Prevention of Thromboembolism After Cardioversion of Recent-Onset Atrial Fibrillation

Brief Is Not Always Safe* 

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Atrial fibrillation (AF) is the most common human arrhythmia causing a significant public health burden. Restoration of sinus rhythm by cardioversion of the arrhythmia, performed either electrically or pharmacologically, has been a main therapeutic option for the treatment of AF patients during the last decades. After publication of several large randomized studies showing no significant benefit of a rhythm control compared with a rate control strategy in AF patients (1,2), the number of cardioversions began to decline (3).

However, recent investigations reported potential advantages of rhythm control such as a survival benefit after several years (4) or a reduced progression rate to more permanent AF forms (5). As a result, the appropriate management of AF patients remains controversial, with rhythm control being the preferred strategy in several instances in everyday clinical practice (6,7). Therefore, issues associated with the safety of cardioversion, which represents the cornerstone of rhythm control, are of major clinical importance.

The most feared complications of AF cardioversion are thromboembolic events, mainly stroke. These events are caused by 2 mechanisms:

1. The presence of thrombus in the left atrial appendage at the time of cardioversion as a result of a reduced flow velocity during AF in the time preceding the procedure and mobilization of this thrombus by cardioversion. This danger is minimized by administration of anticoagulants for several weeks before cardioversion or alternatively by exclusion of thrombus by transesophageal echocardiography before cardioversion.

2. The so-called “atrial stunning.” This term characterizes a paradoxical decrease of left atrial and left atrial appendage function immediately after successful cardioversion to sinus rhythm (8). This decline of function can be visualized as a decrease of the left atrial appendage emptying velocity measured by transesophageal echocardiography, as new formation of spontaneous echo contrast, or—in more severe cases—as formation of new thrombus in the left atrial appendage.

Atrial stunning is clinically very important, because it is responsible for the thromboembolic events in the days after cardioversion. The timing of these events is characteristic, with the vast majority occurring within 1 week after cardioversion, and most cases taking place in the first 3 days (9). The reason for the reduction of the thromboembolic risk after this time interval is the gradual resolution of atrial stunning with recovery of the left atrial function as time passes after cardioversion (10). To prevent thromboembolism as a result of atrial stunning, anticoagulation after the procedure is of paramount importance. Therefore, international guidelines recommend effective anticoagulation for at least 4 weeks after cardioversion (11,12).

Several parameters influence the time course of the recovery of left atrial function, with the duration of AF preceding cardioversion being a major one among them: a brief duration of preceding AF (e.g., <2 weeks) is associated with a more rapid resolution of atrial stunning (13); and a very brief AF duration (e.g., 15 min) does not result in any significant atrial stunning (14). But how brief is safe? In other words, up to which duration of preceding AF do we consider the risk of thrombus formation after cardioversion to be so low that anticoagulation can be safely omitted? Up to now, there were no robust data providing an answer to this question. A duration of 48 h was generally considered a threshold in this regard, and the guidelines emphasize the necessity of effective anticoagulation both before and after cardioversion of AF, with a duration of more than 48 h (11,12). However, there is a knowledge gap for AF, with a duration of <48 h, and the guidelines recommend in this setting anticoagulation in patients who have risk factors for stroke.

In this issue of the Journal, Airaksinen et al. (15) present the results of a study that provides a significant insight into this gray field—namely, patients undergoing cardioversion with a duration of preceding AF of <48 h. The investigators reviewed the data of 5,116 successful cardioversions performed without peri-procedural and post-cardioversion oral anticoagulation or heparin in a total of 2,481 patients with AF lasting <48 h. Within 30 days after cardioversion, there were 38 definite embolic events, corresponding to a rate of 0.7%, and additionally 4 transient ischemic attacks. The time course of the definite embolic events was compatible with the time
course observed previously: the events occurred between 1 and 27 days after cardioversion, with a median of 2 days confirming that the first few days after cardioversion are the ones that carry the highest risk and that deserve the greatest attention.

Significant predictors of embolic events were higher age, female sex, heart failure, and diabetes. These parameters allowed a differentiation of the risk, with an unacceptably high risk of 9.8% for patients with heart failure and diabetes, compared with only 0.2% in young patients (<60 years) without heart failure. It is important that the parameters, which were identified as predictors of subsequent thromboembolic events, are in general the ones that also predict thromboembolic complications in the general AF population, and they are included in the CHA2DS2-VASc (Congestive heart failure, Hypertension, Age ≥75 [doubled], Diabetes mellitus, and prior Stroke, transient ischemic attack, or thromboembolism [doubled], Vascular disease, Age 65 to 74, Sex category [female] score.

These results have important clinical implications and, to a significant extent, fill the existing knowledge gap. They prove the correctness of current guidelines, which recommend anticoagulation therapy in patients with risk factors for stroke even if the AF duration preceding cardioversion is presumed to be brief and <48 h, because the thromboembolic risk might be unacceptably high in the presence of certain risk factors. Conversely, it is reassuring that patients without risk factors for stroke and with a brief duration of preceding AF had a very low rate of thromboembolic events.

The study has some limitations. The most important one is the retrospective character of the analysis. However, this drawback is at least partially compensated by the large patient number and by the presumably good quality of the analyzed registries. Furthermore, given the existence of guidelines recommending anticoagulation in these patients, namely patients with risk factors for stroke even if the preceding AF duration is brief, a randomized trial would be unethical. Thus, retrospective data of good quality are probably the best we can rely on.

Another inherent limitation, which is not related to the study, is the high prevalence of asymptomatic AF episodes (16,17). Thus, the exact duration of a particular AF episode in a given patient can only be assumed. Nevertheless, the authors provide interesting data in this regard, showing a low thromboembolic risk in patients with an assumed AF duration of <48 h and without risk factors for stroke despite these uncertainties.

In conclusion, the study by Airaksinen et al. convincingly demonstrates the necessity of effective anticoagulation in patients with risk factors for stroke even if the duration of AF preceding cardioversion is assumed to be <48 h.

References


Key Words: anticoagulation • atrial fibrillation • cardioversion • stroke • thromboembolism.