

Atrial Fibrillation Ablation in Patients with Cardiac Surgery: A Spreading Indication?

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Atrial fibrillation (AF) is a frequent arrhythmia observed in patients referred to cardiac surgery. It is present in almost 50% of the patients with mitral valve disease, and in 6% of coronary patients. (1-3) Its presence in different pathologies, including mitral valve disease, is associated with increased severity of underlying valve disorder, and with increased morbimortality, with the aggravating circumstance that the replacement surgery as single treatment for chronic AF reverses the arrhythmia in only 20% of the cases. (4)

The AF causes peripheral embolism, deteriorates the ventricular function, and is associated with bleeding due to chronic anticoagulant therapy.

With these data, MAZE surgery, created by Cox, (5) has been the starting point for developing an impressive field of ablation therapies targeting at eliminating these arrhythmias.

Initially, this surgery was based on the electrophysiologic concepts proposed by Garrey and Moe, (4, 6). These concepts indicated that: 1) the AF persistence was directly proportional to the mass involved, 2) narrowed tissue bands would conduct a normal impulse but no fibrillary activity, and 3) the AF is maintained by the multiple reentrant waves caused by the fractioning of activation wave fronts when passing through tissues with non-homogeneous excitability and conduction speed. These reentrant waves usually occur around anatomic obstacles –such as pectineus muscles, pulmonary arterial-venous connection, mitral ring, atrial appendix and fibrosis–, and also functional obstacles.

Based on this information, Cox surgery (1, 8, 9) required incisions that worked as block lines to avoid reentries, generated compartments within the left atrium for mass reduction, and created channels between cuts so that the sinus impulse reached the AV node and allowed atrial contraction and ventricular activation.

This “cut and sew” procedure showed amazing outcomes, with a cure rate of up to 95%. Still, the procedure had to be modified to spread its use, since it evidently implied higher risk, and was only performed in highly experienced centers. This led to the Maze III procedure, (9, 10) with block lines in both atria, which is currently considered the “gold standard” of this therapy. This surgery has required the development of special radiofrequency equipment, such as radiofrequency clamps or pencils that have

helped achieve similar outcomes to the initial ones, quicker and with lower risk. (11) There have also been advances using new sources of energy, like laser, cryo, and ultrasound. (12)

A good example of this is the publication of the work “Atrial contraction recovery after left MAZE III surgery”, by Tinetti et. al., in this issue of the *Revista*. (13)

This interesting article from a center shows the outcomes of heart surgery, mainly valve surgery, with the use of the MAZE III procedure, by means of radiofrequency applied with a clamp that generates quick and apparently efficient transmural lesions. The persistence of sinus rhythm is also assessed and, as outstanding data, the restoration –or not– of effective atrial contraction determined by tissue Doppler imaging.

It has a prospective design, and the advantage of having consecutive patients, with the same surgical technique for all of them, and a follow-up also ordered by pulsed echo-Doppler.

In the 9-month follow-up, 87% of the patients were in sinus rhythm, and 80% of them recovered mechanical atrial function. These outcomes are encouraging, if we consider that AF ablation prolonged surgery for 14 minutes on average, and there were no related complications to this procedure.

Other authors (14, 15) have reported similar or better outcomes; however, the population presented by Tinetti et al. includes elements that increase severity, such as elderly individuals, high rate of FA with more than 5 years of evolution, and 80% hypertensive patients.

Atrial systole restoration matches the increasing number of patients who are recovering their sinus rhythm during follow-up. The authors try to study the variables related to restoration of left atrial contraction, but the results are not totally reliable due to the number of patients with different pathologies. However, time of arrhythmia evolution is the most significant data.

It is known that AF causes more AF, and that this phenomenon, known as electrical remodeling, will end up in a mechanical remodeling consisting of cell fibrosis that will avoid effective atrial contraction. Therefore, it is common that the most sensible and specific variable is a very prolonged duration of AF, of more than five years. How long the AF has been present can also be evident in other events, such as

more chronicity and severity of underlying pathology, delays in undergoing surgery, etc.

Prevalent rheumatic pathology in this series may have a hand in this, due to the inflammation and atrial fibrosis caused by this disease. Other surgeries on rheumatic and non-rheumatic valve diseases show similar outcomes, maybe with a higher percentage of preserved atrial function. This difference is due to different populations, particularly regarding age. (12, 14, 15)

Another important fact about this surgery is that although 20% of the patients do not recuperate atrial contraction, they keep in sinus rhythm, with the potential advantages of more physiologic heart rate, decreased palpitations, no harmful drugs, and tachycardiomyopathy prevention. Moreover, an extended follow-up may trigger an additional recovery; the curves shown in the article are ascending by the end of the 9th month. In spite of the great advances in AF electrophysiology, it is not well known among this particular surgical population. This happens simply because it is excluded from catheter procedures and because intrasurgical mappings are difficult and time-consuming.

But if AF physiopathology for these patients is not well known, why does it work? Unquestionably, the great advantage of this surgery is the possibility of placing the AF clamp or unipole "pencils" in the right sites, guided by sight and direct contact. The appropriate support, especially with the bipolar clamps used for this procedure, conducts RF and obtains the transmural lesion, which is fundamental to achieve the conduction block in key sites that will then avoid the reentrant wave propagation. In addition, direct sight avoids other lesions, such as coronary artery lesions or esophageal injuries. However, these types of complications have been reported and should be taken into account during surgery. (16-18)

The atrial appendix, which is a source of thrombus or arrhythmogenic focuses, is also excluded. (19) Moreover, the surgery in a way solves baseline heart disease in patients. There is still the question about the role of amiodarone in these patients. It would be desirable to stop it in order to know the real progress of the surgery.

So in closing, these outcomes are encouraging and, according to some guidelines, (20) they motivate its recommendation for those patients with chronic AF that will undergo heart surgery, so that they may be offered radio frequency ablation of the arrhythmia, provided it does not imply higher risks and it is performed in experienced centers.

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