Resuscitation (2006) 71, 278—282

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STATEMENT

Emergency management of arrhythmias and/or shocks in patients with implantable cardioverter defibrillators (ICDs)

A statement on behalf of the Resuscitation Council (UK), Heart Rhythm UK (formerly The British Pacing and Electrophysiology Group, BPEG), The Joint Royal Colleges Ambulance Liaison Committee (JRCALC) and the Ambulance Services Association (ASA)

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Received 24 August 2005; received in revised form 26 August 2005; accepted 26 August 2005

1. Introduction

The implantable cardioverter defibrillator (ICD) has revolutionised the management of patients at risk of developing a lethal ventricular arrhythmia. Several clinical trials have testified to their effectiveness in reducing deaths from sudden cardiac arrest in selected patients,[1—5] and the devices are being implanted with increasing frequency.[6—8]

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. The electrodes serve a dual function allowing the monitoring of cardiac rhythm and the administration of tiered electrical therapy. Modern ICD generators are slightly larger than a pacemaker and are usually implanted subpectorally, most often in the left subclavicular area. The 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.

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0300-9572/$ — see front matter
doi:10.1016/j.resuscitation.2005.08.021

The therapeutic options offered include:

- Anti-tachycardia pacing (ATP) for ventricular tachycardia (VT).
- Delivery of biphasic shocks for the treatment of ventricular tachycardia and fibrillation (VF).
- Conventional programmable pacing for the treatment of bradycardia.
- 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. The card should also include details of the leads and their positions.

The personnel caring for such patients in emergency situations are not usually experts in arrhythmia management, nor familiar with the details of the sophisticated treatment regimes offered by modern ICDs. Moreover, the technology is complex, and evolving rapidly. The non-specialist may have difficulty remaining familiar with the detail of this. In an emergency, patients will often present to the ambulance service or A&E, 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.

1. 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 urgently. Once in hospital, local specialists may be available and the patient's ICD centre should be contacted. All patients should have a card giving contact details of the ICD centre and this may have also instructions applicable in an emergency. Many such centres operate telephone help lines available outside normal working hours; these usually provide details of the patient and the programming of the ICD.
2. Whenever possible, record a 12 lead ECG and record the patient's rhythm (with any shocks). Make sure this is printed out and also stored electronically, whenever possible, for future reference. Where a 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). These records may provide vital information for the ICD centre that may greatly influence the patient's subsequent management.
3. When confronted with a patient in cardiac arrest, the usual management guidelines recommended by the ERC/RCUK are appropriate.[9,10] If the ICD is not responding to VF or VT, or if shocks are not effective, 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 5 cm between the edge of the electrode and the ICD. Most ICDs are implanted in the left subclavicular position and are usually readily apparent; the conventional (apical/right subclavicular) electrode position will then be appropriate. The anterior/posterior position may also be used.
4. The energy levels of the shocks administered by ICDs (up to 40 J) are much lower than those employed with external defibrillators (100—360 J). *Personnel in contact with the patient when an ICD discharges will not be harmed, and no special precautions are necessary when handling or treating such patients.* Chest compression and ventilation can be carried out as normal.
5. Placing a ring magnet over the ICD generator can temporarily disable the shock capability of an ICD. The magnet does not disable the pacing capability for treating bradycardia. The magnet may be kept in position with adhesive tape if required. Removing the magnet returns the ICD to the status present before application. The ECG rhythm should be monitored at all times when the device is disabled. An ICD should only be disabled with a magnet when the rhythm for which shocks are being delivered has been recorded. If that rhythm is VT or VF, external cardioversion/defibrillation must be available. With some models it is possible to programme the ICD so that a magnet does not disable the shock capabilities of the device. This is usually done in exceptional circumstances only, and such patients are rare.
6. The manufacturers of the ICD supply magnets. Many implantation centres provide every