

Experience in ICD Implantation and Follow-up in Ibn-Albitar Hospital

Ali Abdul-Amir M. Al-Musawi , Kasim Abbas Ismail , Muthanna Hameed Al-Quraishi , Amjad Rahman Bairam , Kassim Mohamad J. Al-Doori

ABSTRACT:

BACKGROUND:

Survivals of sudden cardiac death (SCD) episodes have recurrence rate of 30-50% within two years, with malignant ventricular arrhythmias most often responsible^{1,2}. The overall survival rate for SCD in USA is 5%. Ninety-five percent of patients suffering their initial event fail to survive to become candidate for secondary prevention¹. Because of the wide spread acceptance of implantable cardioverter defibrillator (ICD) as a method treating the survivals of SCD, attention has turned to primary prevention ¹. Implantable cardioverter-defibrillator (ICD) is highly effective in primary and secondary prevention of SCD due to life threatening ventricular tachycardia (VT).

OBJECTIVE:

To register and interpret the results of implantation and follow-up of ICD during the period between 2002-2007 in Ibn Al-Bitar hospital.

METHODS:

Sixty patients with standard indications for ICD; data were pooled from patients history, ECG, Echocardiography, Holter, blood investigation and coronary angiography. 75% males and 25% females. After implantation, class III anti-arrhythmic drugs (Amiodarone) were stopped, except for patients with a history of supraventricular tachycardia or recurrent VT.

RESULTS:

Coronary artery disease (CAD) was the most common presentation of patients for whom implantation was done; coronary artery disease (CAD) 43%, dilated cardiomyopathy (DCM) 26%, and hypertrophic obstructive cardiomyopathy (HOCM) 16%. Sixty-three of them had moderate-severe LV dysfunction (LVEF<40%). Recurrent VT was the most common cause of implantation (76%). Primary prevention was aimed in (60%) of patients and secondary prevention in 40%. Sixty percent of those with ICD implanted due to primary prevention fulfil MADIT II (Multicenter Automatic Defibrillator Implantation Trial II) criteria. The majority of patients had structural heart disease. Most non-sustained VTs reverted to sinus rhythm by antitachycardia pacing (ATP) therapy from ICD (90%). All VF events reverted to sinus rhythm by high energy shock from ICD devices.

CONCLUSION:

ICD is highly effective in primary and secondary prevention of life threatening VT/VF.

KEY WORDS: CAD: coronary artery disease, ICD: implantable cardioverter-defibrillator, SCD: sudden cardiac death, VT: ventricular tachycardia.

INTRODUCTION:

Survivals of sudden cardiac death (SCD) episodes have recurrence rate of 30 – 50% within two years, with malignant ventricular arrhythmias most often responsible^{1,2}. Options for treatment of these arrhythmias include antiarrhythmic drugs, catheter-based ablation and implantation of implantable cardioverter defibrillator (ICD)^{2,3}. The overall survival rate for SCD in USA is 5%. Ninety-five percent of patients suffering their initial event fail to survive to become candidate for secondary prevention¹.

with the wide spread acceptance of ICD as a method of treating the survivals of SCD, attention has turned to primary prevention ¹. ICD is highly effective in primary and secondary prevention of life threatening ventricular tachycardia (VT).

Implantable cardioverter defibrillator therapy is one of the most important advances in the therapeutic approach of cardiovascular patients with a life- saving benefit exceeding that of all anti-arrhythmic drugs. The combination of ICD with cardiac resynchronization therapy (CRT) proved to be a major asset for heart failure patients, for whom now a real arrhythmia and heart failure management device became available.

Department of Cardiology, Ibn- Albitar Hospital .

ICD IMPLANTATION

The implantable cardioverter-defibrillator (ICD) has undergone a remarkable transformation over the past 25 years. The early devices were large, requiring thoracotomy for epicardial patch placement, and were implanted in the abdomen. This complex surgery resulted in postoperative hospitalization averaging approximately 1 week.

The pulse generators had longevity of less than 2 years, had almost no diagnostic capabilities, and had pacing capabilities that were limited to only backup ventricular pacing. Modern devices provide detailed information about the morphology and rates of arrhythmias, and stored Electrocardiographic signals before, during, and after therapy. Devices have the capabilities to treat multiple problems, not only life-threatening ventricular arrhythmias but also bradyarrhythmias with dual-chamber devices, atrial arrhythmias, and congestive heart failure with biventricular pacing.¹⁹

AIM OF THE STUDY:

The purpose of this paper is to register and interpret the results of implantation and follow-up of ICDs in the period between 2002 – 2007 in Ibn Al-Bitar hospital for cardiac surgery. It is a retrospective study of 60 patients who were selected for ICD implantation for variable indications according to the published guidelines.

PATIENTS AND METHODS:

ICD was first implanted at Ibn Al-Bitar Hospital in 2002. Between (2002-2007), 60 consecutive patients with standard indications for ICD therapy following the current knowledge and/or available

guidelines were enrolled in our institution and retrospectively analyzed. ICD were implanted after aborted ventricular fibrillation (VF) or recurrent VT (secondary prevention), some patients judged at high risk of SCD received a prophylactic ICD according to guidelines (primary prevention). This series includes 60 patients, 75% of them were males (mean age 48 years±10) and 25% were females (mean age 45years±10). ECG and echocardiography records were available in all cases. 25 patients (41%) had holter monitor. Coronary angiography with LV angiography was done in 36 patients (60%). After implantation, class III anti-arrhythmic drugs (Amiodarone) were stopped, except for patients with a history of supraventricular tachycardia or recurrent VT. Follow-up began just after implantation with first follow-up visit is scheduled within two weeks after time of implantation. Afterward follow-up should take place every 3 – 6 months. Additional visits were scheduled whenever patients reported shock, palpitation, syncope or pre-syncope. During each visit, patients were examined and devices interrogated to evaluate the number and type of episodes with stored electrogram.

ICD reprogramming, adjustment of drug therapy, biological samples (blood urea, serum creatinine and electrolytes), chest X-ray and echocardiography were performed as necessary according to the recorded events and factors deemed causative.

RESULTS:

Table: Presentation modes (cause of implantation) .

Cause of implantation	No.	%
Structural heart disease		
CAD +/- ischemic HF	26	43 %
DCM	16	26%
HOCM	10	16%
ARVD	2	3
Congenital heart disease	1	1.5%
No structural heart disease		
Idiopathic VT	3	5%
Congenital long QT	2	3%

Majority of patients had moderate to severe LV dysfunction (LV EF \leq 40%) in 63% of patients. The most common indication for ICD was recurrent VT (76%). 60% of patients with ICD implantation received the device as primary prevention, and 40% as secondary prevention. Sixty percent of those with ICD implanted due to primary prevention fulfil MADIT II criteria. Class III anti-arrhythmic drugs (amiodarone) were

released from patients with ICD after implantation. Amiodarone was only prescribed for patients with history of supraventricular tachycardia or recurrent VT. Amiodarone was prescribed in 25% of patients with ICD. The ICD device was tested by induction of VF in 55 cases. VF was induced by burst pacing in 90%; in 10% by R on T and Non-invasive Programmed Stimulation (NIPS) test. In all patients; the VF was terminated by shock from ICD

device. Analysis of event log of patients with ICDs showed that there was 150 NSVT treated by ATP as first line therapy with successful rate 90% (135 events reverted to sinus rhythm), the other 10% (15 events) of NSVT which is not reverted by ATP (failed trails of ATP) were reverted by shock (low energy 15-20 J) from the devices. Only three of them needed high energy shock (25-36 J) to be reverted to sinus rhythm. There was fifteen VF events occurred, nine of them reverted to sinus rhythm by single shock (high energy shock) from ICD generator, four events reverted by two high energy shocks from ICD and two events needs more than two shock.

DISCUSSION:

The main findings of this study were: The majority of patients who had clinical diagnosis of VT/VF had structural heart disease. The most common cause of ICD implantation was CAD 43%, compared with other studies which showed that the most frequent cardiopathy is CAD 66%⁵ and 78%⁹. This finding points out to the necessity of high index of suspicion of malignant arrhythmias in patients with structural heart disease and LV dysfunction presented with syncope (clinical triad). The relatively low percentage of females' gender (25%) can be explained by low incidence of IHD in females (main presentation was DCM and idiopathic VT). Sixty-three percent of patients who had an ICD implantation have moderate-severe LV dysfunction compared with other study which showed that 68% of patients with ICD have moderate-severe LV dysfunction LVEF \leq 40%⁵. CMS (Centers of Medicare and Medicaid Services) has determined that patients with CAD and LVEF \leq 35 % are now indicated for ICD implantation (MADIT II trail), this decision eliminated the need for secondary indicators of risk (e.g. electrophysiological study EPS). Primary prevention indication was 60%, while secondary prevention was 40 %, compared to 96% as secondary prevention in old study by R.A.Winkle et al ⁹. This difference is due to elimination of an old common practice with reliance on anti-arrhythmic drugs by recent controlled clinical trials for primary and secondary prevention of SCD ^{3,10} and supported by ESC/ACC/AHA guidelines⁷ (MADIT II⁶, DEFINITE¹⁷ and SCD-HEFT trails¹⁸). Success of ATP in reverting majority of VT (90%) increases the importance of this type of ICD therapy and makes the ATP playing a greater role in VT reversion than shock; these findings might encourage us to depend more on ATP therapy and keeping the shock therapy as standby in case of ATP failure or VF ^{11, 12, 13}. Class III anti-arrhythmic drugs (amiodarone) were released (stopped) from

patients with ICD after implantation because it associated with an increase in Defibrillation Threshold (DFT) ¹⁵, or may slow the VT cycle length below tachycardia detection rate cut off ^{9, 13, and 16}.

CONCLUSIONS:

1. Establish a registration system to facilitate pooled data collection, trying to reach optimal management, device function, longevity and safety.
2. Regarding aiming primary prevention of SCD, one should rely on anti-ischemic, anti-failure, rennin angiotensin system antagonist and lipid lowering drug rather than on anti-arrhythmic agents
3. Use of clinical pentads: male, structural heart disease, LVEF<40%, cardiac syncope constitute the majority of patients recommended for secondary prevention of SCD, and without syncope for primary prevention.
4. Repeated cycles of ATP might be useful in terminating more VTs /fast VTs without significant clinical deterioration or risk of VT acceleration to VF.
5. Amiodarone is safe and effective in decreasing the frequency of VTs during follow-up interrogation.

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