A 79-year-old man underwent atrial flutter ablation and placement of a biventricular pacer for intermittent complete heart block. His medical history is significant for Ehlers-Danlos syndrome and associated valvular heart disease, status post-aortic valve replacement with a bioprosthetic valve 2 years earlier. A transthoracic echocardiogram (TTE) 2 months before the procedure showed a bioprosthesis with moderate valvular stenosis, mild mitral regurgitation (MR) without prolapse, and mild tricuspid regurgitation (TR) without prolapse. His atra were dilated, and left ventricular function was normal. During the TTE, the patient was in normal sinus rhythm; the right ventricular inflow view of the tricuspid valve is shown in Movies I and II in the online Data Supplement. Maximum TR velocity by using continuous-wave Doppler was 2.7 m/s (Figure 1). The ablation procedure pacer implantation went well without noted complications.

While shaving in the days following the procedure, the patient noticed a bulging area in his neck. The patient and his family noted this large pulsation on both sides of his neck, but more pronounced on the right. The device interrogation note in the days after the procedure made no mention of either this concern or of physical examination. The patient and family expressed concern for an aneurysm to the cardiologist during the postprocedure follow-up appointment 2 months postprocedure. During the physical examination, the provider noted giant C-V waves, which diminished with moderate pressure (Movie III in the online-only Data Supplement), suggesting venous rather than arterial pulsation. At the time of the follow-up visit, the patient did not report symptoms, such as lower extremity swelling or dyspnea on exertion, and the provider ordered an echocardiogram.

A TTE while in a ventricular-paced rhythm showed severe TR with apparent malcoaptation of leaflets motion with the right ventricular pacer lead in place (Movies IV and V in the online-only Data Supplement, Figures 2 and 3), with right ventricular dilation and normal left ventricular function. Continuous-wave Doppler of the regurgitation showed peak velocity largely unchanged (≈2.5 m/s), although the waveform was much denser (Figure 4). After a few weeks, the patient reported increasing dyspnea on exertion and bilateral lower extremity swelling. In discussing treatment options with the patient and his family, the provider and patient made the decision to remove the right ventricular lead and to treat his right-sided heart failure medically, including aggressive diuresis. A right heart catheterization performed during lead removal confirmed giant C-V waves (Figure 5). Lead extraction was uncomplicated, and the patient did well afterward with a return to baseline functional status. The left ventricular lead remained in place to treat his underlying heart block, with repositioning to ensure adequate capture threshold. Immediately after lead removal, TTE was largely unchanged (Movies VI and VII in the online-only Data Supplement). Over the course of the next few months, the patient did well with a return to baseline functional status and resolution of the bulging pulsation in the neck. A TTE 2 months after the procedure while in a paced rhythm showed only mild TR, with waveforms comparable with baseline, although the ventricle remained somewhat dilated (Movies VIII and IX in the online-only Data Supplement, Figure 6).

TR is a common complication of right ventricular pacer lead implantation, although the literature is mixed regarding worsening of TR.1 Severe TR after lead placement is very uncommon,2 and right-sided heart failure is rare.3 Acoustic shadowing from the lead may also lend itself to difficulty interpreting the severity of TR on echocardiography.3 This case is atypical in progression from mild to severe TR, whereas most patients have a worsening by only 1 grade on a 1+ to 4+ scale.1 In this patient, Ehlers-Danlos syndrome may have contributed to the severity of TR, although some evidence shows the tricuspid valve may be the least involved valve in Ehlers-Danlos syndrome–related valvular abnormalities.4 Currently, limited data exist about the best management of lead-related TR, including which option is preferred among lead extraction, surgical revision, or medical management only.1 It was psychologically important to this patient to remove the lead, and extraction timing was close enough to the original procedure to be considered lower risk.

Disclosures
None.
References


Figure 1. Continuous-wave Doppler waveforms of mild TR, with maximum TR velocity of ≈2.7 m/s. TR indicates tricuspid regurgitation.

Figure 2. Still-frame image from echocardiogram showing malcoaptation of tricuspid valve leaflets with pacer lead.

Figure 3. Still-frame image from echocardiogram with Doppler imaging showing severe tricuspid regurgitation.

Figure 4. Continuous-wave Doppler waveforms of the severe tricuspid regurgitation, with maximum regurgitation velocity of ≈2.5 m/s. Note much denser waveforms in comparison with baseline.
Figure 5. Right atrial pressure waveform showing giant C-V waves taken during right ventricular pacer lead removal.

Figure 6. Continuous-wave Doppler waveforms of TR 2 months after lead extraction, showing waveforms comparable to baseline, with much less density than before lead extraction. TR indicates tricuspid regurgitation.
Severe Tricuspid Regurgitation With Giant C-V Waves After Pacer Implantation
Jarrod D. Frizzell, Michael B. West and Richard L. Snider

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