Case 1: Chris

Chris, 44, is a healthy engineer but feels generally unwell, without specific complaints. A routine exam reveals an irregularly irregular pulse at 110 bpm and an ECG shows atrial fibrillation with rapid ventricular response and no other abnormalities.

This is Chris’s first documented episode of atrial fibrillation and he has no other co-morbidities. His echocardiogram is normal.

Which strategy is best for Chris? For the answer, see page 42.

Case 2: Hoshiar

Hoshiar, 85, has a dilated, non-ischemic cardiomyopathy and an ejection fraction of 38%. He presents with atrial fibrillation of unknown duration and symptoms of exercise intolerance. He is on atenolol, 25 mg, once daily, ramipril, 10 mg, once daily, and no anticoagulation.

Which strategy is best for Hoshiar? For the answer, see page 42.

Rate vs. Rhythm Control: Making the Decision

As stated in recently published guidelines, there is no evidence that rhythm control or rate control is superior to the other, and both are recommended as acceptable initial approaches in all but permanent AF (rate control preferred). The choice of approach is not trivial, and should be made to best achieve patient well-being and quality of life. Pre-existing patient characteristics may make a rhythm control approach impossible, and rate control should be sought instead.

Kamran Ahmad, MD, FRCPC and Paul Dorian, MD, MSc, FRCP(C)

The physician managing a patient with atrial fibrillation (AF) has three goals:

- the improvement of patient well-being (reduction of symptoms and improvement of quality of life [QOL])
- the prevention of stroke and
- the prevention of late consequences of AF (such as tachycardia-induced cardiomyopathy).

Current evidence suggests that these goals can be accomplished by pursuing either rhythm control (restoration and maintenance of sinus rhythm [SR]) or rate control (control of the ventricular response in AF without regard to the atrial rhythm) strategies.

Symptoms and quality of life

The causes of symptoms in patients with AF are complex and only partially understood. Symptoms range from palpitations and shortness of breath to decreased exercise tolerance and anxiety. They arise due to rapid ventricular rate, irregularity of rhythm and other factors, such as underlying heart disease and a patient’s subjective perceptions.

Most older patients with AF can have their symptoms well-controlled or even eliminated with either a rhythm or rate control strategy. In younger, more active patients, achievement of SR has been associated with somewhat better QOL and increased exercise tolerance.
Rate vs. Rhythm Control

Choosing rate versus rhythm control for QOL and exercise tolerance must be individualized for each patient, as there are no large subgroups of patients for whom one strategy has resulted in improved symptoms and QOL. Patient preference for a given approach should be carefully considered. Other patient characteristics (discussed below) can influence the decision to pursue a rhythm control strategy or reject it in favour of rate control. Patients with paroxysmal AF, in whom symptoms can be clearly correlated with occurrence of AF (e.g., on Holter or loop monitoring) should be considered for rhythm control.

Factors favouring rate vs. rhythm control

Factors predictive of a successful rhythm control approach and those favouring an initial rate control approach are listed in Table 1. Choosing a rate control approach because of intolerance to anti-arrhythmic drugs is of particular importance in some elderly patients; in the Atrial Fibrillation Follow-up Investigation of Rhythm Management trial, there was an increase in hospitalizations in the rhythm control arm driven, in part, by side-effects of anti-arrhythmic drugs. Both approaches have limitations, though the rhythm control strategy may not be as widely applicable. Table 2 lists various methods of rhythm and rate control and common limitations to their use.

Note that it is common (and sometimes necessary) to try one strategy first and switch between strategies depending on the response. This is especially valuable in persistent AF; after cardioversion, QOL can be re-assessed to determine the symptomatic benefit of sinus rhythm in the individual patient.

FAQ

Which patients should I refer for the restoration of sinus rhythm?

While any patient can be considered, those who have highly symptomatic atrial fibrillation, are under 65 years of age, have congestive heart failure symptoms, and can tolerate anti-arrhythmic drugs should be strongly considered for rhythm control.

Table 1. Factors favouring rate vs. rhythm control

<table>
<thead>
<tr>
<th>Favours rate control</th>
<th>Favours rhythm control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent atrial fibrillation</td>
<td>Paroxysmal atrial fibrillation</td>
</tr>
<tr>
<td>Recurrent atrial fibrillation</td>
<td>First episode of atrial fibrillation</td>
</tr>
<tr>
<td>Less symptomatic</td>
<td>More symptomatic</td>
</tr>
<tr>
<td>≥ 65 years of age</td>
<td>≤ 65 years of age</td>
</tr>
<tr>
<td>Hypertension</td>
<td>No hypertension</td>
</tr>
<tr>
<td>No history of chronic heart failure</td>
<td>History of chronic heart failure</td>
</tr>
<tr>
<td>Previous anti-arrhythmic drug use</td>
<td>No previous anti-arrhythmic drug use</td>
</tr>
<tr>
<td>Patient preference</td>
<td>Patient preference</td>
</tr>
</tbody>
</table>

Reproduced from: Wyse DG, Simpson CS: Rate control versus rhythm control—Decision making. Can J Cardiol 2005;21 Suppl B:15B-8B.
<table>
<thead>
<tr>
<th>Rate Control</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Contraindications (relative or absolute)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pharmacologic</strong></td>
<td>Well-tolerated, symptom control in CHF</td>
<td>Poor control of HR during exercise</td>
<td>Renal failure (use with caution)</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Potent lowering of ventricular rate</td>
<td>Decreases exercise tolerance in some patients, side-effects</td>
<td>Asthma, reactive airway disease</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>Potent lowering of ventricular rate</td>
<td></td>
<td>Poor LV function, CHF</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>Lowers and regularizes ventricular rate, effective for symptoms</td>
<td>Pacemaker dependence, possible long-term LV dysfunction</td>
<td></td>
</tr>
</tbody>
</table>

**Non-Pharmacologic**

| AV node ablation and pacing | | | |

**Rhythm Control**

<table>
<thead>
<tr>
<th>Pharmacologic</th>
<th>Well-tolerated in patients without structural heart disease, low incidence of toxicity</th>
<th>Less likely than amiodarone or sotalol to maintain SR.</th>
<th>CAD, structural heart disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I agents</td>
<td>Propafenone, flecainide</td>
<td></td>
<td>Lung disease, liver disease</td>
</tr>
<tr>
<td>Class III agents</td>
<td>Amiodarone</td>
<td>Most likely to maintain SR</td>
<td>Long-term toxicity (more of a consideration in younger patients)</td>
</tr>
<tr>
<td>Sotalol</td>
<td>HR lowering and class III anti-arrhythmic effect</td>
<td>Pro-arrhythmic potential (torsades) beta-blockade, related side-effects</td>
<td></td>
</tr>
</tbody>
</table>

**Non-pharmacologic**

| DC cardioversion | Immediate restoration of sinus rhythm | AF relapse likely without concomitant anti-arrhythmic treatment | |
| AF ablation (pulmonary vein isolation) | Potential cure of AF | Limited target population, long-term results uncertain, procedure-related complications | Absolute compliance with anticoagulation essential, limited data regarding symptom control, morbidity |
| Atrial defibrillator | Immediate, patient-controlled restoration of SR | | Low efficacy, requires pacemaker implant |
| Atrial pacing | Non-pharmacologic maintainence of sinus rhythm | | |

AF: Atrial fibrillation  
AV: Atrioventricular  
CHF: Chronic heart failure  
SR: Sinus rhythm  
HR: Heart rate  
LV: Left ventricular  
CAD: Coronary artery disease

The information for Table 2 was originally published in The Canadian Journal of Cardiology 2005; 21(Suppl B):15B-18B.
Preventing late complications

The development of AF is an adverse prognostic factor for morbidity and mortality, particularly in patients with congestive heart failure. Patients who remain in sinus rhythm have lower mortality than those with persistent AF, but it is not clear that actively achieving SR with a rhythm control strategy confers increased survival or whether it is simply a marker for patients who will have a better outcome. Regarding tachycardia-induced cardiomyopathy, the relationship between it and AF with uncontrolled ventricular response is conjectural, and there is no evidence to suggest that pursuing one strategy over another will more effectively prevent the development of LV dysfunction.

Stroke prevention

Stroke is the most devastating consequence of atrial fibrillation and it is well established that its incidence can be greatly reduced by anticoagulation in patients with risk factors (age > 65, hypertension, diabetes, previous stroke or transient ischemic attack, structural heart disease/LV dysfunction, mitral valve disease). Even in patients in whom SR is thought to have been achieved, prolonged episodes of asymptomatic AF occur and this increases the risk for stroke. In most cases, anticoagulation should be continued regardless of rhythm achieved. In the Atrial Fibrillation Follow-up Investigation of Rhythm Management trial, there was no difference in stroke incidence between rate and rhythm control groups, but a majority of strokes occurred in patients in whom anticoagulation had been discontinued.

More on Chris

Rhythm control (cardioversion) is reasonable and feasible. While Chris does not need long-term warfarin (acetylsalicylic acid will suffice), he should be anticoagulated for three weeks prior to cardioversion and four weeks after. Chris is started on sotalol, 80 mg, twice daily, prior to cardioversion and afterwards. He is in sinus rhythm on followup three months later.

More on Hoshiar

Given the presence of left ventricular dysfunction, it is elected to try and restore sinus rhythm (SR) to improve symptoms. Hoshiar is loaded with, and continued on, amiodarone and given warfarin to maintain a therapeutic international normalized ratio for three weeks. He is cardioverted electively. The procedure is successful, but atrial fibrillation recurs within two weeks, even on adequate doses of amiodarone. Symptoms were slightly improved while in SR. It is decided to pursue a rate control approach. Digoxin is added and his atenolol dose is increased; amiodarone is discontinued and warfarin is continued. He feels improved to the same degree as he did while in SR.

FAQ

If rhythm control is achieved, can I reassure the patient that he/she will no longer need warfarin?

No. Patients with successful clinical rhythm control are known to have ongoing episodes of silent atrial fibrillation. They therefore have the same risk of stroke as prior to therapy and anticoagulation needs to be continued based on their existing stroke factors.

About the authors...

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Dr. Dorian is a Cardiologist at St. Michael’s Hospital in Toronto and Professor of Medicine at the University of Toronto, Toronto, Ontario.
Clinical trials have demonstrated that in patients with atrial fibrillation, both rate control and rhythm control are acceptable as initial approaches to management. The exception is permanent AF in which rate control is the preferred strategy.

The decision to choose one strategy over another should be made to achieve the best possible patient well being and quality of life. Relief of symptoms of AF, such as palpitations, shortness of breath, and exercise intolerance should be the goal.

Beyond patient symptoms and preference for one or the other therapy, factors that may influence the choice of rhythm control include: age < 65 and the presence of congestive heart failure. Rate control may be preferable in older patients who are more likely to suffer side-effects and complications of anti-arrhythmic drugs.

A change from one strategy to the other may be required several times before the ideal management for a specific patient is found.

Stroke prophylaxis must be continued based on patient risk factors, not the strategy chosen or ultimate rhythm achieved.

Treat the patient, not the ECG!

FAQ

What is the “pill in the pocket” approach?

For patients with repeated episodes of symptomatic paroxysmal atrial fibrillation and no structural heart disease, an “as needed” rhythm control approach can be taken. A single large dose of flecainide, 300 mg, or propafenone, 600 mg, can be taken at the time of symptom onset to try to restore sinus rhythm before the patient presents to the emergency department for treatment. This strategy, which can be effective in some patients, should first be attempted under observation in the hospital.

Resources
5. Wyse DG, Simpson CS: Rate control versus rhythm control—Decision making. Can J Cardiol 2005; 21 Suppl B:15B-8B.