

Surgical treatment of atrial fibrillation

Li Poa

Chief of Cardiovascular Surgery Stamford Hospital, Stamford, Connecticut; Attending Physician, Columbia New York Presbyterian Hospital; Assistant Professor, Columbia College of Physicians and Surgeons

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Cardiac surgeons have always been pioneers within the field of surgery and the field of heart disease. Cardiac surgeons with their typical adventurous spirit and timeless anatomical/physiological study of the heart during the normal pursuit of their profession have a predisposed ability to develop and enhance new procedures for the heart that cannot be matched. However, through the years many cardiac interventions initially pioneered by cardiac surgeons have then been left in the hands of other specialties to develop with often increased patient risk.

Arrhythmia ablation surgery for atrial fibrillation is one such example where a very successful surgical procedure developed by Dr. James Cox in 1987 has now been left primarily in the hands of practitioners of percutaneous catheter based approaches which have lower efficacy and a lower overall safety profile although less invasive in entry. The perceived advantage in minimally invasive percutaneous approaches has been the primary driver for referring physicians and the patient community to increase this approach almost sevenfold worldwide in just the last 5 years, whereas surgical ablation has merely doubled. The epicardial isolation of pulmonary veins has been shown to be safer and more efficacious in the long term than endocardial percutaneous catheter approaches.

However, as long as surgeons do not adapt to less invasive approaches to epicardial ablation, percutaneous ablation will still set the standard in growth. Midline sternotomies and bilateral minithoracotomies are excellent exposure incisions but not in terms of trauma to the patient and are not even comparable in comparison to a percutaneous groin catheter approach. Until surgeons are able to adapt to thoracoscopic/pericardioscopic type procedures as are sweeping the general, urologic, gynecologic, and vascular fields the referral volumes will be stationary.

Unfortunately, 15 million patients worldwide with 3 million new patients annually have or develop atrial fibrillation with the catastrophic risks of stroke, medicinal risks, and overall cardiac dysfunctional risks. These patients deserve a safe efficacious method to treat their disease process and they're waiting for us. The percutaneous approaches are approaching their limits in therapy because of inherent

limitations in the technologies available for safe, permanent percutaneous endocardial ablation. Percutaneous approaches in ablation are now stalled as they await the next great advance in energy therapy technologies, which may be a long time in coming if ever. The surgical epicardial approaches have great efficacy and permanence of solution but need cardiac surgeons to truly embrace the minimally invasive scope based platforms for referring physicians and the patient community to wish to be subjected to the definite trauma of surgery compared to the possible risks of "living with their disease."

There has been much learned over the past five years in the field of atrial fibrillation ablative intervention in terms of different foci, areas of irritability, and their necessary lesion sets for treatment. The field needs the input of cardiac surgery with its unique anatomic/physiologic perspectives on the disease. Cardiac surgeons need to embrace and learn the newer endoscopic techniques of therapy in order to increase the number of patients treated and thus allow medicine to glean the knowledge provided. Technology is at a ceiling now until surgeons can embrace the current developments to help lead the technology into future developments.

The minimally invasive techniques learned while performing ablative surgery carry over into other future lines as well, helping surgeons to adapt to minimally invasive approaches to all the various cardiac surgery fields such as transapical valve, ThoraCAB, stem cell injection, lead implantations, tumor resections, and extraanatomic offpump mitral valve repair apparatus placements, to name a few, all of which will require the surgeon to develop endoscopic and pericardioscopy skillsets.

Cardiac surgeons have the chance to once again be at the forefront of atrial ablative surgery, which is one of the largest areas of future development in cardiac intervention. In order to become innovators in the tradition of our predecessors, cardiac surgeons will need to have inquisitiveness in seeking to bolster their knowledge of the very complex intricacies in the disease initiation and maintenance of atrial fibrillation in the nature of our pioneers but also be willing to burden themselves with the development

Address for correspondences: Li Poa, Cardiovascular Surgery Stamford Hospital, Stamford, Connecticut; Email: LPoa@stamhealth.org

of a technical minimally invasive mindset and skillset that our predecessors did not need to have.

This is a pivotal time for cardiac surgery in the opportunities within atrial ablative surgery as well as the expansion of the surgical horizon with the development of the minimally invasive skillset acquired to become leaders in ablation surgery. We would hope in the future to look back on this time as a moment that cardiac surgeons grasped, fulfilling their responsibilities as pioneers, and not a time reminiscent of cardiac angioplasty.

Important criteria in evaluating these new procedures are as follows in rank order:

1. **Safety** – the minimally invasive procedure cannot have a higher incidence of complications than the established open surgical approach;
2. **Efficacy** – the approach must allow the surgeon to have similar results to those of the open surgical approach (although many noninvasive physicians and public forums would argue with this point as it seems that they would tolerate a slightly lower degree of efficacy for the tradeoff of a minimally invasive approach as long as there is no permanent harm done with the approach from the standpoint of future additive procedures);
3. **Utility** – the minimally invasive approach must have the ability to be done with relative ease by the average surgeon or else this procedure will never survive;
4. **Cost** – the medical system is heavily burdened worldwide already and cannot survive overall cost increases for these procedures (although bear in mind that overall costs will also need to take into account shorter hospital lengths of stay and potential lesser trauma with minimally invasive access; whilst on the other side, the issues of lower efficacy with a secondary procedure also needs to be taken into account);
5. Even with *endoscopic* approaches, in the case of competing technologies with equal safety and efficacy, *percutaneous, catheter* based approaches will always be favored in the long term scenario. However, currently epicardial ablation and overall surgical ablation seem to have greater efficacy than percutaneous approaches.