

Winter 1-1-2009

# The Value of Implantable Cardioverter-Defibrillators in Managing Atrial Fibrillation

Daniel Frisch

*Thomas Jefferson University, [daniel.frisch@jefferson.edu](mailto:daniel.frisch@jefferson.edu)*

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## Recommended Citation

This editorial is the authors' final version prior to publication in Heart Rhythm Volume 6, Issue 1, January 2009, Pages 9-10. The published version is available at . DOI: [10.1016/j.hrthm.2008.10.009](https://doi.org/10.1016/j.hrthm.2008.10.009). Copyright © Elsevier Inc..

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**As submitted to *Heart Rhythm* and later published as: *Heart Rhythm*,  
Volume 6, Issue 1, January 2009, 9-10.  
DOI: 10.1016/j.hrthm.2008.10.009**

**The Value of Implantable Cardioverter Defibrillators in Managing Atrial  
Fibrillation  
Daniel Frisch, M.D.**

Atrial fibrillation (AF) is associated with an increased risk of mortality as well as significant morbidity including bothersome symptoms, exacerbation of heart failure, and thromboembolic events.<sup>1 2-6</sup> Explanations for the mortality risk are variable, but the majority opinion favors AF as a marker of reduced health status, especially cardiovascular health.<sup>6,7</sup>

In patients with congestive heart failure (CHF) AF is especially problematic. Atrial fibrillation may occur in 10% to 30% of patients and is associated with both a reduction in exercise capacity and a worsened long-term prognosis.<sup>8 9</sup> As CHF class increases there is a concomitant rise in the prevalence of AF, which often adversely affects outcome.<sup>9 10</sup> A particular harbinger of poor outcome is the new diagnosis of AF in patients with CHF. These patients require additional medical attention as they are at increased risk of mortality.<sup>11 12-14</sup>

The diagnosis of atrial fibrillation can be made in several ways, most often by electrocardiography, when patients present with symptoms.<sup>15,16</sup> In more than 10-25% of patients, however, AF is discovered in the absence of symptoms or after a complication attributable to AF.<sup>7,17</sup> An obvious limitation of relying on symptoms and of

episodic screening for AF is that silent episodes may occur during periods without observation.

In an era where the indications for implantable devices continue to grow, along with the ability to perform sophisticated telemetry monitoring, it is not surprising that AF is being diagnosed during routine device interrogation. Importantly, device-derived atrial high rate episodes correlate with true AF diagnosis.<sup>18,19</sup> In one study, 38% of patients with a history of AF had episodes of AF lasting more than 48 hours noted at the time of interrogation despite these patients being asymptomatic and in sinus rhythm at the time of evaluation.<sup>20</sup> In patients receiving pacemakers for sinus node dysfunction up to 68% may have device-documented AF over time.<sup>21</sup> This is especially true in patients with a history of AF. In one cohort without documented AF prior to implant, atrial high-rate episodes lasting longer than 5 minutes were noted in 29% of the patients.<sup>22</sup> Furthermore, detection of atrial high-rate events in devices is a predictor of poor outcome.<sup>23</sup> Based on these observations, it is likely that the current estimates of AF prevalence in the general population may eventually be revised upward.

In this issue of the *Journal*, Dr. Bunch et al. have submitted an analysis from the Inhibition of Unnecessary RV Pacing with AV Search Hysteresis in ICDs (INTRINSIC RV) study that evaluated newly-detected AF (as diagnosed by the proprietary Atrial Rhythm Classification algorithm) in patients with and without a history of AF.<sup>24</sup> Over 80% of the cohort had New York Heart Association (NYHA) Class II heart failure or greater. In an unadjusted model comparing patients with and without a history of AF, the

cohort with prior AF had significantly more CHF hospitalizations, death, and ICD shocks. After adjustment for baseline characteristics these differences were attenuated, and after further adjustment for medication differences, there were no statistical differences. It is interesting that adjustment for medication differences eliminated the differences in death, CHF hospitalization, and ICD shocks between the groups with and without a history of AF. The authors consider that effective medication use may have mitigated the cardiovascular risk factors that would have predisposed to adverse outcomes. This finding stands in contrast to observations made by others, which have shown increased ICD therapies, heart failure progression, and mortality in patients with a history of AF.<sup>25,26</sup> The disparity possibly reflects differences in medication use and modification of other co-morbidities.

An additional observation was that new-onset AF during the first three months after implant in patients without a prior history of AF (45 of 1170, 4%) was associated with a significant increased risk of death [HR 2.86, p=0.05] but not with inappropriate ICD shock or CHF hospitalization after adjustment. In the group without a history of AF there was a 3.2% incidence of death (n=36) when no AF was documented and an 8.9% incidence (n=4) when AF was diagnosed within the first 3 months after implant. Though the numbers are small, these patients may represent a particularly high-risk group. Although the duration of the AF episodes is not stated, this may be of some relevance. In an analysis of the Mode Selection Trial (MOST), atrial high event rate episodes of 5 minutes or longer predicted an increased risk of cardiovascular events including stroke.<sup>23</sup>

In contrast, another study looking at the duration of atrial high rate events, found that only episodes lasting longer than one day increased risk.<sup>27</sup>

The investigators also noted that 12% of the cohort received an ICD shock during the first 3 months after implantation. Occurrence of a shock was associated with an increase in hospitalization for CHF and for subsequent shocks, but not death. In a similar population that was followed longer, the presence of any shock carried a higher risk of death.<sup>28</sup> Both reports are reminders that any ICD shock carries the potential for unfavorable consequences in patients with left ventricular dysfunction.

An important limitation, voiced by the authors, bears emphasis which is that up to a third of patients with “new-onset AF,” may have had AF prior to device implantation. The analyses presented in this paper should be interpreted cautiously in light of this scenario.

Overall there are three relevant findings in this study. First, aggressive medical therapy may mitigate the negative impact of AF in ICD patients, possibly by addressing underlying cardiovascular issues and possibly by avoiding inappropriate shocks. Second, the development of AF may herald an adverse change in clinical status necessitating intensification of care. Finally, this report reiterates the value of implanted devices to serve as patient monitors, in addition to their ability to deliver therapy, and compels further investigation.



## References

1. Benjamin EJ, Wolf PA, D'Agostino RB, Silbershatz H, Kannel WB, Levy D. Impact of atrial fibrillation on the risk of death: the Framingham Heart Study. *Circulation*. 1998; 98: 946-952.
2. Risk factors for stroke and efficacy of antithrombotic therapy in atrial fibrillation. Analysis of pooled data from five randomized controlled trials. *Arch Intern Med*. 1994; 154: 1449-1457.
3. Krahn AD, Manfreda J, Tate RB, Mathewson FAL, Cuddy TE. The natural history of atrial fibrillation: Incidence, risk factors, and prognosis in the manitoba follow-up study. *The American Journal of Medicine*,. 1995; 98: 476-484.
4. Wang TJ, Larson MG, Levy D, Vasan RS, Leip EP, Wolf PA, D'Agostino RB, Murabito JM, Kannel WB, Benjamin EJ. Temporal Relations of Atrial Fibrillation and Congestive Heart Failure and Their Joint Influence on Mortality: The Framingham Heart Study. *Circulation*. 2003; 107: 2920-2925.
5. Stewart S, Hart CL, Hole DJ, McMurray JJV. A population-based study of the long-term risks associated with atrial fibrillation: 20-year follow-up of the Renfrew/Paisley study. *The American Journal of Medicine*,. 2002; 113: 359-364.

6. Levy S, Maarek M, Coumel P, Guize L, Lekieffre J, Medvedowsky J, Sebaoun A.

Characterization of Different Subsets of Atrial Fibrillation in General Practice in France :  
The ALFA Study. *Circulation*. 1999; 99: 3028-3035.

7. Fuster V, Ryden LE, Cannom DS, Crijns HJ, Curtis AB, Ellenbogen KA, Halperin JL, Le Heuzey JY, Kay GN, Lowe JE, Olsson SB, Prystowsky EN, Tamargo JL, Wann S, Smith SC, Jr, Jacobs AK, Adams CD, Anderson JL, Antman EM, Halperin JL, Hunt SA, Nishimura R, Ornato JP, Page RL, Riegel B, Priori SG, Blanc JJ, Budaj A, Camm AJ, Dean V, Deckers JW, Despres C, Dickstein K, Lekakis J, McGregor K, Metra M, Morais J, Osterspey A, Tamargo JL, Zamorano JL, American College of Cardiology, American Heart Association Task Force, European Society of Cardiology Committee for Practice Guidelines, European Heart Rhythm Association, Heart Rhythm Society.

ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation:  
full text: a report of the American College of Cardiology/American Heart Association  
Task Force on practice guidelines and the European Society of Cardiology Committee for  
Practice Guidelines (Writing Committee to Revise the 2001 guidelines for the  
management of patients with atrial fibrillation) developed in collaboration with the  
European Heart Rhythm Association and the Heart Rhythm Society. *Europace*. 2006; 8:  
651-745.

8. Dries DL, Exner DV, Gersh BJ, Domanski MJ, Waclawiw MA, Stevenson LW. Atrial  
fibrillation is associated with an increased risk for mortality and heart failure progression



in patients with asymptomatic and symptomatic left ventricular systolic dysfunction: a retrospective analysis of the SOLVD trials. *Studies of Left Ventricular Dysfunction. J Am Coll Cardiol.* 1998; 32: 695-703.

9. Hunt SA, Abraham WT, Chin MH, Feldman AM, Francis GS, Ganiats TG, Jessup M, Konstam MA, Mancini DM, Michl K, Oates JA, Rahko PS, Silver MA, Stevenson LW, Yancy CW, Antman EM, Smith SC, Jr, Adams CD, Anderson JL, Faxon DP, Fuster V, Halperin JL, Hiratzka LF, Jacobs AK, Nishimura R, Ornato JP, Page RL, Riegel B, American College of Cardiology, American Heart Association Task Force on Practice Guidelines, American College of Chest Physicians, International Society for Heart and Lung Transplantation, Heart Rhythm Society. ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Update the 2001 Guidelines for the Evaluation and Management of Heart Failure): developed in collaboration with the American College of Chest Physicians and the International Society for Heart and Lung Transplantation: endorsed by the Heart Rhythm Society. *Circulation.* 2005; 112: e154-235.

10. Maisel WH, Stevenson LW. Atrial fibrillation in heart failure: epidemiology, pathophysiology, and rationale for therapy. *Am J Cardiol.* 2003; 91: 2D-8D.

11. Mathew J, Hunsberger S, Fleg J, Mc Sherry F, Williford W, Yusuf S. Incidence, predictive factors, and prognostic significance of supraventricular tachyarrhythmias in congestive heart failure. *Chest*. 2000; 118: 914-922.
12. Benza RL, Tallaj JA, Felker GM, Zabel KM, Kao W, Bourge RC, Pearce D, Leimberger JD, Borzak S, O'connor CM, Gheorghiade M, OPTIME-CHF Investigators. The impact of arrhythmias in acute heart failure. *J Card Fail*. 2004; 10: 279-284.
13. Olsson LG, Swedberg K, Ducharme A, Granger CB, Michelson EL, McMurray JJ, Puu M, Yusuf S, Pfeffer MA, CHARM Investigators. Atrial fibrillation and risk of clinical events in chronic heart failure with and without left ventricular systolic dysfunction: results from the Candesartan in Heart failure-Assessment of Reduction in Mortality and morbidity (CHARM) program. *J Am Coll Cardiol*. 2006; 47: 1997-2004.
14. Swedberg K, Olsson LG, Charlesworth A, Cleland J, Hanrath P, Komajda M, Metra M, Torp-Pedersen C, Poole-Wilson P. Prognostic relevance of atrial fibrillation in patients with chronic heart failure on long-term treatment with beta-blockers: results from COMET. *Eur Heart J*. 2005; 26: 1303-1308.
15. Savelieva I, Camm J. Anti-arrhythmic drug therapy for atrial fibrillation: current anti-arrhythmic drugs, investigational agents, and innovative approaches. *Europace*. 2008; 10: 647-665.

16. Tayal AH, Tian M, Kelly KM, Jones SC, Wright DG, Singh D, Jarouse J, Brillman J, Murali S, Gupta R. Atrial fibrillation detected by mobile cardiac outpatient telemetry in cryptogenic TIA or stroke. *Neurology*. 2008; .
17. Wolf P, Kannel W, McGee D, Meeks S, Bharucha N, McNamara P. Duration of atrial fibrillation and imminence of stroke: the Framingham study. *Stroke*. 1983; 14: 664-667.
18. Pollak WM, Simmons JD, Interian A, Jr, Atapattu SA, Castellanos A, Myerburg RJ, Mitrani RD. Clinical utility of intraatrial pacemaker stored electrograms to diagnose atrial fibrillation and flutter. *Pacing Clin Electrophysiol*. 2001; 24: 424-429.
19. Seidl K, Meisel E, VanAgt E, Ottenhoff F, Hess M, Hauer B, Zahn R, Senges J. Is the atrial high rate episode diagnostic feature reliable in detecting paroxysmal episodes of atrial tachyarrhythmias? *Pacing Clin Electrophysiol*. 1998; 21: 694-700.
20. Israel CW, Gronefeld G, Ehrlich JR, Li YG, Hohnloser SH. Long-term risk of recurrent atrial fibrillation as documented by an implantable monitoring device: implications for optimal patient care. *J Am Coll Cardiol*. 2004; 43: 47-52.
21. Gillis AM, Morck M. Atrial fibrillation after DDDR pacemaker implantation. *J Cardiovasc Electrophysiol*. 2002; 13: 542-547.
22. Cheung JW, Keating RJ, Stein KM, Markowitz SM, Iwai S, Shah BK, Lerman BB, Mittal S. Newly detected atrial fibrillation following dual chamber pacemaker implantation. *J Cardiovasc Electrophysiol*. 2006; 17: 1323-1328.

23. Glotzer TV, Hellkamp AS, Zimmerman J, Sweeney MO, Yee R, Marinchak R, Cook J, Paraschos A, Love J, Radoslovich G, Lee KL, Lamas GA, MOST Investigators. Atrial high rate episodes detected by pacemaker diagnostics predict death and stroke: report of the Atrial Diagnostics Ancillary Study of the MOde Selection Trial (MOST). *Circulation*. 2003; 107: 1614-1619.
24. Bunch TJ, Day JD, Olshansky B, Stolen KQ, Mullins CM. Newly Detected Atrial Fibrillation in Patients with an Implantable Cardioverter Defibrillator is a Strong Risk Marker of Increased Mortality. *Heart Rhythm*. 2008; .
25. Deneke T, Lawo T, Gerritse B, Lemke B, The European GEM DR Trade Mark Investigators. Mortality of patients with implanted cardioverter/defibrillators in relation to episodes of atrial fibrillation. *Europace*. 2004; 6: 151-158.
26. Ryan S, Siemon G, Drogemuller A, Rameken M, Vater M, Senges J, Seidl K. 2 Year Follow-Up of 321 Patients with an Implantable Cardioverter/defibrillator: Comparison of Patients with and without Atrial Fibrillation. *Z Kardiol*. 2001; 90: 906-915.
27. Capucci A, Santini M, Padeletti L, Gulizia M, Botto G, Boriani G, Ricci R, Favale S, Zolezzi F, Di Belardino N, Molon G, Drago F, Villani GQ, Mazzini E, Vimercati M, Grammatico A, Italian AT500 Registry Investigators. Monitored atrial fibrillation duration predicts arterial embolic events in patients suffering from bradycardia and atrial fibrillation implanted with antitachycardia pacemakers. *J Am Coll Cardiol*. 2005; 46: 1913-1920.

28. Poole JE, Johnson GW, Hellkamp AS, Anderson J, Callans DJ, Raitt MH, Reddy RK, Marchlinski FE, Yee R, Guarnieri T, Talajic M, Wilber DJ, Fishbein DP, Packer DL, Mark DB, Lee KL, Bardy GH. Prognostic importance of defibrillator shocks in patients with heart failure. *N Engl J Med.* 2008; 359: 1009-1017.