



Home > Journal > Medicine & Healthcare > WJCD

[Indexing](#) [View Papers](#) [Aims & Scope](#) [Editorial Board](#) [Guideline](#) [Article Processing Charges](#)

WJCD > Vol.3 No.1, January 2013

OPEN ACCESS

Atrial fibrillation ablation in patients with heart failure review

PDF (Size: 225KB) PP. 49-57 DOI : 10.4236/wjcd.2013.31011

Author(s)

Mohammad I. Amin, Laurence D. Sterns, Richard A. Leather, Anthony S. Tang

ABSTRACT

Atrial fibrillation and heart failure often coexist in patients with advanced heart failure symptoms. The result, in addition to a significant impact on quality of life, is an increase in the risk of a adverse clinical outcomes including stroke, hospitalization and overall mortality. Pharmacological therapy for atrial fibrillation in the heart failure population remains limited due to sub-optimal drug efficacy and a likely increased mortality due to pro-arrhythmia. Atrial fibrillation ablation, since it allows for therapy without the need for toxic medication, has the potential to become mainstream treatment in patients with drug refractory, symptomatic atrial fibrillation and heart failure. Randomized studies and observational data suggest that atrial fibrillation ablation provides superior rhythm control to anti-arrhythmic drugs. Atrial fibrillation ablation is relatively safe and may result in improvement of left ventricular function and quality of life. Ongoing studies are attempting to assess a number of outcome measures to help define its role in the heart failure patient population. This review focuses on atrial fibrillation ablation in patients with congestive heart failure, and summarizes the results of available literature.

KEYWORDS

Atrial Fibrillation; Ablation; Heart Failure

Cite this paper

Amin, M. , Sterns, L. , Leather, R. and Tang, A. (2013) Atrial fibrillation ablation in patients with heart failure review. *World Journal of Cardiovascular Diseases*, 3, 49-57. doi: 10.4236/wjcd.2013.31011.

References

- [1] Braunwald, E. (1997) Shattuck lecture—cardiovascular medicine at the turn of the millennium: Triumphs, concerns, and opportunities. *The New England Journal of Medicine*, 337, 1360-1369. doi: 10.1056/NEJM199711063371906
- [2] Lloyd-Jones, D., et al. (2010) Heart disease and stroke statistics—2010 update: A report from the American Heart Association. *Circulation*, 121, e46-e215. doi: 10.1161/CIRCULATIONAHA.109.192667
- [3] Johansen, H., et al. (2003) On the rise: The current and projected future burden of congestive heart failure hospitalization in Canada. *Canadian Journal of Cardiology*, 19, 430-435.
- [4] Bursi, F., et al. (2006) Systolic and diastolic heart failure in the community. *JAMA*, 296, 2209-2216. doi: 10.1001/jama.296.18.2209
- [5] Owan, T.E., et al. (2006) Trends in prevalence and outcome of heart failure with preserved ejection fraction. *The New England Journal of Medicine*, 355, 251-259. doi: 10.1056/NEJMoa052256
- [6] Klein, L., et al. (2003) Pharmacologic therapy for patients with chronic heart failure and reduced systolic function: Review of trials and practical considerations. *American Journal of Cardiology*, 91, 18F-40F. doi: 10.1016/S0002-9149(02)03336-2
- [7] Benjamin, E.J., et al. (1998) Impact of atrial fibrillation on the risk of death: The Framingham heart study. *Circulation*, 98, 946-952. doi: 10.1161/01.CIR.98.10.946
- [8] Vidaillet, H., et al. (2002) A population-based study of mortality among patients with atrial fibrillation

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[WJCD Subscription](#)

[Most popular papers in WJCD](#)

[About WJCD News](#)

[Frequently Asked Questions](#)

[Recommend to Peers](#)

[Recommend to Library](#)

[Contact Us](#)

Downloads: 13,873

Visits: 67,045

[Sponsors >>](#)

- [9] Haywood, L.J., et al. (2009) Atrial fibrillation at baseline and during follow-up in ALLHAT (Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial). *Journal of the American College of Cardiology*, 54, 2023- 2031. doi:10.1016/j.jacc.2009.08.020
- [10] Wattigney, W.A., Mensah, G.A. and Croft, J.B. (2003) Increasing trends in hospitalization for atrial fibrillation in the United States, 1985 through 1999: Implications for primary prevention. *Circulation*, 108, 711-716. doi:10.1161/01.CIR.0000083722.42033.0A
- [11] Dorian, P., et al. (2000) The impairment of health-related quality of life in patients with intermittent atrial fibrillation: Implications for the assessment of investigational therapy. *Journal of the American College of Cardiology*, 36, 1303-1309. doi:10.1016/S0735-1097(00)00886-X
- [12] Singh, S.N., et al. (2006) Quality of life and exercise performance in patients in sinus rhythm versus persistent atrial fibrillation: A veterans affairs cooperative studies program substudy. *Journal of the American College of Cardiology*, 48, 721-730. doi:10.1016/j.jacc.2006.03.051
- [13] Ehrlich, J.R., Nattel, S. and Hohnloser, S.H. (2002) Atrial fibrillation and congestive heart failure: Specific considerations at the intersection of two common and important cardiac disease sets. *Journal of Cardiovascular Electro- physiology*, 13, 399-405. doi:10.1046/j.1540-8167.2002.00399.x
- [14] Cleland, J.G., et al. (2003) The EuroHeart Failure survey programme—A survey on the quality of care among patients with heart failure in Europe. Part 1: Patient characteristics and diagnosis. *European Heart Journal*, 24, 442- 463. doi:10.1016/S0195-668X(02)00823-0
- [15] Nieuwlaat, R., et al. (2005) Atrial fibrillation management: A prospective survey in ESC member countries: The Euro Heart survey on atrial fibrillation. *European Heart Journal*, 26, 2422-2434. doi:10.1093/eurheartj/ehi505
- [16] Cohn, J.N., Johnson, G., Ziesches, S., et al. (1991) A comparison of enalapril with hydralazine-isosorbide dinitrate in the treatment of chronic congestive heart failure. *The New England Journal of Medicine*, 325, 303-310. doi:10.1056/NEJM199108013250502
- [17] Cohn, J.N., Archibald, D.G., Ziesche, S., Franciosa, J.A., Harston, W.E., Tristani, F.E., Dunkman, W.B., Jacobs, W., Francis, G.S. and Flohr, K.H. (1986) Effect of vasodilator therapy on mortality in chronic congestive heart failure. Results of a veterans administration cooperative study. *The New England Journal of Medicine*, 314, 1547- 1552. doi:10.1056/NEJM198606123142404
- [18] Doval, H.C., Nul, D.R., Grancelli, H.O., Perrone, S.V., Bortman, G.R. and Curiel, R. (1994) Randomised trial of low-dose amiodarone in severe congestive heart failure. Grupo de Estudio de la Sobrevida en la Insuficiencia Cardíaca en Argentina (GESICA). *The Lancet*, 344, 493-498. doi:10.1016/S0140-6736(94)91895-3
- [19] Johnstone, D., Limacher, M., Rousseau, M., Liang, C.S., Ekelund, L., Herman, M., Stewart, D., Guillothe, M., Bjerken, G. and Gaasch, W. (1992) Clinical characteristics of patients in studies of left ventricular dysfunction (SOLVD). *American Journal of Cardiology*, 70, 894-900. doi:10.1016/0002-9149(92)90734-G
- [20] Packer, M., Poole-Wilson, P.A., Armstrong, P.W., Cleland, J.G., Horowitz, J.D., Massie, B.M., Rydén, L., Thygesen, K. and Uretsky, B.F. (1999) Comparative effects of low and high doses of the angiotensin-converting enzyme inhibitor, lisinopril, on morbidity and mortality in chronic heart failure. ATLAS Study Group. *Circulation*, 100, 2312-2318. doi:10.1161/01.CIR.100.23.2312
- [21] Singh, S.N., Fletcher, R.D., Fisher, S.G., Singh, B.N., Lewis, H.D., Deedwania, P.C., Massie, B.M., Colling, C. and Lazzari, D. (1995) Amiodarone in patients with congestive heart failure and asymptomatic ventricular arrhythmia. Survival trial of antiarrhythmic therapy in congestive heart failure. *The New England Journal of Medicine*, 333, 77-82. doi:10.1056/NEJM199507133330201
- [22] (1987) Effects of enalapril on mortality in severe congestive heart failure. Results of the cooperative north Scandinavian enalapril survival study (CONSENSUS). The CONSENSUS Trial Study Group. *The New England Journal of Medicine*, 316, 1429-1435. doi:10.1056/NEJM198706043162301
- [23] Yusuf, S., Pepine, C.J., Garces, C., Pouleur, H., Salem, D., Kostis, J., Benedict, C., Rousseau, M., Bourassa, M. and Pitt, B. (1992) Effect of enalapril on myocardial infarction and unstable angina in patients with low ejection fractions. *The Lancet*, 340, 1173-1178. doi:10.1016/0140-6736(92)92889-N
- [24] Tsang, T.S., Gersh, B.J., Appleton, C.P., Tajik, A.J., Barnes, M.E., Bailey, K.R., Oh, J.K., Leibson C,

Montgomery, S.C. and Seward, J.B. (2002) Left ventricular diastolic dysfunction as a predictor of the first diagnosed nonvalvular atrial fibrillation in 840 elderly men and women. *Journal of the American College of Cardiology*, 40, 1636-1644. doi:10.1016/S0735-1097(02)02373-2

- [25] Shinbane, J.S., et al. (1997) Tachycardia-induced cardiomyopathy: A review of animal models and clinical studies. *Journal of the American College of Cardiology*, 29, 709-15. doi:10.1016/S0735-1097(96)00592-X
- [26] Pozzoli, M., et al. (1998) Predictors of primary atrial fibrillation and concomitant clinical and hemodynamic changes in patients with chronic heart failure: A prospective study in 344 patients with baseline sinus rhythm. *Journal of the American College of Cardiology*, 32, 197- 204. doi:10.1016/S0735-1097(98)00221-6
- [27] Li, D., et al. (1999) Promotion of atrial fibrillation by heart failure in dogs: Atrial remodeling of a different sort. *Circulation*, 100, 87-95. doi:10.1161/01.CIR.100.1.87
- [28] Sanders, P., et al. (2003) Electrical remodeling of the atria in congestive heart failure: Electrophysiological and electroanatomic mapping in humans. *Circulation*, 108, 1461-1468. doi:10.1161/01.CIR.0000090688.49283.67
- [29] Sparks, P.B., et al. (1999) Electrical remodeling of the atria following loss of atrioventricular synchrony: A long-term study in humans. *Circulation*, 100, 1894-1900. doi:10.1161/01.CIR.100.18.1894
- [30] John, B., et al. (2010) Reverse remodeling of the atria after treatment of chronic stretch in humans: Implications for the atrial fibrillation substrate. *Journal of the American College of Cardiology*, 55, 1217-1226. doi:10.1016/j.jacc.2009.10.046
- [31] Sanders, P., et al. (2003) Reversal of atrial mechanical dysfunction after cardioversion of atrial fibrillation: Implications for the mechanisms of tachycardia-mediated atrial cardiomyopathy. *Circulation*, 108, 1976-1984. doi:10.1161/01.CIR.0000091408.45747.04
- [32] Wilton, S.B. (2010) Investigation of non-pharmacological therapies in patients with heart failure and atrial fibrillation, University of Calgary, Calgary.
- [33] Mamas, M.A., et al. (2009) A meta-analysis of the prognostic significance of atrial fibrillation in chronic heart failure. *European Journal of Heart Failure*, 11, 676-683. doi:10.1093/eurjhf/hfp085
- [34] Hagens, V.E., et al. (2005) Rate control versus rhythm control for patients with persistent atrial fibrillation with mild to moderate heart failure: Results from the RATE control versus electrical cardioversion (RACE) study. *American Heart Journal*, 149, 1106-1111. doi:10.1016/j.ahj.2004.11.030
- [35] Roy, D., et al. (2008) Rhythm control versus rate control for atrial fibrillation and heart failure. *The New England Journal of Medicine*, 358, 2667-2677. doi:10.1056/NEJMoa0708789
- [36] Kober, L., Torp-Pedersen, C., McMurray, J.J., et al. (2008) Increased mortality after dronedarone therapy for severe heart failure. *The New England Journal of Medicine*, 358, 2678-2687. doi:10.1056/NEJMoa0800456
- [37] Bardy, G.H., et al. (2005) Amiodarone or an implantable cardioverter-defibrillator for congestive heart failure. *The New England Journal of Medicine*, 352, 225-237. doi:10.1056/NEJMoa043399
- [38] Flaker, G.C., et al. (1992) Antiarrhythmic drug therapy and cardiac mortality in atrial fibrillation. The stroke prevention in atrial fibrillation investigators. *Journal of the American College of Cardiology*, 20, 527-532. doi:10.1016/0735-1097(92)90003-6
- [39] Kaufman, E.S., et al. (2004) Risk of proarrhythmic events in the atrial fibrillation follow-up investigation of rhythm management (AFFIRM) study: A multivariate analysis. *Journal of the American College of Cardiology*, 44, 1276- 1282.
- [40] Torp-Pedersen, C., et al. (2007) The safety of amiodarone in patients with heart failure. *Journal of Cardiac Failure*, 13, 340-345. doi:10.1016/j.cardfail.2007.02.009
- [41] Wyse, D.G., et al. (2002) A comparison of rate control and rhythm control in patients with atrial fibrillation. *The New England Journal of Medicine*, 347, 1825-1833. doi:10.1056/NEJMoa021328
- [42] Corley, S.D., et al. (2004) Relationships between sinus rhythm, treatment, and survival in the atrial fibrillation follow-up investigation of rhythm management (AFFIRM) study. *Circulation*, 109, 1509-1513. doi:10.1161/01.CIR.0000121736.16643.11

- [43] Pedersen, O.D., et al. (2001) Efficacy of dofetilide in the treatment of atrial fibrillation-flutter in patients with reduced left ventricular function: A Danish investigations of arrhythmia and mortality on dofetilide (diamond) sub-study. *Circulation*, 104, 292-296. doi: 10.1161/01.CIR.104.3.292
- [44] Deedwania, P.C., Singh, B.N., Ellenbogen, K., Fisher, S., Fletcher, R. and Singh, S.N. (1998) Spontaneous conversion and maintenance of sinus rhythm by amiodarone in patients with heart failure and atrial fibrillation: Observations from the veterans affairs congestive heart failure survival trial of antiarrhythmic therapy (CHF-STAT). *Circulation*, 98, 2574-2579. doi: 10.1161/01.CIR.98.23.2574
- [45] Shelton, R.J., et al. (2009) A randomised, controlled study of rate versus rhythm control in patients with chronic atrial fibrillation and heart failure: (CAFE-II study). *Heart*, 95, 924-930. doi: 10.1136/hrt.2008.158931
- [46] Haissaguerre, M., et al. (1998) Spontaneous initiation of atrial fibrillation by ectopic beats originating in the pulmonary veins. *The New England Journal of Medicine*, 339, 659-666. doi: 10.1056/NEJM199809033391003
- [47] McKenna, C., et al. (2009) Cost-effectiveness of radio-frequency catheter ablation for the treatment of atrial fibrillation in the United Kingdom. *Heart*, 95, 542-549. doi: 10.1136/hrt.2008.147165
- [48] Cappato, R., et al. (2010) Updated worldwide survey on the methods, efficacy, and safety of catheter ablation for human atrial fibrillation. *Circulation: Arrhythmia and Electrophysiology*, 3, 32-38. doi: 10.1161/CIRCEP.109.859116
- [49] Nair, G.M., Nery, P.B., Diwakaramenon, S., Healey, J.S., Connolly, S.J. and Morillo, C.A. (2009) A systematic review of randomized trials comparing radiofrequency ablation with antiarrhythmic medications in patients with atrial fibrillation. *Journal of Cardiovascular Electrophysiology*, 20, 138-144. doi: 10.1111/j.1540-8167.2008.01285.x
- [50] Wilber, D.J., Pappone, C., Neuzil, P., De Paola, A., Marchlinski, F., Natale, A., Macle, L., Daoud, E.G., Calkins, H., Hall, B., Reddy, V., Augello, G., Reynolds, M.R., Vinekar, C., Liu, C.Y., Berry, S.M., Berry, D.A. and ThermoCool AF Trial Investigators (2010) Comparison of antiarrhythmic drug therapy and radiofrequency catheter ablation in patients with paroxysmal atrial fibrillation: A randomized controlled trial. *JAMA*, 303, 333-340. doi: 10.1001/jama.2009.2029
- [51] Anter, E., Jessup, M. and Callans, D.J. (2009) Atrial fibrillation and heart failure: Treatment considerations for a dual epidemic. *Circulation*, 119, 2516-2525. doi: 10.1161/CIRCULATIONAHA.108.821306
- [52] Themistoclakis, S., Corrado, A., Marchlinski, F.E., Jais, P., Zado, E., Rossillo, A., et al. (2010) The risk of thromboembolism and need for oral anticoagulation after successful atrial fibrillation ablation. *Journal of the American College of Cardiology*, 55, 735-743. doi: 10.1016/j.jacc.2009.11.039
- [53] Dagres, N., Hindricks, G., Kottkamp, H., Sommer, P., Gaspar, T., Bode, K., et al. (2009) Complications of atrial fibrillation ablation in a high-volume center in 1000 procedures: Still cause for concern? *Journal of Cardiovascular Electrophysiology*, 20, 1014-1019. doi: 10.1111/j.1540-8167.2009.01493.x
- [54] Tilz, R.R., Chun, K.R., Schmidt, B., Fuernkranz, A., Wissner, E., Koester, I., et al. (2010) Catheter ablation of long-standing persistent atrial fibrillation: A lesson from circumferential pulmonary vein isolation. *Journal of Cardiovascular Electrophysiology*, 21, 1085-1093. doi: 10.1111/j.1540-8167.2010.01799.x
- [55] Chen, M.S., Marrouche, N.F., Khaykin, Y., Gillinov, A.M., Wazni, O., Martin, D.O., et al. (2004) Pulmonary vein isolation for the treatment of atrial fibrillation in patients with impaired systolic function. *Journal of the American College of Cardiology*, 43, 1004-1009. doi: 10.1016/j.jacc.2003.09.056
- [56] Hsu, L.F., Ja€s, P., Sanders, P., Garrigue, S., Hocini, M., Sacher, F., et al. (2004) Catheter ablation for atrial fibrillation in congestive heart failure. *The New England Journal of Medicine*, 351, 2373-2378. doi: 10.1056/NEJMoa041018
- [57] Tondo, C., Mantica, M., Russo, G., Avella, A., De Luca, L., Pappalardo, A., Fagundes, R.L., Picchio, E., Laurenzi, F., Piazza, V. and Bisceglia, I. (2006) Pulmonary vein vestibule ablation for the control of atrial fibrillation in patients with impaired left ventricular function. *Pacing and Clinical Electrophysiology*, 29, 962-970. doi: 10.1111/j.1540-8159.2006.00471.x
- [58] Gentlesk, P.J., Sauer, W.H., Gerstenfeld, E.P., Lin, D., Dixit, S., Zado, E., et al. (2007) Reversal of left ventricular dysfunction following ablation of atrial fibrillation. *Journal of Cardiovascular*

- [59] Efremidis, M., Sideris, A., Xydonas, S., Letsas, K.P., Alexanian, I.P., Manolatos, D., et al. (2008) Ablation of atrial fibrillation in patients with heart failure: reversal of atrial and ventricular remodelling. *The Hellenic Journal of Cardiology*, 49, 19-25.
- [60] Nademanee, K., Schwab, M.C., Kosar, E.M., Karwecki, M., Moran, M.D., Visessook, N., Michael, A.D. and Ngarmukos, T. (2008) Clinical outcomes of catheter substrate ablation for high-risk patients with atrial fibrillation. *Journal of the American College of Cardiology*, 51, 843- 849. doi:10.1016/j.jacc.2007.10.044
- [61] Lutomsky, B.A., Rostock, T., Koops, A., Steven, D., M€ullerleile, K., Servatius, H., et al. (2008) Catheter ablation of paroxysmal atrial fibrillation improves cardiac function: a prospective study on the impact of atrial fibrillation ablation on left ventricular function assessed by magnetic resonance imaging. *Europace*, 10, 593-599. doi:10.1093/europace/eun076
- [62] De Potter, T., Berruezo, A., Mont, L., Matiello, M., Tamborero, D., Santibanez, C., et al. (2010) Left ventricular systolic dysfunction by itself does not influence outcome of atrial fibrillation ablation. *Europace*, 12, 24-29. doi:10.1093/europace/eup309
- [63] Choi, A.D., Hematpour, K., Kukin, M., Mittal, S. and Steinberg, J.S. (2010) Ablation vs medical therapy in the setting of symptomatic atrial fibrillation and left ven- tricular dysfunction. *Congestive Heart Failure*, 16, 10-14. doi:10.1111/j.1751-7133.2009.00116.x
- [64] Cha, Y.M., Wokhlu, A., Asirvatham, S.J., Shen, W.K., Friedman, P.A., Munger, T.M., Oh, J.K., Monahan, K.H., Haroldson, J.M., Hodge, D.O., Herges, R.M., Hammill, S.C. and Packer, D.L. (2011) Success of ablation for atrial fibrillation in isolated left ventricular diastolic dys-function: A comparison to systolic dysfunction and normal ventricular function. *Circulation: Arrhythmia and Electrophysiology*, 4, 742-32.
- [65] Khan, M.N., Ja?s, P., Cummings, J., Di Biase, L., Sanders, P., Martin, D.O., et al. (2008) Pulmonary-vein isolation for atrial fibrillation in patients with heart failure. *The New England Journal of Medicine*, 359, 1778-1785. doi:10.1056/NEJMoa0708234
- [66] MacDonald, M.R., Connelly, D.T., Hawkins, N.M., Steedman, T., Payne, J., Shaw, M., et al. (2011) Radio-frequency ablation for persistent atrial fibrillation in patients with advanced heart failure and severe left ventricular systolic dysfunction: A randomised controlled trial. *Heart*, 97, 740-747. doi:10.1136/hrt.2010.207340
- [67] Wilton, S.B., Fundytus, A., Ghali, W.A., Veenhuyzen, G.D., Quinn, F.R., Mitchell, L.B., Hill, M.D., Faris, P. and Exner, D.V. (2010) Meta-analysis of the effective- ness and safety of catheter ablation of atrial fibrillation in patients with versus without left ventricular systolic dysfunction. *American Journal of Cardiology*, 106, 1284-1291. doi:10.1016/j.amjcard.2010.06.053
- [68] Dagues, N., Varounis, C., Gaspar, T., Piorkowski, C., Eitel, C., Iliodromitis, E.K., Lekakis, J.P., Flevari, P., Simeonidou, E., Rallidis, L.S., Tsougos, E., Hindricks, G., Sommer, P. and Anastasiou-Nana, M. (2011) Catheter ab- lation for atrial fibrillation in patients with left ventricular systolic dysfunction. A systematic review and meta-ana- lysis. *Journal of Cardiac Failure*, 17, 964-970. doi:10.1016/j.cardfail.2011.07.009
- [69] St. Luke' s-Roosevelt Hospital Center (2011) Pulmonary vein isolation for rhythm control in patients with atrial fibrillation and left ventricular dysfunction: A pilot study. *ClinicalTrials.gov* identifier: NCT01082601.
- [70] Barts & The London NHS Trust (2010) Catheter ablation versus medical treatment of AF in heart failure (CAM- TAF). *ClinicalTrials.gov* identifier: NCT01411371
- [71] Royal Brompton & Harefield NHS Foundation Trust (2012) Catheter ablation versus medical rate control for atrial fibrillation in patients with heart failure (ARC-HF). *ClinicalTrials.gov* identifier: NCT00878384
- [72] St. Jude Medical (2012) Atrial fibrillation management in congestive heart failure with ablation (AMICA). *ClinicalTrials.gov* identifier: NCT00652522
- [73] Marrouche, N.F., Brachmann, J. and CASTLE-AF Steering Committee (2009) Catheter ablation versus standard conventional treatment in patients with left ventricular dysfunction and atrial fibrillation (CASTLE-AF)—Study design. *Pacing and Clinical Electrophysiology*, 32, 987-994. doi:10.1111/j.1540-8159.2009.02428.x
- [74] University of Ottawa Heart Institute (2012) Rate versus catheter ablation rhythm control in patients

with heart failure and high burden atrial fibrillation (RAFT-AF). ClinicalTrials.gov identifier:
NCT01420393.

[Home](#) | [About SCIRP](#) | [Sitemap](#) | [Contact Us](#)

Copyright © 2006-2013 Scientific Research Publishing Inc. All rights reserved.