Successful Transcatheter Ablation of Ectopic Atrial Tachycardia in Young Patients Using Radiofrequency Current

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Walsh et al, in this issue of Circulation, report the results of a series of pediatric patients who underwent radiofrequency catheter ablation of atrial ectopic tachycardias that had resulted in ventricular dysfunction. The authors point out that chronic tachycardias, as opposed to the more frequently occurring paroxysmal tachycardias, may produce a chronic and sometimes severe depression of ventricular dysfunction. The exact pathophysiological mechanism of this dysfunction is not fully understood. It is not merely due to a physical inability of the heart to contract at an elevated rate, because the decrease in function does not occur instantaneously at the onset of tachycardia nor does improvement occur instantaneously at the termination of tachycardia. The onset of dysfunction occurs over a variable period of time that depends on the rate of the tachycardia, the percent of time the patient is in tachycardia, and the age of the patient. Although A-V synchrony may play some role, normal A-V synchrony with a normal PR interval may still lead to ventricular dysfunction. A rate of 120 beats per minute in a 10-year-old patient, which is present 100% of the time, will result in congestive heart failure in a period of 1–2 years. Faster rates will result in ventricular dysfunction more quickly. In animals, rates of 200 beats per minute will result in severe ventricular dysfunction with congestive heart failure in 1–2 weeks. If tachycardia is intermittent and occurs less than 50% of the day, ventricular dysfunction usually does not occur.

The sequence of parameters of ventricular dysfunction begins with dilatation. Left ventricular end-diastolic dimension is the first echocardiographic index to become abnormal. Symptoms appear very late, usually only after the left ventricular shortening fraction is less than 15%. Initial symptoms may be syncope, exercise intolerance, or shortness of breath.

When the tachycardia is terminated, symptoms are often relieved immediately. Ventricular function normalizes over weeks to months. The shortening fraction normalizes first but left ventricular size lags behind by months. Normalization of ventricular function occurs whether tachycardia is stopped by pharmacological or nonpharmacological means. Normalization can occur even if the treatment is creation of A-V block and thus A-V synchrony is not maintained.

Our knowledge of the sequence of onset of ventricular dysfunction allows us to tailor our treatment. Medical treatment could be carried out until ventricular dilatation occurs. The shortening fraction should not be allowed to fall below normal. Nonpharmacological treatment of any chronic tachycardia, most commonly atrial ectopic tachycardia or the permanent form of junctional reciprocating tachycardia, should now begin with radiofrequency catheter ablation (RFCA) of the arrhythmogenic substrate. RFCA is also a treatment option for patients who are intolerant of drug treatment or who do not want to take drugs.

The technique has been shown to be safe enough in the short-term in this series to outweigh possible late complications. Because the ablation is performed in the atrium, if RFCA causes late dysrhythmia, they will be atrial. These would be less life-threatening than ventricular dysrhythmia that might occur if ventricular dilatation were allowed to persist. Although this series consisted of only 12 patients, we have used atrial RFCA to ablate accessory connections in over 50 infants and children with no perforations or proarrrhythmias. Follow-up on RFCA of accessory connections is short, as it was for this series. Surgical treatment of accessory connection and atrial ectopic tachycardias in children has been carried out for over a decade without any reports of late atrial arrhythmias. All this evidence suggests that atrial-level RFCA will be safe and should be considered the treatment of choice for atrial ectopic tachycardia.

References


KEY WORDS • Editorial Comments • transcatheter ablation
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