in patients with multivessel disease, provided complete revascularization could be achieved. Thus, it is very encouraging that, in the stent era, even in diabetics with multivessel disease after CABG, PCI may be contemplated as a reasonable treatment option when additional revascularization is required.

The disturbing news is that overall, diabetics continue to fare much worse than non diabetics, with large increases in mortality at 3 years. The magnitude of this increased risk appears similar in patients with vs without prior CABG. This worse outcome of PCI in diabetics is related to the more frequent multivessel disease, to the possibility of accelerated atherogenesis or plaque progression in the vessels subjected to revascularization, even at non target sites\[6,7\], and to the greater difficulty to achieve complete revascularization in diabetics\[8\]. Previous studies have highlighted the specificity of atherothrombosis in diabetic patients and also suggested the increased propensity for plaque progression and restenosis in these patients.

From the interventionalist point of view, drug-eluting stents represent our best hope to improve the outcome of PCI in diabetics, especially in the very severe subset of patients who have undergone prior CABG, in whom complete revascularization appears so critical. This provides another reason to eagerly await the results of ongoing trials testing drug-eluting stents in diabetic patients.

**References**


Management of atrial fibrillation in patients with implantable cardioverter defibrillator. Do all need a dual chamber device?

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Over the last decade, remarkable progress has been made in the field of implantable cardioverter defibrillator (ICD) therapy. There is no doubt that tiered ICD therapy with sophisticated antitachycardia pacing and defibrillation capabilities can successfully terminate nearly all sustained ventricular tachyarrhythmias\[1,2\]. Despite its appeal, the ICD is not perfect. Management of atrial fibrillation represents an urgent challenge in patients with ICD. Approximately every fourth patient receiving an ICD to treat life-threatening ventricular arrhythmias has documented atrial tachycardias before implantation. Furthermore, a large proportion of patients without prior history of
atrial tachyarrhythmias will develop paroxysmal atrial fibrillation after ICD implantation\(^6\). The prognostic implications of atrial fibrillation are obvious. Haemodynamic impairment and thromboembolic complications related to atrial fibrillation result in significant morbidity, mortality and cost particularly in patients with structural heart disease. In ICD recipients atrial fibrillation is an independent predictor of recurrent life-threatening ventricular arrhythmias, and a common cause of inappropriate ventricular shocks\(^4,5\). In addition, atrial fibrillation may precipitate symptoms of the underlying cardiac disease (e.g. chest pain, dyspnoea, fatigue) and stroke.

Drug therapy of atrial fibrillation in patients with structural heart disease has been disappointing because of only a moderate efficacy, risk of proarrhythmia and undesirable side effects. Therefore, any new treatment strategies for atrial fibrillation are welcomed. It has been suggested that a dual chamber ICD could be used for this purpose. In this issue, Ricci \textit{et al.} report the results of an Italian multicentre study, which evaluate the effectiveness of a Medtronic 7250 dual chamber ICD in detecting and treating spontaneous atrial tachycardias in 112 patients with life-threatening ventricular arrhythmias\(^6\). The advantages of this device over a single chamber ICD include physiological pacing capability, automatic atrial electrogram storage, enhanced arrhythmia discrimination algorithms, and a potential to treat and prevent atrial arrhythmias by pacing and/or defibrillation.

The results of the study confirm that atrial fibrillation is a common problem in patients with ICD. More than half (55%) of the patients had documented atrial fibrillation before implantation. During the follow-up (11 ± 9 months) 40% of these patients had arrhythmia relapse, and 10% of the ICD recipients with no prior atrial fibrillation episodes had their first atrial tachycardia event detected by the device. Although the positive predictive value of the discrimination algorithm for detecting atrial arrhythmias (94%) was comparable to that observed with the same device in other studies\(^7–9\), the data of Ricci \textit{et al.} revealed some limitations of the algorithm\(^6\). In keeping with the results of previous investigations\(^8–10\), they showed that inappropriate ventricular tachycardia/ fibrillation detection was mainly due to far field R wave oversensing. It is essential during the implant procedure to obtain P wave amplitudes that will allow future adjustment of atrial sensitivity. The programming of the device is more challenging than that of conventional ICD. Incorrect or incomplete programming of the device (e.g. atrial sensitivity and blanking periods) may lead to inappropriate ventricular shocks, erroneous pacing, inappropriate mode switching and/or atrial therapies\(^10\). Therefore, it is recommended that implantation and follow-up of these devices should preferably be performed only at experienced centres.

Rapid conversion of atrial fibrillation may decrease the risk of additional arrhythmia episodes by preventing atrial remodelling (‘sinus rhythm begets sinus rhythm’). Furthermore, recent data indicate that prompt restoration of normal sinus rhythm may reduce the incidence of ventricular tachyarrhythmias\(^4,5\). Although the absence of a control group makes it difficult to estimate the actual benefit derived from atrial antitachycardia therapies, the results of Ricci \textit{et al.} provide indirect evidence on the safety and effectiveness of these therapies\(^6\).

In a randomized cross-over study, Friedman \textit{et al.} recently demonstrated an 87% reduction in mean atrial arrhythmia burden by using this device\(^11\). The overall efficacy of atrial antitachycardia pacing therapies was similar in both studies (54% vs 49%). The efficacy of the therapy was related to the arrhythmia cycle length and regularity of the arrhythmia. Atrial burst pacing terminated 71% and 50 Hz burst 36% of atrial arrhythmias detected at the atrial tachycardia and atrial fibrillation zones, respectively\(^6\). Atrial shock was significantly more effective in restoring sinus rhythm than antitachycardia therapies. The main drawback of atrial defibrillation was pain from the shock. The shock tolerance was only weakly related to the delivered energy and strongly dependent on the number of shocks and their efficacy in restoring sinus rhythm. Consequently, the authors speculated that setting the initial shock energy at too low a level may decrease the efficacy of the therapy and intensify the pain\(^6\). Thus, it may be advisable to programme a margin larger than twice the threshold for atrial defibrillation.

Several important questions need further evaluation. The study provided no data on the efficacy of the different atrial tachyarrhythmia prevention algorithms. The role of these algorithms in the prevention of atrial tachyarrhythmias in patients with structural heart disease remains to be established. In other populations the response to these algorithms has been heterogeneous\(^12\). The impact of atrial shocks also merits consideration. Some evidence has linked multiple shocks with myocardial injury and fibrosis, and sporadic shocks have been associated with marked reductions in quality of life\(^13\). Furthermore, it is obvious that multiple atrial shocks will decrease the life expectancy of the device and increase the cost of the treatment. The role of medication is important. In ICD recipients atrial fibrillation is almost solely associated with coronary artery disease, congestive heart failure or some other form of structural heart disease. In these patients high priority should be given to appropriate management of the co-morbidity.
factors contributing to atrial fibrillation. In particular, the beta-blocker therapy should be optimised. Beta-blockers not only improve survival in this population\cite{14}, but they may also alleviate symptoms and facilitate rhythm discrimination by slowing ventricular rate during atrial tachyarrhythmias. Although Ricci et al. did not give detailed information on medications\cite{15}, it seems that beta-blockers were under-used. That is, only 57\% of the patients were on continuous beta-blocker or other antiarrhythmic medication. ACE inhibitors and angiotensin II receptor antagonists may also reduce the incidence of atrial fibrillation in congestive heart failure\cite{15}. Among the patients with impaired left ventricular function and prior myocardial infarction even asymptomatic atrial fibrillation predisposes to stroke and other thromboembolic events. On the basis of automated arrhythmia documentation, Ricci et al. estimated that most patients with ICD will endure atrial fibrillation during the lifespan of the device\cite{6}. Given the high prevalence of structural heart disease in the study (95\%), it is likely that most of these ICD patients should be anticoagulated with warfarin.

What can we recommend at the present time? Although cost-efficacy is a vital issue in settings of limited or restricted health care recourses, physicians should always be able to choose the most applicable ICD for the needs of a given patient. In the light of current knowledge, patients with symptomatic persistent atrial fibrillation despite optimal medical treatment who actually need a defibrillator can be considered as imminent candidates for dual chamber ICD with atrial tachyarrhythmia detection and treatment functions. Most other patients without conventional indications for physiological pacing could be prescribed a single chamber ICD. The value of the complex, programmable features of the new device needs to be weighed against ease of use and cost in prospective randomised trials, and the impact of the therapy on quality of life has to be carefully evaluated.

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