Anticoagulation Issues in Atrial Fibrillation Ablation

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KEYWORDS

• Atrial fibrillation ablation • Anticoagulation • Intracardiac echocardiography • Reversal agents • Novel oral anticoagulants • Warfarin

KEY POINTS

- Patients undergoing atrial fibrillation ablation should be anticoagulated before, during, and following ablation to reduce the risk of thromboembolic complications.
- The uninterrupted use of warfarin throughout the ablation period seems safe and effective, though benefits are limited by the inherent variability of the international normalized ratio.
- The periprocedural use of the novel oral anticoagulants throughout the ablation period requires additional investigation though their use is increasing. Differences among these novel agents need to be defined.
- The development of safe and effective reversal agents for the novel oral anticoagulants is needed to minimize the bleeding risks associated with their use.
- The long-term use of oral anticoagulants following successful ablation requires ongoing research and investigation.

INTRODUCTION

Patients undergoing atrial fibrillation ablation are anticoagulated before, during, and following their procedure to reduce the serious risk of a thromboembolic complication. Despite this well established recommendation, there remains debate about the optimal nature of anticoagulation and a continuing evolution in practice patterns. This article addresses issues related to anticoagulation in atrial fibrillation ablation focusing on the preprocedural, intraprocedural, and postprocedural periods.

PREPROCEDURAL ANTICOAGULATION

Most patients undergoing atrial fibrillation ablation are maintained on therapeutic oral anticoagulation, with warfarin or one of the novel oral anticoagulants, including dabigatran, rivaroxaban, or apixaban. Selected low-risk patients (with a CHADS2 [congestive heart failure, hypertension, age, diabetes, stroke] score of 0-1) may be maintained without anticoagulation or on aspirin therapy.[1]

The most current guidelines regarding anticoagulation and the performance of transesophageal echocardiography before atrial fibrillation ablation are modeled on the guidelines used to guide anticoagulation before cardioversion.[2] That is, for patients who are persistently in atrial fibrillation or have episodes lasting longer than 48 hours, 3 weeks of therapeutic anticoagulation is recommended. In such patients, the performance of a transesophageal echocardiogram before ablation is not required. In situations in which patients are not anticoagulated, performance of a transesophageal echocardiogram is recommended. Notably, the CHADS2 score (or other scoring system grading thromboembolic risk) is not a part of these recommendations. Uncommonly, these recommendations can lead to some unusual clinical

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scenarios. For instance, a patient with infrequent paroxysmal atrial fibrillation with a CHADS2 score of 0 who is maintained on aspirin would require a transesophageal echocardiogram, whereas a patient with persistent atrial fibrillation with a CHADS2 score of 3 to 4 who is maintained on warfarin would not require a transesophageal echocardiogram. In scenarios such as these, or when there is any concern for left atrial appendage thrombus, clinical judgment regarding the performance of a transesophageal echocardiogram should take precedence.

Historically, up until a few years ago, warfarin was discontinued before atrial fibrillation ablation and anticoagulation bridging before and after the ablation was performed with heparin (low-molecular-weight or unfractionated). As for many surgical procedures, the rationale for this practice was to attempt to reduce the bleeding risks associated with the procedure. In the case of atrial fibrillation ablation, these risks are often serious and are associated with pericardial tamponade and retroperitoneal bleeding.[3–6] This concern regarding bleeding risks required weighing the relative risks associated with thromboembolic complications during and immediately following the procedure when, in the absence of therapeutic levels of an oral anticoagulant, the patient may have lower levels of systemic anticoagulation.

Recent observational studies have demonstrated that periprocedural continuation of uninterrupted warfarin can be performed safely and it does not seem to increase the rate of bleeding complications.[7–13] One difficulty with the approach of uninterrupted warfarin is the inherent unpredictability of the patient's international normalized ratio (INR) on the day of the procedure. For this reason, the increasingly common practice of performing atrial fibrillation ablations on the day of admission to the hospital (based on insurance company mandate or physician preference) complicates the practice of performing atrial fibrillation ablations on uninterrupted warfarin. Evidence suggests that a supratherapeutic INR can be associated with an increased risk of complications that may minimize the benefit from performing procedures on warfarin.[14] To minimize the elevated risks associated with high INRs, one large center administers fresh frozen plasma to any patient with an INR greater than 3.5 on the day of the procedure.[7] Another approach has been to hold 1 or 2 days of warfarin before the ablation in an attempt to minimize extremely high INRs; however, this approach has not been studied and validated and may negate the benefit in thromboembolism prevention (due to subtherapeutic INRs).

Up until the release of the newer generation novel oral anticoagulants, the choice of anticoagulation was limited to warfarin. The availability of dabigatran, rivaroxaban, and apixaban has led to an increasing number of patients using one of these agents for the prevention of thromboembolism.[15–17] As expected, many of these patients are presenting for atrial fibrillation ablation on one of these novel agents. Periprocedural management of these new agents is less well understood from both evidence-based and experience-based perspectives. Importantly, because of differences in pharmacokinetics as well as mechanism of action, these agents likely will not behave identically to warfarin, or even to each other, in terms of risks and benefits. This emphasizes the need for ongoing investigation regarding the use of these agents periablation for atrial fibrillation. Toward that end, several small observational studies have evaluated the use of periprocedural dabigatran versus uninterrupted warfarin.[18–22] These studies have differed in patient population as well as the number of doses of dabigatran held before the ablation. There are conflicting results between studies related to bleeding complications and thromboembolism complications. They have not yielded clear recommendations and thus there is an ongoing need for large randomized trials of uninterrupted warfarin versus all of the novel oral anticoagulants.

Finally, any interruption of oral anticoagulation raises the issue of whether the performance of a transesophageal echocardiogram is warranted. Strictly speaking, patients presenting for their ablation in atrial fibrillation who have held doses of a novel oral anticoagulant should be considered for transesophageal echocardiography.

INTRAPROCEDURAL ANTICOAGULATION

Heparin Anticoagulation During the Atrial Fibrillation Ablation

As mentioned above, there is ongoing debate regarding the optimal means to manage warfarin and the novel oral anticoagulants immediately before ablation. There is clearly an increasing trend toward uninterrupted (or minimally interrupted) oral anticoagulation throughout the procedure. Despite differences in the management of oral anticoagulants preprocedure, there is nearly universal use of unfractionated heparin during the ablation procedure. Dosing regimens range from 70 mg/kg to 100 mg/kg bolus followed by a continuous infusion.[23] Physician preference dictates the decision about when to administer the heparin bolus. This decision usually revolves around whether to give the heparin bolus before