regain atrioventricular synchrony as well as rate control. A full set of left-sided lesions and control of the left atrial appendage should take no more 20 additional minutes of clamp time. The right-sided lesions can be easily added during the recovery phase of the pump run with the heart warm and beating should that be deemed necessary by the surgeon. An experienced perfusionist with vacuum-assisted venous drainage does not require caval snaring, so the downside to doing a comprehensive set of biatrial lesions is merely the additional right atriotomy.

In summary, this paper provides concern over adding SA when faced with the critically ill, elderly AF patient needing cardiac surgery, but this hypothesis will need much more rigorous validation to have face validity in the presence of far more robust literature. It is absolutely agreed that patients with years of AF with gross left atrial distention and fibrosis are less likely to benefit from SA, and thus the additional benefit of SA should be questioned.

However, the current evidence supports that the majority of patients older than 75 years of age will benefit from relieving their AF burden without increasing the surgical risk while improving the quality and quantity of life.

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Commentary: Should age alter the decision to perform concomitant or stand-alone surgical ablation for atrial fibrillation?

Niv Ad, MD

Niv Ad, MD

CENTRAL MESSAGE

Age alone should not be used as the basis to not intervene on elderly patients. In general, concomitant surgical ablation is not associated with increased risk for major perioperative complications.

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Atrial fibrillation is very common among candidates for open-heart surgery. Despite strong evidence supporting surgical ablation, significant variability exists among

surgeons and centers when performing ablation procedures and their extent.^{1,2} Like any other cardiac surgical procedure, the indications, risks, and benefits should be carefully reviewed before the final decision whether to ablate a patient. The study by MacGregor and colleagues³ raises an interesting clinical question about whether advanced age should impact the decision to treat atrial fibrillation surgically. The question is worth examining in more detail, but in general, age by itself should not be used as the basis to not intervene on elderly patients. Concomitant surgical ablation or device-based Cox maze III/IV is not associated with increased risk for major perioperative complications.^{1,2}

When reading reports on long-term success rates of surgical ablation for atrial fibrillation, it is important to consider 2 important facts. The first is that patients with preoperative atrial fibrillation, especially persistent and long-standing persistent atrial fibrillation, will almost certainly have life-long atrial fibrillation and its subsequent complications if left untreated at the time of surgery. The second important point is related to our reported failures, which are based on a threshold of 30 seconds of any atrial arrhythmia even if it is only a single event and recurrences may be short and intermittent with very little, if any, clinical significance, especially if the left atrial appendage was excluded.

WHAT IS THE DEFINITION OF FAILURE?

Before the discussion related to whether surgical ablation should be performed in the elderly population, it is important to clarify the definitions of failure. We consider a failure to be any atrial arrhythmia longer than 30 seconds and off antiarrhythmic drugs beyond the blanking period of 3 months.⁴ None of us really understand why such a bar was set, as it often has no clinical significance, especially since the atrial arrhythmia events can often be very short and self-terminated in as many as 50% of the cases.⁵ Be that as it may, it is important to adhere to the guidelines so we all use the same reporting methods and techniques for results. In contrast, the fundamental problem with these definitions is the lack of clinical context that extends beyond the definition of failure. Unfortunately, we rarely have detailed reports and studies that are based on atrial arrhythmia burden and/or focused on clinical outcome following surgical ablation (quality of life, freedom from complications, and responders to antiarrhythmic drugs that were ineffective prior to the intervention). The other important aspect to consider is that as surgeons we always discuss the single procedure success rate for the Cox maze procedure but neglect to recognize the fact that catheter ablation as a touch-up

FIGURE 1. Kaplan–Meier survival curves for high-risk surgical ablation patients (blue line) versus high-risk patients with no atrial fibrillation and no ablation (red line) after propensity score matching. Reprinted from Ad and colleagues.¹²

follow-up procedure is extremely effective for recurrence in this clinical setup.⁶

In their publication, MacGregor and colleagues³ adhered to the Heart Rhythm Society guidelines⁴ and found that age was one of the significant risk factors, but not the only one, for lower success in surgical ablation for atrial fibrillation with the majority of patients having the Cox maze procedure. The paper shows that more than 60% of the elderly patients were free of atrial arrhythmia (30 seconds or longer) and antiarrhythmic drugs when monitored at 5 years. The study does not share with us what the burden of atrial arrhythmia was, the number and duration of events per patient, and what the rate of success was when antiarrhythmic drugs were allowed.

Readers should recognize the significant limitations of the current definitions for success when deciding whether patients should have surgical ablation. It is also crucial to recognize the potential importance of a follow-up touch-up ablation (in most of the cases associated with very low risk) to complete the procedure and significantly improve the overall success of the intervention.

WHAT IS THE ROLE OF AGE IN THE DECISION-MAKING PROCESS?

As mentioned by the authors,³ elderly patients are more prone to side effects associated with antiarrhythmic drugs and drug interactions. It is also known that older age is also a significant risk factor for severe complications from anticoagulation treatment.

The evidence related directly to patients older the age of 75 years and surgical ablation is lacking, and a retrospective analysis may not give the answers that we are looking for. Our group reported on a smaller group of patients older than the age of 75 years and demonstrated very acceptable outcomes.⁷ Analyzing outcome in a selective group of patients may lead to significant biases such as potential patient selection bias and surgical team bias. These biases cannot be overcome by statistical method only. We should also question whether the comparison between older and younger groups is the right one, as younger patients will almost always experience better success in outcome when compared to older patients for any given open-heart procedure. A very helpful analysis could be one that compares patients older than 75 years old with atrial fibrillation who were surgically ablated to patients who were not ablated and to those with only left atrial appendage exclusion. Our older patients deserve to know what their options and expected outcomes are for the different surgical alternatives. What if we would only treat their valve or coronary artery disease and leave them with atrial fibrillation untreated? How would it impact their survival, quality of life, freedom from stroke, major bleeding, etc?

WHAT VARIABLES IMPACT SUCCESS FOLLOWING SURGICAL ABLATION?

Experience with the Cox maze procedure over 30 years has taught us a lot about success and failure of the procedure. Recent data suggest that the vast majority of patients will be left in atrial fibrillation if not treated at the time of surgery.⁸ The following variables are associated with inferior success rates: duration of atrial fibrillation, type of atrial fibrillation, left atrial size, and extent of the lesion set (biatrial or not).^{9,10} Interestingly, for surgical ablation procedures confined to the left atrium only, we previously identified age as the most consistent risk factor for failure probably because older patients have much longer duration of preoperative atrial fibrillation, the most important risk factor for failure.¹¹ In our experience, older age was not found to be associated with greater failure rates with the Cox maze procedure.⁷ The most consistent risk factors identified in our work were the duration of atrial fibrillation and surgeon experience (number of surgical ablation cases performed). Therefore, it would be worth looking into the possible interaction between the effect of age and duration of atrial fibrillation on recurrence.

As mentioned before, it is crucial for all of us to be aware of those important predictors for failure. However, we also have to keep in mind what the definition of failure is and the lack of evidence regarding the burden of atrial arrhythmia that may be an important risk factor for long-term morbidity

and mortality. We also need to keep in mind that the numerous publications in the literature are significantly lacking answers related to follow-up interventions and their potential impact on the success and durability of the indexed procedure.

SUMMARY

The Cox maze procedure is the most effective ablation method to treat atrial fibrillation that exists today. The procedure can be added to any open-heart procedure in a very efficient way without significant additional cardiopulmonary bypass time, and without compromising the quality of the lesions. The procedure itself was not found to be associated with increased risk of mortality and morbidity, even in greater-risk patients (Figure 1), which is well-reflected by recent guideline documents.^{1,2,12} As surgeons, we are often challenged with very complex patients, but our decision of whether to perform a surgical ablation procedure should be based on good clinical judgment. When making the decision, we should all keep in mind the limitations of the current literature and the deficiency in clinical applicability. This study found that more than 60% of elderly patients were free of atrial arrhythmia and antiarrhythmic drugs at 5 years. Despite the fact that expected success was slightly lower for older patients than for the younger group of patients, the most important take-away message might be that none of the older age group patients would be in sinus rhythm without an intervention. Last but not least, if your decision is to not perform surgical ablation at all, then do not forget to address the left atrial appendage.

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Commentary: Is 80 really the new 60?

Osama Haddad, MD, and Kevin Landolfo, MD

The age at which patients undergo cardiac surgery is increasing.¹ Atrial fibrillation (AF) remains the most common sustained cardiac arrhythmia in the United States, occurring in as many as 10% of individuals older than the age of 80 years.² In addition, antiarrhythmic therapy may be less effective in sustaining sinus rhythm, and anticoagulation carries a greater risk of complications in elderly patients.³ The surgical treatment of AF (Cox-maze IV procedure) provides an effective treatment for AF in the general cardiac surgical population, although published data in elderly patients are limited.⁴

In the current issue of the *Journal*, MacGregor and colleagues⁵ examine the impact of age on the efficacy of the Cox-maze IV procedure in 696 patients, including 148 “elderly” (defined as >75 years of age) patients. Study design involves prospective data collection from a single institution analyzed retrospectively. The elderly patient cohort exhibited greater rates of New York Heart Association III/IV heart failure, previous myocardial infarction, hypertension, peripheral vascular disease, and preoperative pacemaker placement than younger patients. In addition, more than 90% of the elderly patients required concomitant cardiac surgical procedures compared with 64% in the younger patient group. As anticipated, given their increased risk profiles, elderly patients had greater rates of overall complications and greater 30-day mortality (6% vs 2%) compared with younger patients. Notably, 21% of

Kevin Landolfo, MD (left), and Osama Haddad, MD (right)

CENTRAL MESSAGE

Surgical ablation for atrial fibrillation is less effective in the elderly; however, the likelihood of symptomatic recurrence is low.

the elderly cohort required permanent pacemaker implantation before discharge.

Patients received meticulous long-term follow-up (median 3.8 years), including 90% of study patients undergoing prolonged arrhythmia monitoring (24 hour-Holter, implantable loop recorder). During follow-up >50% of elderly patients were found to be free from atrial arrhythmias, although freedom from atrial arrhythmias was significantly greater in younger patients over the follow-up time period. Furthermore, multivariable regression identified increasing age as an important predictor of arrhythmia recurrence. Importantly, however, only 6% of the elderly cohort had a symptomatic recurrence at 5 years.

Historically, the results of surgical ablation compare favorably with published reports following AF catheter ablation.⁶ In the current study, the authors present a timely analysis of surgical ablation for the treatment of AF in elderly patients. Contemporary clinical practice has resulted in the routine evaluation and referral of patients, for contemplation of surgical intervention, into the eighth

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