

## Society Guidelines

**Canadian Cardiovascular Society Atrial Fibrillation Guidelines 2010: Management of Recent-Onset Atrial Fibrillation and Flutter in the Emergency Department**Ian G. Stiell, MD, MSc,<sup>a</sup> Laurent Macle, MD,<sup>b</sup> and the CCS Atrial Fibrillation Guidelines Committee<sup>c</sup><sup>a</sup> Department of Emergency Medicine, Ottawa Hospital Research Institute, University of Ottawa, Ottawa, Ontario, Canada<sup>b</sup> Department of Medicine, Electrophysiology Service, Montreal Heart Institute, Université de Montréal, Montreal, Québec, Canada<sup>c</sup> For a complete listing of committee members, see Gillis AM, Skanes AC. Canadian Cardiovascular Society Atrial Fibrillation Guidelines 2010: Implementing GRADE and achieving consensus. *Can J Cardiol* 2011;27:27–30.**ABSTRACT**

Atrial fibrillation (AF) is the most common arrhythmia managed by emergency physicians. There is increasing evidence that most patients with recent-onset AF or atrial flutter (AFL) can be safely managed in the emergency department (ED) without the need for hospital admission. The priorities for ED management of recent-onset AF/AFL include rapid assessment of potential hemodynamic instability and identification and treatment of the underlying or precipitating cause. A careful evaluation of the patient's history should be performed to determine the time of onset of the arrhythmia. All patients should be stratified using a predictive index for the risk of stroke (eg, CHADS<sub>2</sub>). For stable patients with recent-onset AF/AFL, a strategy of either rate control or rhythm control could be selected based on multiple factors including the duration of AF and the severity of symptoms. If a strategy of rhythm control has been selected, either electrical or pharmacologic cardioversion may be used. Before proceeding to cardioversion in the absence of systemic anticoagulation, physicians must be confident that the duration of AF/AFL is clearly <48 hours and that the patient is not at a particularly high risk of stroke. When the duration of AF/AFL is >48 hours or uncertain, rate control should be optimized first and

**RÉSUMÉ**

La fibrillation auriculaire (FA) est la forme d'arythmie la plus fréquemment rencontrée à la salle d'urgence. La plupart des patients présentant une FA ou un flutter auriculaire d'apparition récente peuvent être traités en toute sécurité au service des urgences sans nécessiter d'hospitalisation. Les priorités du traitement à l'urgence incluent une évaluation rapide de l'état hémodynamique ainsi que l'identification et le traitement de la cause sous-jacente et/ou des facteurs précipitants. Le patient doit être soigneusement questionné sur ses symptômes, pour tenter de déterminer le début d'apparition de l'arythmie. Le risque d'accident vasculaire cérébral (AVC) doit être déterminé dans tous les cas, en utilisant, par exemple, le score de CHADS<sub>2</sub>. Chez les patients hémodynamiquement stables et présentant une FA ou un flutter auriculaire d'apparition récente, une stratégie soit de contrôle de la fréquence ventriculaire soit de conversion et maintien du rythme sinusal doit être adoptée, en tenant compte de nombreux éléments comme la durée de la FA et la sévérité des symptômes. Si l'on retient une stratégie de conversion et maintien du rythme sinusal, la cardioversion pourra être électrique ou pharmacologique. Avant cardioversion chez les patients non anticoagulés, il faudra être certain que la durée de l'épisode de FA ou de flutter

Atrial fibrillation (AF) is the most common arrhythmia managed by emergency physicians and accounts for approximately one-third of hospitalizations for cardiac rhythm disturbances.<sup>1</sup>

In Canada, the estimated overall rate of hospitalization with AF is 583 per 100,000 population.<sup>2</sup> Hospital admissions for AF have increased by 66% over the past 20 years due to an aging

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This statement was developed following a thorough consideration of medical literature and the best available evidence and clinical experience. It represents the consensus of a Canadian panel comprised of multidisciplinary experts on this topic with a mandate to formulate disease-

specific recommendations. These recommendations are aimed to provide a reasonable and practical approach to care for specialists and allied health professionals obliged with the duty of bestowing optimal care to patients and families, and can be subject to change as scientific knowledge and technology advance and as practice patterns evolve. The statement is not intended to be a substitute for physicians using their individual judgment in managing clinical care in consultation with the patient, with appropriate regard to all the individual circumstances of the patient, diagnostic and treatment options available and available resources. Adherence to these recommendations will not necessarily produce successful outcomes in every case.

the patients should receive therapeutic anticoagulation for 3 weeks before and 4 weeks after planned cardioversion. Adequate follow-up of patients with recent-onset AF/AFL is recommended to identify structural heart disease and evaluate the need for long-term antithrombotic or antiarrhythmic therapy.

population and a rising prevalence of chronic heart disease.<sup>3,4</sup> The overall mortality rate for patients with AF is approximately double that for patients in normal sinus rhythm.<sup>5</sup> The rate of ischemic stroke among patients with nonvalvular AF averages 5% per year, 2 to 7 times that of the population without AF.<sup>5-7</sup> Atrial flutter (AFL) may also occur in the patient with AF or may present as an isolated arrhythmia. The goals of therapy and management approaches for AFL are similar to those for AF.

In the emergency department (ED), physicians often manage patients with either recent-onset (first detected or recurrent) or those with permanent AF/AFL.<sup>8</sup> In the case of permanent AF/AFL, cardioversion has previously failed or clinical judgment has led to a decision not to pursue cardioversion, and ED care focuses on rate control and treatment of underlying conditions.<sup>9</sup> When AF terminates spontaneously within 7 days of recognized onset, it is designated paroxysmal; when sustained beyond 7 days, AF is designated persistent. This chapter will focus on those with symptomatic, recent-onset episodes of AF/AFL (either newly detected, recurrent paroxysmal, or recurrent persistent episodes), the most common arrhythmia managed in the ED.<sup>10,11</sup> There are 2 competing strategies for management: rate-control and rhythm-control treatment.<sup>1,12-14</sup> The rate-control approach consists of ventricular rate control, oral anticoagulation, no attempt to return the patient to sinus rhythm in the ED, and delayed cardioversion after 4 weeks, if indicated. With the rhythm-control approach, attempts are made to cardiovert patients to sinus rhythm in the ED, either pharmacologically or electrically, and then discharge them home in sinus rhythm.<sup>15-17</sup>

## Evidence for Emergency Department Management

Variation in practice within Canadian EDs has been observed, and this variation likely reflects a lack of high-quality evidence to guide the acute management of recent-onset AF patients.<sup>18,19</sup> Standard guidelines and textbooks are unable to offer clear evidence-based direction for emergency physicians.<sup>1,20</sup> Particularly controversial is the issue of using rhythm control or rate control.<sup>1,12-14</sup> The very large AF-FIRM and AF-CHF clinical trials compared rate and rhythm control but did not explore the optimal management for recent-onset AF/AFL patients presenting to the ED with <48 hours of symptoms.<sup>21,22</sup> In the United States, patients are often admitted to hospital under the cardiology service or discharged home after rate-control therapy only.<sup>23-25</sup> One Canadian site has described 2 cohorts of patients successfully treated with rhythm control with good results.<sup>11,26</sup> Other studies of rhythm control in the ED have been small or did not include both pharmacologic and electrical cardioversion as an option.<sup>15,17,23,27,28</sup>

auriculaire est inférieure à 48 heures et que le patient ne présente pas un risque particulièrement élevé d'AVC. Lorsque la durée de l'épisode de FA ou de flutter auriculaire est incertaine ou supérieure à 48 heures, la fréquence cardiaque sera optimisée et les patients seront anticoagulés pour 3 semaines précédant et 4 semaines suivant la cardioversion. Au départ de la salle d'urgence, tous les patients avec FA ou flutter auriculaire d'apparition récente devront faire l'objet d'un suivi rapproché pour déterminer la présence de cardiopathie sous-jacente et évaluer la nécessité d'un traitement antithrombotique ou antiarythmique au long cours.

## Emergency Department Management of Recent-Onset AF/AFL

### Overall approach

The priorities for ED management of recent-onset AF/AFL (Fig. 1) include rapid assessment of potential hemodynamic instability, the identification and treatment of the underlying or precipitating cause, and a careful assessment of the patient's history with particular attention to the risk of thromboembolism. At this time, evidence equally supports a strategy of rate control or rhythm control for stable patients with known onset of AF/AFL within 48 hours. Both approaches are presented here. The decision regarding the initial strategy of rate versus rhythm control depends upon multiple factors including patient and physician preference, clarity of the history of onset of symptoms, type and duration of AF, severity of symptoms, associated cardiovascular disease and medical conditions, and age.

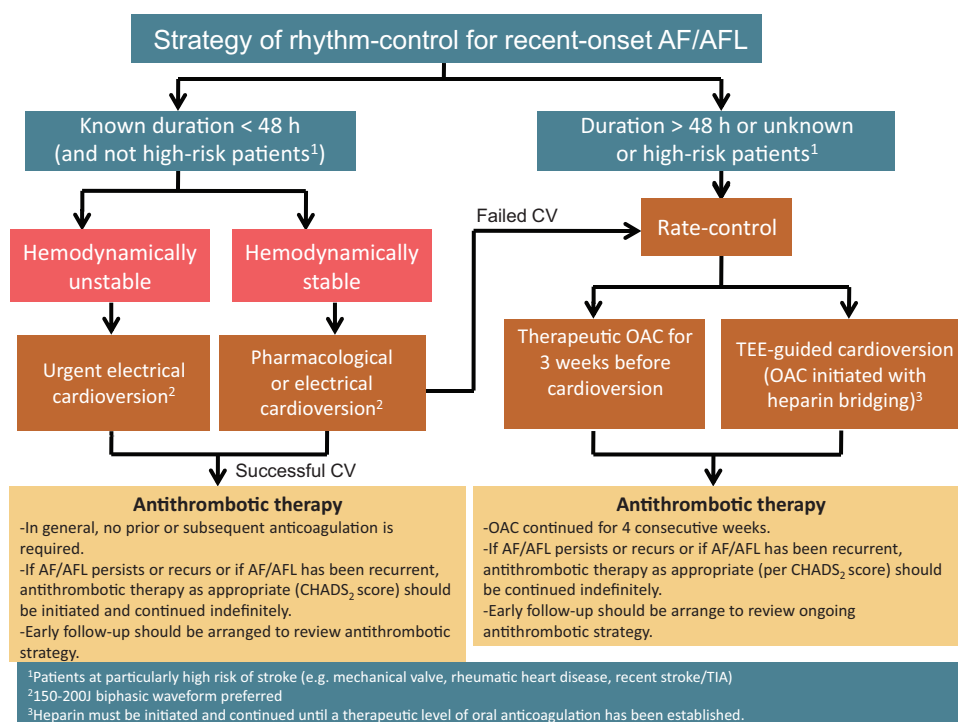
### RECOMMENDATION

We recommend that in stable patients with recent-onset AF/AFL, a strategy of rate control or rhythm control could be selected (Strong Recommendation, High-Quality Evidence).

**Values and preferences.** This recommendation places a high value on the randomized controlled trials investigating rate control as an alternative to rhythm control for AF/AFL, recognizing that these trials did not specifically address the ED environment.

### Assessment

Uncommonly, patients with recent-onset AF/AFL will present with hemodynamic instability and must be immediately cardioverted as described later. Most patients are stable, presenting with palpitations, chest tightness, or weakness, although some patients, especially the elderly, are often unaware that they have a tachyarrhythmia or when it started. A careful history should be taken to determine the time of onset, if known, and particularly to determine if it was within the past 48 hours. Other important points to determine include previous episodes and treatment, associated cardiac conditions, current antiarrhythmic agents, anticoagulation and current INR level, rhythm on most recent ECG, and risk of thromboembolism per the CHADS<sub>2</sub> [Congestive Heart Failure, Hypertension, Age, Diabetes, Stroke/Transient Ischemic Attack] score (see Table 1 and Therapies for Prevention of Stroke and Vas-



**Figure 1.** A management strategy for patients with recent-onset AF/AFL.

cular Events). AF may be related to acute, temporary causes including alcohol use (eg, “holiday heart syndrome”), myocardial ischemia or infarction, myocarditis or pericarditis, pulmonary embolism or other pulmonary diseases, hyperthyroidism, and other metabolic disorders. In such cases, successful treatment of the underlying condition may promote the resolution of AF. Routine chemistry and hematology are indicated as well as, in some cases, troponin and thyroid-stimulating hormone levels. Transesophageal echocardiography, if available, is useful to exclude the presence of left atrial clot in patients in whom the onset of arrhythmia is unclear and cardioversion is desired.

### Unstable patients

If recent-onset AF/AFL has caused hemodynamic instability with hypotension, acute coronary syndrome, or florid pulmonary edema, then patients must undergo immediate electrical cardioversion. This is a relatively uncommon presentation of recent-onset AF/AFL, and physicians must ensure that the patient is not in long-standing persistent AF/AFL, as attempts to cardiovert such patients are likely to fail and may increase morbidity. In this case, the rapid AF may be secondary to an

acute decompensation of an underlying condition such as sepsis or hypovolemia. Generally, unstable patients need not be given an anticoagulant either before or following cardioversion if the duration of AF/AFL is known to have occurred <48 hours. However, if the duration of AF/AFL is ≥48 hours or unknown or the patient is at particularly high risk of stroke (eg, mechanical valve, rheumatic valve disease, recent stroke, or transient ischemic attack), we suggest administering the patient intravenous unfractionated heparin or low-molecular-weight heparin before cardioversion if possible or immediately thereafter if even a brief delay is unacceptable. Such a patient should then be bridged with heparin and started on a course of oral anticoagulants for ≥4 weeks postcardioversion.

### RECOMMENDATION

We recommend for patients with acute hemodynamic instability secondary to rapid recent-onset AF/AFL, immediate electrical conversion to sinus rhythm (Strong Recommendation, Low-Quality Evidence).

**Values and preferences.** This recommendation places a high value on the immediate management of hemodynamic instability and a lower value on anticoagulation status under these circumstances. It is also recognized that this is a relatively rare circumstance and that, in most cases, stroke risk and anticoagulation status can be considered prior to immediate cardioversion.

### Rate control

Criteria for adequate rate control vary. A sustained, uncontrolled tachycardia over weeks may lead to deterioration of left

**Table 1.** CHADS<sub>2</sub> risk criteria for stroke in patients with nonvalvular atrial fibrillation if not treated with anticoagulation

Risk criteria	Score
Prior stroke or TIA	2
Age >75	1
Hypertension	1
Diabetes mellitus	1
Congestive heart failure	1

Data from Gage BF, et al.<sup>54</sup> and Wang TJ, et al.<sup>55</sup>

**Table 2. Recommended intravenous drugs for heart rate control in the ED**

Drug	Dose	Risks
Diltiazem*	0.25 mg/kg IV bolus over 10 min; repeat at 0.35 mg/kg IV	Hypotension, bradycardia
Metoprolol	2.5–5 mg IV bolus over 2 min; up to 3 doses	Hypotension, bradycardia
Verapamil*	0.075–0.15 mg/kg over 2 min	Hypotension, bradycardia
Digoxin	0.25 mg IV each 2 h; up to 1.5 mg	Bradycardia, digitalis toxicity

\*Calcium-channel blockers should not be used in patients with heart failure or left ventricular dysfunction.

ventricular function, a condition called tachycardia-related cardiomyopathy, so it is important that adequate rate control be achieved.<sup>29</sup> Physicians should attempt to reduce the heart rate prior to discharge from the ED to target rates of <100 beats per minute (bpm) at rest and <110 bpm during moderate exercise (such as a walk test). The most commonly used drugs are intravenous diltiazem, verapamil, and metoprolol (Table 2). Digoxin is not considered a first-line agent for rate control because of slow onset of action and it affects only resting heart rate. It may be useful in patients with heart failure and left ventricular systolic dysfunction or as an adjunctive agent, allowing lower doses of beta-blockers or calcium channel blockers to be used. At discharge from the ED, physicians should ensure the patient is placed on oral rate-control medications and the appropriate prophylaxis for stroke.

## Rhythm control

Cardioversion in the absence of systemic anticoagulation carries a risk of thromboembolism when AF/AFL has been present for >48 hours. When the duration of AF/AFL has been <48 hours, cardioversion appears to have an acceptably low risk of thromboembolism except in particularly high-risk groups.<sup>30,31</sup> Such high-risk situations include the presence of a mechanical valve, rheumatic valve disease, or recent stroke or transient ischemic attack unless the patient is already on oral anticoagulation with a therapeutic INR. There is no evidence that the risk of thromboembolism or stroke differs between pharmacologic and electrical cardioversion. Before proceeding to immediate cardioversion in the absence of systemic anticoagulation, physicians must be confident that the onset of AF/AFL is clearly <48 hours and that the patient is not at a particularly high risk of stroke. Most patients in the ED are acutely aware of the time of onset of symptoms but some are not. In such situations, a transesophageal echocardiogram may be used to establish the safety of immediate cardioversion. If patients are on warfarin, it is important to ensure that their INR has been therapeutic for ≥3 consecutive weeks.<sup>1,32</sup>

Rate-control drugs have not been shown to enhance the rate of conversion when a rhythm-control approach is used. Physician and patient preferences dictate whether to start rhythm-control treatment with drugs or with electrical cardioversion. Initial use of antiarrhythmic agents may also prevent immediate recurrence of AF after electrical cardioversion.<sup>33,34</sup> All patients undergoing pharmacologic or electrical cardioversion require continuous electrocardiographic monitoring and temporary pacing

capability. Prevention of thromboembolism for patients managed with rhythm control is discussed later.

Spontaneous conversion of recent-onset AF to sinus rhythm within 24 hours is common. Some emergency physicians have the patients return the following day for cardioversion at that time if spontaneous conversion has not occurred.<sup>5,35</sup> In this scenario, after documentation of appropriate rate control, patients at low risk of stroke can be discharged on rate control alone to return the following day for reevaluation. Patients who remain in AF can then undergo DC cardioversion at this time as long as the total duration of AF remains <48 hours.

## RECOMMENDATION

In hemodynamically stable patients with AF/AFL of known duration <48 hours in whom a strategy of rhythm control has been selected:

We recommend that rate-slowing agents alone are acceptable while awaiting spontaneous conversion (Strong Recommendation, Moderate-Quality Evidence).

We recommend that synchronized electrical cardioversion or pharmacologic cardioversion may be used when a decision is made to cardiovert patients in the emergency department. See Table 2 for drug recommendations (Strong Recommendation, Moderate-Quality Evidence).

We suggest that antiarrhythmic drugs may be used to pretreat patients before electrical cardioversion in ED in order to decrease early recurrence of AF and to enhance cardioversion efficacy (Conditional Recommendation, Low-Quality Evidence).

**Values and preferences.** These recommendations place a high value on determination of the duration of AF/AFL as a determinant of stroke risk with cardioversion. Also, individual considerations of the patient and treating physician are recognized in making specific decisions about method of cardioversion.

## Pharmacologic cardioversion

Physicians may consider several drugs for the pharmacologic cardioversion of recent-onset AF/AFL in the ED<sup>13,15,16,36,37</sup> (Table 3). Procainamide is administered intravenously over 60 minutes at a dose of 15–17 mg/kg and occasionally is accompanied by transient hypotension. A recent report described the successful use of procainamide in the ED, where this drug was 60% effective for conversion of recent-onset AF.<sup>38</sup> This study showed procainamide to have an excellent safety profile, even for patients already taking oral antiarrhythmic agents. Oral propafenone or flecainide, both Class IC agents, can be safely administered in the ED but can be expected to have slower onset of action than intravenous drugs.<sup>39–41</sup> The Class III agent ibutilide is administered intravenously and has been shown to effectively and quickly terminate AF and AFL of recent onset.<sup>42</sup> Ibutilide is associated with a 2%–3% risk of torsades de pointes but this risk can be mitigated by pretreatment with intravenous magnesium sulfate.<sup>43</sup> Amiodarone and sotalol are not recommended for recent-onset AF as they are no more effective than placebo in the initial 6–8 hours and are associated with adverse reac-



**Table 3. Recommended drugs for pharmacologic conversion in the ED**

Drug	Dose	Efficacy	Risks
Class IA			
Procainamide	15-17 mg/kg IV over 60 min	++	5% Hypotension
Class IC*			
Propafenone	450-600 mg PO	+++	Hypotension, 1:1 flutter, bradycardia
Flecainide	300-400 mg PO	+++	Hypotension, 1:1 flutter, bradycardia
Class III			
Ibutilide	1-2 mg IV over 10-20 min Pretreat with MgSO <sub>4</sub> 1-2 mg IV	++	2-3% Torsades de pointes

\*Class IC drugs should be used in combination with AV nodal blocking agents (beta-blockers or calcium channel inhibitors). Class IC agents should also be avoided in patients with structural heart disease.

tions.<sup>44-49</sup> Adenosine transiently slows heart rate, does not cardiovert AF, and is associated with a significant risk of ventricular arrhythmias in Wolff-Parkinson-White syndrome with AF (see Rapid Preexcitation later). Recent trials of vernakalant have demonstrated high clinical efficacy of this intravenous agent for conversion of recent-onset AF.<sup>50,51</sup> This atrial selective antiarrhythmic drug was recently approved for use in the European Union, but in North America it is currently available only for investigational use.

### Electrical cardioversion

Synchronized electrical cardioversion is highly effective and physicians have the option of pretreating with antiarrhythmic drugs or proceeding directly to electrical shock. In a series of 660 patients, one Canadian site described 91.0%

successful electrical cardioversion in the ED, after pretreatment with intravenous procainamide. Patients had no serious adverse events and their ED lengths of stay averaged only 4-6 hours.<sup>26</sup> Current guidelines recommend starting with a higher energy level, such as 150-200 joules for biphasic waveform devices in order to increase the likelihood of initial success and thus limit the cumulative energy dose with multiple attempts at cardioversion.<sup>1,52</sup> Likewise, an anterior-posterior pad positioning may be more effective than an anterior-lateral approach.<sup>1,53</sup> Sedation typically involves rapid acting agents such as intravenous fentanyl, propofol, and midazolam.

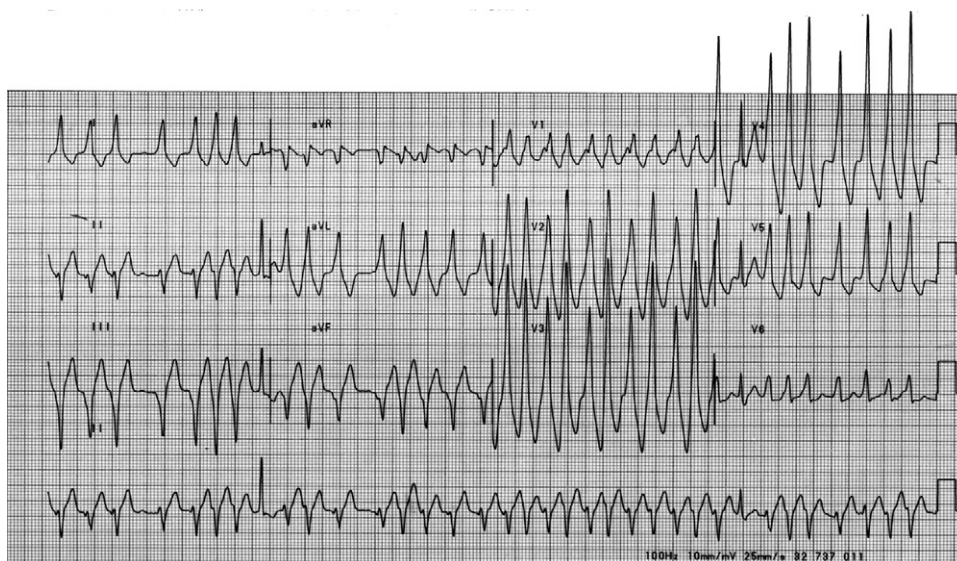
### RECOMMENDATION

We recommend that electrical cardioversion may be conducted in the ED with 150-200 joules biphasic waveform as the initial energy setting (Strong Recommendation, Low-Quality Evidence).

**Values and preferences.** This recommendation places a high value on the avoidance of repeated shocks and the avoidance of ventricular fibrillation that can occur with synchronized cardioversion of AF at lower energy levels. It is recognized that the induction of VF is a rare but easily avoidable event.

### Rapid preexcitation during AF

AF occurring in the setting of Wolff-Parkinson-White syndrome (Fig. 2) is a precarious situation because rapid atrioventricular conduction through the accessory pathway may precipitate ventricular fibrillation. In these patients, drugs that block atrioventricular conduction (digoxin, calcium channel blockers, beta-blockers, and adenosine) are contraindicated because they do not slow conduction



**Figure 2.** Electrocardiogram of rapid ventricular preexcitation (Wolff-Parkinson-White syndrome) during atrial fibrillation. Note very rapid (up to 300 bpm) irregular wide QRS complexes.

through the accessory pathway and, therefore, may precipitate VF. We recommend urgent electrical cardioversion if the patient is hemodynamically unstable or intravenous antiarrhythmic agents procainamide or ibutilide in stable patients. Amiodarone should be used with caution in the case of preexcited AF as several case reports have described the occurrence of VF after intravenous administration.<sup>45</sup>

## RECOMMENDATION

We recommend, in patients with rapid ventricular pre-excitation during AF (Wolff-Parkinson-White syndrome):

Urgent electrical cardioversion if the patient is hemodynamically unstable (Strong Recommendation, Low-Quality Evidence).

Intravenous antiarrhythmic agents procainamide or ibutilide in stable patients (Strong Recommendation, Low-Quality Evidence).

AV nodal blocking agents (digoxin, calcium channel blockers, beta-blockers, adenosine) are contraindicated (Strong Recommendation, Low-Quality Evidence).

**Values and preferences.** These recommendations place a high value on avoidance of the degeneration of preexcited AF to ventricular fibrillation. It is recognized that degeneration can occur spontaneously or it can be facilitated by the administration of specific agents that in the absence of ventricular preexcitation would be the appropriate therapy for rate control of AF.

**Practical tip.** Identification of preexcited AF can be challenging and should be considered with any very rapid (240-300 bpm) sustained, highly irregular wide complex tachycardia (Fig. 2). Spontaneous degeneration of preexcited AF to VF can occur in the absence of administration of medication. As such, DC cardioversion is most often the preferred option when preexcited AF is very rapid.

## Prevention of thromboembolism

Perhaps the most important and controversial aspect of ED management for recent-onset AF/AFL is ensuring that patients do not sustain a stroke. Physicians should be familiar with the CHADS<sub>2</sub> risk scoring system<sup>54,55</sup> (Table 1). If warfarin is prescribed, patients need careful follow-up to minimize the risk of bleeding.<sup>56,57</sup> Dabigatran is a promising new oral anticoagulant that reversibly inhibits thrombin and can be used with a fixed-dose regimen without the need for routine coagulation monitoring.<sup>58,59</sup>

**a. Duration of AF/AFL 48 hours or high-risk patient.** In stable patients with AF/AFL >48 hours or of uncertain duration in which a strategy of rhythm control has been selected, rate control should first be optimized. The patient should also receive therapeutic warfarin (INR 2-3) or dabigatran for 3 weeks before and at least 4 weeks after attempted cardioversion.<sup>1,32</sup> Antithrombotic therapy should be continued indefinitely if symptoms suggest that AF/AFL has been recurrent or if AF/AFL persists, using either aspirin

or oral anticoagulants as appropriate based on the patient's risk of thromboembolism. If sinus rhythm is achieved and sustained for 4 weeks, the need for ongoing antithrombotic therapy should be based on the risk of stroke. If rhythm control is not anticipated, aspirin is sufficient for those with a CHADS<sub>2</sub> score of 0, whereas oral anticoagulants are preferred if the CHADS<sub>2</sub> score is 1 and strongly recommended if the CHADS<sub>2</sub> score is  $\geq 2$  (see Prevention of Stroke and Systemic Thromboembolism in Atrial Fibrillation and Flutter).<sup>60</sup> If the patient is at particularly high risk of stroke (eg, mechanical valve, rheumatic valve disease, recent stroke or transient ischemic attack), even when the duration of new-onset AF/AFL is <48 hours, we recommend that cardioversion be delayed and that oral anticoagulants be prescribed for 3 weeks before and at least 4 weeks postcardioversion. Subsequent antithrombotic therapy should be based on balancing the risks of stroke and bleeding.

## RECOMMENDATION

We recommend that hemodynamically stable patients with AF/AFL of  $\geq 48$  hours' or uncertain duration for whom a strategy of rhythm control has been selected should have rate control optimized and receive therapeutic oral anticoagulants (OAC) therapy (warfarin [INR 2-3] or dabigatran) for 3 weeks before and at least 4 weeks postcardioversion.

Following attempted cardioversion:

If AF/AFL persists or recurs or if symptoms suggest that the presenting AF/AFL has been recurrent, the patient should have antithrombotic therapy continued indefinitely (using either OAC or aspirin as appropriate).

If sinus rhythm is achieved and sustained for 4 weeks, the need for ongoing antithrombotic therapy should be determined based on the risk of stroke, and in selected cases, expert consultation may be required (Strong Recommendation, Moderate-Quality Evidence).

**Values and preferences.** These recommendations place a high value on minimizing stroke risk by rate control, appropriate anticoagulation and delayed cardioversion, and a lower value on symptomatic improvement associated with immediate cardioversion.

**b. Duration of AF/AFL 48 hours and not high risk.** In stable patients with AF of known duration <48 hours in whom a strategy of rhythm control has been selected, we recommend that they may generally be cardioverted without prior or subsequent anticoagulation or use of heparin. If symptoms suggest that AF/AFL has been recurrent or if AF/AFL persists, then antithrombotic therapy should be commenced and continued indefinitely as the risk of stroke with paroxysmal AF is equivalent to that of permanent AF.<sup>61,62</sup> Aspirin is sufficient for those with a CHADS<sub>2</sub> score of 0, whereas oral anticoagulants are preferred for patients with a CHADS<sub>2</sub> score of 1 and strongly recommended if the CHADS<sub>2</sub> score is  $\geq 2$  (see Prevention of Stroke and Systemic Thromboembolism in Atrial Fibrillation and Flutter).<sup>60</sup>

**RECOMMENDATION**

We recommend that hemodynamically stable patients with AF/AFL of known duration <48 hours for whom a strategy of rhythm control has been selected may generally undergo cardioversion without prior or subsequent anticoagulation. However, if the patient is at particularly high risk of stroke (eg, mechanical valve, rheumatic heart disease, recent stroke, or transient ischemic attack), cardioversion should be delayed and the patient should receive OAC for 3 weeks before and at least 4 weeks post-cardioversion.

Following attempted cardioversion:

If AF or AFL persists, recurs, or if symptoms suggest that the presenting AF/AFL has been recurrent, antithrombotic therapy (OAC or aspirin as appropriate) should be commenced and continued indefinitely.

If NSR is achieved, the need for ongoing antithrombotic therapy should be determined based on the risk of stroke according to CHADS<sub>2</sub> score and early consultant follow-up should be arranged (Strong Recommendation, Low-Quality Evidence).

**Values and preferences.** These recommendations place a high value on minimizing stroke risk by appropriate anticoagulation prior to cardioversion in all patients except those at very low risk of stroke due to a short duration of AF/AFL. A lower value is placed on symptomatic improvement associated with immediate cardioversion in patients who are deemed not to be at very low risk of stroke despite an apparent short duration of AF/AFL.

**c. Transesophageal echocardiography.** If the onset of symptoms is not clearly <48 hours or there is a particularly high risk of stroke, we suggest that patients may undergo cardioversion guided by transesophageal echocardiography, as an alternative to anticoagulation prior to cardioversion.<sup>63,64</sup> Patients with no identifiable left atrial thrombus may undergo immediate cardioversion. Prior to cardioversion, pretreatment with heparin must be initiated and continued until a therapeutic level of oral anticoagulation has been established. Oral anticoagulation must be continued for a minimum of 4 weeks (as discussed). For patients in whom thrombus is identified by transesophageal echocardiography, oral anticoagulation should be prescribed for ≥3 weeks and transesophageal echocardiography repeated to confirm the resolution of thrombus before proceeding to cardioversion.

**RECOMMENDATION**

When the duration of an episode of AF/AFL is uncertain, we suggest that patients may undergo cardioversion guided by transesophageal echocardiography, as an alternative to anticoagulation prior to cardioversion. However, anticoagulation needs to be simultaneously started and maintained for ≥4 weeks postcardioversion (Conditional Recommendation, High-Quality Evidence).

**Values and preferences.** This recommendation places a higher value on the symptomatic improvement with immediate cardioversion as well as avoidance of precardioversion anticoagulation. A lower value is placed on the small risks associated with transesophageal echocardiography.

**Disposition and follow-up**

Most patients with recent-onset AF/AFL may be discharged home from the ED within a period of 6-12 hours, once adequate rate or rhythm control has been achieved. We recommend hospital admission of symptomatic patients with decompensated heart failure or myocardial ischemia. Occasionally, admission may be required for highly symptomatic patients in whom adequate rate or rhythm control cannot be achieved.

**RECOMMENDATION**

We recommend hospital admission for highly symptomatic patients with decompensated heart failure or myocardial ischemia (Strong Recommendation, Low-Quality Evidence).

We suggest limiting hospital admission to highly symptomatic patients in whom adequate rate control cannot be achieved (Conditional Recommendation, Low-Quality Evidence).

**Values and preferences.** This recommendation places a high value on the need for monitoring of the response to therapy and its reassessment, as well as ancillary investigation and treatment not available in the ED in patients with complex medical conditions associated with AF/AFL. A lower value is placed on the attendant costs of admission to hospital in patients with complex medical conditions associated with AF/AFL.

Adequate follow-up is recommended to identify structural heart disease and the possible need for long-term anticoagulation or antiarrhythmic therapy. Patients with newly detected AF/AFL should have outpatient echocardiography and referral to a cardiologist or internist. Adequate and early follow-up are necessary to safely monitor the INR of patients discharged on warfarin. The need for long-term antithrombotic therapy may be reviewed by the appropriate consultant, weighing the risks and benefits. Long-term rhythm management should also be reviewed by a consultant, based on the estimated probability of recurrence, the symptoms during AF, and other factors.

**RECOMMENDATION**

We suggest that after conversion to sinus rhythm has been achieved, whether antiarrhythmic drug therapy is indicated should be based on the estimated probability of recurrence and the symptoms during AF. Long-term therapy will need to be determined by an appropriate outpatient consultation (Conditional Recommendation, Low-Quality Evidence).



**Values and preferences.** This recommendation places a high value on minimizing the risk of infrequent but serious side effects associated with long-term antiarrhythmic drugs. A high value is also placed on the appropriate use of specialty care to make patient-specific decisions to minimize these risks. A lower value is placed on the avoidance of symptoms associated with subsequent episodes of AF/AFL if antiarrhythmic drugs cannot be avoided.

## Conclusion

Physicians frequently encounter ED patients with recent-onset AF/AFL and may safely manage these patients with either a rate-control or rhythm-control strategy. Immediate specialist consultation or admission to hospital is not often necessary. Careful consideration of the risks of thromboembolism is a priority and appropriate follow-up is important. There is a need for more evidence to specifically guide the unique management of patients in the ED with recent-onset AF.

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