

Catheter Ablation for Atrial Fibrillation - Current Indications

Catheter ablation has been successfully applied to virtually all supraventricular arrhythmias with great success. Atrial fibrillation (AF) has been the one exception, owing to its greater complexity of mechanism and involvement of large portions of both atria. However, recent results suggest that many AF patients may be suitable ablation candidates.

It has recently been learned that many forms of AF may be triggered or maintained by a single focus of automatic firing. In most patients, these sites have been mapped to the pulmonary veins. These venous structures have sleeves of atrial tissue extending from the left atrium for variable distances into the main branch or its tributaries. This musculature is capable of generating ectopic complexes, or repetitive activity at very rapid rates. In susceptible patients, this may lead to AF, either paroxysmal or persistent.

Elimination of the triggers can lead reduction or elimination of AF. This is a startling advance that has generated a great amount of optimism for a catheter-based approach of treatment of AF.

Catheter ablation techniques have been designed and successfully applied to a variety of patients with AF targeting the pulmonary vein musculature. These muscle sleeves have discrete and limited connections to the atria, which may be vulnerable to catheter ablation. A mapping catheter and an ablation catheter are passed into the left atrium using a transseptal puncture. The discrete connections of the pulmonary vein to the left atrium are mapped and precisely identified. These connections are then ablated using radiofrequency energy. The pulmonary vein is then progressively disconnected with the ultimate result of complete isolation of the pulmonary vein musculature from the left atrium. Each pulmonary vein is entered and serially ablated until all pulmonary veins are completely electrically disconnected. This can be achieved in about 99% of targeted veins. The pulmonary veins continue to serve as conduits of oxygenated blood to the left atrium.

If the pulmonary veins are the critical trigger for an individual's episodes of AF, the expectation would be an excellent response with elimination of AF events. This very desirable result can occur in up to 90% of patients, who will then require no further antiarrhythmic therapy. Some additional patients may respond to antiarrhythmic drugs that were previous ineffective, or have substantial reduction in AF events. About 10% of patients have no response, presumably due to alternate triggers or tissue in the right or left atria; these can also be targeted at subsequent procedures if desired.

The procedure has a small risk of about 2%. Fortunately, serious complications are infrequent. The specific complication of pulmonary vein stenosis has been limited to about 1% of cases given advances in energy delivery and targeting.

This is a revolutionary advance in AF therapy. For the first time, a catheter technique has successfully and reproducibly controlled AF in a substantial number of patients who have had had this procedure. Ideal candidates include patients who have paroxysmal AF without major structural heart disease. Selected patients with persistent AF may be also be candidates. If AF is chronic, alternative treatment modalities should be considered.

Remarkable progress has been made in the understanding of how AF develops, and the therapeutic options available to produce a desirable response. Catheter ablation is an effective tool.