

2021 ESC Guidelines on Cardiac Pacing and Cardiac Resynchronisation Therapy

Gheorghe-Andrei Dan 

Carol Davila University of Medicine, Bucharest, Romania

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Correspondence: Gheorghe-Andrei Dan, Carol Davila University of Medicine, Colentina University Hospital, Bucharest, Romania. E: andrei.dan@gadan.ro

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Eight years have passed since the last European guidelines on cardiac pacing and resynchronisation therapy (CRT), an interval in which concepts have been refined and new concepts developed based on new data. These have been included in the recently published 2021 guidelines.¹

Among the novel approaches included in the updated guidelines is a comprehensive algorithm to evaluate patients with bradycardia or conduction disease. The algorithm includes: polysomnography; genetic testing in patients with early onset of progressive cardiac conduction disease (<50 years old); specific laboratory tests when a determined cause is suspected (such as thyroid function tests, Lyme titer, electrolytes); cardiac imaging when structural myocardial disease is suspected; carotid sinus massage (after excluding carotid stenosis) and tilt tests for patients who have suspected recurrent reflex syncope. There is also exercise testing for patients who experience symptoms during or after exercise or there is a raised suspicion of chronotropic incompetence and infranodal site of block.


Electrophysiological testing is reserved for patients with bifascicular block when the cause of syncope is still unexplained, when the cause of bradycardia is not excluded by non-invasive testing or when urgent empirical pacemaker (PMK) implantation is preferred based on clinical judgement. Ambulatory ECG monitoring (with longer periods of recording as the frequency of symptoms decreases) is recommended to correlate the rhythm disturbance with symptoms and an implanted loop recorder (ILR) is recommended for patients with infrequent episodes of bradycardia (less than once per month) in whom the non-invasive testing was irrelevant.

Several new recommendations for pacing include patients with the bradycardia-tachycardia form of sinus node disease (SND) both for symptomatic relief and to enable pharmacological treatment if ablation of tachyarrhythmia is not possible. Minimisation of the unnecessary ventricular pacing is a class IA indication in patients with SND and a DDD type of PMK. Dual-chamber pacing should be considered in patients with adenosine-sensitive syncope and paroxysmal atrioventricular block (AVB) lasting for more than 10 seconds and in patients aged over 40 years with severe,

recurrent, unpredictable syncope and asystolic pauses (>3 seconds if symptomatic or >6 seconds if asymptomatic) documented spontaneously or accompanied by symptoms during carotid sinus massage or tilt test.²

Several refined indications offer advice on device management in special conditions. PMK implantation is recommended if AVB does not resolve in less than 5 days in patients with acute MI (AMI). Also, a new recommendation refers to early device implantation (defibrillator CRT – CRT-D/or pacemaker CRT – CRT-P) in selected patients with anterior AMI and acute heart failure. Permanent PMK implantation is a class I indication for patients with persistent AVB or new onset alternating bundle branch block after transcatheter aortic valve implantation (TAVI); also, this indication should be applied in patients with pre-existing right bundle branch block with new conduction disturbance peri-procedure for TAVI.

CRT is recommended for patients with heart failure in sinus rhythm with left ventricular ejection fraction (LVEF) <35%, QRS duration >150 ms, and left bundle branch block (LBBB) QRS morphology despite optimised medical therapy. With a narrower QRS of 130–149 ms and non-LBBB morphology, the recommendation is less sustained. A CRT-D device should be implanted in patients suitable for CRT who are also indicated for an ICD. CRT rather than right ventricular (RV) pacing is recommended in patients with LVEF <40% and AF and anticipated RV pacing >20% or LVEF <50% who are undergoing AV junctional ablation. His bundle pacing should be considered in patients with an indication for CRT in whom the coronary sinus lead implantation was unsuccessful. Leadless pacing could be considered in patients with difficult or impossible upper venous access or who are at high risk for pocket infection. Temporary transvenous pacing is recommended in cases of haemodynamic compromising bradyarrhythmia refractory to intravenous chronotropic drugs. MRI could be performed safely following manufacturer's instructions in patients implanted with MRI-conditional PMK and leads.

Despite the many gaps still limiting our knowledge, the 2021 guidelines on cardiac pacing and CRT represent a major step forward and should be rapidly implemented in clinical practice. 

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