THE AFIB REPORT

Your Premier Information Resource for Lone Atrial Fibrillation!

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Returning to our main mission, in this issue we report on recent developments in medical research that are of interest to afibbers. Reports of late afib recurrence (one or two years after a seemingly successful ablation) have appeared on the Bulletin Board. This is obviously hugely disappointing to those affected, but it now turns out that late recurrence is not uncommon. Researchers at the University of Pennsylvania have found that about 11% of afibbers whose PVIs were deemed successful experienced recurrence more than 12 months post-procedure. Cox-Maze patients are not immune to recurrence either. A study reported by the Barnes-Jewish Hospital in St. Louis (Dr. Damiano's group) concluded that about 8% of seemingly successfully treated patients could expect afib recurrence more than a year after their procedure.

Also in this issue we report that aspirin is not effective for primary stroke prevention, combining aspirin with warfarin is not a good idea, outcome of the Pappone PVI procedure can be improved by checking lesion continuity with two Lasso catheters, and research is apace in finding safer and more effective antiarrhythmics with dronedarone (an amiodarone analogue) looking particularly promising.

Finally, a word of caution to those readers relying on MEDLINE abstracts to keep abreast. While MEDLINE abstracts are extremely helpful in preliminary research, they do not always tell the whole story and sometimes tend to gloss over less favourable findings. For example, a recent abstract of a paper discussing the success rate of the Cox-Maze IV procedure stated that 90% of patients having undergone the procedure were free of afib at the 12-month check-up. What the abstract failed to mention was that one-third of these patients only attained this enviable state by the continued use of antiarrhythmics. So in terms used to evaluate PVI results, the complete success rate (no afib, no antiarrhythmics) of the Cox-Maze IV procedure was only 67%.

In a similar vein, the MEDLINE abstract describing the phase II trial of rivaroxaban, a possible warfarin replacement, failed to mention that 4% of the patients taking the drug experienced an increase in aminotransferase levels indicating possible liver toxicity. In other words, rivaroxaban may have the same problems as the once promising, but now sidelined, ximelagatran.

Last, but not least, 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 very much appreciated.

Wishing you good health and lots of NSR,

Hans

Highlights

AF in athletes

KANSAS CITY, MISSOURI. Sustained, vigorous exercise is associated with a permanent increase in vagal tone and a lower than normal resting heart rate. The first indication that athletes might be more prone to developing atrial fibrillation came in 1998 when Finnish researchers reported that middle-aged orienteers (distance runners) experienced 5 times the prevalence of lone afib than did age-matched controls. The excess prevalence of lone afib was particularly high in the 46-54 year age group where the prevalence among orienteers was 4.2% as compared to 0.5% in controls. On the plus side, the researchers also noted that the orienteers had a lower incident of coronary artery disease and much lower mortality than did controls.

An Italian study, also reported in 1998, involved 1772 athletes with an average (mean) age of 21 years. Over a 5-year follow-up period, 6% of these athletes experienced one or more episodes of atrial fibrillation. A more recent Spanish study reported that the proportion of athletes in a group of lone afibbers was much higher than the proportion in the general population (63% vs. 15%). The Spanish researchers conclude that long-term, vigorous exercise may predispose to AF. They also make the interesting observation that the athletes tended to have their episodes during sleep or after meals when vagal tone is elevated.

In contrast, a recent study by the Italian National Olympic Committee found no significant difference in afib prevalence between athletes and the general population, but did notice that athletes tended to have enlarged left atria. The authors of this article (all MDs with AF engaged in long-distance running) conclude that lone atrial fibrillation is a common arrhythmia in conditioned athletes and may be more common than in the general population, especially among males. They point out that the use of beta-blockers, antiarrhythmics, and warfarin in athletes is problematical and suggest that early radiofrequency ablation may be the best option for athletes with lone atrial fibrillation.

Farrar, MW, et al. Atrial fibrillation in athletes. **Missouri Medicine**, *Vol. 103, May/June 2006, pp. 297-301*

Aspirin in primary stroke prevention

BIRMINGHAM, ALABAMA. Although there is substantial evidence that aspirin is beneficial in protecting against a second heart attack (secondary prevention), it is still controversial whether the daily aspirin "ritual" helps protect against a first stroke or heart attack (primary prevention). Researchers from the University of Alabama now present the results of a meta-analysis of 6 large trials aimed at evaluating the benefits of aspirin in primary prevention of cardiovascular events (heart attack and stroke) and coronary heart disease.

The trials involved a total of 47,293 aspirin users and 45,580 controls not on aspirin who had no prior indication of cardiovascular disease. The dosage of aspirin involved in the trials varied from 75 mg/day to 500 mg/day. The researchers conclude that regular aspirin use reduces the relative risk of experiencing a first non-fatal heart attack by 24%, that of developing coronary heart disease by 23%, and reduces the risk of any cardiovascular event by 15% (relative). No risk reduction was observed for stroke, cardiovascular mortality or all-cause mortality. The authors conclude that their analysis supports the current recommendation for the use of aspirin for primary prevention in patients with a high risk of cardiovascular disease (10-year risk of 6% or higher). Unfortunately, they completely ignore the downside of aspirin usage – a substantially increased risk of hemorrhagic stroke and major gastrointestinal bleeding. NOTE: This study was funded by Bayer, the major manufacturer of aspirin.

Bartolucci, AA and Howard, G. Meta-analysis of data from the 6 primary prevention trials of cardiovascular events using aspirin. **American Journal of Cardiology**, *Vol. 98, September 15, 2006, pp. 746-50*

Editor's comment: It is noteworthy that long-term aspirin usage had no effect on the risk of stroke in patients without prior cardiovascular disease. On the other hand, a meta-analysis of 5 of the 6 trials discussed above clearly showed that long-term aspirin usage increases the relative risk of hemorrhagic stroke (stroke caused by a burst blood vessel) by about 40% and the risk of major gastrointestinal bleeding by 70%. Thus, it would seem prudent to keep in mind the conclusion of the U.S. Preventive Services Task Force, "Patients at low risk for coronary heart disease probably do not benefit from and may even be harmed by aspirin because the risk for adverse events may exceed the benefits of chemoprevention."[1]

[1] Hayden, M, et al. Aspirin for the primary prevention of cardiovascular events. Annals of Internal Medicine, Vol. 136, January 15, 2002, pp. 161-72

Late recurrence of afib after PVI

PHILADELPHIA, PENNSYLVANIA. About 50% of all afibbers undergoing a pulmonary vein ablation experience recurrence of their afib at some point (less frequent if procedure performed by skilled EP, more frequent if not). Depending on the timing, the recurrence is classified as acute (AF returning within the first 4-6 weeks), late (between 1 to 12 months), and very late (greater than 12 months post-ablation). Some researchers use the term "early" to describe recurrence within the first 6 months after the procedure. Risk factors for early recurrence have been fairly well determined and include older age, hypertension, a large left atrium size, presence of foci outside the pulmonary veins, and number of years the patient has suffered from AF.

Now researchers at the University of Pennsylvania (the Callans/Marchlinski group) report that very late recurrence occurs in about 8% of patients thought to have undergone a successful PVI. Their study involved 342 patients who underwent a PVI using both electrophysiologic, electroanatomic and intracardiac ultrasound mapping. It is of interest to note that a pre-procedure transesophageal echocardiogram (TEE) was only performed in patients with persistent afib and in paroxysmal afibbers who arrived for the procedure in afib and had not been adequately anticoagulated for 4 weeks prior to the hospital admission.

The average age of the patients was 55 years, 79% were men, and 65% had the paroxysmal (intermittent) variety of AF. During the procedure 88% of patients had their right superior vein isolated, 90% the left superior vein, right inferior vein 57%, and left inferior vein 77%. All patients returned to the hospital for follow-up 6 weeks, 3 months and 6 months after the procedure, and then every 6 months.

Four weeks post-procedure 72% of the study participants were afib-free. However, subsequent to the 12-month check-up 27 patients experienced a recurrence of AF. This is 7.9% of the original cohort of 342 patients and 11% of the 246 patients whose procedure had been believed to be successful. The researchers found that the main risk factors for very late recurrence was a weight over 200 pounds, fewer veins completely isolated during the procedure (2.8 vs. 3.3), failure to isolate the right inferior vein (37% vs. 61%), failure to isolate all veins (30% vs. 56%), and more likely to have triggers outside the pulmonary veins (30% vs. 11%). There was also a statistically non-significant trend for patients on digoxin to have a late recurrence (p=0.10).

Mainigi, SK, et al. Incidence and predictors of very late recurrence of atrial fibrillation after ablation. **Journal of Cardiovascular Electrophysiology**, *Vol. 18, January 2007, pp. 69-74*

Editor's comment: It is a sobering realization that about 10% of afibbers who thought that they were "home free" after having had a year or more of post-procedural normal sinus rhythm may actually experience late afib recurrence. However, for non-obese afibbers it would seem that very late recurrence is closely tied in with shortcomings in their initial procedure.

Possible new warfarin replacement

GOTHENBURG, SWEDEN. Hip and knee replacement surgery is associated with a significant incidence of deep vein thrombosis, pulmonary embolism, and stroke. Effective post-operative anticoagulation is therefore essential. Because of its slow onset of action, need for frequent monitoring, numerous drug interactions, and undesirable side effects warfarin is far from being an ideal candidate for use in hip and knee replacement procedures. Thus, it is common practice to use low-molecular-weight heparins like enoxaparin (Lovenox) for prevention of thromboembolism. The drug is usually injected (0.4 ml providing 40 mg) prior to surgery, 6-8 hours after, and then once a day in the evening for 5 to 9 days after the procedure.

A team of British, Danish, Dutch, and German researchers now reports that rivaroxaban (BAY 59-7939) may be a suitable oral anticoagulant equally

as effective as enoxaparin and with similar or fewer side effects. rivaroxaban inhibits coagulation Factor X, has a rapid onset of action, can be given in one daily dose, and does not require titration and frequent monitoring.

The phase II randomized, double-blind clinical trial involved 852 patients who were assigned to receive various doses of rivaroxaban (5, 10, 20, 30 or 40 mg) or 40 mg of enoxaparin 6-8 hours after completion of surgery and then once a day in the evening for the next 5-9 days. An enoxaparin injection was also given on the evening before surgery for the patients in the enoxaparin group.

Thromboembolic complications occurred in 25.2% of patients receiving enoxaparin and in 6.4% to 14.9% of those receiving rivaroxaban. Major postoperative bleeding (the major adverse effect of both drugs) was observed in 1.9% of patients receiving enoxaparin and in 0.7% to 5.1% of those receiving rivaroxaban. Detailed results are presented below:

Drug	Dosage, mg	Thromboembolic Events, %	Major Bleeding Events, %
Enoxaparin	40	25.2	1.9
Rivaroxaban	5	14.9	2.3
Rivaroxaban	10	10.6	0.7
Rivaroxaban	20	8.5	4.3
Rivaroxaban	30	13.5	4.9
Rivaroxaban	40	6.4	5.1

The researchers conclude that 10 mg/day of rivaroxaban may be the optimum dose when considering both efficacy and safety. A large phase III trial is being planned. About 4% of patients in the rivaroxaban group experienced an increase in aminotransferase levels indicating possible liver toxicity. NOTE: This study was funded by Bayer, the developer of rivaroxaban.

Eriksson, BI, et al. A once-daily, oral, direct Factor Xa inhibitor, rivaroxaban (BAY 59-7939), for thromboprophylaxis after total hip replacement. **Circulation**, *Vol. 114, November 28, 2006, pp. 2374-81*

Mahaffey, KW and Becker, RC. The scientific community's quest to identify optimal targets for anticoagulant pharmacotherapy. **Circulation**, *Vol. 114, November 28, 2006, pp. 2313-16*

Editor's comment: It is encouraging to see continued research on finding a worthy successor to warfarin, but the results for rivaroxaban are not very impressive and I doubt that it will prove suitable for long-term use unless the liver toxicity problems are eliminated. Thus, it is not likely to be the "white knight" many afibbers are eagerly awaiting. Another agent, dabigatran, has also shown promising results and is now undergoing phase III trials. Dabigatran belongs to the same class of anticoagulants as ximelagatran, so potential liver toxicity will no doubt be monitored closely.

New antiarrhythmic drugs for AF

INDIANAPOLIS, INDIANA. It is becoming increasingly clear that atrial fibrillation is now epidemic and that there simply are not enough skilled EPs/cardiac surgeons available to cure a significant number of patients with an ablation or maze procedure. Thus, the search for new, effective antiarrhythmics is gaining renewed impetus. Currently available antiarrhythmics are, with the possible exception of amiodarone, frequently ineffective and all can result in serious adverse effects.

The use of class I antiarrhythmics, especially if underlying heart disease is present, is highly problematical and little, if any, research is being done to develop new versions of these drugs (disopyramide, flecainide, propafenone) which work by blocking sodium channels. Instead attention is being focused on developing new class III antiarrhythmics that block potassium channels.

Dronedarone has a molecular structure very similar to that of amiodarone, but lacks the iodine component which is believed to be responsible for

amiodarone's adverse effects on the liver, lungs, and thyroid gland. Preliminary clinical trials have shown that dronedarone may reduce the risk of afib recurrence by about 25% and does not exhibit liver/lung/thyroid toxicity.

The problem with most antiarrhythmics is that they not only affect the myocytes (heart cells) in the atria, but also those in the ventricles. Unfortunately, what is good for the atria may not be good for the ventricles. Some very recent research has shown that the ultra-rapid delayed outward potassium current I_{kur} plays a much more prominent role in regulating the myocyte potential in the atria than in the ventricles. Thus, research to specifically block I_{kur} looks promising with such experimental drugs as RSD-1235, AVE-0118 and AZD7009 undergoing preliminary trials.

Agents that affect the fluidity of cell membranes are also being scrutinized with the most promising candidate so far being fish oil. A recent study involving patients undergoing coronary artery bypass surgery found that patients who took 2 grams/day of EPA + DHA (the main components of fish oil) reduced their risk of post-operative afib by 50%.

There is now also increasing evidence that the renin-angiotensin aldosterone system (RAS) is important in the initiation and possibly maintenance of afib. For example, it now appears that atrial stretch upregulates angiotensin II. Thus, several existing angiotensin-converting enzyme (ACE) inhibitors (enalapril), angiotensin receptor blockers (valsartan), and aldosterone receptor blockers (eplerenone) have all shown some promise in preventing afib.

Finally, statin drugs (atorvastatin) have also been found useful in preventing post-operative AF. The authors of the report conclude that new antiarrhythmic agents hold great promise, but further studies are needed to define their role in the treatment of patients with AF.

Padanilam, BJ and Prystowsky, EN. New antiarrhythmic agents for the prevention and treatment of atrial fibrillation. **Journal of Cardiovascular Electrophysiology**, *Vol. 17, Suppl. December 2006, pp. S62-S66*

Editor's comment: It is interesting that the idea of cell membrane integrity (fluidity) being a crucial factor in afib was first advanced by Erling Waller (the inventor of Waller Water), an early contributor to *The AFIB Report* and bulletin board. Erling has described how he permanently cured his afib through diet changes and supplementation with fish oil and other natural supplements in the November 2002 issue. His story can also be found on pages 177-180 of *Lone Atrial Fibrillation: Towards A Cure* (volume I). Of equal interest is the fact that the role of the RAS in AF was first discussed in the conference room (session 2) in January 2003 and has subsequently been the topic of several follow-up sessions.

Success rate for Cox-Maze IV

ST. LOUIS, MISSOURI. The Cox-Maze procedure is considered to be the gold standard for the surgical treatment of atrial fibrillation. The original procedure used a cut-and-sew technique for creating lesions forming a "maze" that conducts the electrical impulse from the sino-atrial (SA) node to the atrio-ventricular (AV) node, while at the same time interrupting any "rogue" circuits. The cut-and-sew process, however, is difficult and time-consuming to perform so it is not surprising that surgeons have been looking for other means of creating the lesions.

Cardiac surgeons at Washington University School of Medicine, Barnes-Jewish Hospital (Dr. Ralph Damiano belongs to this group) now report the development of the Cox-Maze IV procedure. This procedure uses a bipolar radiofrequency ablation clamp (Atricure) to create most of the lesions. A review of the outcome of 130 Cox-Maze procedures was recently published in the *Annals of Surgery*. One hundred of the patients underwent the full maze procedure, 7 a limited Cox-Maze, and 23 had only their pulmonary veins isolated. All the patients had underlying heart disease and none had lone atrial fibrillation. The maze procedure was carried out in connection with coronary artery bypass grafting, valve replacement, patent foramen ovale closure, or other less common heart problems. Five patients died during the operation, 4 in the full Cox-Maze IV procedure, and 1 in the pulmonary vein isolation group. Post-operative pacemaker implantation was necessary in 10% of the full maze patients (none in the pulmonary vein isolation group), and post-operative tachyarrhythmias occurred in 60% of the full maze group and 70% in

the PVI group. The average length of the hospital stay was 11 days.

At the 12-month checkup freedom from afib was observed in 91% of patients having undergone the full maze. However, one-third of the patients needed an antiarrhythmic to remain afib-free. Thus, the complete success rate (no afib, no antiarrhythmics) was actually only 67%. For the 23 patients undergoing pulmonary vein isolation only, the percentage that was afib-free at 12 months was 69% and 25% remained on antiarrhythmics. The percentage of PVI patients who were free of afib at the 12-month checkup was substantially higher for paroxysmal afibbers (75%) than for permanent/persistent ones (60%).

The authors of the study conclude with a statement of particular interest to lone afibbers, "It is a weakness of this study that we did not examine pulmonary vein isolation in patients who had lone AF. Further data are needed to evaluate the efficacy of this procedure in this group. However, our historical results with the cut-and-sew procedure (Cox-Maze III) had higher success rates in patients who had AF associated with concomitant cardiac pathology as opposed to those who had lone AF."

In a subsequent round-table discussion of the report Dr. Damiano also made the following statement, "What they are doing in the Electrophysiology Laboratory is ablating most of the back of the left atrium, which our data would suggest would be successful in a significant number of these patients who do not have organic heart disease and a small left atrium. So I do believe there are certain centers around the world that can get excellent success rates with catheter-based ablation. I personally feel that surgical pulmonary vein isolation would be less effective than catheter ablation because it doesn't ablate as much atrial tissue."

Melby, SJ, et al. A new era in the surgical treatment of atrial fibrillation: The impact of ablation technology and lesion set on procedural efficacy. **Annals of Surgery**, *Vol. 244, No. 4, October 2006, pp. 583-92*

Editor's comment: According to the data presented in this report the complete success rate (no afib, no antiarrhythmics) of the full Cox-Maze IV procedure is 67% with a complete + partial success rate (no afib, but continued need for antiarrhythmics) of 91%. It is, of course, important to note that all patients had underlying heart problems, which probably help explain the high mortality and need for permanent pacemaker implantation accompanying the procedure. Nevertheless, the statement by the authors that the Cox III procedure had a lower success rate in lone afibbers than in afibbers with concomitant heart disease would support my own opinion that the Cox-Maze may not be the optimum procedure for lone afibbers, especially not for vagal afibbers with relatively short paroxysmal episodes. I also feel that it is important to take note of the fact that the authors of this report define success as freedom from afib with or without the use of antiarrhythmic drugs. If one defines complete success as absence of afib without the use of antiarrhythmics, then the 67% success rate of the Cox-Maze IV procedure is not superior to the average complete success rate (after repeats as necessary) of 72% for PVIs performed at the 10 top-rated institutions in the LAFS-9 survey.

Warfarin + aspirin – Not a good idea!

COLUMBIA, MISSOURI. Patients at high risk for cardiovascular events are sometimes prescribed a combination of warfarin and aspirin in an attempt to provide added protection. Now a team of researchers from Canada, Finland, France, and the United States reports that the combination does not confer added stroke protection among patients with atrial fibrillation, but does increase the incidence of major and minor bleeding events.

The study involved 7300 patients who participated in the SPORTIF III and V trials comparing the efficacy and safety of warfarin and ximelagatran for stroke prevention in AF patients. (NOTE: The trial participants were not lone afibbers, but afibbers with a high risk of ischemic stroke). The trial protocol discouraged the concomitant use of aspirin, but doses up to 100 mg/day were allowed at the discretion of participating physicians. Those prescribed aspirin were significantly more likely to have diabetes, coronary artery disease, and left ventricular dysfunction.

Trial participants were followed for an average of 16.5 months during which time INR was closely controlled between 2.0 and 3.0 and all strokes (ischemic or hemorrhagic), transient ischemic attacks (TIAs), and major and minor bleeding

events were recorded. Bleeding events were defined as major if fatal, involving a critical anatomical site, or requiring transfusion of 2 units of blood or more.

The researchers found no significant difference in the incidence of stroke between patients taking warfarin and those taking warfarin + aspirin nor was there any difference between patients taking ximelagatran and those taking ximelagatran + aspirin. Overall, annual ischemic stroke rates ranged from 1.2% to 1.7%. The incidence of major bleeding events was, however, significantly higher for patients taking warfarin + aspirin (3.9%/year) than for those taking warfarin alone (2.3%/year). The rate of minor bleeds was also significantly higher when aspirin was added with a rate from warfarin alone of 37% vs. 63% with warfarin + aspirin. The most common site for major bleeds was the gastrointestinal tract.

The researchers conclude that the results suggest that the risks associated with addition of aspirin to anticoagulation in patients with atrial fibrillation outweigh the benefits.

Flaker, GC, et al. Risks and benefits of combining aspirin with anticoagulation therapy in patients with atrial fibrillation: An exploratory analysis of stroke prevention using an oral thrombin inhibitor in atrial fibrillation (SPORTIF) trials. **American Heart Journal**, *Vol. 152, November 2006, pp. 967-73*

Post-maze arrhythmias

CLEVELAND, OHIO. Although the Cox-Maze procedure is considered to be highly successful in curing atrial fibrillation, there are cases where arrhythmias develop or recur after the procedure. Electrophysiologists at the Cleveland Clinic now report a study of 23 patients who were admitted after experiencing supraventricular (atrial) arrhythmias subsequent to having undergone the cut-and-sew Cox-Maze procedure. Eight patients (35%) underwent the procedure in order to cure lone AF, while the remaining 15 had the procedure in conjunction with bypass surgery or mitral valve surgery. Eight of the 23 patients (35%) presented at the Cleveland Clinic with atrial fibrillation caused by conduction recovery around the lesion lines encircling the pulmonary veins, 5 had focal atrial tachycardia, 4 had right atrial flutter associated with the maze incisions, and 6 (26%) had left atrial flutter again associated with the maze lesions.

Twenty-two of the patients (96%) were treated successfully with catheter-based radiofrequency ablation and at the 12-month follow-up 86% were still in sinus rhythm and taking no antiarrhythmics.

Wazni, OM, et al. Atrial arrhythmias after surgical maze: Findings during catheter ablation. **Journal of the American College of Cardiology**, *Vol. 48, October 3, 2006, pp. 1405-09*

Editor's comment: A study carried out at Barnes-Jewish Hospital in St. Louis (Dr. Damiano's group) concluded that post-procedure atrial tachyarrhythmias are relatively common (43% of patients experiencing them) in the 30 days following the maze procedure, especially about a week after. Late recurrence (more than a year post-procedure) is much less common at about 8% of cases.[1] It is comforting to know that these recurrences can, in most cases, be eliminated by catheter ablation performed by a skillful electrophysiologist.

[1] *Ishii, Y, et al. Atrial tachyarrhythmias after the maze procedure: Incidence and prognosis*. **Circulation**, *Vol. 110, Suppl. II, September 14, 2004, pp. II-164-II-68*

Refinement to Pappone method

WUHAN, CHINA. A satisfactory outcome of a catheter-based pulmonary vein isolation procedure depends on the elimination of electrical conduction between the pulmonary veins and the left atrium. Lesions (usually created by application of radiofrequency energy through an ablation catheter) are placed around the veins guided by either electrophysiologic or electroanatomic mapping. Electrophysiologic mapping is based on locating abnormal electrical potentials, while electroanatomic mapping (CARTO) is based on accurately locating anatomical features of the left atrium, specifically in the area where the pulmonary veins connect to the atrium.

Electrophysiologic mapping is used in an ablation procedure known as segmental pulmonary vein isolation (Haissaguerre method), while

electroanatomic mapping is used in the so-called circumferential anatomical pulmonary vein isolation (CAPVI) procedure (Pappone method). In the Haissaguerre method the procedure is complete when conduction between the pulmonary veins (PVs) and the left atrium is eliminated. In the Pappone method the completion of ablation rings around the left and right PVs is usually the endpoint. The inability to induce afib is another endpoint often used in the Haissaguerre method.

Chinese researchers now report that they have successfully used two circular Lasso mapping catheters to ensure that electrical conduction between PVs and left atrium has been eliminated after completion of a CAPVI. Their study involved 106 patients with paroxysmal (78), persistent (12), or permanent AF (16). As part of the procedure, Lasso catheters were placed in the superior and inferior veins on each side (left and right) and ablation was continued as necessary to ensure elimination of PV potentials. Total abolition of all PV potentials was achieved in 94 patients (88.7%).

Eight-seven patients were followed up for 8 to 15 months. The complete success rate of the procedure (no afib, no antiarrhythmics) was 62% and the partial success rate (no afib, but still on antiarrhythmics) was 9%. The researchers conclude that combining CARTO or CartoMerge mapping with the use of double Lasso catheters to ensure complete PV isolation can achieve an "almost ideal" outcome for the treatment of atrial fibrillation. They do point out though that afib originating outside the pulmonary veins is unlikely to be cured by this method.

It is interesting to look at the pre-procedure tests done in the Wuhan University People's Hospital. All patients had ECGs, chest x-rays, echocardiogram, transesophageal echocardiography (TEE), and magnetic resonance imaging (MRI) or multislice CAT scan (for merging with CARTO data) prior to their ablation. Echocardiograms, MRI or CAT scans (to check for stenosis) were repeated at 1, 3, and 12 months post-ablation and Holter recording were obtained at 1, 2, 3, 6, 9, 12, 18, and 24 months post-ablation. T3, T4, liver function, and chest x-ray were checked every 3 months after the procedure in patients on amiodarone. The average duration of the ablation procedure was 2.5 hours with fluoroscopy time and ablation time of 33 minutes and 25 minutes respectively.

Jian, MA, et al. Linear ablation of left atrium for the treatment of atrial fibrillation guided by double Lasso catheters and three dimensional electroanatomical mapping. **Chinese Medical Journal**, *Vol. 119, No. 24, 2006, pp. 2042-48*

Editor's comment: The initial procedure complete success rate of 62% is very close to the rates obtained at the top three institutions (Bordeaux, Cleveland Clinic, and Marin General) covered in our 2006 ablation/maze survey. Unfortunately, only 87 of 106 initially ablated patients were included in the follow-up and there is no indication of the fate of the missing 19 patients. Nevertheless, the addition of the double Lasso catheter protocol is, no doubt, a worthwhile refinement. This new procedure also has the advantage that it can be performed with amiodarone still present in the system.

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