

ArrhythmiaNEWS

From the Arrhythmia Service of St. Luke's-Roosevelt Hospital Center

Arrhythmia News is a physician bulletin providing arrhythmia updates and information on services at **St. Luke's-Roosevelt Hospital Center** which may benefit your practice and your patients.

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A Critical Appraisal of Surgical Ablation of Atrial Fibrillation

Atrial fibrillation is a common yet complex arrhythmia. In up to 1/3 of patients, there is no associated cardiovascular disease, but in the majority of patients, AF occurs in the setting of important vascular or cardiac disease. AF is associated with an approximately two-fold increase in mortality, and a substantial incidence of stroke in the setting of recognized risk factors.

Because anti-arrhythmic drug therapy of AF is often unsuccessful and because it may be associated with an increased death rate over time, alternative treatments have been sought. Seminal studies have identified a complex interplay of trigger sites, abnormal atrial substrate fomenting reentrant circuits, and autonomic facilitation, in the development and maintenance of atrial fibrillation. Non-pharmacologic treatment strategies need to be aimed at any or all of these critical mechanisms.

Extensive surgical procedures pioneered by Cox et al (the "Maze" procedure) were able to permanently eradicate AF in large numbers of patients. Unfortunately, the procedure was complex and prolonged, required cardiopulmonary bypass, and had a significant morbidity and even mortality rate.

Initial modifications to the conventional "cut and sew" Maze technique used alternative sources of energy to create lines of block within the atria. Among the energy sources that have been used were cryoenergy, radiofrequency energy and

microwave energy. In addition, variations on the procedure have evolved from a bi-atrial approach to a left atrial alone approach and sometimes preservation of the left atrial appendage, an important source of atrial natriuretic peptide. Epicardial access is now preferred.

Surgical Outcomes Data Questionable

There have been many published studies describing contemporary surgical ablation and outcomes. Of all published studies, approximately 50% were retrospective. Small studies, i.e., less than 50 patients, were common, and in fact about half of the published studies had small samples. Most importantly, less than 20% of the studies had a suitable control group. In addition, definitions of atrial fibrillation were quite varied, and non-standard definitions of "chronic" AF included AF lasting only six months. Very few studies had an accurate outcome detection program using ambulatory recording techniques, and most relied almost entirely on patient self-reporting during follow-up.

The latter point bears importantly on interpretation of published results. It has been very nicely established in a recent prospective controlled clinical trial, in which a seven day Holter recording was used as the primary measure of success, that a great many important AF events after ablation will be asymptomatic and undetected unless prolonged ECG recording is employed. In this important study, the success rate from a widely used catheter ablation technique was less than 50% when tested with prolonged Holter recording versus approximately 70% for a segmental pulmonary vein isolation approach, which we employ at St. Luke's-Roosevelt.

The surgical literature includes a great range of outcome success rates, but most fall in the range of 50-80%. Keeping in mind that these include largely self-

reported arrhythmia endpoints, the actual success rate is substantially smaller. Further, because very few studies had control groups, simple cardioversion may render the patient AF-free during follow-up. Importantly, many of the surgical patients are treated with anti-arrhythmic drugs, which in combination with cardioversion and/or surgical ablation, will influence the outcome. Thus, the success rate of surgical ablation may be in actuality result from a "hybrid approach", i.e. ablation plus anti-arrhythmic drugs. Few studies had a standard protocol for anti-arrhythmic drug use.

In the catheter ablation literature, it has been clearly established that procedural testing of the electrophysiologic success of the designed ablation protocol is crucial to the long-term success of the procedure. For example, it is critical to test whether the most likely trigger site, the pulmonary veins, are indeed electrically disconnected at the time of pulmonary vein isolation. If a circumferential lesion is used and testing is not employed, a much higher failure rate is observed because a substantial number of patients will not have pulmonary vein isolation. However, if isolation is demonstrated at the time of the procedure, success rates are improved. If linear left atrial ablation is performed, as is commonly done with a surgical approach, the integrity of the left atrial lines must be tested to ensure that complete and contiguous block results.

Failure to establish a complete line of block can actually be pro-arrhythmic. In many ablation series, approximately 25% of patients treated with linear left atrial lesions can develop new atrial tachyarrhythmias resulting from gaps in the ablation lines. These arrhythmias may result from new macro re-entrant circuits or may have focal mechanisms. Either way, these more organized and often regular and rapid atrial tachycardias, can have extremely deleterious clinical conse-

quences. They tend to be much more rapid and associated with much greater severity of symptoms than the pre-existing atrial fibrillation. Repeat procedures and elimination of these atrial flutters and tachycardias becomes mandatory and they are often quite difficult to manage.

Thus, one of the great concerns of employing an empirical surgical approach is the inability to demonstrate that the desired electrophysiologic endpoints, isolation of the pulmonary veins and development of lines of block, are in fact created.

A recent randomized clinical trial highlights the dangers in interpreting the uncontrolled, retrospective, or poorly documented endpoints in prior surgical series. This randomized clinical trial tested the value of left atrial radio-frequency ablation during mitral valve surgery. Approximately 50 patients each were enrolled in a surgical ablation group and an equal number in a control group. At the end of 12 months, atrial fibrillation was suppressed in a greater number of patients in the surgical group than the control group. However, only 44% of the surgical group actually maintained sinus rhythm and 56% continued in atrial fibrillation. Obviously the success rate will fall off even further over time. Thus, it appears that surgical ablation, when tested in a well-designed clinical trial, may be better than no therapy at all but results in a low ultimate success rate.

Catheter Ablation Provides Superior Long-term Outcomes

Relative to catheter ablation techniques and

well-designed clinical studies, the surgical series have inferior outcomes. Catheter series, for a variety of different AF populations, have consistently demonstrated success rates in the **60-80% range for long-term maintenance of sinus rhythm off anti-arrhythmic drugs**. Catheter ablation techniques have evolved to include segmental pulmonary vein isolation and the addition, as needed depending on the specific arrhythmic and clinical context, linear left atrial ablation, modification of the function of autonomic ganglia, treatment of non-pulmonary vein trigger sites, and treatment of adjunctive arrhythmias such as SVT, atrial flutter and atrial tachycardia. This more comprehensive and electrophysiologically guided approach results in the best outcome possible for patients with atrial fibrillation.

Further, these procedures have been refined so that the safety and technical efficacy rates are quite high at the present time. Patients require only an overnight stay and complication rates are $\leq 2\%$. The procedures typically last in the range of only 4-5 hours. In contradistinction, surgical ablation may require longer stays in the hospital and potential morbidity.

When cardiac surgery is required, such as mitral valve replacement or repair, it is logical to employ a concomitant surgical AF ablation approach if the patient is pre-screened for the appropriateness of need. However, primary surgical ablation thus far does not measure up to the success and safety of catheter ablation.

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New Physician On Staff

Suneet Mittal, MD, formerly of New York Hospital, will join the Arrhythmia Service this September as Director of the EP Lab.

Dr. Mittal can be reached at (212) 523-4017.

Jonathan Steinberg, MD, appointed to endowed position of *Al-Sabah* Director of the Arrhythmia Institute at SLR