Phantom Arrhythmia: Is It a Clinical Myth?

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Artificial pacemakers and automatic implantable cardioverter-defibrillators are life-saving devices that generally improve patient quality of life. However, some patients report adverse effects such as anxiety, depression, and phantom shocks or, less often, phantom arrhythmia. The authors report the case of an 81-year-old woman who received a permanent artificial pacemaker and later described having rapid and irregular heartbeats and “pounding sounds,” which were suggestive of arrhythmia. However, a cardiac event monitor did not document any abnormalities. Although literature is limited regarding the phenomenon of phantom arrhythmia, the authors propose to define it as a cluster of symptoms suggestive of an arrhythmia perceived by a patient but not clinically verified.


Artificial pacemakers were introduced in 1932 by Albert S. Hyman, MD, for cardiac resuscitation. However, trials of the first pacemaker were delayed until 1948 when improved battery technology was available. In 1958, the first artificial pacemaker, which had stainless steel thread electrodes and a battery that required weekly recharging, was implanted in a human patient.

Since its inception, pacemaker technology has advanced to include programming, sensing, separate atrial and ventricular pacing, biventricular pacing, and defibrillation. In 2005, nearly 50 years after the first pacemaker was implanted, 180,000 pacemaker procedures occurred in the United States alone.

The first automatic implantable cardioverter-defibrillator (ICD) was implanted in 1980 at Johns Hopkins Hospital in Baltimore, Md. In 1985, the US Food and Drug Administration approved the use of ICDs to help prevent the 300,000 cases of sudden cardiac death each year. Although ICDs are less common than pacemakers, some 91,000 ICDs were implanted in US patients in 2005.

Various studies have investigated quality of life improvements for patients with artificial pacemakers or other implantable cardiac devices. Most patients report being less angry, worried, and sad as a result of these devices, also noting other positive physical and psychological outcomes.

Phantom shock has been defined as an electric jolt sensation that the patient perceives even though the implantable device or other cardiac event monitor indicates that no such event occurred. Although patients with ICDs had a decreased fear of dying, one study showed that one-third of these individuals—especially those who reported being anxious about automatic ICD shocks—had greater anxiety levels and increased avoidance behaviors.

Patients with permanent pacemakers have similar quality-of-life scores and incidents of anxiety, depression, and general psychiatric distress as those with ICDs. In fact, with regard to feelings of physical discomfort, limitations, depression, general well-being, and duration of adjustment, Duru et al reported no differences between patients receiving pacemakers and those receiving ICDs.

As a result, patients with permanent pacemakers or ICDs might have symptoms of phantom arrhythmias or phantom shocks. However, the subject of phantom arrhythmia has received little attention in medical literature, and as of yet, the term has not been well defined.

We describe the case of a patient with a permanent pacemaker who had multiple episodes of phantom arrhythmia. We define phantom arrhythmia in light of the improved technology for clinically monitoring and verifying patient symptoms.

Report of Case

An 81-year-old woman presented to Sienna Cardiology in Henderson, Nev, complaining of irregular heartbeat, pounding, and “dizzy spells,” which were consistent with symptomatic paroxysmal atrial fibrillation. She lived independently and had no history of clinically significant psy-
chiastic issues or dementia. On physical examination, her heart rate was 52 beats per minute and her blood pressure was 136/80 mm Hg.

A cardiac event monitor was placed June 30, 2006, for 30 days. The monitor recorded multiple episodes of sinus bradycardia and phasic and nonphasic sinus arrhythmia with heart rates as low as 30 beats per minute. Cardiac events included episodes of paroxysmal atrial fibrillation, multiple premature atrial contractions, premature ventricular contractions, and a transient first-degree atrioventricular block. The patient reported having dizziness, blurred vision, and stomach pain when she was wearing the monitor.

Sick sinus syndrome was diagnosed, and the patient received a dual-chamber rate responsive permanent Victory pacemaker (St Jude Medical, St Paul, Minn) in mid-July 2006. Implantation data showed P wave 3.5 mV with capture threshold 0.75 V at 0.5 millisecond pulse width. The R wave was 8.9 mV with capture threshold 1 V at 0.5 millisecond pulse width. The final capture threshold improved to 0.625 V at 0.5 millisecond in the atrium and 0.5 V at 0.5 millisecond pulse width in the ventricle.

One week postimplant, the patient presented to the clinic for pacemaker interrogation. Her pacemaker data showed atrial pacing at 97% and ventricular pacing at 15%. No mode switching was recorded. However, the patient described new symptoms including hearing her heartbeat at night and “feeling” her pacemaker. The maximum sensor heart rate was decreased from 130 to 120 beats per minute, but her symptoms persisted. These recurrent symptoms led to approximately twelve pacemaker interrogations and adjustments between July 2006 and November 2007, some of which occurred as closely as 2 days apart.

Adjustments included changing ventricular intrinsic preference from 150 to 100 millisecond and, after turning premature ventricular contraction off, resetting it back to 150 milliseconds. Ventricular sensitivity was decreased from 2.0 to 3.0 mV. We also tried decreasing atrial and ventricular outputs from 2.5 to 2.0 V, increasing paced atrioventricular delay from 200 to 225 milliseconds, changing sensed atrioventricular delay from 150 to 180 milliseconds, and adjusting the postventricular atrial refractory period from 250 to 275 milliseconds.

The pacemaker was interrogated in different positions and with high voltage pacing. None of the changes reproduced the symptoms during interrogation or relieved the patient’s symptoms after leaving the clinic. Also, there was no evidence of diaphragmatic stimulation or lead fracture.

The patient was again placed on a cardiac event monitor for a month beginning in September 2007. During that time, the patient had 30 symptomatic events that included strong, irregular, and rapid heartbeats; hearing pounding and roaring sounds as well as clicking and buzzing; and seeing images in front of her. The patient kept detailed records of her symptoms, blood pressure, and pulse rate during each episode. However, the rhythms recorded during the symptoms were normal sinus or paced rhythms. There was no evidence of ventricular-atrial conduction or atrioventricular synchronization issues during pacemaker evaluation at different settings.

The patient’s variety of symptoms and frequent follow-up visits prompted us to perform additional blood tests, cardiac studies, and an ear, nose, and throat evaluation. There was no evidence of coronary artery disease, electrolyte abnormality, hyperthyroidism, or structural heart disease.

In September 2007, the patient telephoned our medical practice to report feeling a shock from her pacemaker. She inquired if an ICD had been implanted accidentally. The patient was reassured and was offered psychological counseling.

The patient continues to visit the clinic, and paroxysmal atrial fibrillation has since been diagnosed. Although she still has symptoms related to atrial fibrillation and phantom arrhythmia and can now differentiate between the two, she no longer worries about the phantom arrhythmia. However, she has complained about the atrial fibrillation, and she has been prescribed antiarrhythmic medications and warfarin sodium. The patient has been receiving ongoing follow-up care from an electrophysiologist and has refused ablation.

Discussion

Pacemaker implantation can cause a hyperadrenergic state, which is a common physiologic phenomenon in patients. Clinically, this condition, as well as associated anxiety, can be managed with medications such as β-blockers or anxiolytics. However, their effect on phantom shocks and phantom arrhythmia are currently unknown.

The term phantom arrhythmia was first mentioned by Corday et al. in 1965 with the introduction of the pocket-electrocardiograph. The authors defined phantom arrhythmia as an arrhythmia that exists but has not been documented by an electrocardiogram. The introduction of the ambulatory electrocardiographic monitor and long-term event recorders have led to an improved ability to identify arrhythmias.

In our patient, cardiac event monitoring has helped document cardiac rhythms before and after pacemaker implantation, yet no arrhythmias were recorded to account for her symptoms. We suggest a change in the definition of phantom arrhythmia that is more consistent with current technology. Phantom arrhythmia should be defined as a cluster of symptoms suggestive of an arrhythmia that are perceived by a patient with a cardiac device but cannot be verified clinically.

Despite having a clearer definition and understanding of phantom arrhythmia, our patient’s experience raises several questions:

- How many patients with pacemakers or ICDs have similar symptoms that go unnoticed, undocumented, or untreated?
Does this phenomenon represent a psychosomatic or adjustment disorder?

Are phantom arrhythmias a form of posttraumatic stress disorder?

More research is needed to answer these questions and find appropriate treatment options. Nevertheless, patients with phantom arrhythmia may benefit from reassurance and psychological counseling.

Conclusion

Although most patients who receive implanted cardiac devices have positive physical and psychological results, the adverse effects that some patients have can be unsettling for patients and their families. Physicians should discuss these potential adverse effects with their patients before and after the placement of any implantable cardiac device.

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References


