

THE AFIB REPORT

Your Premier Information Resource for Lone Atrial Fibrillation!

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10th YEAR



Welcome to the first issue of our 10th year of publication – amazing how time flies!! Afibbers who subscribe to this newsletter or participate in the activities on the Bulletin Board and in the Conference Room have long been aware of the benefits of supplementing with nattokinase to prevent ischemic stroke. Now Chinese researchers provide convincing proof that nattokinase does indeed prevent the formation of blood clots by inhibiting several steps in the coagulation cascade. This is good news indeed!

Not so good news – researchers at Pennsylvania State University report that the prevalence of atrial fibrillation and atrial flutter is substantially higher than previously accepted – over 3 million people are now struggling with afib in the USA.

In other news, fish oil, specifically docosahexaenoic acid (DHA), helps prevent the development of afib, there are mixed opinions concerning the new WATCHMAN device for stroke prevention, weather does indeed influence afib episode frequency, and electric cardioversion is usually quite ineffective.

Of particular interest is the finding by British researchers that high aldosterone and low renin levels (hyperaldosteronism) are associated with afib and that normalizing these levels may eliminate episodes. I would urge afibbers, particularly those with hypertension or regularly spaced episodes, to have a blood test (drawn sitting upright) to determine their aldosterone and renin levels. This may be a crucial piece in the afib puzzle. So if this situation applies to you, I urge you to contact your GP for this test.

Finally, if you need to restock your supplements, please remember that by ordering through my on-line vitamin store you will be helping to defray the cost of maintaining the web site and bulletin board. You can find the store at <http://www.afibbers.org/vitamins.htm> - your continuing support is truly appreciated.

Wishing you lots of NSR,

Hans

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Prevalence of AF on the rise

HERSHEY, PENNSYLVANIA. A recent study carried out by researchers at Pennsylvania State University concludes that the prevalence in the US

(total number of cases at a specific time) of atrial fibrillation and atrial flutter is substantially higher than previously assumed. The study involved over 21 million people enrolled in various employer- and government-funded (Medicare) healthcare insurance plans and covered the period July 1, 2004 to December 31, 2005.

The researchers found that 242,900 (1.12%) of the study participants had been diagnosed with atrial fibrillation (AF) and atrial flutter (AFL) during the 18-month study period. The prevalence of AF (91.6%) was substantially higher than that of AFL (2.0%) with the remaining 6.4% having both AF and AFL. The prevalence of AF was somewhat higher among men than among women (54% vs 46%) whereas

the prevalence of AFL was substantially higher among men (63% vs 37%). The prevalence of AF and AFL increased sharply with age with 74% of AF patients and 58% of AFL patients being 65 years or older.

The study, unfortunately, did not distinguish between lone atrial fibrillation (LAF) and AF with underlying heart disease. Most patients with AF had one or more comorbidities such as congestive heart failure (30.3%), valvular heart disease (30.3%), coronary artery disease (43%), and hypertension (62%). Matched controls with no AF or AFL had much lower rates of these conditions (congestive heart failure 6.5%, valvular heart disease 7.9%, coronary artery disease 19.4%, and hypertension 45.1%).

Based on this 21 million population sample, the researchers estimate that 3.03 million people in the

US were struggling with AF in 2005 with corresponding numbers for AFL and AF and AFL being 0.07 million and 0.19 million. The estimate for 2050 is 7.56 million with AF, 0.15 million with AFL and 0.44 million with both AF and AFL. They conclude that the prevalence of AF has increased since 1996-1997 to a greater extent than would be attributed to the population growth and aging alone. *Naccarelli, GV, et al. Increasing prevalence of atrial fibrillation and flutter in the United States. American Journal of Cardiology, Vol. 104, 2009, pp. 1534-39*

Editor's comment: It is most unfortunate that this study did not distinguish between lone and heart disease-related AF; however, it is certainly clear that atrial fibrillation and flutter are becoming increasingly common and that an affordable protocol for effectively managing these conditions is urgently needed.

Nattokinase is an effective anticoagulant

CHANGHUA, TAIWAN. An ischemic stroke is caused by a blood clot or plaque fragment obstructing the flow of blood through the small arteries in the brain. A heart attack (myocardial infarction) is caused by a blood clot or plaque fragment obstructing the flow of blood through the small arteries feeding the heart. Venous thromboembolism, also known as deep vein thrombosis (DVT), is caused by a blood clot forming in the veins, most often in the lower legs.

Thus, inhibiting blood clot (thrombus) formation is of primary importance in the prevention of all the above conditions. The drug warfarin (Coumadin) is the most commonly used anticoagulant and works by inhibiting the activation of the vitamin K-dependent coagulation factors V, VII and X in the extrinsic and common pathways of the coagulation cascade. The level of other important coagulation promoters, such as fibrinogen and factor VIII, are not affected by warfarin.

Nattokinase, an extract from fermented soybeans (natto), is also known to inhibit blood clot formation (thrombosis), but does so by dissolving already formed fibrin-rich clots and by inactivating plasminogen activator inhibitor-1. Now researchers at the Changhua Christian Hospital in Taiwan report that nattokinase also inhibits the synthesis of fibrinogen and coagulation factors VII and VIII. Elevated fibrinogen levels are associated with increased blood viscosity and an increased risk of cardiovascular disease (CVD). There is also evidence that elevated levels of factors VII and VIII are associated with atherosclerosis and coronary heart disease.

The Changhua study involved 15 healthy controls, 15 patients with CVD or at least 2 risk factors for CVD, and 15 patients undergoing dialysis for chronic kidney disease (a known risk factor for CVD). At the beginning of the study (baseline) the levels of fibrinogen, factor VII and factor VIII in the three groups were as follows:

	<u>Controls</u>	<u>CVD Group</u>	<u>Dialysis Group</u>
Fibrinogen, mg/dL	335.0	376.2	433.5
Factor VII, IU	122.5	139.7	154.8
Factor VIII, IU	106.1	156.7	236.3

All study participants ingested 2 nattokinase capsules a day (2000 fibrinolysis units per capsule) for 2 months. At the end of this period levels of

fibrinogen had decreased by 9% in the healthy group, by 7% in the CVD group, and by 10% in the dialysis group. Corresponding declines in factor VII

level in the 3 groups were 14%, 13% and 7% and for factor VIII 17%, 19% and 19% respectively. No adverse events or increases in uric acid level were observed during the trial.

However, 18% of participants noticed a drop in blood pressure and/or increased vitality. Thirteen percent noticed an improvement in bowel function and 11% reported a lessening of shoulder-neck ache. The Taiwanese researchers conclude that supplementation with nattokinase would have a beneficial effect on risk factors associated with CVD through its reduction in fibrinogen, factor VII and factor VIII levels.

Hsia, CH, et al. *Nattokinase decreases plasma levels of fibrinogen, factor VII, and factor VIII in human subjects. Nutrition Research, Vol. 29, 2009, pp. 190-96*

Editor's comment: This study confirms that nattokinase is effective in preventing the formation of fibrin-rich blood clots such as those associated with venous thromboembolism and atrial fibrillation (blood stagnation in left atrium or left atrial appendage). Although nattokinase also reduces the level of factor VIII I am not aware of any evidence that it would also reduce the formation of platelet-rich clots (plaque). Additional evidence for the effectiveness of nattokinase in preventing DVT can be found in a study by a group of British and Italian researchers involving 204 airline passengers at high risk for venous thrombosis traveling between London and New York.[1]

[1] Cesarone, MR, et al. *Prevention of venous thrombosis in long-haul flights with Flite Tabs. Angiology, Vol. 54, No. 5, Sept-Oct 2003, pp. 531-39*

Excess aldosterone – A continuing saga

BIRMINGHAM, UNITED KINGDOM. In January 2003 I hypothesized that high aldosterone levels could precipitate AF episodes. Please see the Conference Room Proceedings Session 2 at www.afibbers.org/conference/session2.pdf. I further elaborated on this hypothesis in the March 2003 issue of *The AFIB Report*. In November 2006 researchers at the Veterans Affairs Medical Center in Minneapolis reported on the case of a 58-year-old man whose weekly afib episodes were clearly related to low serum levels of potassium (2.7 mEq/L – normal range is 3.5 to 5.5 mEq/L) associated with Conn's syndrome (primary hyperaldosteronism). At the time of hospitalization the patient's plasma renin activity (PRA) was 0.07 ng/mL/hr (normal range is 0.7 to 5.0 ng/mL/hr) and his plasma aldosterone (PA) level was 82.7 ng/dL (normal range is 4.0 to 31.0 ng/dL). He was discharged with a prescription for 25 mg/day of spironolactone (Aldactone) and 10 mEq/day (390 mg/day) of potassium chloride. At the time of writing the report the patient had been afib-free for a year.[1]

More recently (July 2009) Timothy Watson and colleagues at the Birmingham City Hospital reported on six cases in which a clear association between hyperaldosteronism (elevated levels of PA and reduced PRA) and lone atrial fibrillation was evident.

Case 1 – A 39-year-old man admitted to hospital with AF was found to have a serum potassium level of 3.3 mmol/L (3.3 mEq/L), a PRA of 0.16 nmol/L/hr, and a PA of 31 ng/dL (845 pmol/L). A CT scan revealed a 10 mm nodule on the right adrenal

gland. It was removed resulting in normalization of potassium levels and no recurrence of afib. NOTE: This patient continued treatment for hypertension with 10 mg/day of lisinopril (Zestril).

Case 2 – A 33-year-old male presented with afib which converted spontaneously after 24 hours. His potassium level was 3.3 mmol/L, his PRA 0.7 nmol/L/hr, and his PA 79 ng/dL. A CT scan revealed a 16 mm nodule on the right adrenal gland. It was removed resulting in normalization of potassium levels and no further afib episodes. NOTE: This patient continued treatment with amlodipine (Norvasc) and losartan (Cozaar) for elevated blood pressure.

The Birmingham researchers report on four more cases where a clear association was found between lone AF (no underlying heart disease), low serum potassium levels and hyperaldosteronism. They point out that an elevated aldosterone level has been shown to induce cardiac fibrosis which in turn is a plausible mechanism to promote the development of AF, possibly by disruption of the normal intra-cardiac conduction system.

Watson, T, et al. *Atrial fibrillation in primary aldosteronism. Journal of the Renin-Angiotensin-Aldosterone System, Vol. 10, No. 4, December 2009, pp. 190-94*

[1] Aloul, BA, et al. *Atrial fibrillation associated with hypokalemia due to primary hyperaldosteronism (Conn's syndrome). PACE, Vol. 29, November 2006, pp. 1303-05*

Editor's comment: Although hyperaldosteronism is usually associated with high blood pressure

(hypertension) there are cases where it is not and there are also many cases where elevated PA is not caused by a tumor on the adrenal gland (idiopathic hyperaldosteronism). I am one such case having undergone a CT scan and since no tumor was found and I do not have hypertension, I was diagnosed with idiopathic hyperaldosteronism. See Conference Room Proceedings session 26 <http://www.afibbers.org/conference/session26.pdf>. I would urge any afibber with hypertension or

regularly spaced episodes to have their aldosterone and renin levels determined (blood test sitting upright). If they are abnormal then a CT scan should follow in order to rule out a tumor on the adrenal gland the removal of which may eliminate future afib episodes. Even if no tumor is found it may be possible to effectively manage hyperaldosteronism-related AF with eplerenone (Inspra) and/or ACE inhibitors such as lisinopril (Zestril).

Fish oil prevents atrial fibrillation

KUOPIO, FINLAND. The three most important components of fish oil are eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and docosapentaenoic acid (DPA). Extensive research has established that EPA and DHA play a vital role in the prevention of Alzheimer's disease, atherosclerosis, heart attack, angina, stroke, congestive heart failure, depression and cancer. Clinical trials have also shown that fish oil supplementation is effective in the treatment of many disorders including high blood pressure, rheumatoid arthritis, diabetes, ulcerative colitis and Raynaud's disease.

Now Finnish researchers report that high serum levels of EPA, DHA and DPA are associated with a significantly reduced risk of developing atrial fibrillation (AF). Their study included 2174 men enrolled in the Kuopio Ischemic Heart Disease Risk Factor Study begun in 1984-1989. The men were 42, 48, 54 or 60 years of age at the baseline examination. During 17.7 years of follow-up, 11% of the participants were found to have AF upon admission to hospital (for arrhythmia or other reasons). This corresponds to an incidence rate of 0.6% a year. NOTE: Considering that the study only included men admitted to hospital, it is clear that the population-wide incidence would be significantly higher than 0.6% a year.

At baseline, the mean percentages of EPA, DPA and DHA in serum fatty acids were 1.67%, 0.55% and 2.46% respectively. After adjustment for age and other possible confounders the researchers observed that men in the highest quartile of EPA+DPA+DHA concentration (5.3 – 15.6%) had a 35% reduced risk of developing AF when compared to men in the lowest quartile (1.7 – 3.6%). The absolute risk in the lowest quartile group was 13.4% vs 8.7% in the highest quartile group. Further

analysis revealed that DHA accounted for the entire risk reduction and that EPA and DPA levels were not associated with risk of developing AF.

Considering only lone afibbers (no heart disease prior to diagnosis of AF) strengthened the association between serum fatty acid concentration of DHA and AF risk. Men in the lowest quartile had a risk of 10.9%, while those in the highest quartile had a risk of only 5.6% – a relative risk reduction of 49%.

The mean serum fatty acid concentration of alpha-linolenic acid (found in flaxseed and other vegetable oils) was 0.74% and was not related to the risk of developing AF. A hair analysis revealed no correlation between methylmercury level (methylmercury is an increasingly common contaminant of fish) and risk of AF, nor did a high methylmercury level attenuate the beneficial effects of DHA. There was also no evidence that age, hypertension, systolic blood pressure or a history of ischemic heart disease modified the association between DHA level and AF risk.

Virtanen, JK, et al. Serum long-chain n-3 polyunsaturated fatty acids and risk of hospital diagnosis of atrial fibrillation in men. Circulation, Vol. 120, December 8, 2009, pp. 2315-21

Editor's comment: The finding that a high serum fatty acid concentration of DHA is associated with a 49% reduction in the risk of developing lone atrial fibrillation (LAF) is indeed encouraging. Unfortunately, it does not prove that a high fish intake or fish oil supplementation will reduce episode severity in patients already diagnosed with LAF. However, since LAF has a very significant genetic component fish oil supplementation could well be highly beneficial for relatives of afibbers.

Does the WATCHMAN device prevent stroke?

ROCHESTER, MINNESOTA & HAMILTON, ONTARIO, CANADA. Patients with heart disease and atherosclerosis accompanied by paroxysmal or permanent AF have a substantially increased risk of suffering an ischemic stroke (stroke caused by a blood clot or a ruptured plaque). The risk increases with age from about 7% a year for patients aged 50 to 59 years to 36% for those between the ages of 80 to 89 years. NOTE: There is no evidence that people with no underlying heart disease (lone afibbers) or other risk factors for ischemic stroke (congestive heart failure, hypertension, diabetes, history of prior stroke or TIA, age over 75 years) have a greater stroke risk than that found in an age-matched population without AF.

A major cause of stroke in AF patients is the formation of cardiac emboli (blood clots) in the left atrium. It is estimated that 90% of these emboli are formed in the left atrial appendage (LAA) due to poor circulation in and out of this small pouch attached to the left atrium. Thus it is not surprising that cardiovascular surgeons have been experimenting with either removing or closing off the LAA.

The latest entry in the market for devices used to close off the LAA is the WATCHMAN device. This is a nitinol (nickel-titanium alloy) cage covered with a polyethylene membrane and having barbs for anchoring it to the inside of the LAA. The device is inserted with a special catheter entering the left atrium through the femoral vein – a procedure similar to that used in pulmonary vein ablation procedures. The first trial of the device involved 66 patients with AF and one or more risk factors for ischemic stroke; it was performed at the Mayo Clinic. After 45 days, 93% of participants had achieved satisfactory sealing of the LAA and 92% were able to discontinue warfarin.

Preliminary results of a larger trial indicated that 87% of patients were able to discontinue warfarin after 45 days and the Mayo Clinic researchers conclude that the WATCHMAN device is “non-inferior” to warfarin treatment as far as the risk of stroke and bleeding is concerned. This despite the fact that 5% of the trial participants required intervention to deal with pericardial effusion occurring during the procedure. NOTE: Both the Mayo Clinic and the authors of the article have a direct financial interest in Atritech, the manufacturer of the WATCHMAN device.

In an accompanying article published in *Circulation*, researchers at McMaster University in Hamilton, Ontario question the conclusion that the implantation of the WATCHMAN device will eliminate the need for warfarin therapy. They state, “*No conclusive evidence exists to demonstrate that LA exclusion reduces stroke in AF patients*”. They also point out that there is evidence that removing or isolating the LAA may *decrease cardiac function, impair hemodynamic response to volume and pressure changes, impede thirst, and promote heart failure*. Thus it is by no means certain that eliminating LAA function is a benign procedure. Furthermore, some studies involving surgical closure of the LAA have shown that stroke risk can actually increase if the LAA is not completely isolated.

In commenting specifically on the most recent WATCHMAN trial (707 patients) involving device implantation in 449 patients and comparison to 258 patients on warfarin they point out that 12.3% of patients experienced serious complications during the implantation procedure and that the rate of ischemic stroke during the follow-up period was actually 50% higher in the device group than in the warfarin group. Nevertheless, the total incidence of stroke (including hemorrhagic stroke) cardiovascular death, and systemic embolization was lower in the WATCHMAN group (3.4% a year) than in the warfarin group (5% a year). Their conclusion was, “*the evidence of efficacy and safety is insufficient to recommend this approach for any patients other than those in whom long-term warfarin is absolutely contraindicated*”.

Holmes, DR and Schwartz, RS. *Does left atrial appendage occlusion eliminate the need for warfarin? Left atrial appendage occlusion eliminates the need for warfarin. Circulation, Vol. 120, November 10, 2009, pp. 1919-26*

Whitlock, RP, et al. *Does left atrial appendage occlusion eliminate the need for warfarin? Left atrial appendage occlusion does not eliminate the need for warfarin. Circulation, Vol. 120, November 10, 2009, pp. 1927-32*

Editor’s comment: Clearly there is no consensus on the merits of the WATCHMAN device. Fortunately, this is largely irrelevant to lone afibbers with no risk factors for stroke since they do not have an increased risk of stroke and need neither long-term warfarin therapy nor LAA isolation or removal.

Seasonal variations in atrial fibrillation

TOYOAKE, JAPAN. It is well established that the incidence of several cardiovascular diseases peaks during the winter. Japanese researchers now report that the incidence of paroxysmal (intermittent) atrial fibrillation (PAF) also exhibits a seasonal pattern. Their 5-year study involved 12,390 patients with an average age of 65 years (range of 16 to 95 years) for whom 24-hour Holter recordings were available. Analysis of the recordings revealed the presence of 258 paroxysmal afib episodes in 237 patients, or an overall incidence of 2.1%. The researchers observed a distinct peak in episode incidence during the month of September (3% of recordings during the month) and a distinct minimum during the month of June (1.2% of recordings). Thus the incidence of PAF was 62% lower in June than in September. The peak month for PAF was found to be different for the 152 patients aged 65 years or older (18% lone afibbers) and the 85 patients younger than 65 years (47% lone afibbers).

In the younger group the peak month was December and the minimum month was June with an incidence difference of 63%. In the older group the peak month was September and the minimum month was June with an incidence difference of 62%. The Japanese researchers also made the following interesting observations:

- The cumulative episode duration in older afibbers was substantially longer than among younger ones (377 minutes vs 244 minutes).
- Only 39% of recorded episodes were accompanied by symptoms such as palpitations and shortness of breath indicating that most recorded episodes were asymptomatic.
- The incidence of PAF also showed an autumn peak and a summer minimum.
- Treatment with antiarrhythmic drugs did not influence the seasonal pattern of PAF.
- There was no significant interaction between outdoor temperature and PAF incidence, but longer daylight periods were associated with a lower incidence of PAF.

The researchers speculate that sharp variations in daily temperatures and atmospheric pressure commonly occurring during autumn may explain the PAF peak during this season. They also suggest, based on animal experiments, that fewer daylight hours may increase gene expression of certain potassium-related ion channels resulting in a shorter action potential duration and thus a greater risk of initiating an afib episode.

Watanabe, E, et al. Seasonal variation in paroxysmal atrial fibrillation documented by 24-hour Holter electrocardiogram. Heart Rhythm, Vol. 4, January 2007, pp. 27-31

Editor's comment: In addition to the above speculations, the study could also point to a connection between PAF episode frequency and vitamin D and/or melatonin. Subsequent to the publication of the *Heart Rhythm* article, Polish researchers reported an association between PAF frequency and weather conditions. A summary of their work is presented below. Their speculation about the effect of electromagnetic radiation (EMF) upon afib frequency seems to me to be of particular relevance considering the "soup" of EMF in which we are all immersed today.

Seasonal variation in AF episodes

LUBLIN, POLAND. It has been known since the time of Hippocrates that the weather (atmospheric conditions) influences people's mood and health. As far back as the first half of the 19th century, Polish researchers reported an association between short-term weather changes and a worsening of angina, increased incidence of heart attacks, and more pronounced fluctuations in blood pressure. More recent research has shown that levels of the stress hormone cortisol are lower at high barometric pressures and that lower levels are associated with a lessening of depression. So, conceivably, a person with elevated cortisol levels would feel better on a sunny day.

Polish researchers report that weather conditions also affect the incidence of paroxysmal afib episodes. Their study involved 739 patients (52% females, average age of 65 years, range of 18-91 years) who were admitted to hospital because of an AF episode during the period 2005-2006. Patients with acute coronary syndrome, myocarditis, pericarditis, thyrotoxicosis, and respiratory problems were excluded from the study, as were those who had recently suffered a heart attack.

The researchers correlated the number of patients admitted each day with air temperature, atmospheric pressure, wind speed and cloudiness, and also investigated the effect of approaching cold fronts and warm fronts. On average, there was one admission per day related to afib episodes. However, there were 9 days on which 4 patients were admitted and 4 days on which 5 patients were admitted. There was a seasonal effect with more cases (2.4/day) reported in the winter (December to February) than in the spring and summer (1.7 cases/day during the period May to August).

The most interesting correlation though was between the approach of a cold front and the number of afib-related hospital admissions. All the high admission days (4-5 cases/day) occurred 24-36 hours prior to the arrival of a cold front. The researchers speculate that the effect may be due to the electromagnetic waves created in deep low-pressure systems and storm centers. These waves travel at the speed of light, whereas the front itself moves at 10-50 km/hr, thus explaining why the effect of an approaching cold front would be felt 24-36 hours in advance. The researchers found no relationship between afib incidence and the approach of a warm front. However, they did notice that periods of constant high atmospheric pressure were associated with a significant decline in hospital admissions for AF.

Gluszak, A, et al. Episodes of atrial fibrillation and meteorological conditions. Kardiologia Polska, Vol. 66, September 2008, pp. 958-63

Editor's comment: The speculation that a temporary increase in exposure to electromagnetic radiation may precipitate afib episodes is indeed an interesting one and, if proven correct, could perhaps partly explain the current AF epidemic, which certainly coincides with a vast increase in our exposure to electromagnetic radiation. As way of explanation the Polish researchers make the following remarks:

"Electromagnetic waves penetrate into the tissue to a depth depending on the electric resistance and wavelength. In the very low frequency generated by atmospheric conditions (up to 10 MHz) living tissue acts as a conductor in which an alternating electric field produces Foucault eddy currents practically induced in the entire body. These phenomena were also reported by Kozłowski, who claimed that electromagnetic field effects in the body tissues involve stimulation of particles and atomic movements which cause chemical reactions and bioelectric processes. Induction of these changes occurs in electromagnetic field of relatively low intensities. This was also underlined by Hessmann-Kosaris, who reported that even weak electromagnetic fields may affect metabolic processes of cells and cellular membranes".

Left atrial size and ablation outcome

TAIPEI, TAIWAN. There is some evidence that a large left atrial diameter (parasternal long-axis view) as determined with transesophageal echocardiography (TEE) is associated with an increased risk of afib recurrence following catheter ablation. Now Dr. Shih-Ann Chen and colleagues at the Taipei Veterans General Hospital report that patients with permanent (persistent or long-standing persistent) atrial fibrillation (AF) have a lower recurrence rate if their pre-procedural left atrial diameter (LAD) is less than 45 mm and their AF terminated spontaneously during their first ablation procedure.

The study involved 87 patients (83% male) who had suffered from permanent AF for an average of 7 years. The patients were divided into two groups depending on their LAD. Group 1 consisted of 49 patients with a LAD below 45 mm (mean of 38 mm)

and group 2 consisted of 38 patients with a LAD at or above 45 mm (mean of 49 mm). In group 1, 8% had congestive heart failure as compared to 27% in group 2. Hypertension was about equally common in both groups (35% vs 30%). Thus it is likely, although not stated, that the majority of the groups had lone atrial fibrillation (no underlying heart disease).

All patients underwent circumferential isolation of the pulmonary veins followed by segmental ablation as needed. If this procedure did not terminate the AF, linear ablation was performed at the anterior roof and the lateral mitral isthmus (93% of patients needed this procedure). Finally, if the linear ablation did not result in a return to normal sinus rhythm (NSR), complex-fractionated atrial electrogram mapping was performed and additional ablation done as required (59% of patients needed

this step). At the end of the 3 steps, 35% of patients experienced spontaneous termination (39% in group 1 and 29% in group 2); electric cardioversion was used to bring the remaining patients to NSR. The total procedure time in group 1 was 130 minutes vs 162 minutes in group 2 – a remarkably short time for such a complex procedure. All patients were placed on antiarrhythmics for 8 weeks following the procedure.

During follow-up, 73% of patients in group 1 and 74% in group 2 experienced recurrence (an average of 6 months after the initial procedure). A second ablation was performed in 24% of the 87 patients, a third procedure in 6%, and a fourth in one patient (1%). In all cases pulmonary vein reconnections were found and re-ablated. At the end of the 21-month follow-up period, 51% of group 1 were in NSR without the use of antiarrhythmics, while another 39% were afib-free with the use of previously ineffective antiarrhythmics. Corresponding numbers for group 2 were 32% and 36%.

The researchers observed that those participants in group 1 (LAD less than 45 mm) whose AF terminated spontaneously during the initial procedure had a substantially lower risk of recurrence during the follow-up period than did those who had to be cardioverted (15% vs 70%). The corresponding numbers for those in group 2 were 22% and 18% - not a statistically significant difference.

Lo, LW, et al. The impact of left atrial size on long-term outcome of catheter ablation of chronic atrial fibrillation. Journal of Cardiovascular Electrophysiology, Vol. 20, November 2009, pp. 1211-16

Editor’s comment: This study is a good example of just how complex a catheter ablation for permanent AF is and how relatively low the complete success rate (no afib, no drugs) is, especially for patients with an enlarged left atrium. The “take-home” message is – “Don’t wait until your afib becomes permanent or your left atrium enlarged before undergoing ablation or surgery to eliminate afib”.

Predicting recurrence after cardioversion

SEOUL, KOREA. Approximately 50% of afibbers undergoing electric cardioversion (CV) experience recurrence within the first month following the procedure. The extent of electrical and structural remodeling of the left atrium (LA) is known to affect the risk of recurrence. Now a team of Korean researchers report that several other factors influence whether a CV results in long-term normal sinus rhythm (NSR).

Their study involved 81 patients with an average age of 59 years (78% male) who had been taking an antiarrhythmic drug (AAD) for at least one month prior to the CV and who were on an optimal anticoagulation protocol. Sixteen percent of the study participants had heart failure and 26% had hypertension so, although not stated, the majority of the participants were lone afibbers (no underlying heart disease). The mean left ejection fraction (LEF) was 49%, the mean LA diameter was 45.5

mm, and 58% of the participants showed spontaneous echo contrasts (SECs) in the left atrium – despite supposedly optimal anticoagulation.

All patients underwent CV with an initial biphasic R-wave synchronized shock at 70 J increasing to 100, 150 or 200 J if the first shock failed to achieve NSR. If afib returned within 15 minutes, amiodarone was administered intravenously and the CV repeated. Patients still in afib after this were classified as having failed CV. Seven patients (8.6%) failed CV leaving 74 patients for follow-up at 1, 2, 4 and 8 weeks and then every 3 months. After an average 13-month follow-up, 65% were back in afib, while 35% remained in NSR. The median time to recurrence was 21 days. The following statistically significant differences were found between the group that experienced recurrence and the one that remained in NSR.

<u>Variable</u>	<u>Recurrence Group</u>	<u>NSR Group</u>
Age, yrs	60	55
Presence of SEC	68%	40%
SDF-1 alpha concentration, ng/mL(1)	3.242	3.88
Pro-ANP concentration, nmol/L(2)	4.92	6.68
Use of ACE inhibitor or ARB(3)	27%	50%
Use of spironolactone	0%	19%

- (1) stromal cell-derived factor
- (2) pro-atrial natriuretic peptide
- (3) ACE inhibitors or angiotensin II receptor blockers

CV failure was less common in patients on amiodarone (29% vs 65%) and high levels of transforming growth factor (TGF-beta) were associated with immediate CV failure. Recurrence of afib following a successful CV (after adjusting for confounding variables) was more common in patients older than 60 years, those with SEC, and those with low levels of SDF-1 alpha. Under-utilization of ACE inhibitors, ARBs, and spironolactone was associated with a greater risk of recurrence. Left atrial diameter and level of C-reactive protein were not associated with recurrence.

Kim, SK, et al. Clinical and serological predictors for the recurrence of atrial fibrillation after electrical cardioversion. Europace, Vol. 11, December 2009, pp. 1632-38

Editor's comment: This study clearly shows that remaining in sinus rhythm after a seemingly successful CV is the exception rather than the rule. It is unfortunate that the researchers did not measure potassium and magnesium levels prior to the procedure. It is likely that they would have been found to be low in light of the seemingly beneficial effect of potassium- and magnesium-sparing drugs (ACE inhibitors, ARBS, and spironolactone). In any case, it is important to ensure adequate potassium and magnesium stores prior to a CV and it may well be that taking one of the above-mentioned drugs prior to and after a CV may extend the time to recurrence.

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