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Interaction between Atrial Fibrillation and Congestive Heart Failure Needs Assessment

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PURPOSE

Develop a Continuing Medical Education activity targeted to primary care physicians that discusses the interaction between atrial fibrillation (AF) and congestive heart failure (CHF) and treatment options.

BACKGROUND

AF is the most common sustained arrhythmia and occurs when abnormal electrical pathways cause the atria to contract in an unorganized fashion, or fibrillate.[1] After the age of 40, the lifetime risk of developing AF is 1 in 4.[2] In 2010, almost 2.5 million adults are projected to have AF. The American Heart Association reports that the number of patients diagnosed with AF is projected to increase almost 5-fold in the next 40 years causing a significant health care burden.[3] The estimated cost of treatment in 2005 was $6.65 billion.[1] Atrial thromboembolism and CHF are the most common and serious complications that occur with AF.[4]

AF and CHF are frequently encountered together in the clinical setting.[4] CHF is a condition in which the heart's ability to deliver oxygen rich blood to the body is inadequate to meet the body's needs. In the United States, approximately 5 million people currently have CHF. According to the Framingham Heart Study, CHF increases the risk of patients developing AF 4- to 6-fold.[5] Another study found 21.4% of patients with CHF had AF.[6] Those who have AF concurrently with CHF have a worse prognosis than those with CHF alone.[7]

Pressure/volume overload-induced CHF results in progressive dilatation, or stretch, of the atrial myocardium, thereby turning on molecular signaling pathways that result in myocyte hypertrophy as well as interstitial fibrosis. Both hypertrophy and fibrosis in turn contribute to electrophysiological substrate for AF.[8-10] In spite of the key role played by chronic stretch in the creation of AF substrate, the molecular signaling pathways that mediate stretch-induced hypertrophy and fibrosis in the atria are not well understood. However, deregulation of intracellular calcium, such as sarcoplasmic reticulum calcium overloading, was found to contribute to the production of arrhythmogenic substrate in the mycocardium in the CHF setting.[4,9] Many studies currently research the cellular, extracellular, neurohormonal, and electrophysiologic processes through which AF and CHF interact.[11]

Given that the ways AF and CHF influence one another is still not completely elucidated, primary care physicians need to be aware of other factors that may affect the outcome of AF treatment. For example, when patients were discharged after being admitted to the hospital with CHF, the mortality rate after 8 years was slightly higher for those who had AF upon discharge compared with those who did not (77% vs 73%). However, if patients with ischemic heart disease and AF upon discharge were analyzed separately from those who only had AF upon discharge, the hazard ratio (HR) increases to 1.25 (95% CI: 1.09-1.42, P<.001). Whereas the HR for those who only had AF upon discharge decreases to 1.01 (95% CI: 0.88-1.16, P=.88) indicating ischemic heart disease is a complicating factor in patients who have AF and CHF.[12]

Currently, there are 2 strategies that are used to treat AF. Rhythm control techniques involve disrupting the abnormal rhythm, either through drugs such as

dofetilide and amiodarone or electrical means like surgical or catheter ablation, to restore the proper electrical pathways.[13] Using rhythm control methods possibly gives the patient fewer symptoms, lower risk of stroke, the ability to discontinue anticoagulant therapy earlier, better exercise tolerance, better quality of life, and better survival.[14] Rate control drugs work to slow the heart rate and include such drug classes as β-blockers (BBL), calcium channel blockers, and cardiac glycosides like digoxin.[13] The advantages of these drugs are that they simplify therapy and are less toxic than the rhythm control drugs.

Several clinical trials have recently published their results comparing rate and rhythm control strategies in patients with AF and CHF.[14-17] One study found cardioversion, a rhythm control method, was more successful when the patient previously underwent treatment for CHF using BBL (47% success rate) or either angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs) (64% success rate) versus no CHF treatment (29% success rate). The greatest success rates occurred when a combination of BBL and ACE inhibitors or ARB (80%, *P*=.001) or the combination plus mineralocorticoid receptor blockers (93%, *P*=.001) was used.[15] The Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM) study found there was a higher risk of death associated with the rhythm control strategy than the rate control strategy in those without CHF. However, in patients with concurrent CHF and AF, there was no survival benefit to using the rate control strategy to treat atrial fibrillation versus the rhythm control strategy. Nonetheless, the rhythm control strategy was associated with more drug related adverse events that caused patients to discontinue the therapy.[14] In 2008 these results were confirmed by the Atrial

Fibrillation and Congestive Heart Failure trial in which there were no significant differences in the Kaplan-Meier estimates of death from cardiovascular causes (*P*=.59) in patients with concurrent CHF and AF treated with either the rate or rhythm control strategy. These patients were also being treated for CHF using a combination of BBLs and ACE inhibitors or ARBs.[16] However, patients who maintained normal sinus rhythm for 1 year undergoing a rhythm control strategy had better quality of life scores than patients who achieved adequate rate control for 1 year in the rate control group.[17]

Treatment of AF in the presence of CHF is not as simple as the treatment of AF alone since the 2 conditions interact through a variety of mechanisms that are still being studied. Guidelines published in 2006 recommend a rate control strategy first in the treatment of AF alone.[13] However, recent studies have shown no significant difference in mortality between rate and rhythm control strategies in treating AF when patients have CHF as well. In fact, the Atrial Fibrillation and Congestive Heart Failure trial showed patients undergoing a rhythm control strategy had better quality of life scores after 1 year. Therefore, primary care physicians need to be aware of the complications that can arise when a patient has both AF and CHF, and the emerging benefits of employing a rhythm control strategy in this situation.

OBJECTIVES

After completing this continuing medical education activity, primary care physicians should be able to do the following:

1. Describe how AF contributes to the development of CHF
2. Identify how CHF contributes to the induction and perpetuation of AF

3. Compare rate and rhythm control strategies in the treatment of AF in the presence of CHF
4. Select the best treatment strategy for patients with concurrent AF and CHF

ASSESSMENT

Before the activity, participants will be given a case history of a patient diagnosed with CHF and AF and asked to outline their treatment approach. After the activity, participants will complete a 15 question multiple choice test. To receive credit for the activity, 12 questions must be answered correctly. In addition, the participants will be asked to note any changes to their previous treatment approach. Finally, 3 months later the participants will be invited to take the test again online.

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