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Atrial Fibrillation: A Historical Perspective 1
 Atul Khasnis and Ranjan K. Thakur

Atrial fibrillation (AF) undoubtedly has become one of the most well studied arrhythmias today in terms of pathophysiology and diagnostic and therapeutic (interventional) electrophysiology. Although it lends itself to an apparently easy diagnosis on a surface ECG, myriad electromechanical mechanisms underlie its origin. An era of technology has been reached that makes AF not only “treatable” but also potentially “curable.” This article aims at walking through the historical corridors and maze that have led to the present-day understanding of this most common yet complex arrhythmia.

Status of the Epidemiology of Atrial Fibrillation 17
 William B. Kannel and Emelia J. Benjamin

Atrial fibrillation (AF), an increasingly common dysrhythmia, is responsible for substantial morbidity and mortality. Currently in the United States, approximately 2.3 million people are diagnosed with AF and, based on the census, this number may rise to 5.6 million by 2050. Risk factors for AF include advancing age and cardiovascular disease and its risk factors. The chief hazard of AF is embolic stroke, which is increased four- to fivefold, assuming great importance in advanced age when it becomes a dominant factor. AF is associated with about a doubling of mortality.

Genetics of Atrial Fibrillation

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Patrick T. Ellinor, B. Alexander Yi, and Calum A. MacRae

Recent studies of atrial fibrillation (AF) have identified mutations in a series of ion mutations; however, these channels appear to be relatively rare causes of AF. Recent genome-wide association studies for AF have identified novel variants associated with the disease, although the mechanism of action for these variants remains unknown. Ultimately, a greater understanding of the genetics of AF should yield insights into novel pathways, therapeutic targets, and diagnostic testing for this common arrhythmia.

New Concepts in Atrial Fibrillation: Mechanism and Remodeling

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Chung-Chuan Chou and Peng-Sheng Chen

Atrial fibrillation (AF) is a complex disease with many possible mechanisms. Studies indicate that the arrhythmogenic foci within the thoracic veins are AF initiators. Once initiated, AF alters atrial electrical and structural properties in a way that promotes its own maintenance and recurrences and may alter the response to antiarrhythmic drugs. The exact mechanisms by which the initiators trigger AF remain elusive, however. Evidence to date suggests that autonomic modulation does have an adjunctive role to play in catheter AF ablation, especially when applied selectively. Further mechanistic and clinical studies are warranted before a wider application can be recommended.

Diagnosis and Management of Typical Atrial Flutter

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Navinder S. Sawhney and Gregory K. Feld

Can “past decade” be rephrased to refer to more specific years? Typical atrial flutter (AFL) is a common atrial arrhythmia that may cause significant symptoms and serious adverse effects, including embolic stroke, myocardial ischemia and infarction, and, rarely, a tachycardia-induced cardiomyopathy resulting from rapid atrioventricular conduction. As a result of the well-defined anatomic and electrophysiologic substrate and the relative pharmacologic resistance of typical AFL, radiofrequency catheter ablation has emerged since its first description in 1992 as a safe and effective first-line treatment. This article reviews the electrophysiology of typical AFL and techniques currently used for its diagnosis and management.

Postoperative Atrial Fibrillation

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Krit Jongnarangsin and Hakan Oral

Atrial fibrillation is a common arrhythmia after cardiac surgery. It is associated with an increase in morbidity, length of hospital stay, and mortality. Patients who are at higher risk of postoperative atrial fibrillation should receive prophylactic treatment. Atrial

fibrillation usually resolves spontaneously after heart rate is controlled; however, if patients are highly symptomatic or hemodynamically unstable, sinus rhythm should be restored by electrical or pharmacologic cardioversion. Patients with atrial fibrillation of more than 48 hours should receive antithrombotic therapy for thromboembolism prevention.

Electrical and Pharmacologic Cardioversion for Atrial Fibrillation

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Susan S. Kim and Bradley P. Knight

In this article, electrical and pharmacologic cardioversion for atrial fibrillation is described in detail. Indications for cardioversion and management of pericardioversion anticoagulation also are discussed. Finally, management strategies for immediate recurrence of atrial fibrillation and cardioversion failure are offered.

Drug Therapy for Atrial Fibrillation

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Simone Musco, Emily L. Conway, and Peter R. Kowey

Atrial fibrillation (AF) is the most frequently diagnosed arrhythmia. Prevalence increases with age, and the overall incidence is expected to increase as the population continues to age. Choice of pharmacologic therapy for atrial fibrillation depends on whether or not the goal of treatment is maintaining sinus rhythm or tolerating atrial fibrillation with adequate control of ventricular rates. New antiarrhythmic drugs are being tested in clinical trials. Drugs that target remodeling and inflammation are being tested for their use as prevention of AF or as adjunctive therapy.

Anticoagulation: Stroke Prevention in Patients with Atrial Fibrillation

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Albert L. Waldo

It is well recognized that during atrial fibrillation (AF), clots may form in the left atrium. This, in turn, may lead to embolization of the clot, with resulting ischemic stroke or systemic embolism. Also, the presence of AF confers a fivefold increased risk for stroke. AF is the most common and important cause of stroke resulting from any cause. This article considers the risks for and anticoagulation prophylaxis against embolic stroke in patients with AF.

The Role of Pacemakers in the Management of Patients with Atrial Fibrillation

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Gautham Kalahasty and Kenneth Ellenbogen

Pacemakers have an important role in the major strategies for the management of atrial fibrillation, rate control and rhythm control. Of all the current non-pharmacologic therapies for atrial fibrillation, the use of pacemakers impacts the largest number of patients.

Pacemakers are used to facilitate medical management of atrial fibrillation with rate control agents and anti-arrhythmic drugs. Atrioventricular junction ablation in conjunction with pacemaker implantation can be an effective therapy for controlling a rapid ventricular rate during atrial fibrillation. The minimization of right ventricular apical pacing in patients with paroxysmal atrial fibrillation is an important objective. Cardiac resynchronization therapy devices are likely to be beneficial in select patients with chronic atrial fibrillation.

Catheter Ablation of Atrial Fibrillation

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Thomas D. Callahan IV and Andrea Natale

Atrial fibrillation is a common arrhythmia associated with significant morbidity including angina, heart failure and stroke. Medical therapy remains suboptimal with significant side effects and toxicities, as well as a high recurrence rate. Catheter ablation or modification of the atrio-ventricular node with pacemaker implantation provides rate control but subjects the patient to the risks of an implantable device and does nothing to reduce the risk of stroke. Pulmonary vein antrum isolation offers a nonpharmacologic means of restoring sinus rhythm, thereby eliminating the morbidity of atrial fibrillation and the need for anti-arrhythmic drugs.

Surgical Approaches for Atrial Fibrillation

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A. Marc Gillinov and Adam E. Saltman

For cardiac surgery patients presenting with atrial fibrillation (AF), surgeons offer an operation that corrects the structural heart disease and the AF. With this approach, it is estimated that surgeons will perform more than 10,000 ablation procedures in 2007. Surgeons are developing minimally invasive techniques for stand-alone, epicardial ablation of AF. This article (1) reviews the rationale for surgical ablation of AF, (2) describes the classic maze procedure and its results, (3) details new approaches to surgical ablation of AF, (4) emphasizes the importance of management of the left atrial appendage, and (5) considers challenges and future directions in the ablation of AF.

Atrial Fibrillation: Goals of Therapy and Management Strategies to Achieve the Goals

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Benzy J. Padanilam and Eric N. Prystowsky

The primary goals in the management of patients who have atrial fibrillation are prevention of stroke and cardiomyopathy and amelioration of symptoms. Each patient presents to a physician with a specific constellation of symptoms and signs, but, fortunately, most patients can be assigned to broad categories of therapy. For some, anticoagulation and rate control suffice, whereas others require more aggressive attempts to restore and

maintain sinus rhythm. Physicians and patients need to be willing to alter therapeutic plans if an initial strategy of rate or rhythm control is unsuccessful.

Atrial Fibrillation: Unanswered Questions and Future Directions

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Vivek Y. Reddy

Just more than a decade ago, Haissaguerre and colleagues provided the seminal demonstration of the role of pulmonary vein triggers in the pathogenesis of atrial fibrillation (AF) and the potential therapeutic role of catheter ablation to treat patients who have paroxysmal AF. This initial observation ushered in the modern era of catheter ablation to treat patients who have AF, and tremendous progress has been made in understanding its pathogenesis and the catheter approaches to treating this rhythm. Although the current state of AF catheter ablation is well described earlier in this issue, this article reflects on some of the major unanswered questions about AF management, and the future technological and investigational directions being explored in the nonpharmacologic management of AF.

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