## Cardiac Pacing

Cardiac pacemaker is an electronic device used to stimulate the heart to beat at a programmed rate. Patients whose heart is beating too slowly will require a pacemaker. It is about 2 inches in diameter and 1/3 inch thick, and consists of a battery (usually lasts 5 to 10 years), electronic components, and pacing leads to convey electrical signals between the pacemaker and the heart.

One or two pacing leads are used depending on the medical condition.

Under local anaesthesia, an incision about 2 inches long is made on the upper chest below the clavicle, either on the right or left side. Pacing leads are inserted into a vein and guided to the heart under fluoroscopy. The leads are then connected to the pacemaker which is implanted under the skin.

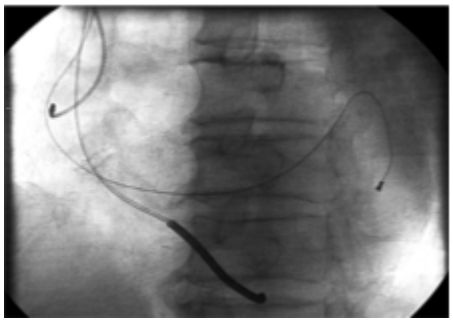
The procedure takes 1 to 2 hours and the patient is hospitalized for one to a few days. Patients with pacemakers can return to normal lives. However, regular follow-up with the cardiologist is required.

Biventricular Pacing

Some patients with severe heart failure may still be symptomatic despite intensive medical therapy. If their ECG showed prolonged intraventricular electrical conduction, their symptom may improve after biventricular pacing.

Conventionally only the right ventricle is paced in cardiac pacing. In biventricular pacing, both the right and left ventricles are paced. An extra pacing lead is required and is positioned in a cardiac vein to pace the left ventricle.

Biventricular Pacing

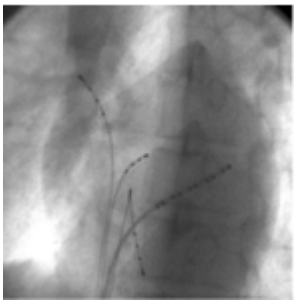


Electrophysiology Study ( EPS )

The normal heartbeat is the result of an electrical signal that follows a certain pathway in the heart. Heartbeats can become abnormal by being too fast, too slow, or traveling along abnormal pathways.

Patients with a heart rhythm disorder may present with palpitation, dizzy spells, syncope or cardiac arrest. An electrophysiology study will be considered if a diagnosis cannot be made by other simpler tests

EPS is a study of the electrical activity of the heart. It is used to confirm whether a patient's symptom is due to a heart rhythm disorder. It may also be used to find out the underlying cause of the heart rhythm disorder and guide treatment. During the procedure, patient will be given local anaesthesia. Long flexible catheters or electrodes will be inserted via peripheral veins into various sites of the heart under x-ray control. Different electrical signals are recorded. Stimulation of the heart will be performed. There may only be slight discomfort during the procedure, which usually takes 2 to 4 hours. The patient will be allowed home the next day.



Radiofrequency (RF) Catheter Ablation

Radiofrequency catheter ablation is a technique used in treatment of heart rhythm disorder (arrhythmia). RF energy is a low voltage high frequency form of energy that can produce small necrotic lesions several mm in size. The RF energy is passed through the electrode to heat the abnormal part of the heart and to cause a tiny burn. This will destroy an abnormal focus or interrupt an abnormal pathway in the heart.

The procedure is usually done at the same session of an EP study and the patient can be allowed home the next day.

RF catheter ablation has revolutionalised the treatment of many forms of cardiac rhythm disorder. It has become a first line treatment to cure many kinds of tachycardia. It spares the patient the need for life-long medical therapy or opened heart surgery.

Implantable Cardioverter Defibrillator (ICD)

Sudden cardiac death is due to arrhythmia including either ventricular fibrillation (VF) or sustained ventricular tachycardia (VT). These disorders often occur in patients with coronary heart disease, but could also occur in patients with other structural heart diseases. In a minority of patients, no underlying structural abnormality can be found. Patients who survive sudden cardiac death have a high risk of further episodes, which may be fatal. Despite using the best appropriate anti-arrhythmic drugs, arrhythmia recurrence rates are still 40-50% at five years.

Implantable cardioverter defibrillator (ICD) is an electronic device implanted in the human body.
It is connected to leads (wires) that are inserted through a vein into the heart.
Inside the ICD are a battery and a small computer that continuously monitors heart function.
When the ICD detects an abnormal rhythm that causes the heart to beat too fast and/or irregularly, it will deliver low energy electrical stimulation to control the heart beat or high energy defibrillation shocks that will be felt by the patient. The abnormal heart beat will then be converted to a normal rhythm. Modern

device has the back up of bradycardia pacing if the heart beats too slow.

The cardioverter defibrillator is implanted under the skin of the chest wall below the clavicle using a combination of local anaesthesia and intravenous sedation. During follow up, the device and its memory are interrogated. Any stored arrhythmic events are correlated with symptoms. If indicated, appropriate programming changes can be made or the patient's medication can be altered.

Survival from sudden death at one year after implantation ranges between 92 and 100%. An ICD is not a cure. Patients are still considered to be at risk of an arrhythmia, which might cause unconsciousness or cardiac arrest, if only for a few seconds before treatment is delivered. Anti-arrhythmic drugs still have a role in reducing the incidence of arrhythmias. Many of the patients with ICD also have coronary artery disease and poor left ventricular function, and are likely to require ongoing medical treatment.