Declaration of conflict of interest

None to declare
Antithrombotic policies in atrial fibrillation patients

Anticoagulation after ablation: what is optimal?

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Over the past decade, catheter ablation has emerged as a potential cure for atrial fibrillation.

Many centers worldwide have been reporting relatively high success rates (70–90%) with few associated complications after ablation of atrial fibrillation in selected patient populations.

Cappato R et al, Circulation 2005
The thromboembolic complication rate has ranged from 0 to 7% in patients undergoing AF ablation.

Most of those patients encountered transient ischemic attacks, but only a few patients had any severe disabilities or fatal events.

Cappato R et al, Circulation 2005
Wazni OM et al, JCE 2005
Oral H et al, Circulation 2006
Mortada ME et al, JCE 2008
Prevention of thromboembolism is a principal aim of atrial fibrillation management.

Although the mechanisms underlying thrombogenesis in AF are clearly complex and remain only partly understood, it is intuitive that restoration and reliable maintenance of sinus rhythm after ablation is probably the best preventive strategy against thromboembolism.

Pappone C et al. JACC 2003
For the following reasons, it cannot be assumed that ablation of AF eliminates the risk of thromboembolism:

- Patients with a history of AF and comorbid conditions may be at risk of thromboembolic events even when in SR.
- Ablation causes scars and reduces left atrial transport function by up to 30%, which may predispose to thromboembolic events even in the setting of SR.
- Patients with an apparently successful ablation procedure could have asymptomatic episodes of AF during long-term follow-up.

It is unclear whether anticoagulation can safely be discontinued after AF ablation.
What is the optimal anticoagulation strategy after AF ablation?
Anticoagulation strategy after AF ablation

Available data

- Clinical trials
- Expert consensus documents
- Guidelines
Anticoagulation strategy after AF ablation

Clinical trials

- Unfortunately, few data exist to guide us in this area.
- The anticoagulation management of patients after AF ablation has largely been left to the individual judgment of the treating physician.
- Several practice patterns have emerged based on:
  - the apparent presence or absence of AF
  - duration of recurrent episodes
  - and stroke risk stratification, (CHADS2 scheme being the most commonly used).

Meiltz A et al. Europace 2008
Ablation was performed in 755 pts with PAF (n:490) or chronic AF (n:265).

411 pts (56%) had ≥1 risk factor for stroke.

All pts were anticoagulated with warfarin for ≥3 months.

Warfarin was discontinued in 79% of 256 patients without risk factors and in 68% of 266 patients with ≥1 risk factor.

The risk of a TE after ablation is 1.1%, with most events occurring within 2 weeks after the procedure.

Discontinuation of anticoagulant therapy appears to be safe after successful ablation, both in pts without risk factors for stroke and in pts with risk factors other than age 65 years and history of stroke.

Risk of Thromboembolic Events After Percutaneous Left Atrial Radiofrequency Ablation of Atrial Fibrillation

- That was an observational cohort study, not a randomized, clinical trial. In the absence of a randomized comparison of chronic anticoagulation versus discontinuation of anticoagulation after ablation, definite conclusions regarding the safety of stopping therapy with warfarin are not possible.

- The mean duration of follow-up was 2 years. It is possible that late recurrences of AF several years after ablation will increase the risk of TEs beyond the risk noted in this study.

- Until the results of larger studies with several years of follow-up become available, the true long-term safety of discontinuing long-term anticoagulation after ablation will remain unclear.

A total of 630 consecutive pts who underwent 934 ablation procedures using an open irrigated tip catheter for symptomatic AF were evaluated.

Outcomes were compared between CHADS2 0–1 pts treated with warfarin (goal INR: 2–3) versus aspirin only (325 mg/day) immediately after ablation.

123 pts (20%) were treated with aspirin and 507 (80%) with warfarin.

Prevalences of the CHADS2 scores of patients on aspirin were (0:40.7%, 1:59.3%) and on warfarin (0:13.6%,1:31.6%, ≥2: 54.8%).

Bunch T et al. JCE 2009
**Conclusion:** “Select low-risk pts with a low CHADS2 (0–1) score who undergo ablation with an aggressive anticoagulation strategy with heparin and use of an open irrigated tip catheter can safely be discharged following their procedure on aspirin alone.”

**Bunch T et al. JCE 2009**

**Editorial:** “The study failed to prove the superiority of either aspirin or warfarin in the low-risk patients because of the lack of an incidence of strokes in either group.”

**Okumura Y. JCE 2009**
Warfarin Is Not Needed in Low-Risk Patients Following Atrial Fibrillation Ablation Procedures

- This study is an observational evaluation and from a single center and not a prospective assessment of anticoagulation strategies.

- These findings require confirmation by other centers and may not be applicable to other ablation strategies.

  Bunch T et al. JCE 2009

- Because of the infrequent rate of 0–7% of thromboembolic events after AF ablation, demonstrating the efficacy of anticoagulation or antiplatelet therapy for infrequent stroke events would require a large cohort randomized study including thousands of patients.

  Okumura Y. JCE 2009
3,355 patients, of whom 2,692 (79% male, mean age 57 11 years) discontinued OAT 3 to 6 months after ablation and 663 remained on OAT after this period.

CHADS2 risk scores of 1 and ≥2 were recorded respectively:
- in 723 (27%) and 347 (13%) Off-OAT group patients
- in 261 (39%) and 247 (37%) On-OAT group patients.

Themistoclakis S, et al JACC 2010
The Risk of Thromboembolism and Need for Oral Anticoagulation After Successful Atrial Fibrillation Ablation

After an average follow-up of 28 ± 13 months, only 2 (0.07%) patients had experienced an ischemic stroke in the Off-OAT group.

No patient with a CHADS2 score ≥2 had experienced a stroke.

In the On-OAT group, after an average follow-up period of 24 ± 15 months, only 3 (0.45%) patients had experienced an ischemic stroke.

Themistoclakis S, et al JACC 2010
OAT can safely be discontinued 3 to 6 months after successful ablation of AF in patients without arrhythmic recurrences off antiarrhythmic drugs, without severe pulmonary vein stenosis, and without severe LA dysfunction.

Themistoclakis S, et al JACC 2010
The authors observed a very low incidence of thromboembolism.

Even in the patients with a CHADS2 score of 0, the expected annual incidence of stroke should be significantly higher than the overall incidence of 0.23% that the authors reported in their patient population.

“The surprising and discrepant paucity of thromboembolic events across the groups in this retrospective study seriously limits deriving a meaningful conclusion regarding discontinuation of warfarin therapy post-ablation, especially in patients with higher risk factors for stroke.”

Cakulev I, Waldo A. JACC 2010
How can one be sure that in patients at high risk for stroke (CHADS2 score \( \geq 2 \)), it is safe to stop OAT?

- Only 347 Pts in this study had CHADS2 score \( \geq 2 \), of the 3,355 total patients.
- 82% of patients in this study would not necessarily have warranted OAT post–AF ablation because their CHADS2 score was \( \leq 1 \).

How can we be sure that a patient is cured?

- Follow-up was often not face–to–face, involved long intervals between each follow–up visit, and on average was only a little over 2 years.

Cakulev I, Waldo A. JACC 2010
Sinus rhythm was present in **46.6%** of patients after the initial procedure during a median follow-up period of **4.8 years**.

After multiple procedures (1 to 3), stable sinus rhythm was achieved in **79.5%** of patients.

Kuck KH et al, Circulation 2010
Arrhythmia-free survival rates after a single catheter ablation procedure were 40%, 37%, and 29% at 1, 2, and 5 years.

Arrhythmia-free survival following the multiple procedures was 87%, 81%, and 63% at 1, 2, and 5 years.

Haissaguerre M et al, JACC 2011
Anticoagulation strategy after AF ablation

Available data

- Clinical trials
- Expert consensus documents
- Guidelines
Expert consensus documents

HRS/EHRA/ECAS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation: Recommendations for Personnel, Policy, Procedures and Follow-Up

Venice Chart International Consensus Document on Atrial Fibrillation Ablation

Consensus document on antithrombotic therapy in the setting of electrophysiological procedures

Bleeding risk assessment and management in atrial fibrillation patients: a position document from the European Heart Rhythm Association, endorsed by the European Society of Cardiology Working Group on Thrombosis
HRS/EHRA Expert consensus statement

- Low molecular weight heparin or intravenous heparin should be used as a bridge to resumption of systemic anticoagulation following AF ablation.

- Warfarin is recommended for all patients for at least 2 months after an AF ablation procedure.

- Decisions regarding the use of warfarin more than 2 months after ablation should be based on the patient’s risk factors for stroke and not on the presence or type of AF.

- Discontinuation of warfarin therapy post–ablation is generally not recommended in patients who have a CHADS2 score $\geq 2$.

“The consensus Task Force acknowledges that the two month recommendation for warfarin post ablation regardless of their CHADS score is empirical and that practice patterns may vary, particularly in patients with paroxysmal AF who are at low risk for stroke, and who are in sinus rhythm at the time of their AF ablation procedure.”

In selected patients without evidence of recurrent AF after three to six months, it may be possible to discontinue warfarin.

If warfarin is discontinued, aspirin (75–325 mg/day) should be started unless contraindicated.

Patients with a CHADS2 score of 1 may be treated with aspirin or warfarin, and those without moderate risk factors are advised to take aspirin or nothing.

New data derived from recent clinical trials necessitate the update of the previous ESC/AHA/HRS atrial fibrillation Guidelines published in 2006.
Recommendations for AF ablation

**ESC Guidelines**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class&lt;$^a$&gt;</th>
<th>Level&lt;$^b$&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ablation of common atrial flutter is recommended as part of an AF ablation procedure if documented prior to the ablation procedure or occurring during the AF ablation.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Catheter ablation for paroxysmal AF should be considered in symptomatic patients who have previously failed a trial of antiarrhythmic medication.</td>
<td>IIa</td>
<td>A</td>
</tr>
<tr>
<td>Ablation of persistent symptomatic AF that is refractory to antiarrhythmic therapy should be considered a treatment option.</td>
<td>IIa</td>
<td>B</td>
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<tbody>
<tr>
<td>Catheter ablation of AF in patients with heart failure may be considered when antiarrhythmic medication, including amiodarone, fails to control symptoms.</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>Catheter ablation of AF may be considered prior to antiarrhythmic drug therapy in symptomatic patients despite adequate rate control with paroxysmal symptomatic AF and no significant underlying heart disease.</td>
<td>IIb</td>
<td>B</td>
</tr>
</tbody>
</table>

Camm et al. ESC AF guidelines 2010 Eur Heart J 2010
**Recommendations for AF ablation**

*AHA/HRS Guidelines*

<table>
<thead>
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<tr>
<td>Catheter ablation performed in experienced centers is useful in maintaining sinus rhythm in selected patients with significantly symptomatic, paroxysmal AF who have failed treatment with an antiarrhythmic drug and have normal or mildly dilated left atria, normal or mildly reduced LV function, and no severe pulmonary disease.</td>
<td>I</td>
<td>A</td>
</tr>
</tbody>
</table>

Wann SR et al. ACCF/AHA/HRS focused update on the management of patients with AF. Circulation 2011
Is there any new recommendation regarding anticoagulation strategy after AF ablation?
The most important addition regarding antithrombotic treatment is the recommendation to use the CHA2DS2–VASc scoring system in patients with a CHADS2 score of 0–1.

In patients with a CHADS2 score of ≥2, chronic OAC therapy is recommended, unless contraindicated. Where a more detailed stroke risk assessment is indicated, it is recommended to use the CHA2DS2–VASc score.

Camm et al. ESC AF guidelines 2010 Eur Heart J 2010
New risk stratification scheme

**CHADS$_2$**

- Congestive Heart Failure 1
- Hypertension 1
- Age > 75 years 1
- Diabetes Mellitus 1
- Prior Stroke or TIA 2

**CHA$_2$DS$_2$-VAS$_C$**

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive heart failure/LV dysfunction</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥ 75</td>
<td>2</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1</td>
</tr>
<tr>
<td>Stroke/TIA/TE</td>
<td>2</td>
</tr>
<tr>
<td>Vascular disease [prior myocardial infarcti, peripheral artery disease, aortic plaque]</td>
<td>1</td>
</tr>
<tr>
<td>Age 65-74</td>
<td>1</td>
</tr>
<tr>
<td>Sex category [ie Female gender]</td>
<td>1</td>
</tr>
</tbody>
</table>

Age gradation and vascular disease are parts of the risk score
### Approach to thromboprophylaxis in patients with AF

<table>
<thead>
<tr>
<th>Risk category</th>
<th>CHA$_2$DS$_2$-VASc score</th>
<th>Recommended antithrombotic therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>One ‘major’ risk factor or ≥2 ‘clinically relevant non-major’ risk factors</td>
<td>≥ 2</td>
<td>OAC$^a$</td>
</tr>
<tr>
<td>One ‘clinically relevant non-major’ risk factor</td>
<td>1</td>
<td>Either OAC$^a$ or aspirin 75–325 mg daily. Preferred: OAC rather than aspirin.</td>
</tr>
<tr>
<td>No risk factors</td>
<td>0</td>
<td>Either aspirin 75–325 mg daily or no antithrombotic therapy. Preferred: no antithrombotic therapy rather than aspirin.</td>
</tr>
</tbody>
</table>

Camm et al. ESC AF guidelines 2010 Eur Heart J 2010
New AF guidelines
What’s….new?

- Initially post-ablation, LMWH or i.v. UFH should be used as a bridge to resumption of systemic anticoagulation, which should be continued for a minimum of 3 months.

- Thereafter, the individual stroke risk of the patient should determine whether oral anticoagulation should be continued.

- Discontinuation of warfarin therapy post-ablation is generally not recommended in patients at risk for stroke.

Camm et al. ESC AF guidelines 2010 Eur Heart J 2010
What risk stratification scheme should be used (CHA2DS2-VASC or CHADS2)?

Do patients with CHA2DS2-VASC:1 require continuously OAC after AF ablation?

What is the role of new OAC drugs after AF ablation?
Approach to thromboprophylaxis in patients with AF—New OAC drugs

- Where oral anticoagulation is appropriate therapy, dabigatran may be considered, as an alternative to adjusted dose VKA therapy.
  
  - (i) If a patient is at low risk of bleeding e.g. HAS-BLED score of 0–2, dabigatran 150 mg b.i.d. may be considered, in view of the improved efficacy in the prevention of stroke and systemic embolism.
  
  - (ii) If a patient has a measurable risk of bleeding e.g. HAS-BLED score of ≥3, dabigatran etexilate 110 mg b.i.d. may be considered, in view of a similar efficacy in the prevention of stroke and systemic embolism.

Camm et al. ESC AF guidelines 2010 Eur Heart J 2010
"Dabigatran is the first new oral anticoagulant to become available for clinical use in 50 years"
**Conclusions**

- **Guidelines recommend** continued anticoagulant therapy for 2–3 months following an AF ablation in all patients regardless of stroke risk factors.

- The optimal duration of this therapy has not been clearly established.

- **Owing to the risk of relapse**, the EHRA/ESC guidelines recommend that anticoagulation should be continued long term as per the original indication in subjects with stroke risk factors.

- **This is in line with current observation** that AF tends to recur in many patients, including late recurrences in patients after AF ablation.
“Data cry out for a prospective, randomized clinical trial that includes standardized methods of follow-up to assess and characterize recurrence of AF and to determine the incidence/prevalence of stroke.

Conclusion: do not stop the warfarin until we have prospective, randomized clinical trials that can help guide us in providing anticoagulation therapy for our patients.”

Cakulev I, Waldo A. JACC 2010