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Implantation of a Cardioverter-Defibrillator in a Cardiac Patient

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Description

An implantable cardioverter-defibrillator (ICD) or Automated Implantable Cardioverter Defibrillator (AICD) is a device that, depending on the kind, can do defibrillation, cardioversion, and heart pacing. The ICD is the first-line therapeutic and preventative therapy for people who are at risk of sudden cardiac death owing to ventricular fibrillation or ventricular tachycardia. Current device batteries last six to ten years; however, with technological breakthroughs (higher capacity batteries or maybe rechargeable batteries), this could be extended considerably further. The lead (the electrical line that connects the device to the heart) has a much longer average lifespan, albeit it may fail for a variety of causes, such as insulation failure or conductor fracture, needing replacement.

A device that, depending on the type, can perform defibrillation, cardioversion, and heart pacing is known as an implantable cardioverter-defibrillator (ICD) or an automated implantable cardioverter Defibrillator (AICD). For individuals who are at risk of sudden cardiac death as a result of ventricular tachycardia or fibrillation, the implantable cardioverter defibrillator (ICD) is the first-line therapeutic and preventative treatment. Battery life for current devices is six to ten years; However, this could be extended significantly further with technological breakthroughs (such as rechargeable or larger batteries). The lead, which is the electrical line that connects the device to the heart, has a much longer average lifespan, but it may need to be replaced for a variety of reasons, like insulation failure or conductor fracture.

Similar to how a pacemaker is inserted, an ICD system is also inserted. Actually, there are two parts to ICDs: a generator for an ICD and cables. The first component, or generator, is typically an implanted computer chip or circuitry with RAM (memory), programmable software, a capacitor, and a battery in the left upper chest. The second part of the system, like pacemakers, is an electrode wire or wires that connect to the generator and travel through a vein to the right chambers of the heart. The right ventricle's apex or septum is frequently where the lead gets stuck. Like pacemakers, ICDs can have one wire or lead in the heart (called a "single chamber ICD in the right ventricle"), two leads (called a "dual chamber ICD in the right atrium and right ventricle"), or three leads (called a "triple chamber ICD in the right atrium and right ventricle"). ICDs and pacemakers differ in that ICDs are frequently used as permanent protection against sudden life-threatening arrhythmias [1-3]. Pacemakers can be used temporarily to treat bradycardia, or slow heart rates.

Mechanism of operation

ICDs keep monitoring the heart's rate and rhythm, and if the rate exceeds a set threshold, they can deliver therapy in the form of an electrical shock. Modern devices have software that attempts to discern between ventricular arrhythmias and Ventricular Tachycardia (VT), and in the case of VT, it may attempt to pace the heart faster than its inherent rhythm in order to break the tachycardia before it progresses to ventricular fibrillation. This is referred to as anti-tachycardia or overdrive pacing (ATP). ATP is only effective if the underlying beat is ventricular tachycardia. ATP is never helpful if the rhythm is ventricular fibrillation many modern ICDs employ a number of algorithms to determine if a rapid rhythm, supraventricular tachycardia, or ventricular tachycardia is acceptable. The rate of the ventricles (lower chambers of the heart) is compared to the rate of the atria (upper chambers of the heart) (the atria). If the rate of the atria is faster than or equal to the rate of the ventricles, the rhythm is still most likely not ventricular and is therefore more benign. If this is the case, the ICD will either refuse or withhold therapy for a predetermined length of time.

Rhythm discrimination will be used to determine the regularity of a ventricular tachycardia. The tachycardia in the ventricles is usually regular. If the rhythm is abnormal, it's mostly certainly due to the transmission of an irregular rhythm that begins in the atria, such as atrial fibrillation. The image may show a case of torsade's de pointes, which is a kind of irregular ventricular tachycardia. In this case, the ICD will use rate rather than regularity to identify the correct diagnosis. The morphology of each ventricular beat is examined and compared to the morphology of a routinely conducted ventricular impulse for the patient, as established by the ICD. This normal ventricular impulse is often an average of a number of the patient's recent normal beats.

ICDs can administer therapy in the form of an electrical shock if the heart's rate or rhythm exceeds a predetermined threshold. Software in modern devices tries to tell the difference between ventricular arrhythmias and Ventricular Tachycardia (VT). In the case of VT, it may try to pace the heart faster than its natural rhythm to break the tachycardia before it turns into ventricular fibrillation. Overdrive pacing (ATP) or anti-tachycardia are two names for this. The underlying beat must be ventricular tachycardia for ATP to be effective. Many modern ICDs use a variety of algorithms to determine whether a rapid rhythm, supraventricular tachycardia, or ventricular tachycardia is acceptable. ATP is never helpful if the rhythm is ventricular fibrillation. The rate of the atria, which are the upper chambers of the heart, and the rate of the ventricles, which are the lower chambers of the heart, are compared. The rhythm is still probably not ventricular and is therefore more benign if the rate of the atria is faster than or equal to the rate of the ventricles. The ICD will either refuse therapy or withhold it for a predetermined amount of time if this is the case.

A ventricular tachycardia's regularity will be determined using rhythm discrimination. In most cases, the tachycardia in the ventricles is regular. The transmission of an irregular rhythm that begins in the atria, such as atrial fibrillation, is almost certainly the cause of the abnormal rhythm. A case of torsade's de pointes, an irregular ventricular tachycardia, may be visible in the image. The ICD will use rate rather than regularity to determine the correct diagnosis in this instance. The ICD-established morphology of a routinely conducted ventricular impulse for the patient is compared to the morphology of each ventricular beat. A number of the patient's most recent normal beats are typically used to calculate this normal ventricular impulse.

A cardioverter-defibrillator user can lead a normal life. The ICD may provide the patient with a sense of security, but it rarely improves the patient's quality of life. Like having a pacemaker, living with an ICD restricts one's lifestyle. "Half the size of your phone and a little thicker in my chest and has two cables connected to it... put into the bottom of your heart," says a patient who had an ICD implanted in 2016 following cardiac arrest. Although the wires in my chest can be seen, you won't be able to see it because it is concealed beneath my pectoral muscle [4,5].

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Conflict of Interest

None.

References

1. *Birnie, David H, Christie Sambell, Helen Johansen and Kathryn Williams, et al.* "Use of implantable cardioverter defibrillators in Canadian and US survivors of out-of-hospital cardiac arrest." *CMAJ* 177 (2007): 41-46.
2. Mirowski, M.M, William S. Staewen, Bernard Tabatznik and Albert I. Mendeloff. "Standby automatic defibrillator: An approach to prevention of sudden coronary death." *Arch Intern Med* 126 (1970): 158-161.
3. Simpson, Christopher S. "Implantable cardioverter defibrillators work-So why aren't we using them?" *CMAJ* 177 (2007): 49-51.
4. Matchett, Melissa, Samuel F. Sears, Garrett Hazelton and Kari Kirian, et al. "The implantable cardioverter defibrillator: Its history, current psychological impact and future." *Expert Rev Med Devices* 6 (2009): 43-50.
5. Mirowski, M, Philip R. Reid, Morton M. Mower and Levi Watkins, et al. "Termination of malignant ventricular arrhythmias with an implanted automatic defibrillator in human beings." *N Engl J Med* 303 (1980): 322-324.

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