

CARDIOVERSION

Calling the cardioverted: an audit of long-term anticoagulation in patients attending for DCCV

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Direct current cardioversion (DCCV) is a method to restore sinus rhythm in patients diagnosed with atrial fibrillation (AF). Despite having high initial efficacy, the long-term success rate of this procedure is lower. Consequently, the European Society of Cardiology (ESC) guidelines recommend indefinite anticoagulation in patients with a high risk of recurrence. We sought to establish whether these guidelines had been adhered to in a district general hospital.

Anticoagulation data were provided by GP practices for 208 patients who had undergone a DCCV for AF between 2008 and 2010. One hundred and sixty-five patients (79%) were prescribed warfarin. The remaining 43 patients were invited to a screening clinic with 21 subsequently attending (49%). Eleven of the patients were in AF ($p=0.0002$) and in five of the 11 patients this had not previously been documented ($p=0.035$). Nine of the 11 patients in AF (82%) met ESC criteria for anticoagulation with a mean $\text{CHA}_2\text{DS}_2\text{-VASc}$ score $=2.18 \pm 1.48$.

Our findings suggest that nearly half of patients not on anticoagulation following DCCV have recurrence of AF warranting antithrombotic therapy. We propose similar screening is adopted in other centres in order to ensure that ESC guidelines are being met.



Introduction

Atrial fibrillation (AF) is the most common arrhythmia in the UK and is estimated to affect 2% of the general population, rising to affect 8% of individuals aged over 75 years.¹ Without appropriate antithrombotic therapy, non-valvular AF confers a five-fold risk of stroke and thromboembolism.² Oral anticoagulation effectively reduces stroke risk by two-thirds.³

Direct current (DC) cardioversion (DCCV) is one strategy to restore sinus rhythm in patients with AF (see figure 1), and has been used in clinical practice since the 1960s. This procedure has relatively high initial success rates, however, it has become increasingly evident that the procedure has a high failure rate in the longer term. Previous studies have shown that between 20% and 47% of patients remain in sinus rhythm at one year.^{4,5} Accordingly, recent guidelines recommended that anticoagulation should be continued indefinitely in those with a high risk of AF recurrence. In 2010, the European Society of Cardiology (ESC) stated that “in patients with risk factors for stroke or AF recurrence, VKA (vitamin

Figure 1. ECG showing atrial fibrillation and sinus rhythm being restored after direct current cardioversion



Figure 2. A graph to show the number of patients in different age groups at first attendance for direct current cardioversion (DCCV)

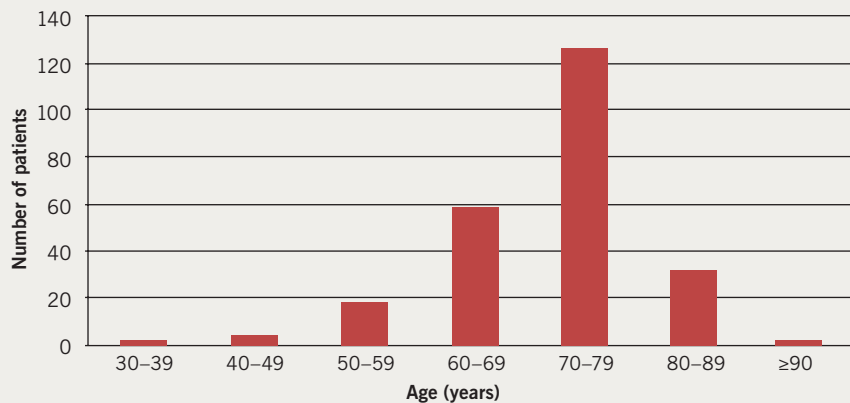
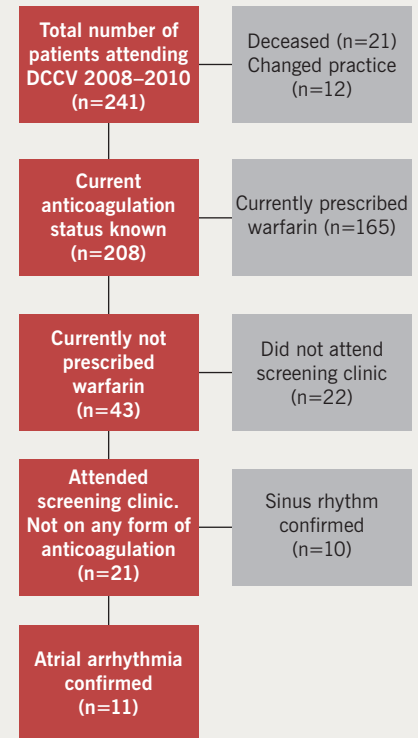


Figure 3. A diagram illustrating patient selection and clinic attendance



K antagonist) treatment should be continued lifelong irrespective of apparent maintenance of sinus rhythm following cardioversion".⁶ Updated guidelines in 2012 also suggested a more aggressive approach to anticoagulation, with consideration of antithrombotics in those patients with a CHA₂DS₂-VASC risk score ≥ 1 .⁷ Current literature suggests that a significant proportion of AF patients do not receive appropriate anticoagulation despite these measures.⁸

Aims

- To determine the total number of patients not on warfarin, or alternative anticoagulant therapy, having attended for an elective DCCV for AF at a district general hospital three to six years previously.
- To identify patients with recurrent AF who warranted anticoagulation but were not on appropriate treatment.
- To establish the number of patients with a recurrence of AF, which had not been documented previously, since the DCCV.
- To assess clinical variables that predict maintenance of sinus rhythm in the long-term following DCCV.

Materials and methods

Patients who attended for a DCCV between 2008 and 2010 were identified using hospital IT records. Local general practitioners (GPs) were subsequently contacted to establish which of these patients were not currently prescribed warfarin. These patients were invited to attend a

clinic between March and October 2014. During attendance, a cardiologist took a brief medical history and performed a clinical examination. A resting 12-lead electrocardiogram (ECG) was also performed. The findings from this consultation were audited against ESC guidelines.

Results

Two hundred and sixty DCCVs were performed over a three-year period between 2008 and 2010 for patients registered with local practices: 19 of these were repeat attempts representing 241 patients in total. At the time of the cardioversion the patients had a median age of 71 years (**figure 2**).

Number of patients

By 2014, 21 patients (9%) were identified to be deceased. We were able to establish a cause of death for 16 of these patients; none were classified as a stroke or bleeding event. Twelve patients (5%) had changed practice, hence, data regarding their anticoagulation status was unavailable. Therefore, anticoagulation status was provided for 208 patients. One hundred and sixty-five patients (79%) were prescribed warfarin, and 43 (21%) were not, according to their current GP prescription records. The latter 43 patients were invited to a designated cardiology clinic with, overall, 21 patients attending (49% uptake) (**figure 3**).

The mean time to follow-up was 4.7 ± 0.7 years. On attendance, it was confirmed that none of the patients were prescribed warfarin or a novel oral anticoagulant. In total, 11 (52%) of the 21 patients had a recurrence of an atrial

arrhythmia (52% vs. 0% in an 'ideal' setting; $p=0.0002$, Fisher's exact test). Specifically, 10 were diagnosed with AF and one with atrial flutter. Five of the 11 cases were newly identified at the clinic (45% vs. 0%; $p=0.035$, Fisher's exact test), whereas six (55%) had previously been documented. Of those 11 patients attending the clinic with known or newly documented AF, nine (82%) met ESC criteria for oral anticoagulation with a mean CHA₂DS₂-VASC score $=2.18 \pm 1.48$. The same group had a mean HAS-BLED score $=1.73 \pm 1.01$.

Of the 10 patients found to be in sinus rhythm at the screening clinic, 40% had a previous diagnosis of atrial flutter, contrasting with 0% in the group with recurrent AF ($p=0.035$). Left atrial (LA) diameter was significantly increased in those with recurrent AF (4.49 ± 0.48 vs. 3.77 ± 0.55 cm; $p=0.0047$). Other baseline characteristics did not differ significantly between the groups (**table 1**).

An ablation procedure following the DCCV significantly favoured maintenance of sinus rhythm (40% vs. 0%; $p=0.035$). There was also

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Table 1. Patients' baseline characteristics

Characteristic	Recurrent AF	Sinus rhythm	p value
Mean age (years)	70.5 ± 13.4	75.5 ± 7.6	0.31
Male gender	n=10 (91%)	n=8 (80%)	0.59
Hypertension	n=8 (73%)	n=5 (50%)	0.39
Systolic BP (mmHg)	144.5 ± 17.1	145.2 ± 16.3	0.92
Diastolic BP (mmHg)	83.5 ± 18.4	75.8 ± 11.4	0.26
Coronary artery disease	n=3 (27%)	n=1 (10%)	0.59
Cardiac failure	n=2 (18%)	n=0 (0%)	0.48
Dyslipidaemia	n=3 (27%)	n=3 (30%)	1.00
Number of medications	5 ± 3.1	4.4 ± 2.2	0.61
Atrial flutter	n=0 (0%)	n=4 (40%)	0.035
AF precipitant	n=2 (18%)	n=2 (20%)	1.00
CHA ₂ DS ₂ -VASc	2.18 ± 1.48	2.5 ± 1.4	0.61
HAS-BLED score	1.73 ± 1.01	1.5 ± 0.71	0.56
LA size (cm)	4.49 ± 0.48	3.77 ± 0.55	0.0047

Key: AF = atrial fibrillation; BP = blood pressure; LA = left atrial

Table 2. Management of atrial arrhythmia

Management	Recurrent AF	Sinus rhythm	p value
Years since DCCV	4.4 ± 0.66	4.95 ± 0.65	0.070
Any AAD	n=8 (73%)	n=7 (70%)	1.00
Class Ic or III AAD	n=1 (9%)	n=3 (30%)	0.31
Ablation	n=0 (0%)	n=4 (40%)	0.035
Antiplatelet therapy	n=10 (91%)	n=7 (70%)	0.31
Any antithrombotic therapy	n=0 (0%)	n=0 (0%)	1.00

Key: AAD = anti-arrhythmic drug; AF = atrial fibrillation; DCCV = direct current cardioversion

a tendency for the patients in sinus rhythm to be prescribed class Ic or III anti-arrhythmic drugs (30% vs. 9%; $p=0.31$), although this did not meet statistical significance (**table 2**).

Discussion

This audit shows that the majority of patients, three to six years following a DCCV, were prescribed anticoagulation appropriately. However, a significant number who were not on anticoagulation therapy had a recurrence of atrial arrhythmia, yet met current ESC criteria for treatment.

Furthermore, a large proportion of those patients with recurrent AF had formerly not been identified. Overall, in the long term, few patients appear to remain both in sinus rhythm and without anticoagulant therapy. LA dilatation appears to predispose to AF recurrence and, conversely, a diagnosis of atrial flutter, and ablation therapy, confers a reduction in risk of arrhythmia recurrence. This is in keeping with previously reported literature.⁹

Admittedly, our findings are limited by a small sample size, and are also prone to

Key messages

- There is a high rate of recurrence of atrial fibrillation (AF) in the long term following direct current cardioversion (DCCV)
- Accordingly, European Society of Cardiology (ESC) guidance recommends indefinite anticoagulation if there is a high risk of recurrence
- A significant proportion of patients seen in our clinic, and not on anticoagulation after DCCV three to six years previously, had recurrence of AF and warranted anticoagulation
- We suggest long-term, routine screening if patients do not remain on anticoagulation therapy following DCCV for AF

selection bias; the patients attending the clinic were likely to exhibit health-seeking behaviour. Alternatively, it is possible that non-responders were already under the care of an appropriate physician. Despite these potential weaknesses, these results suggest that nearly half of patients not on any form of anticoagulation following DCCV in the long term have a recurrence of atrial arrhythmia warranting antithrombotic therapy. We propose that similar screening strategies are adopted either in primary or secondary care. Prospectively, we also suggest that, if a patient does not remain on long-term anticoagulation following DCCV, clear instruction with regards to ongoing rhythm monitoring should be given both to the GP and patient. We believe that these measures should ensure appropriate uptake of anticoagulation therapy and reduce subsequent thromboembolic risk in these individuals ●

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Conflict of interest

None declared.

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Book review

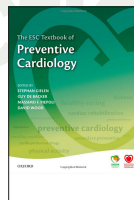
The ESC textbook of preventive cardiology

Editors: Gielen S, De Backer G, Piepoli M, Wood D

Publisher: Oxford University Press, 2015

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Price: £115 (print), £29 (online, 1-year subscription)



It is widely accepted knowledge among health professionals and the general public that premature cardiovascular disease can be prevented. However the evidence and guidelines on prevention are typically scattered, making integration into clinical practice problematic. The *ESC textbook of preventive cardiology* aims to collate all the aspects of prevention into one textbook.

The editors correctly point out that “there is no book that unites” the principles and practice of preventive cardiology. They are promising “a single resource” with a “practical hands-on approach”, that will help the reader integrate the knowledge in this book into their clinical practice. In the preface it is stated that this book is not only aimed at doctors but any health professional that has to deal with cardiovascular disease. It's available in both print and digital formats with the online version to be updated when new evidence becomes available.

The initial chapter on epidemiology swiftly brings the reader up to date with the past 60 years of research into the prevention of cardiovascular disease. While it is clearly outlined that mortality has significantly improved, the reader is presented with evidence for a potential “new phase of the epidemic” of cardiovascular disease mainly related to the meteoric rise of obesity and diabetes. This is an overarching theme that appears time and time again throughout the book.

Chapters dedicated to modification of risk factors are expertly written and provide the reader with the current evidence and guidelines for management of patients. Clinical application is further supported by accompanying

case studies for which a solution is provided at the end of each chapter. The cases are well thought out and thoroughly explained making them a valuable addition to the textbook and well worth reading.

Of particular note to me was the section on imaging in cardiovascular prevention. This is an area I've previously found a minefield with both understanding the indications, relative advantages and disadvantages and interpretation of the numerous imaging modalities available within cardiovascular radiology. Extensive, but clear, tables outlining the various properties of each modality are of great reference to anyone regularly ordering and interpreting cardiovascular radiology.

The editors admit in the preface that this textbook “will not be perfect in all aspects”, and there are areas in which this is true. Risk assessment is a fundamental backbone of prevention, but the section on this mainly pertains to use of the SCORE risk estimation system. Writing from a UK perspective, where QRISK and the more recent JBS3 guidelines (which are notably completely absent from the comparative table), makes the risk assessment section less applicable than it could be. Also, focussing on the SCORE system and its unique use of 10-year risk of mortality rather than risk of events, which it admits is not “universally popular”, I feel adds confusion rather than simplifying the issue.

I found the delivery of preventive cardiology sections not hugely useful. They seem squarely aimed at how to set up a service. Tables outlining the minimum equipment requirements, personnel and organisational issues could be better laid out in books covering cardiac rehabilitation already available.

Overall, I feel the book succeeds in its aim to provide a valuable single resource for the health professional faced with assessing and managing patients and their cardiovascular risk. *The full version of this review is available online...*

Jonty Bennett
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