Atrial Fibrillation and Acute Decompensated Heart Failure

John P. DiMarco, MD, PhD

Atrial fibrillation (AF) is a common rhythm in patients with acute decompensated heart failure (ADHF). Registry and trial data indicate that 20% to 35% of patients with ADHF who are admitted to the hospital will be in AF at presentation. In about one third of these patients, the AF will be of recent onset. Despite the high frequency with which the combination of AF and ADHF is encountered, there are few published data that specifically address this problem. AF and worsening heart failure interact in a dangerous pattern. The adverse effects of AF in patients with heart failure may include loss of atrial transport, rapid and irregular ventricular rates, and toxic effects of antiarrhythmic drug therapy. Worsened heart failure, in turn, leads to increased atrial stretch and heightened sympathetic tone. These latter changes make the AF more resistant to treatment using either a rate-control or a rhythm-control strategy (Figure 1).

The immediate general goals of therapy in ADHF are to improve symptoms, restore oxygenation, improve organ perfusion, and limit cardiac and renal injury. In patients with sinus rhythm and ADHF, the appropriate use of vasodilators, oxygen, diuretics, positive inotropic agents, and mechanical devices to support ventilation or cardiac output forms the cornerstone of therapy. In patients who present with AF, however, additional treatment decisions are required.

Initial Assessment
The clinical history provides critical information that should be used to guide treatment. Five key questions that should be asked before starting therapy are listed in Table 1. Many patients who present with ADHF will have implantable cardioverter defibrillators (ICDs) in place. Inappropriate ICD therapy during AF episodes is both undesirable and dangerous. If the patient has an ICD, interrogation and reprogramming of the ICD to minimize the risk for inappropriate therapy should be performed as soon as possible after presentation. Usually, the rate and duration of arrhythmia that triggers ventricular tachycardia or ventricular fibrillation detection should be increased, and supraventricular arrhythmia discriminators should be activated if they are available. With dual-chamber or biventricular devices, the atrial tachyarrhythmia pacing response should be set to eliminate inappropriate high-rate atrial tracking.

Rate Control Versus Rhythm Control
AF episode duration will affect decisions about the advisability and potential for spontaneous, pharmacological, or electric cardioversion and selection of agents for rhythm or rate control. Three scenarios are commonly encountered. Some patients will present shortly after the onset of AF. Either the AF episode itself has rapidly precipitated heart failure in a previously stable patient or worsening heart failure has triggered an acute episode of AF. In these patients, the potential for successful early restoration of sinus rhythm is high if the heart failure symptoms can be controlled. A second pattern is seen when a patient develops an episode of AF for which the patient is either unaware or does not seek medical attention. During the ensuing days and weeks, the patient gradually slips into ADHF and then presents with severe symptoms. These patients will probably not convert spontaneously but may be candidates for a later cardioversion attempt. Finally, some patients with permanent AF that is usually well rate controlled will develop progressive heart failure and then present emergently with rapid ventricular rates due to the stress of the episode. Long-term restoration of sinus rhythm will rarely be possible in this latter group.

A careful medication history is important to guard against overdosage and adverse drug interactions when drugs for rate control or rhythm control are considered. Anticoagulation status must be known before any cardioversion attempt, unless the episode is definitely known to be of <48 hours duration. Ventricular function strongly affects appropriate rhythm-control and rate-control drug choices. Concomitant disorders (eg, renal or pulmonary disease, infection) may limit drug therapy options and may also require specific therapy.

Immediate cardioversion should rarely be the first step in therapy for a patient with AF and ADHF. Although a shock may transiently restore sinus rhythm, the expected recurrence rate in the still-decompensated patient will be very high. Therefore, it is usually better to start with a rate-control strategy. If the patient has not been previously anticoagulated
and there are no contraindications, heparin should also be
started.

Although the optimal resting heart rate during AF is
between 60 and 100 bpm, rates below 100 bpm may not be
achievable during AHDF until volume overload and hypoxia
have been corrected. A more realistic target is to achieve a
heart rate below 120 bpm during the first hours of treatment.
Digoxin should be the first rate-control agent considered, but
in patients with high persistently sympathetic tone, it may
have little effect early in the course of therapy. If the patient
has already been taking digoxin, additional doses may be
dangerous and should be avoided, unless a low serum digoxin
concentration (<0.5 ng/mL) can be confirmed. Cautious
addition of small doses of an intravenous β-blocker, usually
diltiazem, to digoxin will often be required. If rate control
along with relief of volume overload and dyspnea can be
achieved, patients will frequently revert back to sinus
rhythm if the AF episode is of recent onset. If the patient
does not improve with these measures, meets anticoagulation
criteria for conversion, and is not already on an antiarrhyth-
mic drug, a trial of intravenous amiodarone may be helpful,
and there are no contraindications, heparin should also be
started.

If this approach fails and heart rates during AF remain
elevated, cardioversion after a period of loading with an
antiarrhythmic drug, usually amiodarone, is the next step.
When the patient has not been adequately anticoagulated, a
transesophageal echocardiogram followed by maintained an-
ticoagulation may facilitate the early cardioversion attempt. If
cardioversion attempts are unsuccessful and the patient re-
mains symptomatic with elevated rates, atrioventricular junc-
tional ablation, often with a biventricular pacing system, is an
additional option that can be considered.

Once the ventricular rate has been at least partially con-
trolled, the possible benefit of a cardioversion should be
considered, unless the patient has known long-standing per-
sistent AF. In the latter situation, the probability of restoring
and maintaining sinus rhythm is low. Therefore, once the
acute heart failure exacerbation has been corrected in such a
patient, a continued rate-control strategy is appropriate. In
patients with new- or recent-onset AF, an attempt at cardio-
version and drug therapy is reasonable, with the final decision
on a long-term strategy based on symptoms, drug tolerance,
and the frequency of recurrent episodes. As was shown in the
Atrial Fibrillation and Heart Failure Trial,5 there is no a priori
benefit associated with a rhythm-control strategy, but indi-
vidual patient responses vary widely, and I usually make at
least 1 attempt to maintain sinus rhythm in any patient with
more than mild symptoms associated with AF. In selected
patients, left atrial catheter ablation may prove effective, but
experience with this approach for patients in whom AF was
not the primary cause for heart failure has been limited.

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Table. Key Questions to Consider Before Starting Therapy

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<th>Question</th>
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<td>Does the patient have an ICD or pacemaker in place?</td>
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<td>Does the patient have preserved or reduced systolic function at their baseline?</td>
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<td>What is the duration of the AF episode?</td>
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<td>Is the patient already on drugs for rhythm or rate control and anticoagulation?</td>
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<td>What concomitant disorders are present?</td>
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