

1. Introduction

The Implantable Cardioverter Defibrillator (ICD) has revolutionised the management of patients at risk of developing a life-threatening ventricular arrhythmia. Several clinical trials have testified to their effectiveness in reducing deaths from sudden cardiac arrest in selected patients, and the devices are implanted with increasing frequency.

ICDs are used in both children and adults.

ICD systems consist of a generator connected to electrodes placed transvenously into cardiac chambers (the ventricle, and sometimes the right atrium and/or the coronary sinus) (Figure 3.14). The electrodes serve a dual function allowing the monitoring of cardiac rhythm and the administration of electrical pacing, defibrillation and cardioversion therapy. Modern ICDs are slightly larger than a pacemaker and are usually implanted in the left subclavicular area (Figure 3.14). The ICD generator contains the battery and sophisticated electronic circuitry that monitors the cardiac rhythm, determines the need for electrical therapy, delivers treatment, monitors the response and determines the need for further therapy.

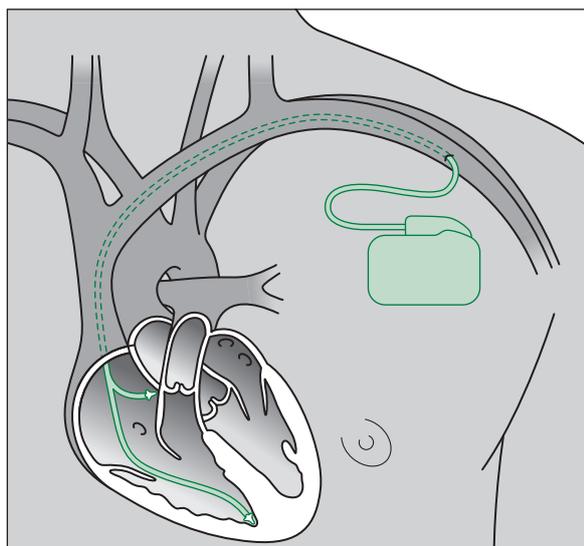


Figure 3.14 – Usual location of an ICD.

The available therapies include:

- Conventional programmable pacing for the treatment of bradycardia.
- Anti-tachycardia pacing (ATP) for ventricular tachycardia (VT).
- Delivery of biphasic shocks for the treatment of ventricular tachycardia and ventricular fibrillation (VF).
- Cardiac resynchronisation therapy (CRT) (biventricular pacing) for the treatment of heart failure.

These treatment modalities and specifications are programmable and capable of considerable sophistication to suit the requirements of individual patients. The implantation and programming of devices is carried out in specialised centres. The patient should

carry a card or documentation which identifies their ICD centre and may also have been given emergency instructions.

The personnel caring for such patients in emergency situations are not usually experts in arrhythmia management or familiar with the details of the sophisticated treatment regimes offered by modern ICDs. Moreover, the technology is complex and evolving rapidly. In an emergency patients will often present to the ambulance service or Emergency Department (ED) and the purpose of this guidance is to help those responsible for the initial management of these patients.

2. General Principles

Some important points should be made at the outset.

On detecting VF/VT the ICD will usually discharge a maximum of eight times before shutting down. However, a new episode of VF/VT will result in the recommencing its discharge sequence. A patient with a fractured ICD lead may suffer repeated internal defibrillation as the electrical noise is misinterpreted as a shockable rhythm.

These patients are likely to be conscious with a relatively normal ECG rate.

When confronted with a patient fitted with an ICD who has a persistent or recurring arrhythmia, or where the ICD is firing, expert help should be summoned at the outset. Outside hospital this will normally be from the ambulance service, who should be summoned immediately by dialling 999.

When confronted with a patient in cardiac arrest the usual management guidelines are still appropriate (**refer to cardiac arrest and arrhythmia guidelines**). If the ICD is not responding to VF or VT, or if shocks are ineffective, external defibrillation/cardioversion should be carried out. Avoid placing the defibrillator electrodes/pads/paddles close to or on top of the ICD; ensure a minimum distance of 8 cm between the edge of the defibrillator paddle pad/electrode and the ICD site. Most ICDs are implanted in the left sub-clavicular position (see Figure 3.14) and are usually readily apparent on examination; the conventional (apical/right subclavicular) electrode position will then be appropriate. The anterior/posterior position may also be used, particularly if the ICD is right sided.

Whenever possible, record a 12-lead electrocardiogram (ECG) and record the patient's rhythm (with any shocks). Make sure this is printed out and stored electronically (where available) for future reference. Where an external defibrillator with an electronic memory is used (whether for monitoring or for therapy) ensure that the ECG report is printed and handed to appropriate staff. Again, whenever possible, ensure that the record is archived for future reference. Record the rhythm during any therapeutic measure (whether by drugs or electricity). All these records may provide vital information for the ICD centre that may greatly influence the patient's subsequent management.

The energy levels of the shocks administered by ICDs (up to 40 Joules) are much lower than those delivered with