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Implantable Cardioverter-defibrillator

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Editorial

An Implantable Cardioverter-defibrillator (ICD) or Automated Implantable Cardioverter Defibrillator (AICD) is a device that may do defibrillation, cardioversion, and pacing of the heart, depending on the kind. For individuals at risk of sudden cardiac mortality due to ventricular fibrillation or ventricular tachycardia, the ICD is the first-line therapeutic and preventative therapy. Current device batteries endure six to 10 years; with advancements in technology (larger capacity batteries or potentially rechargeable batteries, this could be extended much beyond ten years. The lead (the electrical line connecting the device to the heart) has a significantly longer average lifespan, although it might fail for a variety of reasons, including insulation failure or conductor fracture, necessitating replacement.

The procedure for implanting an ICD system is similar to that for implanting a pacemaker. In actuality, ICDs are made up of two parts: an ICD generator and cables. The first component, or generator, is a computer chip or circuitry with RAM (memory), programmable software, a capacitor, and a battery, which is normally implanted behind the skin in the left upper chest. The second component of the system is an electrode wire or wires that are attached to the generator and passed through a vein to the heart's right chambers, similar to pacemakers. The lead frequently lodges in the right ventricle's apex or septum. ICDs, like pacemakers, can have one wire or lead in the heart (in the right ventricle, single chamber ICD), two leads (in the right atrium and right ventricle, dual chamber ICD), or three leads (in the right atrium and right ventricle, triple chamber ICD) (biventricular ICD, one in the right atrium, one in the right ventricle and one on the outer wall of the left ventricle). Pacemakers and ICDs differ in that pacemakers are also available as temporary devices and are primarily designed to repair slow heart rates, or bradycardia, whereas ICDs are frequently permanent precautions against sudden life-threatening arrhythmias [1-3].

Working mechanism

ICDs constantly monitor the heart's rate and rhythm and can provide therapy *via* an electrical shock if the heart rate rises above a certain threshold. Modern devices feature software that tries to distinguish between ventricular fibrillation and Ventricular Tachycardia (VT), and in the case of VT, it may try to pace the heart faster than its intrinsic rhythm to break the tachycardia before it proceeds to ventricular fibrillation. This is known as anti-tachycardia pacing or overdrive pacing (ATP). If the underlying rhythm is ventricular tachycardia, ATP is only effective. If the rhythm is ventricular fibrillation, ATP is never beneficial. Many current ICDs utilise a variety of algorithms to evaluate if a fast rhythm, supraventricular tachycardia, or ventricular tachycardia, is normal. The pace of the lower chambers of the heart (the ventricles) is compared to the rate of the upper chambers of the heart (the atria) (the atria). If the atria's rate is quicker than or equal to the ventricles' rate, the rhythm is most likely not ventricular and is usually more benign. If this is the case, the ICD either refuses to provide therapy or withholds it for a set period of time.

A ventricular tachycardia's regularity will be determined *via* rhythm discrimination. Ventricular tachycardia is usually regular. If the rhythm is abnormal, it's most likely owing to the conduction of an irregular rhythm that starts in the atria, such as atrial fibrillation. A case of torsades de pointes may be noticed in the image; this is a type of irregular ventricular tachycardia. In this situation, the ICD will determine the right diagnosis based on rate rather than regularity. Morphology discrimination examines the morphology of each ventricular beat and compares it to the morphology of a regularly conducted ventricular impulse for the patient, as determined by the ICD. This normal ventricular impulse is frequently an average of a number of the patient's normal beats obtained recently, and is referred to as a template.

People who have a cardioverter-defibrillator implanted can live normal lives. In most cases, the ICD does not improve the patient's quality of life, while it may provide a high level of confidence. Living with an ICD, like having a pacemaker, imposes some limitations on a person's lifestyle. The ICD is "half the size of your phone and a little thicker, in my chest and has two cables connecting to it... inserted into the bottom of your heart," according to a patient who had an ICD implanted in 2016 after cardiac arrest. I chose to have it placed beneath my pectoral muscle, which means you can't see it, but you can see the wires in my chest if you want to [4,5].

Conflict of Interest

None.

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