Cardioneuroablation for symptomatic bradyarrhythmia: for whom it fails?

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Funding Acknowledgements: None.

Background: Cardioneuroablation (CNA) has been proposed as a new therapeutic approach in selected patients with symptomatic functional bradyarrhythmia including recurrent neurally-mediated syncope.

Purpose: In patients after CNA, we investigated the potential predictors of the recurrence of clinically significant bradyarrhythmia.

Methods: A retrospective study included 187 consecutive patients (age: 40 ± 12 years; 57 % of males; predominant AV nodal phenotype of the disorder in 37 % of patients; post-atropine sinus rate acceleration by 72 ± 31 %) who underwent their first CNA at our centre from 2014 to 2022 and were followed for the minimum of 3 months. Bilateral radiofrequency ablation was performed under general anaesthesia by irrigated-tip catheter at empirical sites of ganglionated plexi (GP) with the navigation by 3D electroanatomic mapping system and intracardiac echocardiography. Anterior right GP and posteromedial left GP were always targeted to modulate the innervation of both sinoatrial and atrioventricular nodes, irrespective of the clinical manifestation of the disease. The loss of responsiveness of both nodes to extracardiac vagus nerve stimulation (frequently bilateral) was the procedural endpoint. The association of baseline, procedural, and early follow-up characteristics with the recurrence of clinically significant bradyarrhythmia was analyzed.

Results: CNA with the procedural duration of 154 ± 32 min and radiofrequency time of 14 ± 7 min resulted acutely in sinus rate acceleration by 27 ± 13 bpm, shortening of AH interval by 16 ± 28 ms, an increase of Wenckebach point by 28 ± 28 bpm, shortening of AV node effective refractory period by 114 ± 128 ms, and sinus node recovery time by 462 ± 867 ms. At the 3-month visit, the sinus rate was still significantly higher (83 ± 14 bpm) than at baseline (61 ± 13 bpm); with acceleration by 23 ± 14 bpm. During a median follow up of 33 months (IQR: 18-48 months), recurrence of clinically significant bradyarrhythmia was documented in 18 (10 %) patients. Re-CNA was performed in 11 patients and was scheduled in 3 patients. In 6 (3 %) patients, a pacemaker was finally implanted. Compared to the rest of the population, patients with bradyarrhythmia recurrence were non-significantly younger (36 ± 12 vs. 40 ± 12 years, P = 0.16) and had non-significantly less acceleration of sinus rate at the 3-month post-CNA visit (by 18 ± 11 vs. 23 ± 13 bpm, P = 0.10) suggesting a trend to more pronounced reinnervation of the sinus node.

Conclusion: Long-term clinical efficacy of CNA is reasonably high. We did not identify practically useful predictors of CNA failure. This investigation was significantly limited by the low rate of clinical events.