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Alternative energy sources for atrial fibrillation

A. Marc Gillinov and Patrick M. McCarthy

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Alternative Energy Sources for Atrial Fibrillation

To the Editor:

The publication by Thomas and colleagues [1] and the accompanying editorial by Damiano [2] highlight critically important challenges in the development of new surgical approaches for the treatment of atrial fibrillation. In an experimental model, Thomas and co-workers observed that epicardial application of dry, unipolar radiofrequency energy to a beating heart produced transmural atrial lesions in only 13% of sheep. Lesion depth was influenced by epicardial fat, intracavitary blood cooling the endocardium, and, possibly, blood circulating within the atrial tissue. In contrast, 92% of endocardial lesions were transmural.

These findings have important implications for the development of minimally invasive epicardial approaches to the surgical ablation of atrial fibrillation. Such procedures are on the horizon. Currently, most surgical treatment of atrial fibrillation is undertaken in patients requiring concomitant cardiac surgical procedures. At The Cleveland Clinic Foundation, 291 patients had surgical treatment of atrial fibrillation in 2002; only 11% had lone atrial fibrillation as the indication for operation. To be able to offer curative surgical therapy to the millions of people afflicted by lone atrial fibrillation, surgeons must develop a minimally invasive approach that is both effective and safe. Such a procedure will be performed on the beating heart from the epicardial surface through small incisions or endoscopes. An assessment of lesion transmural, conduction block, or both is a critical component of such a procedure. The data from Thomas

and colleagues clearly demonstrate that we cannot simply assume transmural when applying heat-based energy sources to the epicardium. Devices designed to produce transmural lines of conduction block with endocardial application may not produce such lesions when placed on the epicardium of a beating heart.

Successful minimally invasive surgical ablation of atrial fibrillation requires a focused effort to develop tools for ablation and lesion assessment designed specifically for an epicardial beating-heart approach. As Damiano emphasized, such development must be guided by sound scientific principles with meticulous experimental testing to confirm safety and efficacy. If properly performed, this work will culminate in successful and safe minimally invasive approaches to atrial fibrillation, thus offering the possibility of ablation to large numbers of patients.

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Recommendation for IMA Use in Dialysis Patients With Ipsilateral Fistula

To the Editor:

I enjoyed the case report about internal mammary artery steal in a patient requiring dialysis by Kato and associates [1]. I have been intrigued by whether the ipsilateral internal mammary artery should be used as a coronary bypass graft in a patient with an arteriovenous (AV) fistula. My colleagues and I recently saw 2 patients who had a left internal mammary artery graft to the left anterior descending coronary artery and an AV fistula in the left arm. They underwent nuclear study during dialysis with no reported redistribution. In addition, I have used a left internal mammary artery graft in patients with an ipsilateral fistula, and these patients have not had anginal symptoms.

Crowley and co-workers [2] reported a left internal mammary artery "steal" in a patient with a left AV fistula. I am not convinced that a mammary artery "steal" was demonstrated or that the angina was due to mammary artery "steal." Assuming a "steal" was present, it was likely due to the flow of 2.5 L/min through the AV fistula.

Kato and coauthors reported "steal" in the native internal mammary artery. I suspect that the demonstrated steal was secondary to the construction of the fistula in the antecubital fossa rather than the wrist resulting in flows that were higher than usual. My contention is that the AV fistula flow should be 1 L/min or less if the ipsilateral mammary artery is to be used as a coronary conduit and that if the AV fistula flow is too high, it will cause a left internal mammary artery "steal."

I have had a favorable clinical experience with left internal mammary artery bypass grafting in patients with a left AV

fistula with the caveat that AV fistula flow must be normal. If the fistula has high flow, I am concerned about a "steal" in the ipsilateral mammary artery and would not use that artery for bypass. The grafting reports of both Crowley, Kato, and their colleagues support this policy for this subset of patients having coronary artery bypass grafting.

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Reply

To the Editor:

We thank Dr Baciewicz for his insightful comments on our case report [1] and read with interest a letter to the editor on this subject [2] by him and Harris. This year at the 67th Annual Scientific Meeting of the Japanese Circulation Society, Satoh and colleagues [3] gave a presentation on the influence of hemodialysis on internal mammary artery (IMA) flow using ultrasound study in patients after coronary artery bypass grafting. They demonstrated that there was no significant change in ipsilateral IMA flow before and during hemodialysis in patients with an arteriovenous fistula in the wrist. Their result is similar to that of your thallium studies during hemodialysis [2]. In our patient, the postoperative study with a Doppler guidewire showed clearly that IMA steal was due to an ipsilateral arteriovenous fistula. The flow volume of the arteriovenous fistula in our patient was approximately 1L/min and lower than that in the patient of Crowley and associates [4]. The optimal flow volume of an arteriovenous fistula is reported to be within the range of 400 to 600 mL/min. We cannot determine exactly to what extent fistula flow volume can cause ipsilateral IMA steal in patients requiring dialysis. If we had used the left IMA as a graft in our patient, myocardial ischemia might have occurred during or immediately after the operation.

We think that an ordinary arteriovenous fistula does not cause an ipsilateral IMA steal. We agree with Crowley and colleagues that both the flow volume and the location of the arteriovenous fistula contribute to myocardial ischemia.

We again recommend that preoperative evaluation of IMA flow using angiography or Doppler study should be performed for dialysis patients who are scheduled to undergo coronary artery bypass grafting.

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A Word of Caution About the Skeletonization of the Right Gastroepiploic Artery

To the Editor:

We read with great interest the article by Asai and Tabata [1] in which they reported a technique to skeletonize the right gastroepiploic artery. We agree that skeletonization should be done. It is easy to divide the anterior layer of the omentum. However, their method has limitations. For example, when the omentum is very thick, it takes more time to divide, and there is the risk of burning the graft. We use an ultrasonic scalpel to gently dissect the artery. This "dissect and cut" method avoids injury to the graft. The technique takes a few minutes longer than does that of Asai and Tabata, but the quality of the graft is always excellent. We recommend the "dissect and cut" method for any surgeon who plans to start using skeletonized grafts.

Skeletonized radial artery grafting improved angiographic results [2]. Similarly we expect skeletonized gastroepiploic artery grafts to provide good results.

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Reply

To the Editor:

I thank Dr Osawa and his associate for their interest in our article [1]. Until we developed our method of skeletonizing the right gastroepiploic artery (GEA), we tried low-energy electrocautery, an ultrasonic scalpel with a dissecting hook, and conventional scissors and clips. We found that arterial and venous branches and associate veins often were extremely fragile and prone to bleed, which makes the GEA different from other arterial conduits. Compared with other methods, the Harmonic

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