



# Stroke prevention practices in patients with atrial fibrillation and pacemaker therapy

## Evidence for under-use of anticoagulation

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This study presents a survey of pacemaker patients followed in a pacemaker clinic. Three hundred and twenty-six patients of mean age  $77.7 \pm 9.6$  years, 52% female, 75% VVI, 25% dual chamber were analysed. One hundred and forty (43%) were in atrial fibrillation and were older,  $80.5 \pm 7.1$  years, compared with  $75.5 \pm 11.4$  years ( $P=0.014$ ) for those in sinus rhythm. Temporary pacemaker reprogramming was necessary in 86% in order to determine the abnormal rhythm. Thirty-nine (28%) of those in atrial fibrillation were anticoagulated; 37% were on aspirin; only 10.8% of those in atrial fibrillation who were not anticoagulated had contraindications to this therapy.

Prevalence of atrial fibrillation increased with age, whereas that of anticoagulation decreased with age. In conclusion, the majority of pacemaker patients with atrial fibrillation, for whom anticoagulation is indicated, fails to receive it: those caring for these patients are urged to ensure its much wider use.

(Europace 2000; 2: 115–118)

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**Key Words:** Atrial fibrillation, pacemaker, oral anticoagulation.

## Introduction

Oral anticoagulation has consistently been shown to reduce the risk of thromboembolic events in atrial fibrillation<sup>[1]</sup>. Aspirin also decreases the stroke risk in this population, but to a lesser extent than does oral anticoagulation<sup>[2]</sup>. Therefore oral anticoagulation is recommended in most patients with atrial fibrillation<sup>[3]</sup>. However, despite clear guidelines there is evidence that anticoagulation is under-used in patients with atrial fibrillation in a variety of clinical settings<sup>[4–16]</sup>.

The prevalence of atrial fibrillation is especially high in patients with permanent pacemaker therapy for sick-sinus syndrome<sup>[17,18]</sup>. This population, in part due to its older age, carries an extremely high risk of stroke and should therefore profit from anticoagulation. The purpose of the study was to investigate anticoagulation rates in pacemaker patients who are in atrial fibrillation. The treatment practices often reflect decisions of the

referring physician (general practitioners and internists) rather than those of the physician of the pacemaker clinic.

## Patients and Methods

Between November 1998 and December 1998 all patients in our pacemaker clinic were prospectively analysed concerning pacing history, heart rhythm, underlying disease and current antithrombotic medication. Symptoms suggestive of atrial fibrillation (palpitations, dyspnoea and chest pain) were recorded. The diagnosis of atrial fibrillation was made if one of the following criteria were present: (a) the presence of fibrillation waves between pacemaker artifacts and QRS complexes on the ECG (bipolar limb leads I, II, III); (b) an irregular ventricular rhythm above the pacemaker intervention rate; (c) the presence of fibrillation waves between pacemaker artifacts and QRS complexes on the ECG after the pacemaker had been reprogrammed to VVI 30 beats.min<sup>-1</sup>. Data management and analysis was performed on a personal computer using the STATISTICA<sup>R</sup> 5.0 software (StatSoft, Inc., Tulsa, USA).

Manuscript submitted 8 June 1999, and accepted after revision 26 January 2000.

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**Table 1** Prevalence of atrial fibrillation and antithrombotic treatment stratified by age

Age (years)	≤ 60	61–70	71–80	81–85	86–90
n	13	56	104	94	59
Atrial fibrillation (%)	23.1	28.6	40.4	41	67
Oral anticoagulation (%)#	0	60	31	14	9
Aspirin (%)	100	0	31	72	58
No antithrombotic treatment	0	40	38	14	33
Contraindication to anticoagulation* (%)	0	14	6	0	8

# in patients with atrial fibrillation; \* in patients not receiving anticoagulation.

Data are reported as mean  $\pm$  standard deviation. Continuous variables were compared by using Student's t-test for independent samples. The Wilcoxon test was used for categorical variables. A chi-square test was used to determine the two-tailed statistical significance of associations in 2-by-2 tables. *P* values  $<0.05$  were considered to indicate statistical significance.

## Results

A total of 326 patients with a mean age of  $77.7 \pm 9.6$  years were analysed. Fifty-two percent were female and the mean pacing duration was  $67.8 \pm 53.4$  months (1–225). Seventy-five percent of patients were in a VVI pacing mode and 25% were in a DDD pacing mode. One hundred and forty (43%) were diagnosed as being in atrial fibrillation, 153 (47%) were in sinus rhythm while 33 (10%) had other rhythms. While patients with atrial fibrillation had a mean age of  $80.5 \pm 7.1$  years, patients in sinus rhythm were  $75.5 \pm 11.4$  years of age ( $P=0.014$ ). All patients with atrial fibrillation had at least one additional clinical risk factor for thromboembolic stroke (history of hypertension, diabetes, congestive heart failure, prior TIA/stroke). While 117 patients (36%) had had atrial fibrillation at implant, 140 patients (43%) were in atrial fibrillation at the time of follow-up after  $71.4 \pm 49.9$  months of pacing.

The ECG was insufficient to diagnose atrial fibrillation in 120 (86%) of the patients. These patients required temporary pacemaker reprogramming to low ventricular rates to diagnose the underlying rhythm.

Of the patients with atrial fibrillation 39 (28%) were on anticoagulation, 37% were on aspirin and the remainder was not receiving any antithrombotic medication. Only 10.8% (11/101) of the patients not receiving oral anticoagulation had contraindications to this therapy. Although there is no consensus on contraindications to anticoagulation we used the following criteria<sup>[5]</sup>: gastrointestinal or genitourinary bleeding in the previous 6 months, a history of frequent falls or syncope, probable non-compliance or inability to comply with anticoagulants, evidence for excessive alcohol intake, uncontrolled hypertension, daily use of non-steroidal antiinflammatory drugs. Twelve percent of patients had a history of stroke/TIA and all of these were in atrial fibrillation and on aspirin. There were no contraindications to oral

anticoagulation in these patients. The prevalence of atrial fibrillation was age dependent (Table 1) as was the use of oral anticoagulation. But while atrial fibrillation was increasing with age, usage of oral anticoagulants was decreasing despite the fact that the rate of contraindications against anticoagulation was about the same in all age groups.

## Discussion and Conclusions

Our data add to the large body of evidence that anticoagulation is under-used in patients with atrial fibrillation despite proven efficacy. If the recommendations of the American College of Chest Physicians were taken as a basis, all our patients without contraindications should have been on anticoagulants. Around 64% (90/140) of our patients with atrial fibrillation were therefore not being treated according to official guidelines.

Under-use of anticoagulation has been described in a variety of clinical settings. These include elderly rural patients<sup>[4]</sup>, Medicare patients after stroke<sup>[8]</sup>, patients in university hospitals<sup>[15]</sup>, patients in community and tertiary care hospitals<sup>[10]</sup>, and nursing home and long-term care patients<sup>[12,13]</sup>. In general, all investigations found that anticoagulation rates declined with increasing age despite increasing stroke risk, and the rate of anticoagulation in eligible patients varied between 20% in nursing home patients<sup>[13]</sup> and 44% in university hospital patients<sup>[15]</sup>. The overall rate of anticoagulation in patients with atrial fibrillation and no contraindications to warfarin increased from 13% in 1989 to 40% in 1993 in a nationwide US study by Stafford and Singer<sup>[6]</sup>. However, between 1993 and 1996 they found no further increase in warfarin use (33% in 1996). Moreover, inadequate implementation of anticoagulation therapy for atrial fibrillation has been found in different countries<sup>[5,6,18]</sup>. Therefore, the barriers to anticoagulation need to be identified in order to lower stroke rates in this increasing worldwide population of patients with atrial fibrillation. In accordance with other studies we found that anticoagulants were used even less frequently in patients  $>80$  years old<sup>[5,6,7,11,12,15]</sup>. In our study 21% of patients  $>80$  years were on anticoagulants which is in accordance with the 18.9% reported from the US<sup>[7]</sup>. Patient age is the reason given most often for the non-prescribing of anticoagulants, despite proven

efficacy and official guidelines<sup>[3]</sup>. In contrast to the declining use of anticoagulants in older patients the prescription of aspirin is increasing, in our study from 0% in patients 61–70 years to 50% in patients over 80 years of age (Table 1). Physicians may regard aspirin as the ‘harmless’ alternative to warfarin ignoring the fact that aspirin is less effective in reducing the risk of ischaemic strokes<sup>[2]</sup>. On the other hand, many of these patients obviously have independent indications for aspirin therapy.

In our view, the absence of a consensus about contraindications to anticoagulants is a major obstacle against implementation of this effective therapy. Another fact is probably the perception that results of highly selected patients in clinical trials cannot be applied to routine daily practice<sup>[19]</sup>.

The percentage of atrial fibrillation in our study (43%) is comparable with other investigations. Sparks *et al.* found 53/110 (48%) of paced patients to be in atrial fibrillation<sup>[18]</sup>. In addition to this very high prevalence of atrial fibrillation in this group, pacemaker patients with atrial fibrillation are at an especially high risk for stroke<sup>[17]</sup> and efforts to promote warfarin use in this population should be extremely worthwhile. In this regard, the role of the cardiologist or electrophysiologist in the pacemaker clinic cannot be over-emphasized. Firstly, the use of anticoagulation is lower in patients treated by family and general practitioners than in those followed by cardiologists<sup>[4,6]</sup>. Secondly, in the majority of patients with pacemakers and atrial fibrillation the heart rhythm can only be diagnosed after reprogramming the pacemaker to lower rates.

The comparable low rate of physiological pacing (AAI/DDD) is worth mentioning since VVI pacing seems to be associated with an increase in mortality and morbidity, including atrial fibrillation, stroke, and heart failure<sup>[20]</sup>. Pacemaker implantation had been performed more than 6 years before in 50% of the patients when the benefits of physiological pacing were not as clear as today. Moreover, the age of our patients is relatively high and cost considerations most likely played a role in pacing mode selection. The rate of physiological pacing has increased in our hospital since then, but there still is room for improvement.

Among the limitations of our study is the inability to provide data on patients with paroxysmal atrial fibrillation and sinus rhythm at the time of the visit to the pacemaker clinic. Another limitation is the fact that we do not have data on the quality of anticoagulation. In elderly patients the optimal level of anticoagulation is of great importance since not only does the stroke risk increase with age but also the risk of bleeding and intracerebral haemorrhage. In the study by Gurwitz *et al.* long-term care patients on anticoagulants were maintained above or below the recommended therapeutic range 60% of the time<sup>[12]</sup>. Improvements in the quality of anticoagulation could be expected from specialized anticoagulation clinics and self-management of anticoagulation in selected patients. A third limitation of our study is that we overcame neither systematically

identified patient-, physician- or health care system-related barriers to anticoagulation nor did we try to improve the reported low rate of adequate stroke prevention. Unfortunately, this is true for all reports concerning anticoagulation practices, and studies targeting interventions toward identified barriers are urgently needed<sup>[21]</sup>.

We conclude that the majority of atrial fibrillation patients with pacemakers does not receive appropriate prophylaxis against thromboembolic stroke despite having no contraindications to anticoagulation. This is in part due to the fact that atrial fibrillation could be diagnosed only after reprogramming the pacemaker to lower ventricular rates in most patients. Therefore, cardiologists and electrophysiologists caring for pacemaker patients should not only facilitate the diagnosis of atrial fibrillation but also encourage the use of anticoagulation in order to lower the stroke risk in this population.

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