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EDITORIAL COMMENT

Les Miserables

Sometimes the Journey to Redemption Has Consequences*

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Cardiac transplantation has revolutionized the treatment of end-stage heart failure since was it first performed in 1967 by Dr. Christian Baarnard (1). Operative techniques have developed over the years, with the initial description of the biatrial technique by Lower et al. (2) to the bicaval technique as proposed by Yacoub and Banner (3). The biatrial technique for orthotopic cardiac transplantation retains large amounts of recipient right atrial and left atrial tissue to facilitate anastomosis to the donor heart in comparison to the bicaval technique. Some of the concerns with the biatrial technique include distortion of right atrial morphology, increased incidence of supraventricular arrhythmias, and tricuspid regurgitation (4); therefore, the bicaval technique has become the standard operation for orthotopic cardiac transplantation, as it potentially better preserves right atrial and left atrial structure and function. Depending on how much of the recipient right atrium has been excised and if there is any damage to the sinus node during the surgery, the recipient right atrium may have its own atrial rhythm separate from the donor heart.

Thus, in patients who have undergone cardiac transplantation using the bi-atrial technique, there is the potential for arrhythmias to occur in the 2 electrically separate compartments (recipient right atrium and donor right atrium), as usually there is no electrical conduction taking place across the suture line. An arrhythmia arising from a recipient right atrium that is not conducted to the donor atrium is usually of no functional consequence.

In this issue of *JACC: Case Reports*, the authors (5) describe a case of an atypical atrial flutter occurring in a patient who underwent orthotopic cardiac transplantation for ischemic heart disease using the bi-atrial technique 22 years ago. The main circuit in the donor right atrium was described as a counterclockwise circuit in the donor right atrium with a zone of slow conduction at the cavotricuspid isthmus, which was successfully targeted with radiofrequency ablation. Despite the circuit being "typical" for classical counterclockwise right atrial flutter, the electrocardiogram (ECG) does not have the characteristic sawtooth appearance of flutter waves in the inferior leads. This may be a reflection of the presence of significant scarring in the atrium in this patient. A similar situation can occur in atrial flutters after extensive ablation for atrial fibrillation, where the presence of large amounts of scar in the left atrium can result in atypical ECG appearances of counterclockwise right atrial flutter (6).

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What is interesting is that in the biatrial technique for orthotopic cardiac transplantation, the remnant recipient atrium can be large enough to support a tachycardia circuit. However, as the suture line forms a line of conduction block, any tachycardia contained within the recipient right atrium usually never conducts to the donor right atrium and does not usually manifest itself on the ECG, which is what happened in this case. There are rare instances where atrioatrial electrical connections develop many years after orthotopic transplantation and can result in an clinical arrhythmia being driven by the recipient right atrium with variable conduction (7). Options in this situation would include ablation of the atrioatrial connections or the tachycardia circuit in the recipient right atrium.

In this patient, there was no evidence of atrioatrial conduction and therefore little risk of a clinical arrhythmia manifesting if the arrhythmia was not ablated. The authors chose to perform ablation of the

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arrhythmia in the recipient right atrium after careful and detailed mapping studies and elegantly showed tachycardia slowing and termination during ablation. Following termination, electrical silence was noted in the recipient right atrium. One reason to target this arrhythmia circuit, apart from the fact that electrophysiologists intensely dislike leaving an ongoing arrhythmia untreated, is the theoretical risk of increased thromboembolic complications; however, the electrical silence in the recipient right atrium following termination suggests that this risk may not be mitigated.

Overall, the authors should be congratulated on an elegant description of successful ablation of 2 tachycardias occurring in 2 electrically separate compartments in an orthotopic cardiac transplant recipient using modern mapping techniques. As surgical techniques have evolved toward performing the bicaval technique as standard, it is likely that having to tackle a recipient atrial arrhythmia will be rarer and rarer and may be relegated to a historical footnote. Even so, it is still worth remembering "the tale of two hearts."

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REFERENCES

1. Michael LH, Hunt S. Conquering the first hurdles in cardiac transplantation: In the footprints of giants. J Heart Lung Transplant 2017;36:1276–8.

2. Shumway KE, Lower RR, Stofer RC. Transplantation of the heart. Adv Surg 1966;2:265–84.

3. Yacoub MH, Banner NA. Recent developments in lung and heart-lung transplantation. Transplant Rev 1989;3:1–29.

4. Schnoor M, Schafer T, Luhmann D, Sievers HH. Bicaval versus standard technique in orthotopic heart transplantation: a systematic review and meta-analysis. J Thorac Cardiovasc Surg 2007;134:1322–31.

5. Ali F, Dickfeld TM, See VY, et al. A tale of 2 hearts: simultaneous dual tachycardias occurring 22 years after orthotopic heart transplantation. J Am Coll Cardiol Case Rep 2019;1:235–7.

6. Nof E, Stevenson WG, Epstein LM, Tedrow UB, Koplan BA. Catheter ablation of atrial arrhythmias after cardiac transplantation: findings at EP study utility of 3-D mapping and outcomes. J Cardiovasc Electrophysiol 2013;24:498–502.

7. Chyou JY, Hickey K, Diamond L, et al. Atypical electrocardiographic features of cavotricuspid isthmus-dependent atrial flutter occurring during left atrial fibrillation ablation. Ann Noninvasive Electrocardiol 2010;15:200–8.

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