

THE AFIB REPORT

Your Premier Information Resource for Lone Atrial Fibrillation!

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Data concerning the long-term outcome of catheter ablations for atrial fibrillation has finally been released by the Cleveland Clinic. Average complete success rate (no atrial arrhythmia without the use of antiarrhythmics) for a single procedure is 76% at year 1 and 63% at year 5.

Corresponding numbers for multiple procedures are 86% (year 2) and 84% respectively. These success rates are encouraging, as is the finding that 87% of ablatees who are arrhythmia-free at the one-year check-up can expect to be so 3 years later. The Cleveland data is discussed in detail in this issue, as are the results of four other studies reporting long-term (5 years) data.

Also in this issue, we report that general anesthesia is associated with better ablation results, that spouses of afibbers suffer as well, that afib is more than a nuisance, and finally, a most important finding, that fish oil supplementation prior to cardioversion and catheter ablation markedly improves the outcome through a reduction in atrial stunning.

And 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 good health and lots of NSR,

Hans

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General anesthesia associated with better ablation results

AUSTIN, TEXAS. Catheter ablations for atrial fibrillation (AF) are usually performed with the patient under conscious sedation, that is, awake, but sedated to minimize pain and movement during the procedure. The most commonly used agents used in achieving conscious sedation are a combination of fentanyl (an opium-like drug) and midazolam (a benzodiazepine). The conscious sedation approach unfortunately does not guarantee that the patient will keep still or that their

breathing will be regular – both important factors in ensuring catheter contact and stability. In order to overcome these shortcomings, several electrophysiologists (EPs) now use general anesthesia when performing catheter ablations for AF.

A team of EPs from St. David's Medical Center and California Pacific Medical Center now report the results of a randomized study to compare the efficacy and long-term outcome of ablation procedures performed using general anesthesia with that of similar procedures using conscious sedation. The study included 257 patients with paroxysmal AF who were randomly assigned to undergo a pulmonary vein antrum isolation procedure (PVAI or Natale protocol) with conscious sedation (group 1 – 128 patients) or general anesthesia (group 2 – 129 patients). The average age of the patients was 59 years, 75% were male, and 86% had lone AF (no coronary heart disease).

A combination of electrophysiologic mapping and intracardiac echocardiograms (ICE) was used to guide the ablation with a 3.5-mm irrigated-tip catheter. An esophageal temperature probe was also used to prevent damage to the heart wall adjacent to the esophagus. All patients underwent complete pulmonary vein isolation after which the catheter was positioned at the junction of the right atrium and the superior vena cava where mapping and ablation was performed in 86% of patients. Additional non-pulmonary vein triggers were ablated in 11% of group 1 patients and in 10% of group 2. Follow-up examinations were performed at 3, 6, 9 and 12 months after the procedure and included 7-day Holter monitoring. Recurrence was defined as any episode of AF or tachycardia lasting for at least 30 seconds after an 8-week blanking period.

At an average of 17 months after the initial procedure, 69% of group 1 were free of arrhythmia without the use of antiarrhythmic drugs as compared to 88% of group 2 patients. The only variable independently associated with freedom from recurrence was the use of general anesthesia.

Recurrence was experienced by 31% of group 1 patients and 12% of group 2 (general anesthesia) patients. All underwent a second procedure during which it was discovered that 42% of ablated pulmonary veins in group 1 had recovered conduction as compared to only 19% in group 2. Fluoroscopy and total procedure time were significantly shorter in group 2 (53 minutes and 2.4 hours respectively) than in group 1 (84 minutes and 3.6 hours). No major complications were observed in either group.

The study authors attribute the better outcome for procedures performed under general anesthesia to greater stability of the ablation catheter resulting from the fact that the patient is immobile and breathing is regular.

Di Biase, L, Natale, A, et al. General anesthesia reduces the prevalence of pulmonary vein reconnection during repeat ablation when compared with conscious sedation: Results from a randomized study. Heart Rhythm, Vol. 8, March 2011, pp. 368-72

Living with AF – Spouses and significant others suffer too!

BOSTON, MASSACHUSETTS. While lone atrial fibrillation (LAF) is not life-threatening, it certainly can, as most afibbers will readily attest to, play serious havoc with ones quality of life. Most afibbers are well aware that their spouses or partners are also affected, but up until now, the magnitude of the partner's decline in quality of life (QoL) has not been quantified. This gap in our knowledge has now been closed by a group of researchers at the Brigham and Women's Hospital.

The QoL study involved 411 afibbers (54% male) and 129 partners (33% male) who completed questionnaires during an educational symposium "Living with Atrial Fibrillation". The average age of the afibbers was 67.6 years (90% were over the age of 55 years) and that of their partners was 65 years (82% were over the age of 55 years). The majority of the afibbers (61%) had been diagnosed more than 5 years ago and, as expected, most (54%) had the paroxysmal variety of AF, while 23% had persistent, and the remaining 23% permanent.

The overall effect on QoL was deemed to be mild by 42% of afibbers and 44% of partners. Another 26% of AF patients and 25% of partners thought the effect was moderate, while the remaining 32% of

afibbers and 31% of partners thought their QoL had been severely affected. It is clear from these findings that the partners of afibbers experience a QoL deterioration similar to that of the afibbers themselves.

The decline in QoL was perceived as considerably more severe in afibbers and partners below the age of 55 years. In this age group, 41% of afibbers and 35% of partners rated the effect as severe with only 17% and 22% respectively rating it as mild. The effect on QoL clearly diminished with age with 50% of study participants 70 years or older reporting mild effect and 30% reporting severe effect. The deterioration of QoL was more pronounced in female afibbers (severe effect in 36%) than in male afibbers (severe effect in 28%).

A subgroup analysis produced data regarding the specific effect of AF in regard to daily activity, work life, sex life, physical activity, psychological well-being, and social activity. The percentage of afibbers and partners who reported a moderate or severe negative effect on their QoL is presented in the table below. NOTE: The percentage of afibbers who reported no or only mild QoL effect is 100 minus the percentage for moderate or severe effect.

Subgroup Analysis – Moderate or Severe Effect

	<u>Afibbers</u>	<u>Partners</u>
Daily activity	46%	43%
Work life	30%	20%
Sex life	38%	37%
Physical activity	51%	40%
Psychological well-being	51%	49%
Social activity	36%	31%

The reason for the relatively low effect on work life is possibly related to the fact that the average age of the participants was 68 years making it likely that many were retired and therefore had no work commitment.

The above data clearly shows that AF, although being a relatively benign chronic disease, can be very limiting for the patient and therefore also

limiting for a person who shares the life and activities of the patient. The authors of the study conclude that, “*Our findings emphasize that health care providers should not only focus on the patient with AF but should take the spouse into account as well when managing this condition.*”

Bohnen, M, Koplan, BA, et al. Quality of life with atrial fibrillation: Do the spouses suffer as much as the patients? PACE, April 28, 2011 [Epub ahead of print]

Endurance sport implicated in lone atrial flutter

LEUVEN, BELGIUM. Several large studies have found a clear association between long-term participation in endurance sports and the development of atrial fibrillation (see www.afibbers.org/conference/session64.pdf). Now researchers at the University of Leuven report that endurance sports activity is also associated with a significantly increased risk of developing lone atrial flutter. Lone atrial flutter is defined as right atrial flutter in the absence of structural heart disease where structural heart disease, in turn, is defined as coronary artery disease, left ventricular systolic or diastolic dysfunction, more than mild left ventricular hypertrophy, and/or valvular heart disease.

The Leuven study included 58 patients (90% men) with a mean age of 52 years who had undergone a right atrial flutter ablation. The extent of physical activity among the men in the group was compared to the physical activity level in a group of 104 age-matched men who had not been diagnosed with lone atrial flutter. NOTE: None of the 6 female patients having undergone flutter ablation participated in regular sports activities so a comparison was not possible in this case.

Of the 52 male flutter patients, 26 (56%) had performed regular sports activity defined as at least 3 hours of sports a week. The main sports activity was endurance sport (competitive or semi-competitive participating in cycling, running and/or

swimming for at least 3 hours a week) for 16 (62%) of the 26 flutter patients. In contrast, only 18 (17%) of the members of the control group had participated in regular sports activity and, of these, only 8 (44%) had participated in endurance sport. Thus, in the flutter group the proportion of those engaged in long-term endurance sports was significantly higher (31%) than that observed in the control population (8%).

The authors conclude that men participating in regular sports activity more than 3 hours a week have a 4.8 times higher risk of developing lone atrial flutter than do those without such regular participation. For men engaging in long-term endurance exercise, the risk of flutter development was found to increase by a factor of 5.3. The researchers observed that endurance sports participants had a significantly larger left atrium diameter (average of 41.1 mm) than did men just participating in regular sports activity or exercising less than 3 hours a week (average of 36.6 mm). They also noted that 40% of the patients who had undergone a right atrial flutter ablation later developed atrial fibrillation. The authors conclude that their findings should not be interpreted to mean that sports practice is dangerous and should be discouraged. The benefits of an active lifestyle in regard to cardiovascular and general health are well-documented and the benefits of an active lifestyle certainly outweigh the risks.

Claessen, G, Heidbuchel, H, et al. Long-term endurance sport is a risk factor for development of lone atrial flutter. *Heart*, Vol. 97, 2011, pp. 918-22

Editor's comment: Several mechanisms have been suggested to explain the association between long-term endurance exercise and the development

of lone atrial fibrillation. These include changes in autonomic tone (vagal dominance), systemic inflammation, and/or structural atrial changes such as atrium enlargement. It is likely that the mechanism underlying the association between endurance sports and atrial flutter are similar.

Atrial fibrillation is more than a nuisance!

ROCHESTER, MINNESOTA. As all afibbers well know, atrial fibrillation (AF) is far more than a nuisance. It is a frightening, debilitating disorder that has wrecked careers and relationships, and left many of its victims with a quality of life that is worse than that experienced by heart attack survivors and patients with heart failure. Yet many physicians and cardiologists dismiss AF, especially lone AF (no underlying heart disease), as merely a nuisance that "is not going to kill you". This lack of understanding may lead to delay in diagnosis, wrong diagnosis, and inappropriate care. A team of researchers from the Mayo Clinic and the University of Nebraska Medical Center has just completed a study aimed at finding out how it is to live with AF in the hope that its publication may lead to better understanding and management of the disorder.

The study included 7 women and 8 men ranging in age from 33 years to 85 years (median of 61 years) who underwent hour-long interviews. The participants had been diagnosed 8 years ago on average, 7 had paroxysmal AF, 8 had the persistent variety, and 80% had lone AF (no coronary artery disease). Following are the highlights of the interviews (italics indicate a verbatim quote from a participant):

- Although patients described their symptoms (palpitations, shortness of breath, loss of energy, etc) in detail, they were often told that there was no objective explanation for them and that they were probably under too much stress, working too hard, having a panic attack, or needed more rest. *I had these symptoms for a year and a half, and I kept going to my local physician and he'd say – "Oh, I think you're stressed out – I think you need to cut down on some things – you know, lack of sleep."*
- Some participants felt that their doctor was neither informative nor supportive

once a diagnosis was made. *They didn't tell me much of anything. They really didn't know what it was. Our regular doctor said, "They'll take you down, cardiovert you, and that will be the end of it."*

- Several patients experienced a "turning point" when they realized the seriousness of their condition and that they had to take an active hand in dealing with it. *I had never experienced such a rapid and fast heart rate. I said to myself – I really don't want to die here. I thought I was going to have a heart attack. That was the point at which I decided I need to find out exactly what this is. That's the day I realized I was not bullet proof anymore.*
- After receiving the diagnosis, patients tried to find ways to avoid further episodes and their lifestyle became increasingly limited. *Not knowing is the worst – not knowing what the trigger point is. You were always second-guessing what you were doing – what might happen – so you avoided certain things. I don't dare exercise very much or I know I'll be in a spell and then that ruins the whole day. I don't think you can manage it – it more manages you. Unfortunately, no matter how much you try to manage it, it ends up creeping into your life and forcing you to have workarounds and compromises that you wouldn't normally have. It has complete control – you cannot be in control of an out-of-control situation.*
- Study participants reported trying, often in vain, to curtail their episodes. *To break it – other things I did was cold water, ice cubes on my face, coughing real hard, deep breaths and coughing,*

but it seems in this calendar year, none of those things have worked.

- The loss of energy, persistent tiredness and shortness of breath associated with AF episodes dramatically influenced the ability to work, exercise, and participate in social functions. *I'm not worth anything – couldn't do my work – I was just tired all the time.*
- Medical treatments were often ineffective and accompanied by emotional distress. Patients reported feeling like they were on an emotional roller coaster – high hopes that a treatment would work to deep disappointment when it did not. Another source of distress was anxiety and a feeling of loss of control due to not knowing when or where an AF episode would occur, how long it would last, and what would be its aftermath. *It doesn't go away – it subsides – it's like it hides until one day – here I am again! It's just mind boggling to the point you don't know what to do. It limits you as to what kind of plans you make or what you decide to do. The unpredictable part is if you had something coming up that you knew you really had to be at or couldn't miss – some function you devoted time to – I hope I have a good day, or I hope I'm not going to have a*

bad day. When that goes on you kind of stress out – get anxiety about it. I've withdrawn from things.

- Eventually participants began to redefine their expectations and goals so as to accommodate the fact that they had a disorder that was not going to disappear on its own, although at the same time, maintaining hope that someday a cure would be found. *You know you get so used to a certain way of life you think it's normal. It becomes your new normal. It is a setback in your life, and you just have to deal with it.*

The authors conclude that the experience of living with AF is, in some ways, similar to living with heart disease or heart failure. However, some aspects of the AF “experience” are unique, notably delayed diagnosis, lack of support, lack of advice on how to manage the condition, and the distress associated with not knowing when the next episode will occur. McCabe, PJ, Barnason, SA, et al. *Living with atrial fibrillation: A qualitative study.* **Journal of Cardiovascular Nursing**, January 21, 2011 [Epub ahead of print]

Editor's comment: The findings of this study will resonate with most afibbers and, if read by physicians, will hopefully give them a better understanding of what it is like to live with AF.

C-reactive protein level predicts ablation outcome

BEIJING, CHINA. Studies of the association between inflammation and atrial fibrillation (AF) have demonstrated three basic findings.

- There is an association between AF and increased inflammatory activity as measured at the cellular and biochemical level.
- Elevated inflammatory activity is associated with the development of AF.
- Elevated inflammatory activity is associated with the recurrence of AF.

There is also evidence that elevated baseline levels of C-reactive protein (CRP), a biomarker for

inflammation, is associated with the development of AF after cardiac surgery and an increased risk of recurrence after electric cardioversion. Now researchers at the Chinese Academy of Medical Sciences report that high baseline levels of hsCRP (high sensitivity CRP) are also associated with an increased risk of AF recurrence after a pulmonary vein isolation (PVI) procedure.

Their clinical trial involved 121 lone afibbers (average age of 55 years, 80% male, 64% paroxysmal, 36% persistent) who had suffered from AF for an average of 4 years. All patients underwent extensive blood testing at baseline followed by an anatomically-guided (CARTO) PVI with additional lesions as required, and were then followed for an average of 23 months. During this

period, 24.7% of the paroxysmal and 38.6% of the persistent afibbers experienced at least one arrhythmia episode (AF, atrial flutter or atrial tachycardia lasting 30 seconds or longer) after a 3-month blanking period. The researchers made the following observations:

- Average baseline hsCRP level in paroxysmal afibbers was 0.84 mg/L (0.084 mg/dL) in the non-recurrence group vs. 2.12 mg/L in the recurrence group. This difference was highly significant ($P < 0.001$). A value above 1.08 mg/L predicted recurrence with a sensitivity of 68.4% and specificity of 56.9%.
- Average baseline hsCRP level in persistent afibbers was 0.89 mg/L in the non-recurrence group and 2.29 mg/L in the recurrence group. This difference was statistically significant ($P = 0.005$). A value above 1.89 mg/L predicted recurrence with a sensitivity of 76.5% and a specificity of 70.4%.
- Paroxysmal afibbers with elevated baseline hsCRP were 4 times more likely to experience recurrence than were those with lower levels.
- Persistent afibbers with elevated baseline hsCRP had a 16-fold increased risk of recurrence, while those with long-duration episodes had a 32% increased risk, and those with an

enlarged left atrium had a 21% increased risk of recurrence.

- There was a statistically significant correlation between high baseline hsCRP levels and increased stroke risk (CHADS₂ score), between high hsCRP levels and increased body mass, and between high hsCRP levels and erythrocyte sedimentation rate (ESR).

The Chinese researchers speculate that patients with high pre-ablation hsCRP levels may have significant systemic inflammation and extensive left atrium remodeling that adversely affect the outcome of ablation. They also believe that inflammation augments oxidative stress and may promote fibrosis. They further suggest that prospective ablatees with high baseline hsCRP levels may benefit from modifications in ablation technique or from pharmacologic intervention aimed at modulating the increased inflammatory activity.

Liu, J, Zhang, S, et al. High-sensitivity C-reactive protein as a predictor of atrial fibrillation recurrence after primary circumferential pulmonary vein isolation. PACE, Vol. 34, April 2011, pp. 398-406

Editor's comment: Afibbers awaiting ablation should have an hsCRP test and if their level is elevated should consider supplementing with a natural anti-inflammatory such as *Zyflamend*, beta-sitosterol, fish oil, bromelain, curcumin, boswellia, quercetin or *Moducare*.

Long-term ablation data from the Cleveland Clinic

CLEVELAND, OHIO. The Cleveland Clinic has finally released data concerning long-term success of pulmonary vein antrum isolation (PVAI) procedures with the aim of curing atrial fibrillation (AF). The study included 831 patients who underwent a PVAI in 2005. The average age of the patients was 59 years, 78% were male, and 86% had no underlying heart disease (lone AF). The majority (69%) had paroxysmal afib, 20% had the persistent variety, and the remaining 11% had permanent (long-standing persistent AF). All patients underwent PVAI, and 79% also had ablation at the superior vena cava. The study participants were followed for an average of 55 months, with the most recent update in October

2009. Follow-up examinations (including 24-hour Holter monitoring) were done 3, 6 and 12 months post-ablation, and yearly thereafter.

Arrhythmia recurrence was recorded when patients reported symptoms of arrhythmia and/or when an atrial tachyarrhythmia (AF, atrial flutter or atrial tachycardia), lasting 30 seconds or longer, was captured on a 12-lead electrocardiogram, event recorder, or Holter monitor recording. Atrial arrhythmias occurring during the two months following the procedure (blanking period) were not counted as recurrences since they do not necessarily imply failure of the procedure. NOTE: 39% of patients had documented arrhythmia during

the blanking period, and 80% during the first month following the ablation. However, 40% of ablatees having arrhythmia during the blanking period were free of arrhythmia at the 12-month check-up.

Twelve months post-ablation, 76.2% of study participants were arrhythmia-free without the use of antiarrhythmic drugs (AADs), while 23.8% had experienced one or more arrhythmia episodes, mostly (83%) atrial fibrillation. At the five-year follow-up, 63% of patients having undergone a single procedure were arrhythmia-free without the use of AADs. It is of interest to note that 87% of ablatees who were arrhythmia-free at 12 months were also arrhythmia-free at 44 months. This indicates a highly favourable long-term prognosis for afibbers who are arrhythmia-free at 12 months.

Of the 198 patients experiencing arrhythmia during the first 12 months (early recurrence), 161 (81.3%) underwent repeat ablations which, after an average 14 months of follow-up, were completely successful (no arrhythmia, no AADs) in 78.9% of cases, and partially successful (no arrhythmia, but still taking AADs) in 13.7% of cases. Of the 74 patients experiencing late recurrence (arrhythmia episodes after the 12-month follow-up), 27 underwent a repeat ablation which was completely successful in 74.1% of cases, and partially successful in 25.9% of cases after 17 months of follow-up. At last follow-up (median 55 months from initial ablation), 660 of 785 patients (46 patients were lost to long-term follow-up) were free of arrhythmia without the use of AADs (84%) after a total of 1019 ablations (1.2 per patient). Another 11% was arrhythmia-free with the use of AADs, leaving only 5% failures that were managed with beta- or calcium channel blockers.

The incidence of procedure-related complications was low at 2.4%. and no procedure-related deaths were observed during follow-up. Antiarrhythmic therapy was continued for two months post-ablation, and warfarin was administered for at least one year post-procedure. Among the 587 patients with no arrhythmia recurrence at the 12-month check-up, warfarin was stopped in the 449 patients (76%) with a CHADS₂ score of 2 or less, but continued in all patients with a CHADS₂ score of 3 or higher. Over a median follow-up of 44 months, only one patient (0.6%) suffered an ischemic stroke, and this had minimal residual deficit. A multivariable Cox proportional hazards analysis showed that early recurrence was associated with older age, higher body mass index, persistent or permanent afib, reduced left ventricular ejection fraction, enlarged left atrium, and high levels of C-

reactive protein and BNP (brain natriuretic peptide). Late recurrence, in contrast, was only associated with an enlarged left atrium, and persistent or permanent afib at baseline. The authors conclude that pulmonary vein isolation is safe and efficacious for long-term maintenance of sinus rhythm in patients with drug-resistant atrial fibrillation.

Hussein, AA, Wazni, O, et al. *Natural history and long term outcomes of ablated atrial fibrillation*. **Circulation: Arrhythmia and Electrophysiology**, April 14, 2011 [Epub ahead of print]

Editor's Comment: The Cleveland data are a most welcome addition to the information available in regard to the likelihood that an initially successful pulmonary vein isolation (PVI) procedure will still keep an afibber arrhythmia-free for at least five years post-procedure. It is most encouraging to note that 87% of ablatees who were arrhythmia-free at 12 months were also arrhythmia-free at 44 months. This indicates a highly favourable long-term prognosis for afibbers who are arrhythmia-free at 12 months.

We now have five studies providing data on the long-term success of catheter ablation (PVI) in the treatment of atrial fibrillation.

The **San Diego** study involved 71 paroxysmal afibbers that underwent an initial PVI procedure at the University of California (San Diego) Medical Center between January 1, 2002 and August 31, 2003 and were followed for a minimum of 5 years. Results were reported in *American Journal of Cardiology*, Vol. 104, 2009, pp. 366-72

The **afibbers.org** 2009 ablation/maze survey involved 88 afibbers (78% paroxysmal) that underwent an initial PVI procedure at various hospitals and clinics between 1997 and 2005 and were followed for up to 10 years. Results were reported in the December 2009/January 2010 issue of *The AFIB Report*.

The **Hamburg** study involved 161 afibbers that underwent an initial PVI procedure at the Asklepios Klinik St. Georg in Hamburg, Germany in 2003 and 2004 and were followed for a median of 4.6 years. Results were reported in *Circulation*, Vol. 122, 2010, pp. 2368-77

The **Bordeaux** study involved 100 afibbers (64% paroxysmal) that underwent an initial PVI procedure at Hopital Cardiologique du Haut Leveque in Bordeaux, France between January 2001 and April 2002 and were followed for a minimum of 5 years.

Results were reported in the *Journal of the American College of Cardiology*, Vol. 57, No. 2, January 11, 2011, pp. 160-66

at the Cleveland Clinic during 2005 and were followed for 55 months. Results were reported in *Circulation: Arrhythmia and Electrophysiology*, April 14, 2011 [Epub ahead of print]

The **Cleveland** study involved 831 afibbers (69% paroxysmal) that underwent an initial PVI procedure

STUDY DETAILS

	<u>San Diego</u>	<u>afibbers.org</u>	<u>Hamburg</u>	<u>Bordeaux</u>	<u>Cleveland</u>
Participants	71	88	161	100	831
Average age, years	60	62	60	56	59
% lone afibbers	90	92	80	64	86
% male	79	83	75	86	78
% paroxysmal	100	78	?	64	69
% persistent	0	3	?	22	20
% permanent	0	19	?	14	11
Follow-up, months*	63	66	58	60	55
Follow-up months**	8	48	49	60	15
Blanking period, months	3	6	?	0	2

* From initial procedure

** From final procedure

The Cleveland data clearly shows the importance of a “blinking” period. Any arrhythmia occurring during this period is ignored in calculating the success for year 1 and subsequent years. In the case of the Cleveland patients, 39% had a documented arrhythmia occurrence during the 2-month blanking period and 80% had one during the first month following the procedure. However, 40% of ablatees experiencing arrhythmia during the blanking period were free of arrhythmia at the 12-month check-up. In the case of the afibbers.org survey, 45% of survey participants had arrhythmia recurrence during the 6-month blanking period following the initial procedure; however, 58% of patients reporting blanking period arrhythmias were arrhythmia-free at the 12-month check-up.

The observance of a blanking period, obviously and rightly so, significantly improves results for both the first and subsequent years. For some unexplained reason the Bordeaux group did not include a blanking period but rather used antiarrhythmics and bisoprolol freely in the event of early arrhythmia occurrences. This may, in large part, explain their rather poor results (40% success at end of first

year, 37% at end of 2nd year, and 29% at end of 5th year). The Bordeaux study reveals that the recurrence rate (AF, atrial flutter, and atrial tachycardia) during the first 6 months was 56% and that most recurrences took place in the first month. This means that 56 patients were treated as failures even before the first year success rate was calculated. Had the first 6 months been considered a blanking period rather than an exclusion period, it is likely that 50% of the patients that were excluded from calculating the single procedure success rates would have been afib-free at the first year check-up.

In other words, instead of just 40 ablatees being arrhythmia-free at year 1, it is likely that 40 + (56/2) = 68 would have achieved this status giving a first year success rate of 68%. Following the same logic, the success rate at year 2 would be 65% and that at 5 years 57%. In considering the Bordeaux results it should also be kept in mind that this group treated the highest percentage of persistent, permanent and non-lone afibbers and also found that the recurrence rate for permanent afibbers was twice that observed for paroxysmal and persistent afibbers.

Initial procedure results

	<u>San Diego</u>	<u>afibbers.org</u>	<u>Hamburg</u>	<u>Bordeaux</u>	<u>Cleveland</u>
Complete Success, %(1)					
At 1-year follow-up	86	75	62	68 (40)	76
At 2-year follow-up	79	75	54	65 (37)	72
At 5-year follow-up	56	70	47	57 (29)	63

Results after multiple procedures

Procedures per patient	1.9	1.4	1.5	2.0	1.2
Complete Success, %(1)					
At 2-year follow-up	-	72	88	81	86
At 5-year follow-up	84	70	80	63	84

(1) Free of any atrial arrhythmia without the use of antiarrhythmics

In interpreting the Bordeaux results for multiple procedures please note that I was unable to adjust the two and five year results for multiple procedures to reflect the lack of a blanking period. Had I been able to do so the reported success rates would have been higher. Please also note that patients undergoing repeat procedures at the Cleveland Clinic were followed for a maximum of only 17 months rather than 55 months (the follow-up period for the initial procedures). This would tend to exaggerate the success rates for multiple procedures at the 5-year mark. It should also be noted that 44% of participants in the San Diego study underwent repeat procedures with a follow-up period of only 8 months. Finally, the afibbers involved in the 2009 ablation/maze survey (afibbers.org) were followed up for at least 4 years both after their initial and final procedures.

It is clear that the results of the 5 studies are not directly comparable due to the use of different blanking periods and follow-up durations. However, it is probably reasonable to use the results to conclude that the average complete success rates for an initial PVI procedure performed by a highly skilled EP operating at a high-volume center would be about 70% at year 1 and about 55% at year 5.

After multiple procedures the likely 2-year success rate would be around 80% and the 5-year rate about 75%, indicating quite a slow recurrence progression. Our 2009 Ablation/Maze Survey involved 88 AF patients who had undergone their last catheter ablation more than four years ago (53

had only one procedure). The long-term success rate (no atrial arrhythmia and no use of antiarrhythmic drugs) was found to be highly dependent on whether or not the patients had experienced atrial arrhythmias during the last six months of the 12-month period following their last procedure (Index Period). Those who had not experienced arrhythmias during their index period had success rates of 84% at year two, and 86% at year five. In contrast, those patients who did experience arrhythmias during the index period had success rates of only 33% at years two and five. Thus, absence of atrial arrhythmias during the index period is clearly a very important predictor of long-term success. Being a persistent or permanent afibber prior to the procedure was found to be associated with a 5% lower success rate at five years.

In judging the long-term success of catheter ablation for AF, it should also be kept in mind that the failure criteria of one episode lasting 30 seconds or more, is very strict and not really that relevant to an individual AF patient. In our survey we found that at the end of year four, 27% of respondents were still experiencing AF episodes. However, their frequency was down by 95% from pre-procedure levels and the total time spent in AF was down from 7% to 0.2% for paroxysmal afibbers. The reduction in AF burden from pre-procedure days to year four was 97%, and this decline was pretty well universal with only 1 in 16 respondents reporting an increase in burden.

Fish oil prevents atrial stunning

MELBOURNE, AUSTRALIA. Cardioversion and radiofrequency catheter ablation are often followed by a phenomenon known as atrial stunning. This condition involves a transient mechanical dysfunction of the left atrium and left atrial appendage (LAA) and is associated with an increased risk of post-procedure ischemic stroke, failure of improvement in cardiac output, decreased exercise tolerance, and an increased risk of arrhythmia recurrence. The degree of stunning can be measured with transesophageal echocardiography (TEE) and involves comparison of LAA emptying velocity (LAAEV), LAA emptying fraction (LAAEF), and the extent of the development of new or increased spontaneous echocardiographic contrast (SEC) after the procedure. SEC is defined as the appearance of swirling clouds of echodensity on the TEE.

A group of researchers at the University of Melbourne now report that supplementation with

fish oil for at least 30 days prior to cardioversion or catheter ablation markedly reduces the extent of post-procedure atrial stunning. Their trial involved 49 patients scheduled for cardioversion of persistent atrial fibrillation (34 patients) or ablation of atrial flutter (15 patients). Only 18% had underlying heart disease, so 82% had lone AF or flutter. The patients were divided into a control group (26 patients) and a fish oil group in which 23 patients received 6 grams/day of natural fish oil [providing 1080 mg/day of eicosapentaenoic acid (EPA) and 720 mg/day of docosahexaenoic acid (DHA)] for a minimum of 30 days prior to their procedure. Due to scheduling problems fish oil supplementation was actually done for an average (mean) of 70 days. The researchers observed the following differences in LAAEV, LAAEF, SEC, and degree of atrial mechanical stunning when comparing results obtained immediately before the procedure with those obtained immediately after.

	<u>Atrial Fibrillation Patients</u>			
	<u>Fish Oil Group</u>		<u>Control Group</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
LAAEV	29 cm/sec	26 cm/sec	31 cm/sec	19 cm/sec
LAAEF	30%	32%	33%	20%
SEC *	-	11%	-	62.5%
Stunning	-	33.3%	-	68.8%

	<u>Atrial Flutter Patients</u>			
	<u>Fish Oil Group</u>		<u>Control Group</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
LAAEV	56 cm/sec	47 cm/sec	56 cm/sec	24 cm/sec
LAAEF	50%	46%	50%	19%
SEC *	-	40%	-	60%
Stunning	-	20%	-	100%

* New or increased presence of SEC

The researchers conclude that fish oil supplementation for a minimum of 30 days prior to procedures aimed at restoring sinus rhythm is highly effective in preventing post-procedure atrial mechanical stunning (82% reduction in risk). They speculate that reversion to sinus rhythm leads to an acute calcium deficiency implicated in a loss of contractile function. Fish oil is known to modulate L-type calcium channels to reduce fluctuations of concentration in heart cells.

Kumar, S, Sparks, PB, et al. Effects of chronic omega-3 polyunsaturated fatty acid supplementation on human

atrial mechanical function after reversion of atrial arrhythmias to sinus rhythm. Heart Rhythm, Vol. 8, May 2011, pp. 643-49

Editor's comment: The finding that fish oil supplementation can reduce atrial stunning after cardioversion and catheter ablation is obviously of significant importance. Fish oil is also an effective anti-inflammatory, so supplementing before and after cardioversion or ablation would no doubt be a good idea.

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