disease who are not candidates for an ICD. Bradyarrhythmias are the major cardiac adverse effect. Ventricular proarrhythmia can occur, but Torsade de Pointes VT is rare. Noncardiac toxicities are a major problem and contribute to drug discontinuation in approximately a third of patients during long-term therapy. Pneumonitis or pulmonary fibrosis occurs in approximately 1% of patients. Photosensitivity is common, and neuropathy and ocular toxicity can occur. Systematic monitoring is recommended during chronic therapy, including assessment for thyroid and liver toxicity every 6 months and lung toxicity with a chest radiograph and/or determination of lung diffusing capacity annually. Dronedarone has structural similarities to amiodarone but without the iodine moiety. Efficacy for ventricular arrhythmias is poor, and it increases mortality in patients with heart failure.

IMPLANTABLE CARDIOVERTER-DEFIBRILLATORS

ICDs are highly effective for termination of VT and VF and also provide bradycardia pacing. ICDs decrease mortality in patients at risk for sudden death due to structural heart diseases. In all cases, ICDs are recommended only if there is also expectation for survival of at least a year with acceptable functional capacity. The exception is in cases of patients with end-stage heart disease who are awaiting cardiac transplantation outside the hospital, or who have left bundle branch block QRS prolongation such that they are likely to have improvement in ventricular function with cardiac resynchronization therapy from a biventricular ICD.

ICDs can often terminate monomorphic VT by a burst of rapid pacing faster than the VT, known as antitachycardia pacing (ATP) **(Fig. 277-9*A*)**. If ATP fails or is not a programmed treatment, as is often the case for rapid VT or VF, a shock is delivered **(Fig. 277-9*B*)**. Shocks are painful if the patient is conscious. The most common ICD complication is the delivery of unnecessary therapy (either ATP or shocks) in response to a rapid supraventricular tachycardia or electrical noise as a result of an ICD lead fracture. Interrogation of the ICD, which can be performed remotely and communicated via Internet, is critical after an ICD shock to determine the arrhythmia diagnosis and exclude an unnecessary therapy. Device infection occurs in approximately 1% of patients.

Despite prompt termination of VT or VF by an ICD, the occurrence of these arrhythmias predicts subsequent increased mortality and risk of heart failure. Occurrence of VT or VF should therefore prompt assessment for potential causes including worsening heart failure, electrolyte abnormalities, and ischemia. Repeated shocks, even if appropriate, often induce posttraumatic stress disorder. Antiarrhythmic drugs mostly in the form of amiodarone or catheter ablation are often required for suppression of recurrent arrhythmias. Antiarrhythmic drug therapy can alter the VT rate and the energy required for defibrillation, thereby necessitating programming changes in the ICD's algorithms for detection and therapy.

CATHETER ABLATION FOR VT

Catheter ablation is performed by guiding an electrode catheter to the arrhythmia origin and producing a thermal injury with radiofrequency current. The size and location of the arrhythmia substrate determine the ease and likely effectiveness of the procedure, as well as potential complications. The most common complications, which occur in <5% of patients, are related to vascular access, including bleeding, femoral hematomas, arteriovenous fistulae, and pseudoaneurysms.

Catheter ablation is a reasonable first-line therapy for many patients with symptomatic idiopathic VTs. Success rates for those originating from a focus in the right ventricular outflow tract are in the range of 80–90% but lower for idiopathic VTs arising in less common locations such as from the LV outflow tract or aortic root, along the atrioventricular valve annuli, and from the papillary muscles. Failure of ablation is often due to inability to induce the

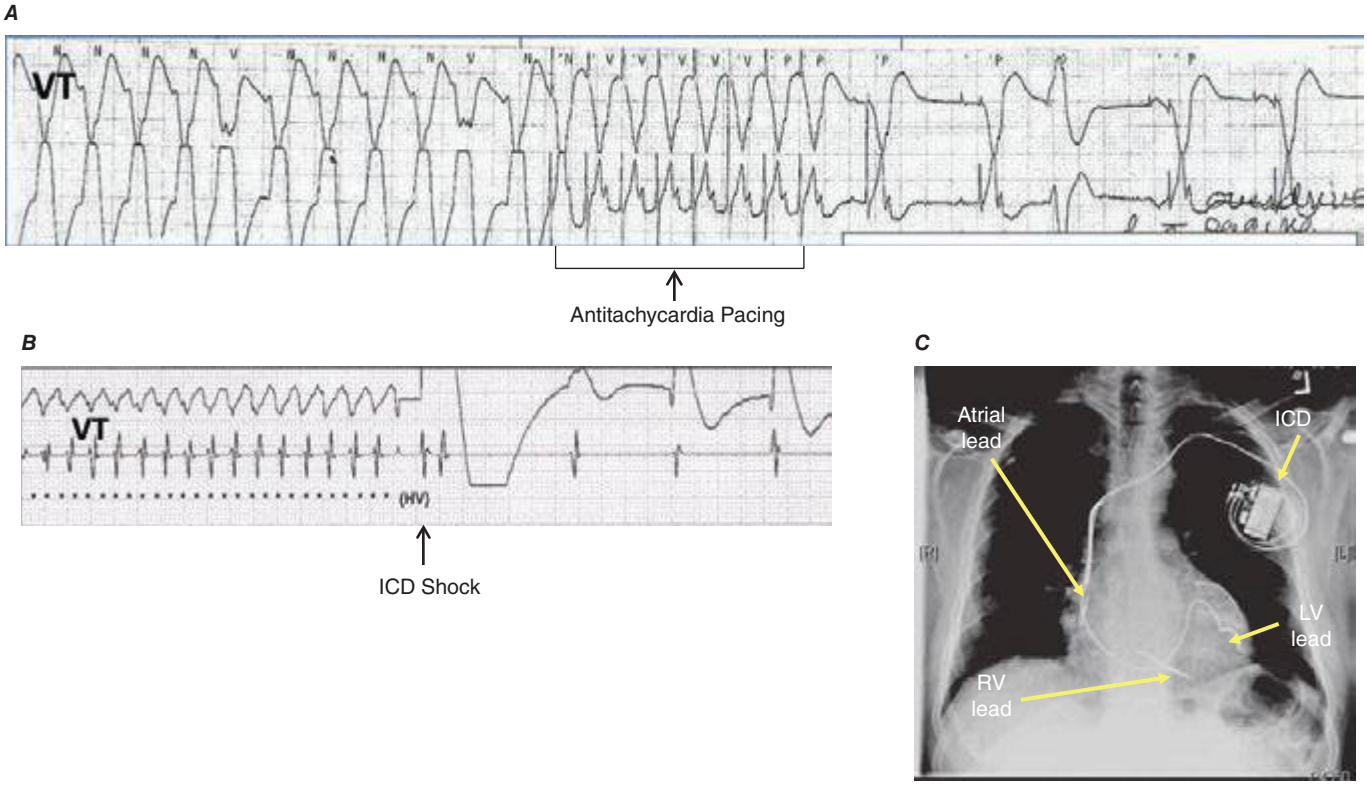

FIGURE 277-9 Implantable cardioverter-defibrillator (ICD) and therapies for ventricular arrhythmias. *A.* A monomorphic ventricular tachycardia (VT) is terminated by a burst of pacing impulses at a rate faster than VT (antitachycardia pacing). ***B.*** A rapid VT is converted with a high-voltage shock (*arrow*). The chest x-ray in panel ***C*** shows the components of an ICD capable of biventricular pacing. ICD generator in the subcutaneous tissue of the left upper chest, pacing leads in the right atrium and the left ventricular (LV) branch of the coronary sinus (LV lead), and a pacing/defibrillating lead in the right ventricle (RV lead) are shown.