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Emergency medicine considerations in atrial fibrillation

Brit Long, MD [a,*], Jennifer Robertson, MD, MS [b], Alex Koyfman, MD [c], Kurian Maliel, MD FACC [d], Justin R. Warix, DO, FAAEM [e]

[a] San Antonio Military Medical Center, Department of Emergency Medicine, 3841 Roger Brooke Dr, Fort Sam, Houston, TX 78234, United States
[b] Emory University, Dept of EM, 531 Asbury Circle, Annex Bldg, Suite N340, Atlanta, GA 30322, United States
[c] The University of Texas Southwestern Medical Center, Department of Emergency Medicine, 5323 Harry Hines Boulevard, Dallas, TX 75390, United States
[d] Wright Patterson Military Medical Center, Department of Cardiology, 4881 Sugar Maple Dr, Dayton, OH 45433, United States
[e] Central Peninsula Hospital, 250 Hospital Pl, Soldotna, AK 99669, United States

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ABSTRACT

Background: Atrial fibrillation (AF) is an abnormal heart rhythm which may lead to stroke, heart failure, and death. Emergency physicians play a role in diagnosing AF, managing symptoms, and lessening complications from this dysrhythmia.
Objective: This review evaluates recent literature and addresses ED considerations in the management of AF.
Discussion: Emergency physicians should first assess patient clinical stability and evaluate and treat reversible causes. Immediate cardioversion is indicated in the hemodynamically unstable patient. The American Heart Association/American College of Cardiology, the European Society of Cardiology, and the Canadian Cardiovascular Society provide recommendations for management of AF. If hemodynamically stable, rate or rhythm control are options for management of AF. Physicians may opt for rate control with medications, with beta blockers and calcium channel blockers the predominant medications utilized in the ED. Patients with intact left ventricular function should be rate controlled to <110 beats per minute. Rhythm control is an option for patients who possess longer life expectancy and those with AF onset <48 h before presentation, anticoagulated for 3–4 weeks, or with transesophageal echocardiography demonstrating no intracardiac thrombus. Direct oral anticoagulants are a safe and reliable option for anticoagulation. Clinical judgment regarding disposition is recommended, but literature supports discharging stable patients who do not have certain comorbidities.
Conclusion: Proper diagnosis and treatment of AF is essential to reduce complications. Treatment and overall management of AF include rate or rhythm control, cardioversion, anticoagulation, and admission versus discharge. This review discusses ED considerations regarding AF management.

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* Corresponding author at: 3841 Roger Brooke Dr., San Antonio, TX 78234, United States.
E-mail address: brit.long@yahoo.com (B. Long).

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1. Introduction

Atrial fibrillation (AF) is one of the most common dysrhythmias, affecting up to 1–2% of the population and 9% in those over age 80 [1-5]. Not only is AF the most common dysrhythmia overall, but it is also the most common dysrhythmia diagnosed in the ED. A study in 2013 demonstrates over a 29% increase in ED AF visits, with the dysrhythmia accounting for up to 0.5% of all ED visits [6]. When associated with other concomitant pathologies such as CHF, AF patients who present to the ED tend to be older and have higher mortality [6]. As the population continues to age, the dysrhythmia will likely increase in prevalence.

The dysrhythmia is strongly associated with stroke and heart failure [1-6]. Men, Caucasians, and the elderly demonstrate greater risk for AF, although women more commonly present with stroke from AF [7-15]. The risk of stroke approaches 5% annually with no anticoagulation, which decreases to <1% with appropriate management [10,16]. Mortality in patients with AF is close to double that of patients with normal sinus rhythm [8-15]. Hypertension, diabetes mellitus, obesity, ethanol use, coronary artery disease (CAD), valvular heart disease, thyroid disease, autonomic or electrolyte disturbances, and prior cardiac surgery contribute to AF [7-13,15-22], and up to 70% of patients with AF have associated heart disease [16-22]. A recent retrospective review of 564 ED patients with recent onset AF found hypertension to be the most common comorbidity, followed by ischemic heart disease [23]. Other contributing factors include channelopathies, stimulant use, pulmonary disease, enhanced vagal tone, extreme exercise, smoking, and chronic kidney disease (CKD) [7,8,11,21–27].

In a normal heart, impulses originate from the sinus node, followed by regular atrial and ventricular activation and contraction [8,28]. AF results from depolarization of multiple microreentry circuits, which reach the AV node at 300–600 atrial impulses per minute. The AV node refractory period is responsible for the irregularly irregular ventricular response [8-10]. On electrocardiogram (ECG), p waves will be absent and the R-R intervals irregular. These irregular atrial beats cause ineffective atrial contraction, leading to thrombus formation predominantly in the left atrial appendage [8-10,16,22,23]. The irregular beats also can lead to rapid ventricular activity, which if not well controlled, decrease myocardial blood flow, decrease cardiac output, and cause long term damage to the myocardium [8-11,28]. The QRS complex is narrow in those without bundle branch block (BBB), though QRS width >120 ms is found in those with ventricular BBB. Some patients with complete heart block and AF may present with regular rhythm and no discernable p waves. Patients with WPW syndrome and AF may demonstrate an ECG resembling ventricular tachycardia, though AF with preexcitation demonstrates an irregularly irregular rhythm [8-13,16].

Atrial fibrillation is comprised of several categories [8-13,16]. Paroxysmal AF consists of episodes that terminate spontaneously or with intervention within 7 days of onset, while persistent AF is present for longer than 7 days [8-13,15,16]. Recurrent AF is defined by more than two episodes. Longstanding persistent AF is continuous AF for greater than one year. Permanent AF is defined as the presence of continuous AF, with joint decision between patient and clinician to stop further attempts to maintain sinus rhythm. If permanent AF is eventually treated with rhythm control, it is redefined as longstanding persistent AF [8-13,15,16]. Prolonged AF makes restoration of normal sinus rhythm difficult [8-11].

2. Methods

This is a narrative review of AF emergency evaluation and management. The objective is to evaluate recent literature and address current considerations in the management of AF in the ED. The literature search was limited to inclusion of recent studies from the prior 20 years. Rather than discussing AF in its entirety, the authors have investigated specific components of the condition relevant to emergency physicians including ED evaluation, rate and rhythm control, anticoagulation, and patient disposition.

3. Discussion

When evaluating and managing the patient with AF with rapid ventricular response (RVR), the physician should consider if the patient is unstable and whether this is due to primary AF versus another cause. Hypotension and tachycardia may not be due to AF solely, but rather sepsis, myocardial infarction, gastrointestinal hemorrhage, alcohol withdrawal, pulmonary embolism, and other causes [29,30]. This is termed complex AF [29,30]. Inflammation and oxidative stress, seen in sepsis, may play a role in the development of AF, as they may directly change the electrical activity of the cardiac myocyte [7,8,25]. Up to 25% of hospitalized patients with sepsis develop AF [7]. If the etiology of tachycardia and hypotension is due to another primary etiology, the patient will likely not improve with interventions targeting specifically AF alone. Attempts to control the heart rate or rhythm in these patients are usually less successful and may be harmful. Rather, the etiology must be properly evaluated and treated [29,30]. Scheuermeyer et al. evaluated 416 patients with AF or atrial flutter in a retrospective descriptive cohort study [29]. Of these patients evaluated, 105 underwent rate control and 30 rhythm control, and 55 adverse events occurred in this group of 135 patients (40.7%), while the 281 patients not managed with rhythm or rate control demonstrated 20 adverse events (7.1%) [29]. Patients with complex AF demonstrated a 5.7-fold increase in adverse events and 11.7-fold increase in major adverse events with rate or rhythm control, and patients with sepsis or heart failure with AF demonstrated the highest number of adverse events, though others included acute coronary syndrome (ACS), acute renal failure, obstructive lung disease, gastrointestinal bleeding, and stroke [29,30]. These patients may need the relative tachycardia to compensate. If no underlying cause of AF is suspected on evaluation, management should focus on symptom improvement and reduction in potential complications [7-12,30]. If another condition is suspected on focused history and examination and the patient has AF with RVR, the underlying etiology should be managed (Fig. 1), as treatments focusing on AF alone may result in patient harm.

3.1. Stable patients

Most patients with AF with RVR who present to the ED possess a well-perfusing blood pressure [8,11,13,30]. Focused history and physical examination are warranted, with the physician inquiring on onset, frequency, duration of symptoms, associated symptoms, prior episodes, medications (anticoagulants, antiarrhythmics, rate control agents), past medical history (heart disease), and instigating factors. Evaluation including electrolyte panel, complete blood cell count, chest x-ray, and ECG is advised. Thyroid panel may assist if the patient demonstrates other symptoms associated with thyroid abnormality. Additional testing including brain natriuretic peptide (BNP) or troponin is not recommended on a routine basis, but rather, depends on the clinical situation. Pregnancy testing in reproductive aged-women is recommended, and evaluation for pulmonary embolism should be based on the clinical situation [30].

Evaluation for ACS can be challenging, as a significant number of patients with AF have coexisting coronary artery disease (CAD) [30-34]. Chest pain is present in 20% of patients presenting with AF with RVR, which is not usually due to a primary ischemic event [31,32]. Patients without significant ST-segment changes are at low risk for acute myocardial infarction [31,32]. One prospective cohort study suggested chest pain and ST segment depression <2 mm (mm) are common findings in AF, but they have limited ability to diagnose or predict ACS [32]. ST segment elevation or depression ≥2 mm was found to be a reliable predictor of concomitant ischemia [32]. Similarly, a 2007 retrospective

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