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REVIEW

The State of the Art: Atrial Fibrillation Epidemiology, Prevention, and Treatment

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Abstract

As the most common sustained arrhythmia in adults, atrial fibrillation (AF) is an established and growing epidemic. To provide optimal patient care, it is important for clinicians to be aware of AF's epidemiological trends, methods of risk reduction, and the various available treatment modalities. Our understanding of AF's pathophysiology has advanced, and with this new understanding has come advancements in prevention strategies as well as pharmacological and nonpharmacological treatment options. Following PubMed and MEDLINE searches for AF risk factors, epidemiology, and therapies, we reviewed relevant articles (and bibliographies of those articles) published from 2000 to 2016. This "state-of-the-art" review provides a comprehensive update on the understanding of AF in the world today, contemporary therapeutic options, and directions of ongoing and future study.

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Atrial fibrillation (AF) is the most common sustained arrhythmia in adults, and its prevalence is expected to increase 3-fold in the next 3 decades. Experts now characterize these epidemiological trends as an AF epidemic. On the basis of these considerations and multiple advances in prevention and treatment, all clinicians should be aware of the current management of AF. The therapeutic strategies for rate control or rhythm control have evolved considerably. The risks and benefits of anticoagulant therapy have a more robust evidence base to guide decision making about anticoagulation. At the same time, options for stroke prevention have evolved into novel pharmacological and nonpharmacological options. There is an important and growing body of evidence that the burden of AF can be reduced with lifestyle interventions that result in weight loss. Following PubMed and MEDLINE searches for AF risk factors (RFs), epidemiology, and therapies, we reviewed relevant articles (and bibliographies of those articles) published from 2000 to 2016. This "state-of-the-art" review represents a comprehensive update for all clinicians, which will ultimately serve to improve outcomes in patients with AF.

EPIDEMIOLOGY AND POPULATION TRENDS

Using Einthoven's string galvanometer in 1909, Lewis[1] and Rothberger[2] separately established electrocardiographically that "auricular fibrillation" caused "pulsus irregularis perpetuus," a condition that was noted years before by the Scottish cardiologist Sir James Mackenzie[3] to have lost the jugular A wave on his ink-writing polygraph. Initially thought of as an insignificant condition, AF is now recognized to have a substantial effect on morbidity and mortality, along with an increasing burden on health care utilization and cost.[4,5] AF is the most common clinically important arrhythmia, with a recent worldwide estimate of up to 33.5 million patients (not even including those with clinically silent disease), and is increasing in prevalence, making this a global epidemic.[6]

The epidemiology of AF is more clearly established in Western developed countries than it is in developing nations.[7,8] However, it appears that the incidence of AF in developed countries is twice as much as that in developing countries.[6] The estimated prevalence in the United States is around 5.2 million, with an expected increase to 12.1 million by the year 2030.[9]

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ARTICLE HIGHLIGHTS

- Atrial fibrillation (AF) is an established and growing global epidemic.
- Several risk factors for AF have been identified, and risk reduction is possible through modification of these factors.
- The chief strategies for AF treatment—rate control and rhythm control—are both viable and have different advantages and disadvantages.
- Prevention of stroke and systemic embolism, a major aspect of AF treatment, is evolving in the form of new anticoagulant agents and left atrial exclusion techniques.
- Sinus rhythm maintenance may be accomplished through the use of antiarrhythmic drugs and/or ablative techniques.
- Rhythm control via ablation for AF, most often in the form of pulmonary vein isolation, is constantly improving and now includes procedures that are catheter-based, operative, or hybrid.

Age

Age is a major RF for AF, with the risk of developing AF doubling with each decade of life.[10] For example, in the Framingham population, the annual incidence of AF per 1000 persons for those younger than 65 years is 1.9 in women and 3.1 in men as compared with 31.4 in women and 38 in men among those older than 85 years.[11] In both men and women older than 40 years, the lifetime risk of AF in the Framingham population was estimated to be around 25%.[12] Similar findings were noted in a European cohort, with an incidence of AF of 1.1 per 1000 person-years in patients aged 55 to 59 years, increasing to 20.7 per 1000 person-years in those older than 80 years, with a lifetime AF risk comparable to that seen in the Framingham cohort.[13] According to a Medicare database review, the incidence of AF has remained approximately stable in the US population older than 65 years over the past decade, ranging from 27.8 to 28.3 per 1000 person-years.[14]

Race

In the United States, whites appear to have a higher risk of incident AF than do African Americans, Hispanics, and Asians.[15] An apparent paradox is evident in the lower incidence of AF in African Americans than in whites, despite African Americans' higher prevalence of RFs for AF.[8,16] The Cardiovascular Health Study was the first to suggest this paradox, with a 79% lower risk of AF in the African American population of the study.[17] The Analysis of the Atherosclerosis Risk in Communities (ARIC) study[16] also suggested that African Americans were at a lower risk of developing AF, with a 41% lower adjusted risk of developing AF compared with whites. A meta-analysis[18] of 10 studies examining more than 1 million patients reported that African American race appeared to be protective from AF, exhibiting a 49% lower risk. To further investigate whether genetic or environmental factors contributed to this AF paradox in African Americans, Marcus et al[19] used genetic analysis to determine the degree of European ancestry in African Americans in the Cardiovascular Health Study and ARIC study and correlated this information with the risk of developing AF. Interestingly, they found that for every 10% increase in European ancestry there was a 10% increased risk of incident AF.

Sex

Sex also affects the incidence and effects of AF. For example, women have been found to be more symptomatic from AF and have longer paroxysmal AF episodes as well as faster ventricular response rates.[20] In the ARIC study,[16] women had a 46% lower risk of AF than did age-matched men. This difference was also seen in a Medicare database review from 1993 to 2007, in which men had an incidence of newly diagnosed AF of approximately 35 per 1000 person-years as compared with approximately 25 per 1000 person-years in women.[14] However, over that 15-year time period, the incidence of AF more than doubled for both sexes, which was related to the advancing age of the population. Despite their lower incidence of AF, it is well established that in the presence of AF, women have a higher risk of stroke than do men.[21,22] Furthermore, in the Copenhagen City Heart Study,[22] a population-based prospective cohort study, women appeared to have an independent 2.5-fold increased risk of cardiovascular (CV) mortality related to AF as compared with men.

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