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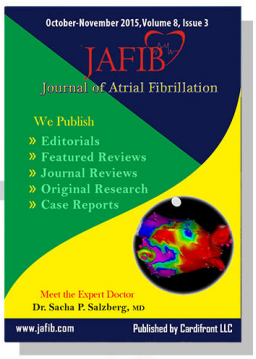

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Cardioversion Of Atrial Fibrillation And Oral Anticoagulation

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Abstract

The risk of thromboembolic events is a major concern in cardioversion of atrial fibrillation. The vast majority of these events occur in the first week following cardioversion. Processes promoting thrombus formation occur early and thrombus may appear in the left atrium within 48 hours of atrial fibrillation. The risk of thromboembolic events also increases with the presence of stroke risk factors. Thus, the current guidelines recommend that also patients with acute atrial fibrillation should undergo cardioversion under cover of unfractionated or low-molecular weight heparin followed by oral anticoagulation for at least 4 weeks in patients at moderate-to-high risk for stroke. Delay of cardioversion > 12 hours from the symptom onset seems to cause a marked increase in the risk of stroke. Thus, short term anticoagulation should be considered also for patients with a low CHA_2DS_2VASc score if the delay to cardioversion is 12-48 hours.

Introduction

Atrial fibrillation (AF) is associated with an almost 5-fold increase in the risk of stroke.[1] Oral anticoagulation reduces the incidence of stroke by over 60 % in patients with AF, and has been shown to be superior to antiplatelet therapies.[2] Current guidelines recommend patient-focused risk stratification, and the risk of stroke of an individual patient has been estimated with the CHA_2DS_2VASc-score.[3] Guidelines recommend that oral anticoagulation should be used in all patients with $CHA_2DS_2VASc \geq 2$, and should be also considered in patients with a score of 1. This short review will focus on the role of cardioversion as an additional short-term risk factor of stroke.

Thromboembolic Risk During Elective Cardioversion Of AF

It is generally known that cardioversion of AF is associated with an increased risk of stroke and systemic embolism. In the early studies, the periprocedural risk ranged from 3 % to 7 % when cardioversion was performed without anticoagulation.[4-5] Later, with the advent of effective anticoagulation therapy the risk of thromboembolic complications has decreased to 0.5% to 1.6% in elective cardioversion of AF.[6-9] Recent data on novel oral anticoagulants have suggested that they are as safe and effective as treatment with vitamin K antagonists in this setting. In the only randomized trial (X-VerRT) comparing rivaroxaban to vitamin K antagonists the primary efficacy outcome (composite of stroke, transient ischemic attack, peripheral embolism, myocardial infarction, and cardiovascular death) occurred in 5 (two strokes) of 978 patients (0.51%) in the rivaroxaban group and in 5 (two strokes) of 492 patients (1.02%) in the VKA group.[10]

For the comparison, the long-term thromboembolic risk in AF is approximately 0.3% per month depending on stroke risk factors, and oral anticoagulation with warfarin reduces this risk by over 60%.[11] Recently published large randomized multicenter studies confirm these findings showing that the risk of stroke has decreased to 0.1% to 0.2% per month during long-term anticoagulation.[12-14] In the light of these figures, it is evident that when a patient is referred to an elective cardioversion of AF we predispose the patient for an extra 4-6 -fold risk of thromboembolic events during the post-cardioversion month even when using the recommended effective anticoagulation.

Thromboembolic Risk During Acute Cardioversion Of AF

Until recent years, cardioversion of acute (< 48 hours) AF was considered safe even without anticoagulation. In 6 small retrospective studies on a total of 1 471 patients, the incidence of thromboembolic events was low (0-0.9%) and all definite events occurred in elderly (age above 75 years) women and after spontaneous restoration of sinus rhythm.[15] In the FinCV Study reporting data on 5,116 successful acute cardioversions performed without anticoagulation the overall risk of thromboembolic events was 0.7%.[14] Thus, the mean risk of stroke in acute cardioversion performed without anticoagulation is in the same range as the risk of elective cardioversion performed with optimal guideline-recommended anticoagulation. Importantly, however, the risk of thromboembolic complications varied from a low risk of 0.2 % to a very high risk of 9.8 % depending on clustering of clinical stroke risk factors. The independent "traditional" predictors of thromboembolic events were old age, female sex, heart failure and

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None.

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diabetes which are all included in the CHA_2DS_2VASc score.

Later, we observed that a delay of cardioversion exceeding 12 hours from the symptom onset caused a >3-fold increase in the risk of stroke when compared to cardioversions performed <12 hours after the symptom onset.[16] This delay of cardioversion was the most significant independent predictor of thromboembolic complications in patients not using anticoagulation. Although the increase in risk was more pronounced in those patients with risk factors was stroke, the cardioversion was not without risk in patients with a CHA_2DS_2VASc score of one or less. Thus, when the delay from the symptoms to cardioversion was > 12 hours the risk of thromboembolism was as high as 0.9% if no anticoagulation was used.[16]

Background Of Thromboembolism After Cardioversion Of AF

Thrombus formation in the left atrial appendage is usually responsible for the thromboembolic complications. Most embolic events occur after successful cardioversion of AF and within one week of the procedure supporting the view that conversion of AF to sinus rhythm is responsible for embolization of thrombus and causing the clinical consequences.[15] Local changes promoting thrombus formation start early. It was shown that platelet activation and increased thrombin generation in the left atrium are measurable as early as 15 minutes following induction of AF,[17] and profound activation of platelets and coagulation factors has been observed within 12 hours of AF.[18] Thus, it is not surprising that transesophageal echocardiography has revealed left atrial thrombi - a clear contraindication to cardioversion - in 4% of the patients already < 48 hours of AF, and in 14% of patients when the duration is < 72 hours when no anticoagulation is used.[19, 20] Importantly, however, the absence of thrombus before cardioversion does not exclude thromboembolic complications, since restoration of sinus rhythm often results in atrial stunning, and a decrease of flow velocities in the left atrial appendage.[21] It is known that post-cardioversion atrial stunning promotes new thrombus formation and predisposes to embolization.

Anticoagulation And Bleeding Complications

Anticoagulation therapy exposes patients to bleeding events, but the rate of major bleeding events has been reported to vary from only 0.2% to 0.3% per month with long-term warfarin or new oral anticoagulants.[12-14] Furthermore, It is obvious that the risk of major bleedings is even lower in the patients with a low CHA_2DS_2VASc score reflecting concomitant low bleeding scores.

Conclusions

The above reasoning supports the view that unnecessary delays in performing cardioversions of rhythm control strategy may increase the risk thromboembolic complications in spite of therapeutic oral anticoagulation. Early cardioversion in the acute phase of AF may not increase the risk of thromboembolic complications in patients already on therapeutic long-term oral anticoagulation. Because of the minor bleeding risk, short term anticoagulation should be considered also for patients with a low CHA_2DS_2VASc score if the delay to cardioversion is 12-48 hours. The overall rate of thromboembolic complications is low after failed cardioversion, which suggests that it is the conversion to sinus rhythm that results in elevated thromboembolic risk. Spontaneous conversion to sinus rhythm is, however, not uncommon after failed cardioversion of acute atrial fibrillation, and these patients are at high risk of stroke if adequate anticoagulation is not used.[22-23]

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