

Editorial



Management of Tachycardia-bradycardia Syndrome: To Pace or to Ablate, That Is the Question

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Sinus node dysfunction (SND) and atrial tachyarrhythmias, particularly atrial fibrillation (AF), often coexist and influence each other. Concomitant SND is reported to be present in 1 of 6 patients with AF¹⁾ and atrial arrhythmias coexist in more than half of patients with SND.²⁾³⁾ Tachycardia-bradycardia syndrome (TBS) is a subset of symptomatic SND which is characterized by prolonged sinus pauses on termination of atrial tachyarrhythmia such as AF or atrial tachycardia (AT). Because of the long pauses following termination of AF or AT, recurrent syncope or presyncope commonly occurs in patients with TBS. Although cardiac pacing has not been evaluated in specific clinical trial including patients with TBS, permanent pacemaker is conventionally indicated in patients with symptomatic sinus pause. However, the disadvantages of cardiac pacing are transvenous leads related complications, pocket infection, and progression of AF. Even though the complex relationship between SND and atrial arrhythmias remains unknown, the primary mechanism of SND associated with TBS is thought to be electric remodeling induced by AF and thus potentially reversible.⁴⁾ With the advancement of catheter ablation of AF, previous studies have demonstrated that successful ablation of AF can lead to improvement of sinus node function and may obviate the need of pacemaker implantation.⁵⁾⁶⁾

In this issue of *Korean Circulation Journal*, Cho et al.⁷⁾ present long-term clinical outcomes of radiofrequency catheter ablation (RFCA) versus pacemaker implantation in patients with TBS. A total of 217 patients with TBS were included and outcomes of catheter ablation (n=108) were compared to pacemaker implantation (n=109). During mean follow-up period of 3.5±2.0 years, the RFCA group showed better sinus rhythm maintenance and most RFCA patients (92.6%) did not require pacemaker implantation. The composite endpoint of cardiovascular rehospitalization and death was not significantly different between 2 groups. They concluded that RFCA is an effective alternative to pacemaker implantation in patients with TBS. One of the major strengths of this study is that it included a relatively large number of patients with a relatively long-term follow-up duration. As far as I know, this is the largest observational study which investigated long term outcome of catheter ablation in patients with TBS. In addition to that, another advantage of current study is that they reported hard endpoints including death, cerebral infarction, and myocardial infarction. Interestingly, incidence of cerebral or myocardial infarction was lower in the RFCA group although this trend did not reach statistical significance. This might be associated with the finding of the

study that the risk of progression to persistent AF was significantly lower in the RFCA group. A previous report has shown that greater AF burden was associated with higher risk of ischemic stroke risk.⁸⁾ Thus, reducing AF burden by catheter ablation may lower the risk of stroke. This study adds to growing body of evidence regarding the feasibility of catheter ablation as a first line treatment of patients with TBS. From this study, it is evident that most SND in patients with TBS may results from AF due to reversible electric remodeling (rather than irreversible structural remodeling) and successful suppression of AF by catheter ablation may provide improvement of SND. However, the limitations of this approach deserve be addressed.

First of all, the individual clinical manifestation and interactions between AF and SND are highly variable. Clearly, AF may cause SND and catheter ablation can improve SND in majority of patients, however, some patients develop irreversible structural remodeling despite of successful catheter ablation for AF. The treatment strategy should be individualized according to the predominant clinical manifestation of the 2 disease entities. Catheter ablation will benefit patients with predominantly AF and secondary SND, and pacemaker implantation may be the treatment of choice for patients with predominant intrinsic SND. In our experience, the length of pause has important clinical implications, because which is not only associated with severity of symptoms but also related with future pacemaker implantation. A study conducted by our group showed a long pause of 6.3 seconds or longer on cessation of AF was an independent predictor of pacemaker implantation after catheter ablation.⁹⁾ Kim et al.⁹⁾ investigated long-term clinical outcome in 121 patients with TBS who underwent catheter ablation. During mean follow up of 29 months, AF or AT recurrence rate after catheter ablation were 19% and permanent pacemaker was required in 11 (9.1%) patients. Multivariate analysis showed that a pause of 6.3 seconds or longer at baseline was associated with the need to implant a permanent pacemaker even after catheter ablation. In addition, the major concern with ablation strategy is recurrence of AF. Catheter ablation of AF has substantial recurrence rate during long-term follow-up. Besides, up to 50% of patients experience early recurrences of AF within 3 months after ablation. However, this does not necessarily mean treatment failure and repeat ablation is not recommended during blanking period because only half of these patients will suffer late recurrences.¹⁰⁾ Therefore, there are inevitable cases where symptomatic sinus pauses due to early recurrence result in pacemaker implantation even though the catheter ablation is not failed. Since progression of SND can occur after a long period of time despite the elimination of atrial tachyarrhythmia in TBS patients, a careful follow-up is necessary even in patients with successful ablation.

In summary, the current study by Cho et al.⁷⁾ makes an important contribution to our understanding of the SND in patients with paroxysmal AF and its management. The catheter ablation can be a reasonable alternative to pacemaker implantation in majority of patient with TBS. The authors are to be congratulated on achieving excellent long-term outcome in catheter ablation of TBS and thus addition of supportive evidence regarding management of TBS. Nevertheless, we'd better keep in mind that the decision of whether to ablate or pace as the first-line treatment of TBS should be individualized based on various clinical characteristics including age, comorbidities, severity of symptom, the length of pause, and intrinsic SND. Future prospective clinical trials are needed to provide more evidence-based treatment recommendations to patients with TBS.

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