of thromboembolic events, replacing traditional anticoagulants, such as warfarin, which require continuous monitoring and present a high risk of drug interactions and bleeding complications.

In view of the above, this study aims to conduct a comprehensive review of the literature on the most recent aspects of the diagnosis, therapeutic management, and prevention of thromboembolic complications in patients with atrial fibrillation. The evolution of treatment strategies will be discussed, with emphasis on pharmacological and non-pharmacological approaches, including cardioversion, catheter ablation and the use of anticoagulants. In addition, current guidelines and evidence-based recommendations for the management of this complex arrhythmia will be addressed, with a focus on best practices for reducing the risk of complications and improving patients' quality of life. Through this review, it is hoped to provide a solid foundation for clinical practice, as well as identify areas that need further studies and innovations in the treatment of atrial fibrillation.

METHODOLOGY

The present study is a systematic review of the literature with the objective of addressing the diagnosis, therapeutic management and prevention of thromboembolic complications in patients with atrial fibrillation. The methodology was structured according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, seeking to ensure the transparency and reproducibility of the results obtained.

The search was performed in the PubMed, SciELO, and Web of Science databases. The keywords used included combinations of the terms "atrial fibrillation", "diagnosis", "therapy", "thromboembolism", and "complications", associated by Boolean operators (AND, OR, and NOT). Specific criteria were applied to the search, restricted to articles in Portuguese, English and Spanish, published in the last 15 years, with access to the full text. In addition, recognized books in the area were also consulted to provide a broader theoretical basis and support the information presented.

Inclusion and exclusion criteria were defined based on the relevance to the theme and the methodological quality of the studies. Studies that addressed adult populations with atrial fibrillation, presenting data on diagnosis, therapies and prevention of thromboembolic complications were included. Non-systematic reviews, studies involving exclusively experimental or pediatric models, and studies that did not present quantitative data were excluded.

The selection process followed three stages. First, all titles and abstracts identified in the searches were independently screened by two reviewers. Then, potentially eligible articles were fully evaluated for adherence to the inclusion and exclusion criteria. Disagreements between the reviewers were resolved by consensus or by a third evaluator. The selection process was described in a PRISMA flowchart.

To extract the data, a standardized spreadsheet was used that included information such as authors, year of publication, type of study, population, interventions, outcomes evaluated, and main results. The methodological quality of the studies was assessed using validated instruments, such as the Newcastle-Ottawa scale for observational studies and the Cochrane Risk of Bias tool for clinical trials.

The extracted data were analyzed in a narrative manner, considering the methodological and outcome heterogeneity between the included studies. Whenever applicable, a comparative discussion was held between the results, considering the clinical impact and the recommendations of current guidelines, such as those of the Brazilian Society of Cardiology (SAMESIMA et al., 2022; TEIXEIRA et al., 2022).

RESULTS AND DISCUSSION

Atrial fibrillation (AF) is a common and frequently observed cardiac arrhythmia in elderly patients, with an increasing prevalence as age advances, especially among those with structural heart disease. It is characterized by a disorganization of atrial electrical activity, leading to an irregular and rapid ventricular response. The diagnosis is primarily made through an electrocardiogram (ECG), which reveals a heart rate between 90 and 170

bpm, with no visible P waves and irregular R-R intervals. The presence of f-waves, small irregular ripples at the baseline of the ECG, is a common feature of atrial activity during AF, reflecting disorganized atrial electrical activity.

In addition, the QRS complex on the ECG is usually narrow and similar to sinus rhythm, except in cases of conduction disorders, such as atrioventricular block. When there is intact atrioventricular conduction, the ventricular response is usually rapid and irregular, ranging between 100 and 160 bpm. This response is influenced by a number of factors, including atrioventricular nodal activity, vagal and sympathetic tone, use of medications, and the presence of accessory pathways, as occurs in Wolff-Parkinson-White syndrome, where the ventricular rate can exceed 300 bpm, which represents a high risk situation for degeneration into ventricular fibrillation.

The classification of AF plays an important role in therapeutic management. It is divided into four main categories: initial (first episode), paroxysmal (episodes of short duration, less than seven days, that cease spontaneously), persistent (episodes that last more than seven days and require intervention for reversal) and permanent (when AF cannot be reversed or chooses not to do so). Recurrent AF is characterized by two or more episodes, and may be associated with rheumatic or non-rheumatic AF, depending on mitral valve involvement, particularly in cases of rheumatic disease.

AF can also occur in young patients, with solitary or isolated AF, who usually do not have structural heart disease, hypertension, or lung disease. In some cases, AF occurs paroxysmally in patients without structural lesions, and this condition may be more frequent in people with sinoatrial nodal syndrome or Wolff-Parkinson-White syndrome. The duration of AF episodes is a critical factor in assessing the risk of thromboembolic complications. When episodes last less than 48 hours, the risk of thrombus formation is relatively low, and reversal to sinus rhythm can be done more safely. On the other hand, when episodes last longer than 48 hours or the duration is not well defined, there is an increased risk of thromboembolism, which requires strict precautions in reversing the arrhythmia.

In terms of risk factors, systemic arterial hypertension, diabetes, valvular heart diseases, and increased atrial size are the main predictors of AF. Increased atrial size favors electrical reentry, which is an important mechanism in the pathogenesis of AF, and myocardial remodeling, with replacement of myocytes by fibrotic tissue, further compromises the electrical properties of the heart. Atrial hypertrophy also contributes to this remodeling process, making it difficult to recover sinus rhythm. Accurate diagnosis and classification of AF is essential for the choice of appropriate treatment, including

anticoagulation to prevent thromboembolism and strategies for heart rate control or conversion to sinus rhythm.

CLINICAL AND DIAGNOSTIC EVALUATION OF ATRIAL FIBRILLATION

The initial evaluation of patients with atrial fibrillation (AF) should prioritize the characterization of the arrhythmia as paroxysmal or persistent, in addition to analyzing the tolerance to the episodes and the impact on quality of life, which is often compromised in comparison with individuals without AF in the same age group. It is essential to investigate cardiac and extracardiac factors that may act as triggers or maintainers of arrhythmia. Among the most relevant etiologies and predisposing factors, the increase in atrial pressure, associated with mitral and tricuspid valve diseases, systemic or pulmonary arterial hypertension, atrial ischemia, and fibrotic changes related to aging, stand out. Other conditions, such as myocarditis, amyloidosis, and intracardiac tumors, should also be considered.

During the anamnesis, it is essential to look for potentially reversible causes, such as alcohol consumption, recent surgeries, acute myocardial infarction, or hyperthyroidism, since management should be directed to the underlying disease. In addition, it is necessary to investigate structural cardiac diseases associated with AF, including valvular heart diseases, particularly mitral valve diseases, congenital heart diseases, dilated or hypertrophic cardiomyopathies, and coronary artery disease. Although less common in healthy young people, AF can be triggered by precipitating factors such as alcohol libation, use of adrenergic substances (cocaine, amphetamine) and electrolyte disturbances.

The investigation should also include the analysis of family history, considering genetic susceptibility to AF. Genetic mutations can cause primary electrophysiological alterations or predispose to the development of comorbidities such as hypertension, diabetes, or heart failure of familial origin. On physical examination, irregularity of the pulse, variation in the intensity of the first heart sound, and absence of the fourth heart sound (B4) are observed. Obesity, an important risk factor, should also be evaluated, especially due to the correlation between body mass index and left atrial size.

The clinical picture of AF is widely variable, determined by factors such as the underlying cardiovascular condition, ventricular rate, and loss of atrial contraction. Patients may present with palpitations, syncope, dizziness, chest pain, and dyspnea to thromboembolic phenomena or be completely asymptomatic, with the diagnosis being made in routine electrocardiographic examinations. In symptomatic cases, palpitations tend to disappear over time in patients who progress to the persistent form, whereas prolonged

episodes of AF with high ventricular response may lead to ventricular dilation (tachycardiomyopathy), especially in asymptomatic patients.

The minimum investigation includes laboratory tests such as evaluation of thyroid, renal and hepatic function, ionogram and blood count, as well as complementary tests, such as electrocardiogram (ECG), chest X-ray and transthoracic echocardiogram. Radiography allows the evaluation of pulmonary circulation and the size of the left atrium, whereas transthoracic echocardiography is essential for the functional and anatomical analysis of cardiac chambers and valves, with a sensitivity of 33% to 72% for intracavitary thrombi. In specific cases, other tests may be necessary, such as the 24-hour Holter monitor, useful to document the dynamics of the episodes and assess the mean ventricular rate. Transesophageal echocardiography, with a sensitivity of 97% to 100% for the detection of intracavitary thrombi, is a valuable diagnostic tool in more complex situations.

THERAPEUTIC STRATEGIES IN ATRIAL FIBRILLATION

The management of atrial fibrillation (AF) involves two main strategies: restoration and maintenance of sinus rhythm or heart rate control, both associated with the prevention of thromboembolic phenomena. The initial choice between these approaches depends on the clinical pattern of presentation, the patient's underlying conditions, and the reported symptoms. If the initial strategy is not successful, you can alternate between them, expanding the therapeutic possibilities. In addition to pharmacological options, invasive interventions such as catheter ablation, surgical procedures, or permanent pacemaker implantation may be considered in refractory or specific cases.

The therapeutic decision is supported by robust evidence from studies such as AFFIRM, RACE, PIAF, STAF, and HOT CAFÉ, which compared the outcomes between rhythm control and frequency control. In general, these studies did not identify significant differences in mortality, incidence of cerebrovascular accident (CVA), hospitalizations, recurrence of arrhythmias, or thromboembolic complications. For example, the AFFIRM study demonstrated similar mortality and stroke rates between the two strategies, while the RACE study reinforced the absence of significant benefits in terms of morbidity and mortality. In addition, none of these studies pointed to relevant differences in the quality of life of the patients treated.

The choice of therapeutic approach is often influenced by the patient's age and clinical conditions. In older adults with persistent AF, often associated with systemic arterial hypertension and structural heart disease, heart rate control is generally preferred, given its safety and efficacy profile. On the other hand, in younger patients, particularly those with

paroxysmal AF alone, restoration and maintenance of sinus rhythm may be more indicated, considering the potential favorable impact on quality of life and the lower risk of complications.

In cases of permanent AF, where restoration of sinus rhythm has not been possible or has not been attempted, treatment is based on close heart rate control and prevention of thromboembolic complications. This approach is currently the most adopted in clinical practice, considering the absence of consistent benefits demonstrated by the sinus rhythm maintenance strategy in comparative studies. Thus, the therapeutic focus in patients with permanent AF is on effective symptom management, reduction of adverse events, and optimization of quality of life.

PHARMACOLOGICAL CONTROL OF HEART RATE

Heart rate management in atrial fibrillation (AF) involves medications that prolong the refractory period of the atrioventricular node, resulting in reduced ventricular response. Although this reduction does not usually impair left ventricular function, there may be adverse effects, such as bradycardia and heart blocks, which, in severe cases, may require temporary pacemaker implantation. These adverse events are more common in elderly patients and those using drugs such as beta-blockers, amiodarone, digitalis, or calcium channel blockers.

The choice between oral or intravenous administration depends on the need for rapid heart rate control. In cases of inadequate response to the isolated use of medications, pharmacological combinations can be implemented, both in the acute and chronic phases. In cases refractory to medical treatment, nonpharmacologic strategies should be considered, including catheter ablation or device implantation.

Particular attention should be given to patients with AF associated with Wolff-Parkinson-White syndrome, in whom the use of agents that decrease atrioventricular nodal conduction (such as beta-blockers, digitalis, adenosine, and non-dihydropyridine calcium-channel blockers) is contraindicated. These drugs can potentiate conduction through the accessory pathway, increasing the risk of exaggerated ventricular response and possible progression to ventricular fibrillation. In this condition, the use of class I antiarrhythmics or amiodarone is preferred, provided that the patient is hemodynamically stable.

The objective of heart rate control is to achieve values close to those observed in sinus rhythm, based on the premise that lower frequencies promote better hemodynamic performance, lower risk of tachycardiomyopathy and reduction of symptoms. Traditional guidelines recommended strict goals such as resting heart rate (HR) below 80 bpm and up

to 110 bpm during moderate physical activity. Epidemiological studies have also associated high frequencies, even sinus frequencies, with higher cardiovascular mortality.

However, data from studies such as AFFIRM and RACE have not demonstrated benefits in terms of mortality or quality of life when comparing tight control with more flexible HR control. More recently, the RACE II study compared two therapeutic targets: a rigid one (HR < 80 bpm) and a more flexible one (HR < 110 bpm, both at rest) during two years of follow-up. The results indicated that there were no significant differences in mortality, serious adverse events (including congestive heart failure), or arrhythmia-related symptoms between the approaches. In addition, less strict control was more easily achieved, with less need for medication, without compromising the safety or efficacy of treatment in the medium term.

Although the RACE II study did not identify disadvantages in more flexible heart rate control in the short and medium term, the safety of this strategy in relation to the development of long-term tachycardiomyopathy in patients with higher CF remains uncertain. In any case, the pharmacological control of heart rate in AF should be individualized, considering the clinical characteristics of the patient, his/her tolerance to the medications, and the possible risks associated with each approach.

PREVENTION OF THROMBOEMBOLISM

Prevention of thromboembolism in patients with atrial fibrillation (AF) is an essential component of clinical management, especially in those at high risk of cerebrovascular disease. Regardless of the therapeutic strategy adopted, whether it is the restoration of sinus rhythm or the control of ventricular rate, anticoagulation is mandatory for individuals with a greater propensity to develop thromboembolic complications.

The main risk factors associated with the occurrence of cerebrovascular accident (CVA) in patients with AF include a previous history of stroke (whether permanent or transitory), episodes of thromboembolism, congestive heart failure (CHF), rheumatic heart disease, systemic arterial hypertension, diabetes mellitus, age over 65 years, and significant increase in the size of the left atrium (greater than 5 cm).

The use of echocardiography plays a fundamental role in risk stratification, complementing the clinical evaluation with structural and functional data. Echocardiographic parameters, such as the presence of intracardiac thrombus, spontaneous contrast in the left atrium, reduced flow in the left atrium and the identification of complex atheromatous plaques in the aorta, are indicative of greater thromboembolic risk. In addition, the test is useful for etiological diagnosis, especially in cases of AF of rheumatic or valvular origin, as

well as in the identification of left ventricular failure. However, the absence of these abnormalities on echocardiography does not exclude the need for anticoagulation, particularly in patients with other significant risk factors.

For the stratification of the risk of systemic embolism, the Brazilian AF guidelines recommend the application of scoring models, such as the one proposed by the American Heart Association/American College of Cardiology and the CHADS2 score (Cardiac failure, Hypertension, Age, Diabetes, Stroke). The CHADS2, widely used, assigns points to specific clinical factors, with scores equal to or greater than 2 indicating the need for anticoagulation. Studies have shown a direct correlation between higher scores and increased rates of thromboembolic complications, reinforcing the importance of careful and systematic evaluation to define the most appropriate preventive therapy.

Therefore, the early identification of risk factors, combined with the use of stratification tools such as CHADS2 and echocardiographic support, is essential for therapeutic decision-making and for the reduction of AF-related complications. Anticoagulation remains the pillar of thromboembolic prevention in high-risk patients, ensuring the reduction of morbidity and mortality associated with this condition.

ANTITHROMBOTIC STRATEGIES FOR PREVENTION OF SYSTEMIC THROMBOEMBOLISM

The prevention of systemic thromboembolism in patients with atrial fibrillation (AF) is an ongoing challenge, being addressed by a variety of antithrombotic strategies, including the use of vitamin K antagonists, antiplatelet agents, and low molecular weight heparins, as well as by non-pharmacological methods. Each of these approaches has its advantages, limitations, and clinical impacts, which must be carefully evaluated in order to choose the most appropriate treatment.

The use of vitamin K antagonists, such as warfarin, remains a widely used strategy for the prevention of stroke in patients with AF. Most studies have shown that oral anticoagulation adjusted according to INR values (between 2 and 3) is effective in reducing the risk of stroke, although the possibility of bleeding complications although rare, it cannot be ignored. The incidence of bleeding in the elderly, especially those with adequate control of anticoagulation and systemic arterial hypertension, has decreased significantly in recent years. On the other hand, the RE-LY study evaluated dabigatran, a direct thrombin inhibitor, at doses of 110 mg and 150 mg, comparing it with warfarin in patients at high risk for cardioembolic events. The results showed that the 110 mg dose had a similar rate of ischemic stroke and systemic embolism to warfarin, but with a lower rate of major bleeds.

The 150 mg dose was associated with a lower incidence of embolic events, but with similar rates of bleeding. The main advantage of dabigatran over warfarin is its greater pharmacological predictability, less interaction with other drugs, and the lack of need for constant INR monitoring. However, the high incidence of acute myocardial infarction (AMI) observed in the dabigatran group raises the hypothesis of platelet activation, suggesting the need for caution in the use of this drug, especially in patients at high risk of AMI. In addition, the high cost of dabigatran may be a limitation for its large-scale implementation.

Regarding antiplatelet agents, acetylsalicylic acid (ASA) and clopidogrel are frequently used in patients with AF, although their efficacy in preventing stroke is modest. Its action is more pronounced in hypertensive and diabetic patients, although protection against events of cardiac origin, such as stroke, is limited. The combination of oral anticoagulants with antiplatelets has not demonstrated additional benefits in terms of reducing the risk of thromboembolic events, but may in fact increase the risk of bleeding complications, especially in the elderly, with an increased risk of intracranial hemorrhages. The ACTIVE study showed that the combination of ASA and clopidogrel reduced the risk of major vascular events, such as stroke, in patients who could not use oral anticoagulants, although the risk of major bleeding events was higher. Brazilian guidelines for the treatment of AF do not recommend double platelet aggregation in patients unable to use oral anticoagulants.

Low molecular weight heparin (LMWH) is another valid therapeutic option, especially in acute situations or in patients with contraindications to the use of oral anticoagulants. LMWH has several advantages, including an extended lifespan, improved bioavailability, and a predictable antithrombotic response, allowing it to simplify treatment and reduce the need for hospitalization to start anticoagulation. In pregnant women with AF, particularly those at high risk of thromboembolism, LMWH is the only safe anticoagulation option, as warfarin is contraindicated due to its teratogenic potential.

In addition to pharmacological options, non-pharmacological strategies, such as obliteration of the left atriautette, have gained prominence. Although studies on this technique are limited, it is based on the removal of the main site of thrombus formation, providing an alternative for patients with AF and high risk of thromboembolism, especially when anticoagulation is not a safe option. This approach is commonly reserved for patients undergoing cardiac surgery, who have concomitant AF at increased risk of thromboembolic events.

Antithrombotic strategies for the prevention of systemic thromboembolism in patients with AF involve a multifaceted approach, with the choice of appropriate therapy depending

on the risk profile of each patient, the comorbidities present, and tolerance to certain treatments. Anticoagulation remains the main pillar in the prevention of thromboembolic events, although clinical management should always be individualized, considering both the benefits and potential risks associated with each therapy.

PROGNOSIS AND MANAGEMENT OF PATIENTS WITH ATRIAL FIBRILLATION

Atrial fibrillation (AF) is a condition associated with a significantly increased risk of stroke, heart failure (HF), and all-cause mortality, especially in women. Patients with AF have a risk of death approximately twice as high as those with normal sinus rhythm, as evidenced in the ALPHA, COMET and Val-Heft studies, which identified AF as a strong and independent risk factor for morbidity and mortality. The severity of the underlying heart disease has a close correlation with the presence of AF, since this arrhythmia aggravates the clinical picture, promoting a worse prognosis for patients with cardiac dysfunction. The rate of ischemic stroke (LVA) among patients with nonvalvular AF averages 5% per year, representing a risk two to seven times higher than in individuals without AF. It is estimated that one in six strokes occurs in patients with AF. In addition, the prognosis of stroke is aggravated by the presence of AF, with a mortality of 25% in 30 days, compared to 14% in cases of stroke without AF. Neurological sequelae also tend to be more severe, since cerebral infarction tends to be of greater extent in cases of cardioembolic embolism.

In patients with acute myocardial infarction (AMI), the occurrence of AF triples mortality, especially in the first year of follow-up, which suggests a relationship between this arrhythmia and the presence of left ventricular dysfunction. The Framingham study also showed that in patients with rheumatic heart disease associated with AF, the risk of stroke is 17 times higher compared to controls of the same age group, with an attributable risk five times higher in those with non-rheumatic AF. The risk of stroke increases with age, ranging from 1.5% in patients aged 50 to 59 years to 23.5% in patients over 80 years. This reflects the urgent need for effective strategies for the management and prevention of complications in patients with AF, especially as the population ages.

The growing aging of the population and the high incidence and prevalence of YF in older age groups indicate that, in the near future, there will be a true "epidemic" of this condition. This makes it essential for cardiology specialists to possess a deep understanding of the proper management of AF in order to effectively treat patients. Patients with failure to control heart rate (HR), persistent symptoms, or progressive decompensation of the underlying heart disease should be referred to a specialist, especially in cases that require more complex interventions, such as the use of multiple

therapeutic regimens, the prescription of antiarrhythmics, or even the indication of non-pharmacological intervention, such as ablation of the atrioventricular node and implantation of a permanent pacemaker.

Patients with permanent AF generally need only outpatient follow-up, aiming at HR control and the maintenance of adequate anticoagulation. However, those who have excessive increases in the international normalized index (INR), with a high risk of severe bleeding, should be hospitalized. In addition, throughout the natural course of AF and the underlying heart disease, the decision to admit the patient should be based on clinical criteria, particularly in episodes of evident decompensation.

Continuous follow-up of patients with permanent AF is essential to ensure adequate control of the INR, which is often complicated, leading to its underutilization in a significant portion of patients. In addition, it is important to regularly assess HR control, using complementary tests such as the stress test or 24-hour Holter ambulatory monitoring, to adjust treatment and improve the patient's prognosis.

CONCLUSION

Atrial fibrillation (AF) is one of the most prevalent arrhythmias and poses a significant public health challenge due to its association with serious complications such as heart failure and thromboembolic events. This study reviewed essential aspects related to the diagnosis, therapeutic management, and prevention of complications in patients with heart disease, with the aim of contributing to a deeper understanding and more effective clinical practices.

Early diagnosis of AF is essential to mitigate its complications. In this sense, the use of modern diagnostic tools and continuous monitoring are indispensable, especially in populations at higher risk, such as the elderly and patients with comorbidities. However, even with advances in technologies, there is still a relevant underdiagnosis, which reinforces the need for educational strategies and public health policies that encourage screening in vulnerable populations.

The therapeutic management of AF should be patient-centered, with decisions based on an individualized assessment that takes into account factors such as thromboembolic risk, symptom severity, and the presence of associated diseases. Combined rhythm and frequency control strategies have been shown to be effective in improving clinical outcomes. In addition, anticoagulation remains the mainstay for the prevention of thromboembolic complications, with direct oral anticoagulants offering a safer and more effective alternative in many cases.

On the other hand, despite therapeutic advances, important challenges remain. Knowledge gaps exist regarding the long-term efficacy of nonpharmacologic approaches, such as catheter ablation, in specific subgroups of patients. In addition, adherence to treatment, especially the use of anticoagulants, is still a critical obstacle, requiring strategies to improve patient awareness and medical follow-up.

As the prevalence of AF continues to rise, especially due to the aging population and increasing cardiovascular risk factors, it is essential to invest in translational research and large-scale clinical studies that explore innovative interventions. Integrated care models, with multidisciplinary teams that include cardiologists, neurologists, geriatricians, and public health specialists, should also be expanded to optimize the management of patients with AF and reduce the socioeconomic impact of this condition.

It is therefore concluded that the approach to AF requires a careful balance between early diagnosis strategies, personalized therapeutic management, and prevention of complications. The advancement of knowledge, combined with the implementation of effective public health policies, will be crucial to minimize the burden of this condition and improve clinical outcomes, especially in cardiac patients.

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