Is it safe to stop anticoagulants after successful surgery for atrial fibrillation?

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Summary

A best evidence topic in cardiothoracic surgery was written according to a structured protocol. The question addressed was: is it safe to stop anticoagulants after successful surgery for atrial fibrillation? Altogether, 177 papers were found using the reported search, of which 14 were selected that represented the best evidence to answer the clinical question. Selection criteria included study relevance, primary outcome, size of study population and length of follow-up. The authors, journal, date and country of publication, patient group studied, study type, relevant outcomes and results of these papers are tabulated. The weight of evidence, including over 10,000 patient-years of follow-up, supports the discontinuation of warfarin following atrial fibrillation correction procedures as being safe, with an associated annual thromboembolic stroke rate of 0–3.8% off warfarin, in studies where warfarin was stopped at a mean of 3.6 months (range 0–8 months) after the procedure. However, the confidence of this conclusion suffers from a paucity of high-quality randomized controlled trials in the field, with the main body of evidence coming instead from observational non-randomized studies. The stroke rate also varies with the exact procedure performed; pulmonary vein isolation procedures are the most extensively evaluated and carry the lowest stroke rate following warfarin discontinuation (0–0.4% per annum when performed as an isolated procedure). By contrast, left atrial appendage occlusion by insertion of a transcatheter device has an associated annual stroke rate of 0–3.8% off warfarin. Thus, discontinuation of warfarin following such transcatheter procedures cannot be recommended at this time. Concomitant heart surgeries, such as mitral valve repair have been shown to increase the thromboembolic rate both unpredictably and dramatically, and this review thus identifies concomitant mitral valve surgery as a potentially substantial risk factor for late thromboembolic stroke in patients undergoing corrective surgeries for atrial fibrillation. This review finds in favour of warfarin discontinuation in selected patients at three months post-procedure, emphasizing consideration of the patient’s individual risk-factor profile as paramount. This recommendation is in line with the 2010 guidelines for the management of atrial fibrillation produced by the European Society of Cardiology.

Keywords: Ablation; Anticoagulation; Atrial fibrillation; Left atrial appendage; Stroke; Thromboembolism

1. Introduction

A best evidence topic was constructed according to a structured protocol. This is fully described in the ICVTS [1].

2. Three-part question

In [patients undergoing successful surgical- or catheter-based interventions for atrial fibrillation (AF)] can [anti-coagulants be discontinued postoperatively] without unacceptable risk of [thromboembolic stroke]?

3. Clinical scenario

A patient who is a long-time sufferer of refractory AF is referred to you. He has found warfarin thromboprophylaxis a struggle and has heard about surgical and catheter-based interventions that may be able to remove his need for indefinite oral anticoagulation. You resolve to check the literature for evidence that it is safe to discontinue oral anticoagulation following successful interventional procedures.

4. Search strategy

A Medline search 1948 to February 2011 was performed using the PubMed interface:

(LAA OR PVI OR Maze OR Left Atrial Appendage OR Ablation)
AND (Atrial Fibrillation OR 'Atrial Fibrillation' [MeSH])
AND (Stroke OR Thromboembolism) AND (Anticoagulation)

The limits applied were that papers had to be written in English and involve human participants.

5. Search outcome

A total of 177 papers were found using the reported Medline search. From the search, 14 papers were selected...
Table 1. Best evidence papers

<table>
<thead>
<tr>
<th>Author, date and country</th>
<th>Patient group</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Themistoclakis et al., (2010), J Am Coll Cardiol, Italy, [2]</td>
<td>Off-OAT group: Two thousand six hundred and ninety-two PVI patients, taken off oral anticoagulation therapy after at least three months free of arrhythmia. Maintained on aspirin. Various CHADS2 scores, including high-risk</td>
<td>Ischaemic strokes at follow-up of 28±13 months</td>
<td>Off-OAT group=0.07% On-OAT group=0.45% P=0.06</td>
<td>The on-OAT group patients in this study remained on anticoagulation because they failed the criteria for discontinuation; hence it is a poor comparator group. For instance, 72% were experiencing recurrence of arrhythmias at the start of the follow-up period</td>
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<td>On-OAT group: Six hundred and sixty-three PVI patients, who remained on OAT due to failing an evaluation to come off OAT</td>
<td>Major haemorrhage at follow-up of 28±13 months</td>
<td>Off-OAT group=0.04% On-OAT group=2% P&lt;0.0001</td>
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<td></td>
<td>Retrospective review of multicentre, non-randomized trials (level 2b)</td>
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<td>Good points of the study include a large sample size and a substantial proportion of patients at high stroke risk (CHADS2 ≥2)</td>
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<td>Nademane et al., (2008), J Am Coll Cardiol, USA, [3]</td>
<td>Off-warfarin group: Four hundred and thirty-four CFAE ablation patients taken off warfarin after three months of sustained SR postoperatively</td>
<td>Annual stroke rate; mean follow-up of 836±605 days</td>
<td>Off warfarin group=0.4% On-warfarin group=2.0% P=0.004</td>
<td>Conversely, there is a short follow-up period</td>
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<td></td>
<td>On-warfarin group: One hundred and eighteen CFAE ablation patients remaining on warfarin because they had sustained recurrence of arrhythmias postoperatively</td>
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<td></td>
<td>Median age in study 69 years. All had at least one risk factor for stroke</td>
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<td>Oral et al., (2006), Circulation, USA, [4]</td>
<td>Three hundred and eighty-three LARFA patients taken off warfarin four months post procedure. Maintained on aspirin (81–325 mg daily)</td>
<td>Late TEs at 25±8 months</td>
<td>None</td>
<td>Twenty-nine patients died over the study follow-up period, and sustained SR was found to be the most important independent factor for survival, ahead of OAT status</td>
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<td>Single-centre, non-randomized, observational cohort study (level 2b)</td>
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<td>Corrado et al., (2008), J Cardiovasc Electrophysiol, USA, [5]</td>
<td>One hundred and thirty-eight consecutive patients taken off warfarin five to six months after ICE PVI</td>
<td>TEs at 16±12 months</td>
<td>None</td>
<td>Therefore, as patients in the off-OAT group restarted warfarin if they were found to re-enter AF for &gt;12 h, this may have unfairly lowered the stroke rate in the off-warfarin group relative to controls</td>
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<td></td>
<td>Retrospective review of multicentre, non-randomized trials (level 3a)</td>
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<td></td>
<td>The authors conclude that, in high-risk patients, successful ablation might allow for warfarin discontinuation, but also that randomized studies are warranted</td>
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<td>Selection criteria for discontinuation:</td>
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<td></td>
<td>1. Maintained SR after the blanking period</td>
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<td></td>
<td>2. Normal left atrial mechanics and pulmonary vein patency</td>
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<td>Weaknesses are the short follow-up period and lack of randomization. Patients taken off warfarin were generally aged under 65 years and had no prior history of TE; fewer than half had one or more risk factors for stroke. The authors acknowledge this and conclude that discontinuing anticoagulation following LARFA appears to be safe in patients without risk factors for stroke, and in patients with risk factors excluding age above 65 years and prior history of stroke, for which there are insufficient data to draw conclusions</td>
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<td></td>
<td>NB. The expected annual rate of TEs in patients with AF aged over 75 is 3.5–8.1% off warfarin</td>
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<td>Study group was at high-risk of stroke: 65% of the population had a CHADS2 score ≥2 (and all were over 75 years old) However, weaknesses are small sample size, retrospective design, short follow-up period and lack of control group</td>
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### Table 1. (Continued)

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<td>Ostermayer et al., (2005), J Am Coll Cardiol, Germany, [6] Analysis of two prospective multicentre trials, non-randomized (level 3a)</td>
<td>One hundred and one patients undergoing PLAATO delivered LAAO. All patients had contraindications to warfarin. They were immediately started indefinitely on aspirin 300–325 mg once daily and/or clopidogrel Mean CHADS2 score 2.5</td>
<td>Strokes at mean follow-up of 9.8 months (maximum 17 months)</td>
<td>Two</td>
<td>Study focuses on patients in whom warfarin was contraindicated. The authors conclude that LAAO may become an alternative to lifelong anticoagulation in patients with contraindications to such therapy; however, they do not infer its role in the wider population. Strengths of the study include the high-risk of the patients followed. Weaknesses include the very short follow-up time and lack of a control group</td>
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<td>Sick et al, (2007), J Am Coll Cardiol, Germany, [7] Multicentre, non-randomized prospective study (level 3a)</td>
<td>Fifty-five watchman recipients discontinuing warfarin at 45 days post procedure</td>
<td>Occurrence of stroke at mean 24±11 months post procedure</td>
<td>None (0%)</td>
<td>Limitations include the small study size and the short mean follow-up period; however, 13 patients were followed up for four years without a stroke</td>
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<td>Cox et al, (1999), J Thorac Cardiovasc Surg, USA, [8] Single-centre, retrospective analysis of non-randomized trial (level 2b)</td>
<td>One hundred and sixty-two patients undergoing maze I, II or III procedure, for lone AF. Discharged on aspirin</td>
<td>Strokes at a mean follow-up of 3.8±3.0 years</td>
<td>One (0.6%)</td>
<td>The study has the longest follow-up time of any in the field, with the maximum patient follow-up being 11 years</td>
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<td>Eighty-six patients undergoing maze II or III procedure, all of whom had AF and at least one further risk factor for stroke. Approximately half discontinued OAT at 3 months postoperative</td>
<td>Strokes at mean follow-up of 3.1±2.9 years</td>
<td>None</td>
<td>However, several aspects of the study limit the scope of its conclusions: the results are from a single surgical centre; 116 patients underwent concomitant, further cardiac procedures; and the exact number of patients discontinuing OAT in each group is not declared by the authors</td>
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<td>Fifty-eight patients with prior history of stroke, and all in AF at the time of surgery. Most remained on OAT indefinitely</td>
<td>Strokes at a mean follow-up of 3.7±2.5 years</td>
<td>None</td>
<td>NB. All patients sustained SR throughout the study period (with 5% requiring transient AADs to do so)</td>
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<tr>
<td>Almahameed et al., (2007), J Cardiovasc Electrophysiol, USA, [9] Single-centre, observational cohort study (level 2b)</td>
<td>One hundred and seven patients discharged from hospital following LAA amputation concomitant with various MV surgeries</td>
<td>TEs at a mean follow-up of 3.6±1.3 years</td>
<td>Off OAT=15% On OAT=10%</td>
<td>Study weaknesses include a small population, and the fact that the indication for LAA amputation was stroke prophylaxis at the time of concomitant MV surgery, and not AF; in fact only 61% of patients had a history of AF. Also, rhythm status post surgery was not reported</td>
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It is possible that the MV surgery may have caused the higher TE occurrence rates in this study. Evidence supporting this includes the fact that different concomitant procedures produced different rates of TE – 71% of the TEs occurred in the 44% of patients who underwent valve repair, with lower rates in those undergoing bio- or mechanical valve replacement.

Randomization successfully produced fairly similar patient groups, which is a strength of this study. However, roughly one-third of the enrolled patients had a CHADS2 score of only 1, which under the present American Heart Association guidelines gives them an insufficient risk of stroke to warrant warfarin therapy. Studies thus need to be performed with higher risk patient profiles.

The follow-up period was also relatively short.

Another study with a small sample size but good follow-up length and a high-risk patient population. However, the TE rate is concerningly high.

Furthermore, four of the five major strokes occurred later than 950 days post procedure, supporting the criticism that many studies have too short a follow-up time.

The authors conclude that the annual stroke rate is acceptable given the high-risk profile of the study group, and emphasize that it is 42% lower than the rate predicted by the group’s mean CHADS2 score.

The study follows high-risk patients but has a small study size and no control group.

The authors conclude that PLAATO may become an alternative to anticoagulation in patients in whom such therapy is contraindicated, but only after larger randomized studies have been performed.

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<td>Holmes et al., (2009), Lancet, USA, [10] Multicentre, prospective randomized controlled trial (level 1)</td>
<td>Group A: Four hundred and sixty-three patients randomized to an ITT of LAAO via the WATCHMAN device and discontinuation of warfarin at 45 days post procedure (actual number taken off warfarin=349)</td>
<td>Composite outcome (stroke, cardiovascular death, unexplained death and systemic embolism)</td>
<td>Group A=3.0 per 100 patient-years (95% CrI 1.9–4.5)</td>
<td>It is possible that the MV surgery may have caused the higher TE occurrence rates in this study. Evidence supporting this includes the fact that different concomitant procedures produced different rates of TE – 71% of the TEs occurred in the 44% of patients who underwent valve repair, with lower rates in those undergoing bio- or mechanical valve replacement.</td>
</tr>
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<td>Block et al., (2009), JACC Cardiovasc Intervent, USA, [11] Non-randomized, multicentre observational prospective study (level 3a)</td>
<td>Group B: Two hundred and forty-four patients randomized to ITT standard warfarin therapy (with no implant)</td>
<td>Ischaemic stroke Follow-up periods for all groups were a mean of 18 months</td>
<td>Group B=4.9 per 100 patient-years (95% CrI 2.8–7.1)</td>
<td>Randomization successfully produced fairly similar patient groups, which is a strength of this study. However, roughly one-third of the enrolled patients had a CHADS2 score of only 1, which under the present American Heart Association guidelines gives them an insufficient risk of stroke to warrant warfarin therapy. Studies thus need to be performed with higher risk patient profiles. The follow-up period was also relatively short.</td>
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<td>Park et al., (2009), J Invasive Cardiol, Germany, [12] Single-centre, prospective registry study (level 2b)</td>
<td>Sixty-one recipients of the PLAATO device. Mean CHADS2 score 2.6, mean age 73.5 years. No warfarin postoperatively Sixty-one patients with successful LAAO via PLAATO device implantation, maintained on aspirin indefinitely and six months of clopidogrel. Mean CHADS2 score 2.52±1.4. Mean age 72.7 years</td>
<td>TEs at mean follow-up of 3.75 years</td>
<td>Group B=2.2 per 100 patient-years (95% CrI 1.2–3.5) Posterior probability of superiority = 90.0%</td>
<td>The authors conclude that the annual stroke rate is acceptable given the high-risk profile of the study group, and emphasize that it is 42% lower than the rate predicted by the group’s mean CHADS2 score. Furthermore, four of the five major strokes occurred later than 950 days post procedure, supporting the criticism that many studies have too short a follow-up time. The authors conclude that PLAATO may become an alternative to anticoagulation in patients in whom such therapy is contraindicated, but only after larger randomized studies have been performed. The study follows high-risk patients but has a small study size and no control group. The authors conclude that PLAATO may become an alternative to anticoagulation in patients in whom such therapy is contraindicated, but only after larger randomized studies have been performed.</td>
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<td>Park et al., (2009), J Invasive Cardiol, Germany, [12] Single-centre, prospective registry study (level 2b)</td>
<td>Seventy-one patients with successful LAAO via PLAATO device implantation, maintained on aspirin indefinitely and six months of clopidogrel. Mean CHADS2 score 2.52±1.4. Mean age 72.7 years</td>
<td>Strokes at 24-month follow-up</td>
<td>Group B=1.6 per 100 patient-years (95% CrI 0.6–3.0) Posterior probability of superiority = 20.1%</td>
<td>The authors conclude that the annual stroke rate is acceptable given the high-risk profile of the study group, and emphasize that it is 42% lower than the rate predicted by the group’s mean CHADS2 score. Furthermore, four of the five major strokes occurred later than 950 days post procedure, supporting the criticism that many studies have too short a follow-up time. The authors conclude that PLAATO may become an alternative to anticoagulation in patients in whom such therapy is contraindicated, but only after larger randomized studies have been performed. The study follows high-risk patients but has a small study size and no control group. The authors conclude that PLAATO may become an alternative to anticoagulation in patients in whom such therapy is contraindicated, but only after larger randomized studies have been performed.</td>
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They also emphasize that the LAA is not the sole source of cardioembolic emboli, so strategies to occlude it may never totally supersede anticoagulation therapy.

**Tao et al., (2010), J Intervent Card Electrophysiol, China, [13]**  
**Single-centre, retrospective observational (level 2b)**  
Five hundred and twenty consecutive CPVA patients, One hundred and eighty-one of whom discontinued warfarin at three months postoperatively  
Late TEs over a follow-up of 28 ± 8 months (all patients)  
Eight (1.5%)  
P = 0.182  
OR 5.475  
95% CI 1.367–34.296  
P = 0.019  
Status of OAT as a predictor of TE  
OR 1.812  
95% CI 0.026–1.973  
P = 0.17  
The largest study looking at PVA/PVI and late TE  
Showed that OAT status is not a significant predictor of late TE, whereas AF recurrence is a significant predictor of late thromboembolism, advocating close monitoring of cardiac rhythm, possibly for life, in patients discontinuing warfarin  
Weaknesses: single-centre, non-randomized study. No patient with a CHADS2 score ≥ 3 was taken off OAT  
The mean age was also low (56.6 years), making the study group less closely related to the typical AF patient population  
A non-randomized study, but with large study populations. Unfortunately, the follow-up time is short. However, the results show that over this period, aspirin alone appears to be a safe anti-thrombotic strategy  
It should be noted that no strokes occurred in any of the 45.2% of patients in the warfarin group who had a CHADS2 score ≤ 1  
No patients died over the one-year follow-up in the aspirin group, five patients in the warfarin group died, and two died from haemorrhage

**Bunch et al., (2009), J Cardiovasc Electrophysiol, USA [14]**  
**Single-centre, observational evaluation (level 2b)**  
Off-OAT group: One hundred and twenty-three patients maintained on 325 mg daily aspirin only, following ablation for symptomatic AF via an open irrigated tip catheter. All patients had CHADS2 scores of 0 (40.7%) or 1 (59.3%)  
Strokes at follow-up of 327.4 ± 368.3 days  
Off-OAT group=0%  
On-OAT group=0.4%  
P = 0.24  
A non-randomized study, but with large study populations. Unfortunately, the follow-up time is short. However, the results show that over this period, aspirin alone appears to be a safe anti-thrombotic strategy  
It should be noted that no strokes occurred in any of the 45.2% of patients in the warfarin group who had a CHADS2 score ≤ 1  
No patients died over the one-year follow-up in the aspirin group, five patients in the warfarin group died, and two died from haemorrhage

**Pappone et al., (2003), J Am Coll Cardiol, Italy, [15]**  
**Single-centre, non-randomized, prospective study (level 2b)**  
Group A: Five hundred and eighty-nine PVI patients, taken off warfarin three months post discharge if they had no recurrence of arrhythmia. The actual number taken off warfarin was not declared by the authors  
Ischaemic strokes at median 900 days follow-up  
Group A=6 (1.0%)  
Group B=29 (5.0%)  
Group A=8 (1.4%)  
Group B=27 (4.6%)  
Non-randomized study that was designed to look at quality of life in ablation vs. medically treated patients, not at long-term outcomes of warfarin discontinuation. However, results show a low TE stroke rate over a substantial follow-up period for the study group, providing favourable evidence for the discontinuation of warfarin following PVI  
The anticoagulation status of the study group was, however, only  
(Continued on next page)
that provided evidence addressing the specific question. Selection criteria included study relevance, primary outcome, size of study population and length of follow-up. These papers are presented in Table 1.

6. Results

Themistoclakis et al. [2] reported on the only large (albeit non-randomized) trial comparing warfarin discontinuation with continuation in patients following surgical correction of AF. The trial included 3355 patients who had undergone pulmonary vein isolation (PVI), and the results reported a lower rate of ischaemic stroke in the discontinuation group (P=0.06). However, selection bias resulted in the continuation group comprising the majority of patients who remained in AF, confounding the results. Nevertheless, the low absolute stroke rate in the warfarin discontinuation group (0.07% over 28±13 months) suggests that discontinuation of warfarin at three months post PVI is safe.

Smaller studies support Themistoclakis' conclusions. Pappone et al. [15] reported an annual stroke rate of 0.4% in a cohort of 589 PVI patients who discontinued warfarin three months postoperatively (provided they remained free of AF). The median follow-up was 900 days. Corrado et al. [5] reported no thromboembolic events (TEs) over a mean follow-up of 16 months in a cohort of 138 high-risk patients who stopped warfarin five to six months after undergoing PVI. Similarly, Bunch et al. [14] also recorded no strokes in a 327-day study following 123 patients undergoing irrigated catheter tip ablation who were maintained on aspirin monotherapy.

In a non-randomized retrospective study, Cox et al. [8] reported just one late stroke in 306 patients over a mean follow-up of longer than three years. All of these patients remained free of AF throughout, and the majority discontinued warfarin at three months post procedure.

Oral et al. [4] and Nademanee et al. [3] looked at patients discontinuing warfarin three months after left atrial ablation. The annual stroke rates in these studies were 0% and 0.4%, respectively. However, in Nademanee's study, patients only discontinued warfarin if they had remained free of AF throughout the immediate three postoperative months, and in fact, in those who suffered recurrence of AF and remained on warfarin, the annual stroke rate was higher, at 2%.

The evidence for warfarin discontinuation following non-rhythm-correcting, left atrial appendage (LAA) occlusion strategies is less convincing. In a randomized controlled trial, Holmes et al. [10] reported the risk of ischaemic stroke off warfarin, following LAA occlusion using the WATCHMAN device (Atritech Inc, Plymouth, MN, USA.), as being just 2.2 per 100 patient-years. This was non-significantly greater than in the control arm of patients on standard warfarin therapy alone (1.6 per 100 patient-years), but was still a very low rate. This study has been criticized, however, as one-third of the patients had a CHADS2 score of only 1, and therefore were at low risk of stroke at study entry. However, Sick et al. [7] had similarly encouraging results, reporting no strokes and only two transient ischaemic attacks (TIAs) over a two-year follow-up period in 55 patients discontinuing warfarin following WATCHMAN implantation.

Multiple non-randomized studies have looked at stroke rates in patients maintained on antiplatelet therapy alone following PLAAO device LAA occlusion [6, 11, 12]. These reported a relatively low incidence of stroke of 0–3.8% per annum.

In fact, the only study found that describes a high incidence of TE in patients taken off warfarin is that reported by Almahameed et al. [9]. This study reported a 15% incidence of TE over a mean 3.6-year follow-up of just 40 patients who were taken off warfarin following concomitant LAA amputation and mitral valve surgery. However, the incidence of TE was 10% in the control arm individuals remaining on warfarin – much higher than in similar studies. Thus, it appears likely that the mitral valve itself was a major embolic source, contributing to the spuriously high TE rate in this study.

7. Clinical bottom line

There is a relatively large body of low-quality evidence showing warfarin discontinuation following AF surgery to be safe. The annual stroke risk following AF ablation surgery undertaken in isolation in patients in whom warfarin is discontinued is low. The current literature review puts
the annual stroke risk at 0–0.4% in such patients, compiled from studies with a cumulative 10,000 patient-years of follow-up, where warfarin was discontinued at a mean of 3.9 months (range 0–8 months) post procedure.

However, if mitral valve surgery is performed concomitantly, stroke rates off warfarin can rise to up to 4.2% per annum, with mitral valve repair carrying a greater stroke risk than replacement. Experimental transcatheter interventional procedures that aim to occlude the LAA (namely the WATCHMAN and PLAATO devices) have a higher risk of stroke in patients off warfarin; 0–3.8% per annum has been reported from trials comprising a total of 560 patient-years of follow-up in which no warfarin was given post-procedurally. Non-randomization of studies presents a major issue when analysing the evidence, and the conclusions should be viewed in light of this.

On the available evidence, we recommend cessation of anticoagulants at three months after established AF ablation procedures, but only after first considering the stroke risk profile of the individual patient. This recommendation is concordant with the European Society of Cardiology’s 2010 guidelines for the management of AF [16].

References


eComment: Anticoagulants after atrial fibrillation ablation: the potential use of dabigatran

Authors: Ioanna Koniarri, Department of Cardiothoracic Surgery, Patras University Hospital, Rion Patras, Greece; Antonios Michalopoulos

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We read with great interest the review of Gray et al. [1] concerning the safety of warfarin discontinuation after successful surgery for atrial fibrillation (AF). According to the HRS/ EHRA/ EACVI Expert Consensus Statement [2], the discontinuation of warfarin therapy post ablation is not generally recommended in patients who have a CHADS2 score of ≥2 because of limited data regarding the safety of treatment cessation. A large body of evidence monitoring patients after curative procedures for AF, mostly after catheter ablation, highlights the fact that recurrent asymptomatic AF can occur commonly, depending on the subset of patients studied as well as the duration and frequency of monitoring. The literature suggests that although the number of undetected AF episodes may increase after catheter ablation, the duration of individual episodes decreases, usually to >24 h – a duration not associated with thromboembolic events. If warfarin is discontinued after successful ablation, it should be reinstated once AF recurrence is confirmed in high-risk patients for thromboembolic events, regardless of the type of AF. The presence of hypercoagulability in the LA of patients with paroxysmal AF and thromboembolic risk has been demonstrated, even in the non-paroxysmal period, suggesting that patients with paroxysmal AF are at high risk for developing cerebral thromboembolism even during sinus rhythm [3]. At the same time, stroke rates as well as stroke risk factors in patients with paroxysmal AF have been proven to be similar to those in patients with persistent AF [3]. Notably, advanced age and structural heart disease were independent predictors for thrombus formation in the LA. Therefore, the resumption of warfarin treatment should not be based on the type of AF, but on the thromboembolic risk in patients with AF recurrence. AF may occur late after catheter ablation, which is not predictable by any cardiac rhythm monitoring. Late AF recurrence is more likely to occur in patients with hypertension, persistent AF, and in older patients [3]. Thus, the discontinuation of warfarin after successful ablation should be based on risk factors. However, anticoagulation therapy using warfarin involves some issues, such as bleeding, intolerability or unstable INR control, all of which may be attributable to thromboembolism in patients who are taking warfarin. The Canadian Cardiovascular Society guidelines recommend that warfarin or dabigatran be used for oral anticoagulation in patients with a CHADS2 score of ≥2, and concluded that dabigatran is preferred over warfarin in most
patients [4]. This recommendation was based on the results of the RE-LY trial, which reported that dabigatran 150 mg po bid is superior to warfarin for the prevention of stroke with an equivalent risk of bleeding while dabigatran 110 mg po bid is equivalent to warfarin in terms of stroke prevention with a significantly reduced risk of hemorrhage [4]. Interestingly, a recent study concerning the use of dabigatran immediately after atrial fibrillation ablation revealed that there were no pre-procedural or intra-procedural thromboembolic episodes or bleeding in patients that received dabigatran. Moreover, there were no post ablation strokes, transient ischemic attacks, or systemic thromboemboli in any of the patients, rendering dabigatran a safe and well-tolerated alternative to warfarin after AF ablation [5].

**References**


**eComment: Is it safe to stop anticoagulants after successful surgery for atrial fibrillation?**

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Gray et al. provide an important evidence-based synthesis of the complex literature on atrial fibrillation and the safety of stopping anticoagulants [1]. Any evidence-based article is limited by the quality of the evidence base analysed, and their analysis raises a number of points. Firstly, the definition of ‘successful’ needs to be made clear. Periods of paroxysmal atrial fibrillation are associated with an increased stroke rate and may need anticoagulant therapy as a prophylaxis [2]. Within the definition of successful documentation of mechanical atrial activity and not just electrocardiogram evidence of sinus rhythm needs to be included, as an akinetic atrium has increased thromboembolic potential [3]. Secondly, the exact surgical technique of atrial fibrillation surgery needs to be stated, and concomitant surgical procedure(s) identified. The risk of a thromboembolic event will be lower in coronary artery bypass surgery patients than in mitral valve repair/replacement patients having concomitant atrial fibrillation surgery. The technique of left atrial exclusion, if indeed it was performed (sometimes omitted in elderly patients with frail tissues), may also affect thromboembolic risk. Thirdly, the patient’s cardiovascular risk profile, via the CHADS2 score [4], is an important factor, as previously ecommented on by Koniari.

**References**


