

Endless Loop Tachycardia: An Uncommon Entity in the Common Devices

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With advancements in modern medicine and improvement in life expectancy, the prevalence of patients with pacemakers is significantly higher. While pacemakers offer significant therapeutic benefits in various conditions such as high-degree atrioventricular block and sick sinus syndrome, they also come with potential complications. These complications include pacemaker site or lead infections, pacemaker-induced cardiomyopathy, and pacemaker-mediated tachycardia.

Pacemaker-mediated tachycardia (PMT) also known as endless loop tachycardia, is an iatrogenic arrhythmia that occurs primarily in patients with dual chamber pacemakers with at least atrial-sensing and ventricular pacing functions. PMT usually occurs due to re-entry, most often triggered by a premature ventricular complex and leading to a disruption in normal conduction through retrograde conduction to the atrium, subsequent premature activation of the atrial lead of the pacemaker, and initiation of the re-entry circuit. This setup is sometimes called endless loop tachycardia.¹ The pacemaker generally acts as the anterograde limb with the atrioventricular (AV) node or an accessory pathway acting as the retrograde limb of the re-entry circuit. PMT can also occur due to capturing of sinus tachycardia or atrial arrhythmias or tracking of electromagnetic devices.²

PMT is notably more common in patients with AV block and sick sinus syndrome.¹ Studies have shown that up to 6% of patients with pacemakers have had at least one episode of PMT.¹

PMT is most commonly an incidental finding during the evaluation of a patient, but patients can also present with palpitations, chest pain, dizziness, lightheadedness, and syncope.

Our case describes a 90-year-old male with incidental finding of PMT with effective management.

Case

A 90-year-old male with a past medical history of sick sinus syndrome and paroxysmal atrial fibrillation with a permanent pacemaker in situ was admitted for management of community-acquired pneumonia. His hospital course was complicated by the development of wide complex tachycardia with a heart rate mostly around 130 bpm with the heart rate not exceeding the upper set limit of the pacemaker.

The wide complex tachycardia was unresponsive to both rate and rhythm-controlling medications like metoprolol and amiodarone, respectively. The pacemaker was switched to magnet mode with subsequent termination of the tachycardia, diagnostic of PMT.

The tachycardia was successfully terminated by switching the pacemaker to magnet mode. Magnet mode switches off the atrial sensing activity, thus terminating the re-entry circuit by disengaging the anterior limb of the circuit.¹

Definitive management was achieved by increasing the post-ventricular atrial refractory period (PVARP) of our patient's pacemaker to 300 milliseconds, which prevented further episodes of PMT.

Definitive management is the reprogramming of the pacemaker to prevent the recurrence by increasing the duration of the PVARP to prevent premature activation of the atrial lead.¹

Discussion

Although PMT can go undetected for a long time, prolonged PMT can lead to a worsening of cardiac function and heart failure by reduced diastolic filling time due to tachycardia,¹ as well as increased cardiac workload and cardiac burnout; thus, it needs to be promptly addressed.

The post-ventricular atrial refractory period (PVARP) is initiated after a paced or a sensed

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ventricular event. PVARP prevents sensing or tracking premature or retrograde P waves, as a longer PVARP protects against PMT.

If the premature or retrograde P waves are tracked by the pacemaker, then PMT is initiated. PMT should be considered in all patients presenting with a wide complex tachycardia in the presence of a dual-chamber pacemaker. Acute termination is by switching the pacemaker to magnet mode, which breaks the PMT as it removes the anterograde limb of the reentrant circuit. Definitive management is reprogramming to prevent recurrence, as in our patient.

It is also important to note the importance of frequent follow-up of patients with pacemakers, especially dual-chamber pacemakers and young patients with longer life expectancies, as PMT can go undetected while worsening heart failure. ■

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